

Keysight Technologies

General Specification for the Environment

1. Purpose

- 1.1. This specification establishes Keysight Technologies Inc.'s (Keysight's) general requirements for purchased parts, components, materials and products that are incorporated into Keysight products.
- 1.2. The requirements described in this specification represent restrictions imposed on Keysight's end products, which need to be reflected in the materials that constitute those products. The restrictions related to Keysight products may be different than those imposed on the individual parts and components, and in some cases exceed regulatory requirements.

2. Scope

- 2.1. This specification provides Keysight's general requirements for restricting or prohibiting certain substances as constituents of parts, components, and materials in products and packaging purchased by Keysight worldwide.
- 2.2. If a supplier believes that components or assemblies they are supplying to Keysight do not conform to the General Specification for the Environment (GSE), they should send an e-mail to gse_inquiry@keysight.com and copy their Keysight Buyer. The e-mail should detail the specific non-conformity and the Keysight/manufacture part numbers affected.
- 2.3. With the exception of Ozone Depleting Substances (ODS), this specification does not apply to substances used in the process of manufacturing parts, component materials, or products sold for internal use to Keysight.
- 2.4. This specification also provides Keysight's general requirements for transport or recycling/disposal marking and labeling, and classification or registration requirements for Keysight purchased parts, components, materials and products.
- 2.5. This specification is not intended to be a listing of all product content limitations or restrictions that may be established as a matter of law. Seller's compliance with this specification does not relieve or diminish Seller's obligation to comply with all applicable laws.
 - 2.5.1. Precedence: Should a conflict occur between this specification and a Keysight family or individual part specification, the Keysight family or individual part specification shall prevail. Full EU RoHS restrictions are set by individual part specification until fully incorporated in future versions of this document. In relation to the RoHS Directive, Keysight products are classed as monitoring and control instruments.
 - 2.5.2. Exception: Legal and/or regulatory requirements for the countries where these purchased parts, components, and products are to be used take precedence over this specification.
- 2.6. This specification is in addition to, and does not in any way limit or supersede, any other product specifications that may be established by Keysight.

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3. Environmental Requirements

3.1. In this specification, environmental requirements are defined for the following:

- Product content and ODS use restrictions
- Battery content restrictions
- Packaging content restrictions
- Phytosanitary measures for solid wood packaging materials
- Product labeling and marking requirements
- Product end of life labeling requirements
- Chemical registration requirements

4. Product Content Restrictions

4.1. The following substances are *prohibited* or *restricted* for use in raw materials, parts, components, or products above the thresholds defined below. A GSE threshold is the maximum concentration level at which the presence of a substance can be tolerated per homogeneous material unless indicated otherwise. The IEC 62474 standard has been referenced since it screens substances to assure they are relevant to electrical and electronic equipment

- Restrictions are divided into two categories: General Restrictions and Specific Applications. For the category of General Restrictions, the substances are prohibited or restricted in any application.
- Application specific thresholds prevail over the threshold from General Restriction thresholds only for the listed applications

These product content restrictions do not apply to chemical supplies like pure substances and mixtures.

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4.2. General Restrictions

The following substances must not be used in any application above the threshold. Unless indicated otherwise, the thresholds are defined per homogeneous material.

IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00001	Diarsenic pentoxide	1303-28-2	Additive in wood, metal, glass and plastics	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00002	Diarsenic trioxide	1327-53-3	Additive in wood, metal, glass and plastics	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00003	Asbestos, Asbestos Materials	See IEC62474 reference list	Insulating material, plastic parts	Must not be present	ANNEX XVII of REACH Regulation (EC) No 1907/2006. United States: Toxic Substances Control Act (TSCA); Switzerland Ordinance on Reduction of Risks from Chemical Products (ORRChim)
00004	Azocolorants and Azodyes	See IEC62474 reference list	Pigment, dyes, colorants	< 0.003% by part weight	ANNEX XVII of REACH Regulation (EC) No 1907/2006

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00017	Disodium tetraborate anhydrous	See IEC62474 reference list	In wood veneers/ pressed wooden panels as starch additive, flame retardant and stabilizer in aminoplastic resin, wood preservative	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00018	Fluorinated Greenhouse Gases (PFC, SF6, HFC)	See IEC62474 reference list	Refrigerants, blowing agents, extinguishing agents, cleaning agents, insulating media, caustic gas	Must not be present	EU Reg. No. 842/2006
00020	Hexabromocyclododecane (HBCDD)	See IEC62474 reference list	Flame retardant; mainly used for expanded polystyrene and some types of fiber	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00032	Ozone Depleting Substances (CFC, Halon, HBFC, HCFC & others)	See IEC62474 reference list	Refrigerant, foaming agent, extinguishant, solvent cleaner	Must not be present and none used in the production process. See Note 1:	Law Concerning the Protection of the Ozone Layer through the Control of Specified Substances and others (Japanese law), Montreal Protocol, 1990 revision of Article 611 of the Clean Air Act (US law); Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00035	2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320)	3846-71-7	UV-stabilizer in adhesives, paints, printing inks, plastics, inked ribbons, putty, caulking or sealing fillers	< 0.1% by part weight	Japan (Law Concerning the Examination and Regulation of Manufacture); Candidate list for European REACH Regulation No. 1907/2006/EC
00038	Bis (2-ethyl(hexyl)phthalate) (DEHP)	117-81-7	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1%	2011/65/EU (EU/RoHS Directive and its amendments); Candidate list for European REACH Regulation No. 1907/2006/EC
00039	Dibutyl phthalate (DBP)	84-74-2	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1%	2011/65/EU (EU/RoHS Directive and its amendments); Candidate list for European REACH Regulation No. 1907/2006/EC
00040	Benzyl butyl phthalate (BBP)	85-68-7	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1%	2011/65/EU (EU/RoHS Directive and its amendments); Candidate list for European REACH Regulation No. 1907/2006/EC

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00041	Diisobutyl phthalate (DIBP)	84-69-5	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1%	2011/65/EU (EU/RoHS Directive and its amendments); Candidate list for European REACH Regulation No. 1907/2006/EC
00044	Polybrominated Biphenyls (PBB) and their ethers/oxides (PBDE)	See IEC62474 reference list	Flame retardant.	< 0.1%	2011/65/EU (EU/RoHS Directive and its amendments); China Management Measures on EIP Pollution Control; Revised law for Promotion of Effective Utilization of Resources(J-Moss)
00047	Polychlorinated Biphenyls (PCB)/ Terphenyls (PCT), Monomethyl-tetrachlorodiphenyl methane and other Halogenated Diphenyl Methanes	See IEC62474 reference list	Insulation oil, lubricant oil, electrical insulation medium, solvent, electrolytic solution, plasticizers, fire retardants, coatings for electrical wire and cable, dielectric sealants	Must not be present	ANNEX XVII of REACH Regulation (EC) No 1907/2006
00048	Polychlorinated naphthalenes	See IEC62474 reference list	Lubricant, paint, stabilizer (electric characteristic, flame-resistant, water- resistant) insulator, flame retardant	Must not be present	Examination and Regulation of Manufacture etc. of Chemical Substances (Class 1 chemical substances: Japanese law), & EU No 519/2012

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00050	Aluminosilicate Refractory Ceramic Fibres		Thermal insulation for high temperature test equipment	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00051	Zirconia Aluminosilicate, Refractory Ceramic Fibres		Thermal insulation for high temperature test equipment	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00052	Short Chain Chlorinated Paraffins (SCCP)	See IEC62474 reference list	Plasticizer for PVC, flame retardant	< 0.1% by part weight	EU REACH candidate list; (EC) 850/2004 (POPs regulation)
00054	Bis(tributyltin)oxide (TBTO)	56-35-9	Antiseptic, antifungal agent, paint, pigment, antistaining, refrigerant, foaming agent, extinguishant, solvent cleaner	< 0.1% by part weight	The Law concerning the Examination and Regulation of Manufacture etc. of Chemical Substances (Class 1 chemical substances: Japanese law); Candidate list (version of European REACH Regulation No. 1907/2006/EC
00059	Bis(2-methoxyethyl) ether (Diglyme)	117-82-8	Plasticizer	< 0.1% by part weight	European REACH Regulation No. 1907/2006/EC (Candidate list of SVHC for authorization 19.12.2011)

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00075	Diboron trioxide	1303-86-2	Found in wood veneers, glass/fiberoptics and ceramics - for industrial applications	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00076	Dibutyltin dichloride (DBT)	683-18-1	Ingredient in some paint thinner and as heat stabilizer for PVC	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00078	N,N-dimethylformamide; dimethyl formamide	68-12-2	Used as electrolyte in electrolytic capacitors rated for low temperature use to - 55C	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00079	Silicic acid, barium salt, lead-doped	68784-75-8	Used in UV emitting light bulbs and lamps	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00082	N-pentyl-isopentylphthalate	776297-69-9	Plasticizer in plastic materials in specialist applications	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00090	Diisodecyl phthalate (DIDP)	68515-49-1, 26761-40-0	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	Must not be present	California Prop 65
00091	Di-n-hexyl Phthalate (DnHP)	84-75-3	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1% by part weight	California Prop 65; Candidate list for European REACH Regulation No.1907/2006/EC

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00095	Dipentyl phthalate (DPP)	131-18-0	Plasticizer in PVC and nitrocellulose resin and rubber; in gunpowder, toys, cosmetics, medical devices	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00096	Pentadecafluorooctanoic acid (PFOA)	335-67-1	PFOA is used as an emulsion stabilizer to manufacture polyvinylidene fluoride (PVDF) and other fluorinated polymers and elastomers	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00097	Ammonium pentadecafluorooctanoate (APFO)	3825-26-1	APFO is used as an emulsion stabilizer to manufacture polyvinylidene fluoride (PVDF) and other fluorinated polymers and elastomers	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00100	Trixylyl phosphate	25155-23-1	Used as a plasticizer for vinyl resin, cellulose resin, natural and synthetic rubber. Also, used as a flame retardant.	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00102	Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)] bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28)	573-58-0	Dye for textiles and paper	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00105	Imidazolidine-2-thione (2-imidazoline-2-thiol)	68515-50-4	Used as a catalyst in some acrylic adhesive glues which may be used in adhesive tapes	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC

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00107	Diisononyl phthalate (DINP)	28553-12-0, 68515-48-0	Used as a plasticizer for PVC	Must not be present	California Prop 65
00125	Perfluorooctane sulfonate (PFOS)	See IEC62474 reference list	Antistatic agent for films and plastics	Must not be present	(EC) 850/2004 (POPs regulation); Canadian Environmental Protection Act SOR/SOR/2008-178; Japan Law concerning the evaluation of chemical substances
00126	Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl) azo][1,1'-biphenyl]-4-yl]azo] -5-hydroxy-6-(phenylazo)naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7	Used in ink for printers	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00127	Benzenamine, N-phenyl-, reaction products with styrene and 2,4,4-trimethylpentene	68921-45-9	Lubricating agent; lubricant additive (antioxidant/corrosion inhibitor/tarnish inhibitor/scavenger/anti-scaling agent), mold release agent; organic chemical for industrial use	Must not be present	Prohibition of Certain Toxic Substances Regulations, 2012, CANADA

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00129	2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE): reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and NOMTE)	15571-58-1	PVC stabilizer	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00130	2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	25973-55-1	UV stabilizer	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00134	2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl) phenol (UV-327)	3864-99-1	UV stabilizer	<0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00135	2, (2H-benzotriazol-2,yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350)	36437-37-3	UV stabilizer	<0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00138	Benzo[def]chrysene	50-32-8	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00139	Dicyclohexyl phthalate (DCHP)	84-61-7	Plasticizer, dye, pigment, paint, ink, manufacture of adhesive, lubricant	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00140	Perfluorononan-1-oic-acid and its sodium and ammonium salts	See IEC62474 reference list	Surfactant in the production of the fluoropolymer polyvinylidene fluoride (PVDF)	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00144	Chrysene	218-01-9; 1719-03-5	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00145	Benz[a]anthracene	56-55-3; 1718-53-2	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00146	Cadmium hydroxide	21041-95-2	It is generated in the anodes of nickel-cadmium and silver-cadmium batteries during the discharge	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00147	Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene ("Dechlorane Plus")	See IEC62474 reference list	Flame retardant for electric wire and cable covering material	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00148	Benzo[ghi]perylene	191-24-2	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00149	Octamethylcyclotetrasiloxane	556-67-2	Siloxanes are monomers used to manufacture silicones. They may remain as unreacted in silicone polymers and copolymers,	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00150	Decamethylcyclopentasiloxane	541-02-6	Siloxanes are monomers used to manufacture silicones. They may remain as unreacted in silicone polymers and copolymers,	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00151	Dodecamethylcyclohexasiloxane	540-97-6	Siloxanes are monomers used to manufacture silicones. They may remain as unreacted in silicone polymers and copolymers,	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC
00152	Disodium octaborate	12008-41-2	Wooden veneer sheets and pressed wooden panels (as a constituent within the starch adhesive), as a flame retardant, as stabilizer in aminoplastic resins, and as a biocide in professional and industrial wood preservation.	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00153	Terphenyl, hydrogenated	61788-32-7	Plasticizers, sealants, epoxy adhesives, paints and heat sinks	< 0.1% by part weight	Candidate list for European REACH Regulation No. 1907/2006/EC

Note 1: The USA imposes an excise tax on inventories of ODCs and imported products manufactured with ODCs. If requested, Keysight requires suppliers to certify that ODCs are not used in manufacturing.

California Prop 65: Suppliers will inform Keysight of any part, component or material that contains a proposition 65 listed material in quantities that would require end user notification. Supplies can use the GSE_Inquiry@keysight.com to make this notification.

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4.3. Specific Applications

The following substances must not be used in the applications listed below above the threshold except in listed application exemptions. Unless indicated otherwise, the thresholds are defined per homogeneous material. In case of a conflict, application specific thresholds prevail over the threshold from general restrictions only for the listed applications.

IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Allowed exemption basis
00010	Cadmium and its compounds	See IEC62474 reference list	All applications, e.g. dyes, pigments, paints/enamels (excepting safety warnings), plastic stabilizer (e.g. electric cables), anti-corrosion coating finish and all other uses	<0.01%	2011/65/EU RoHS Directive and its amendments, cadmium exemptions in Annexes III & IV
00012	Chromium (VI) Compounds	See IEC62474 reference list	Custom mechanical parts fabricated to Keysight engineering drawings	Must not be present	none
00012	Chromium (VI) Compounds	See IEC62474 reference list	Metallic coating and all other uses (e.g. in commercial off-the-shelf parts)	<0.1%	2011/65/EU RoHS Directive and its amendments, chromium (VI) exemptions in Annexes III & IV
00022	Lead/Lead Compounds	See IEC62474 reference list	Rubber hardener, pigment, paint, lubricant, plastic stabilizer, materials for battery, free-machining alloy, free-cutting steels, optical materials, X-ray shielding, solders etc.	< 0.1%	2011/65/EU RoHS Directive and its amendments, lead exemptions in Annexes III & IV
00024	Lead and its compounds	See IEC62474 reference list	PVC stabilizer in cable jackets	< 0.03%	US/CA Proposition 65 Case law

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Allowed exemption basis
00029	Mercury/Mercury Compounds	See IEC62474 reference list	Fluorescent bulb, contact point material, pigment, anti-corrosion, switches, antibacterial treatment	<0.1%	2011/65/EU RoHS Directive and its amendments, mercury exemptions in Annexes III & IV

4.4. Battery Content Restrictions

4.4.1. The following substances are prohibited or restricted for use in batteries. In case of a conflict, battery-specific thresholds from this section prevail over the thresholds from general restrictions in Section 4 or specific applications for the listed applicable battery types.

IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00011	Cadmium/Cadmium compounds	See IEC62474 reference list	photodiode voltaic cell, Ni/Cd battery	0.001% by weight of battery	2006/66/EC EU Battery Directive and Korean Quality Management and Safety Control of Industrial Products Act
00025	Lead/Lead Compounds	See IEC62474 reference list	Zinc carbon batteries, alkaline button cells	0.004 mass% of battery	2006/66/EC EU Battery Directive; Chinese Standard GB 24427-2009 "Limitation of mercury, cadmium and lead contents for alkaline and non-alkaline zinc manganese dioxide batteries"

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00030	Mercury/Mercury Compounds	See IEC62474 reference list	Silver-oxide button cells, alkaline batteries, zinc carbon batteries	Intentionally added or 0.0001 mass% of battery	Taiwan Restrictions on the Manufacture, Import, and Sale of Dry Cell Batteries; Chinese Standard GB 24427-2009 "Limitation of mercury, cadmium and lead contents for alkaline and non-alkaline zinc manganese dioxide batteries"; Korea: Law on quality management and control of safety of industrial products Battery regulation; 2006/66/EC EU Battery Directive
00033	Perchlorates	See IEC62474 reference list	Lithium batteries; coin cell batteries	0.6 ppm by battery weight	California Assembly Bill No. 826 - Perchlorate Contamination Prevention Act

- 4.4.2. All lithium metal and lithium ion cells or batteries must meet the requirements of each test in the current UN Manual of Tests and Criteria, Part III, subsection 38.3, in addition to any additional requirements specified in the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR), the International Air Transport Association (IATA), the International Maritime Dangerous Good Code (IMDG), and the Hazardous Materials Regulations of the United States Department of Transportation (49CFR). Upon request vendor will provide a copy of the specific tests results should Keysight be required to supply it to local authorities.

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5. Packaging Content Restrictions

- 5.1. The following substances (see Appendix B) are prohibited for use in packaging materials purchased by Keysight and used to package the products Keysight sells. In case of a conflict, packaging materials specific thresholds from this section prevail over the thresholds from general restrictions, specific applications or battery restrictions but only for the listed packaging applications.

Substance	Restricted Application	Threshold (Not to Exceed)
Arsenic Compounds	In wooden packaging and packaging materials	Must not be present
Cadmium, Chromium VI (Hexavalent Chromium) Compounds, Lead and Mercury	Packaging, packaging materials and packaging inks	Must not be present. Incidental presence of these substances not to exceed a total sum concentration of 100 ppm
Cobalt dichloride	In packaging materials (e.g. as moisture indicator)	Must not be present
Ozone depleting substances CFCs and HFCs	Foaming agent	Must not be present

5.2. Phytosanitary Measures for Solid Wood Packaging Materials

The following requirement applies to packaging materials purchased by Keysight and used to package the products Keysight sells.

Packaging wood shall be free from bark, insects and damage caused by them. Solid Wood Packaging Materials shall be heat treated or kiln dried to a minimum core temperature of 56°C for at least 30 minutes in a closed chamber or kiln, which has been tested, evaluated and approved officially for this purpose. In addition, the susceptible wood shall display an officially approved heat treated or kiln dried marking enabling the identification of where and by whom the above treatment has been carried out. A logo or mark, officially endorsed by the NPPO (National Plant Protection Organization) of the country from which the wood packaging materials originate must be permanently affixed to each unit of wood packaging material, and in a location that will remain visible and obvious when packaging is used for shipment of Keysight product(s). Fumigation, Chemical Pressure Impregnation (CPI) or other chemical means are not to be used.

6. Product Labeling and Marking Requirements

- 6.1. **Battery Labeling Requirements:** Batteries, rechargeable consumer products, and their packaging must have a durable label with the symbol(s) and wording according to the requirements specified in Appendix A. Information should be supplied with products containing a battery to identify the nature of the battery. Products with user-removable batteries should be supplied with information on the safe insertion and removal of the batteries.
- 6.2. **Battery Declaration of Conformity Requirements:** Batteries, including those contained in parts, components and products, must comply with the China battery registration requirements for no mercury content. A "Suppliers' Declaration of conformity" issued by the battery manufacturer and an SDS or Product Data Sheet must be provided when requested.
- 6.3. **Mercury Product Labeling Requirements:** Removable mercury lamps, as well as products containing mercury lamps, must be labeled in accordance with local regulatory requirements.¹
- 6.4. **Paper and Plastic Packaging Labeling Requirements:** All suppliers of paper and plastic packaging materials must ensure that the material is identified, marked and labeled. Refer to Appendix D.

¹ Localization requirements are applicable to items in this section and will be communicated in the purchase contract, in accordance with Section 2.5 of this specification.

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- 6.5. Packaging Declaration of Conformity Requirements:** Packaging suppliers must provide a Declaration of Conformity regarding the requirements described in section 6.1 when requested.
- 6.6. Product Information and Labeling Requirements:** Keysight is required to comply with the Chinese Administrative Measures for the Restriction of Hazardous Substances in Electrical and Electronic Products. Suppliers to Keysight are responsible for ensuring all goods sold and shipped to China meet the information and labeling requirements, including the following: (1) reflect the required product label (which in most cases will include an EFUP or Environmental Friendly Use Period number), (2) reflect the required toxic/hazardous substance table in the product manual or shipment insert which accompanies the product. (3) Reflect the date of manufacture. For further details or questions contact your Keysight representative.
- 6.7. Product End of Life Labeling Requirements:** All electrical and electronic products requiring the European CE marking must also have the crossed-out wheeled bin label with bar.



7. Chemical Registration Requirements

- 7.1.** Each chemical substance contained in parts, components, materials and products sold to Keysight must comply with chemical registration and pre-manufacture notification requirements in those countries that have enacted such requirements (including but not limited to: Australia, Canada, China, Japan, South Korea, Switzerland, the United States, and the countries of the European Union). This is in order to permit import and sale of the parts, components, materials and products sold to Keysight in all of these countries.

8. Reportable Substances

- 8.1.** The substances listed in Appendix C must be actively reported to Keysight as material content for raw materials, parts, components, or products supplied to Keysight.
- 8.2.** Additionally, substances published by ECHA in the EU REACH candidate List with a date on inclusion after 27-June-2018 (which covers 191 substances) must also be reported where the content is > 0.1% wt/wt.

The candidate list is available at <https://echa.europa.eu/candidate-list-table>

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9. Definitions

European CE Marking – a product marking that specifies compliance to specific European Union Directives

Homogeneous Material – is either material with a uniform composition throughout; or a material that consists of a combination of materials, that cannot be disjointed or separated into different materials by mechanical actions such as unscrewing, cutting, crushing, grinding or abrasive processes

Localization Issues - compliance strategies that require “local” marking, labeling or documentation will generally be applied to the final product, not to the direct material purchase.

SDS –Safety Data Sheet

Must Not Be Present - the material shall not be intentionally added.

ODS/ODC – Ozone Depleting Substance, synonym to ODC; Ozone Depleting Compounds, synonym to ODS

Packaging Systems – consists of all packaging components including cushioning material, plastic materials, paperboard, corrugated containers and wood crate systems, as well as inks, dyes and labels used for marking.

Parts per Million (ppm) - used to express concentration. The ppm is $1,000,000 \times \text{mass substance} / \text{mass of the homogeneous material}$. Concentrations are unit-less, for example $100 \text{ ppm} = 0.01\% = 100 \text{ mg/kg}$.

Prohibited - not allowed

Restricted – allowed in limited quantities
















Suppliers' Declaration of Conformity – a declaration made by a Keysight supplier that the product purchased by Keysight complies with an established list of requirements and standards.

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APPENDIX A
Labeling Requirements for Batteries, Consumer Products Containing Batteries, and their Packaging

As defined in Section 8.1, all Batteries, rechargeable consumer products, and their packaging must have the markings defined in the following table and subsequent requirements.

PRODUCT TYPE	WORLDWIDE SYMBOL ²	WORDING ON LABEL ²
Alkaline batteries	 无汞 Low Mercury  廢電池請回收	<ul style="list-style-type: none"> - Manufacturer's name and address - Either Chinese Low Mercury or Mercury Free character - 无汞碱性电池
Lead-acid (sealed) batteries and their packaging	 廢電池請回收  Pb  Pb	<ul style="list-style-type: none"> - Manufacturer's name and address - "BATTERY MUST BE RECYCLED" - "NON-SPILLABLE" OR "NON-SPILLABLE BATTERY" - "Pb" see Note 1
Lithium Metal cells and batteries	 廢電池請回收 	<ul style="list-style-type: none"> - Manufacturer's name and address - Lithium or , Lithium Metal - See Notes 5
Lithium Ion cells and batteries	 廢電池請回收  Li-ion 	<ul style="list-style-type: none"> - Manufacturer's name and address - Lithium Ion - Watt Hr - See Notes 2, 3 4
Nickel metal hydride batteries	 廢電池請回收  Ni-MH 	<ul style="list-style-type: none"> - Manufacture's names and address - "CONTAINS NICKEL METAL HYDRIDE (NiMH) BATTERY" - Must be recycled or disposed of properly.
Rechargeable consumer products containing not easily removable sealed lead acid batteries	 Pb  Pb	<ul style="list-style-type: none"> - Manufacturer's name and address - "CONTAINS SEALED LEAD BATTERY. BATTERY MUST BE RECYCLED." - "Pb" see Note 1

Note 1 - The chemical symbol "Pb" under the crossed-out wheeled bin is required on all batteries, accumulators and button cells containing more than 0.004% lead by weight.

Note 2 - Lithium ion cells Watt-hour (Wh) rating must be 20 Wh or less.

Note 3 - Lithium ion batteries or battery packs Watt-hour (Wh) rating must be 100 Wh or less.

Note 4 – Lithium ion batteries or battery packs must be marked with the Watt-hour (Wh) rating on the outside case.

² Localization requirements are applicable to items in this section and will be communicated in the purchase contract, in accordance with Section 2.5 of this specification.

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Note 5 - Lithium Metal battery SDS or Data Sheet must contain California Perchlorate Statement. "Perchlorate Material – special handling may apply."

Additional marking requirements for rechargeable - EU Capacity Labeling

All portable rechargeable batteries intended to be replaced by the end user, either standalone cells or battery packs, except for lead-acid, must have their capacity in milliamp hours on the label expressed as an integer using the abbreviation 'mAh'. Lead-acid batteries intended to be replaced by the end user must have their capacity in amp hours on the label expressed as a decimal number with one digit using the abbreviation 'Ah'.

Text size for battery packs:

- For battery packs where the largest side is below 70 cm², the text shall have a minimum size of 1,0 x 5,0 mm (H x L).
- For battery packs where the largest side is equal to or above 70 cm², the text shall have a minimum size of 2,0 x 5,0 mm (H x L).
- The label shall be located only on the external housing, not on each individual cell inside the housing.
- Text size for individual cells, except button cells:
- The text shall have a minimum size of 1,0 x 5,0 mm (H x L).
- Applies to batteries and accumulators sold without packaging
- The label shall be located on the battery or accumulator itself.

For batteries sold with packaging, the capacity labels must also be located on the packaging.

Additional marking requirements for non-rechargeable batteries (all chemistries)

- Battery manufacturer brand name
- Model designation
- Expiration date (month / yr.)
- Country of origin

Product End of Life Labeling Size Requirements

Square batteries

- Crossed-out wheeled bin label must cover 3% of the batteries largest side area, maximum size of 5cm X 5cm

Cylindrical Batteries

- Crossed-out wheeled bin label must cover 3% or half of each battery's side area, maximum size of 5cm X 5cm

Small Batteries (sold separately)

- Where the crossed-out wheeled bin label applied to the package must be smaller than 0.5cm X 0.5cm, a separate 1cm X 1cm mark must be printed on the battery package or shipping package

Battery Indication Type Marks below the Wheeled Bin

- Marks must be at least one-quarter the size of the crossed-out wheeled bin label

Symbol Color

- Color shall be as displayed in the table above or black and white

Durability

All marks and labels must be clear and durable.

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APPENDIX B

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APPENDIX C

The following Reportable Substances reflect the 27-June-2018 EU REACH 1907/2006/EC Candidate List (which covers 191 substances) that have been pre-filtered by IEC 62474 as potentially used in electrical and electronic equipment. The reportable substance threshold applies for concentrations above 0.1% by part weight.

IEC62474 ID	Substances	CAS number	Example Uses
00007	Boric Acid	10043-35-3, 11113-50-1	In wood veneers/ pressed wooden panels as starch additive, flame retardant and stabilizer in aminoplastic resin, wood preservative, as flame retardant in wood, cotton and other plant derived material
00013	Cobalt dichloride	7646-79-9	Pneumatic panels to indicate water contamination
00042	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)	71888-89-6	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant
00043	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	68515-42-4	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant
00053	Strontium chromate	7789-06-2	Pigment; corrosion resistant coating
00056	Tris(2-chloroethyl)phosphate	115-96-8	Flame retardant
00057	4-(1,1,3,3-tetramethylbutyl)phenol	140-66-9	Unreacted process chemical
00061	Potassium hydroxyoctaoxodizincatedichromate	11103-86-9	Paint, anti-corrosion
00064	Bis(pentabromophenyl) ether (decabromodiphenyl ether) (DecaBDE)	1163-19-5	Flame retardant
00065	Sulfurous acid, lead salt, dibasic	62229-08-7	Heat stabilizer for PVC, for example for wiring and cabling insulation
00066	1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)	112-49-2	Solvent may be used in battery electrolytes for lithium batteries. May be in found in printing inks.
00067	Trilead dioxide phosphonate	12141-20-7	Heat stabilizer for PVC, for example for wiring and cabling insulation
00068	1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	110-71-4	Solvent used in battery electrolytes for lithium batteries. May be in found in printing inks and paint strippers
00069	4-Aminoazobenzene	60-09-3	Used as yellow pigment and in inks, including inks for inkjet printers. It is also used as a dye for lacquer, varnish, wax products, oil stains and styrene resins.
00070	Tetralead trioxide sulphate	12202-17-4	Heat stabilizer for PVC, for example for wiring and cabling insulation
00071	Orange lead (lead tetroxide)	1314-41-6	Used in rust-proof primer paints

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IEC62474 ID	Substances	CAS number	Example Uses
00072	Pyrochlore, antimony lead yellow	8012-00-8	Used as yellow pigment for colouring plastics and paint
00073	Pentalead tetraoxide sulphate	12065-90-6	Heat stabilizer for plastics; for example, non-transparent PVC
00074	1,2-Diethoxyethane	629-14-1	Solvent used in electrolytes for lithium batteries.
00080	1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	84777-06-0	Plasticizer in plastic materials in specialist applications, for example where high solvating plasticizers and stain resistance are required
00081	Diisopentylphthalate	605-50-5	Plasticizer in plastic materials in specialist applications, for example where high solvating plasticizers and stain resistance are required
00086	[Phthalato(2-)]dioxotrilead	69011-06-9	Heat stabilizer for plastics, for example for wiring and cabling insulation.
00087	Dioxobis(stearato)trilead	12578-12-0	Heat stabilizer for plastics, for example for wiring and cabling insulation.
00088	Fatty acids, C16-18, lead salts	91031-62-8	Heat stabilizer for plastics, for example for wiring and cabling insulation.
00092	Hexahydromethylphthalic anhydride	See IEC62474 reference list	Primary use is as a hardener for epoxy resins.
00105	Imidazolidine-2-thione; (2-imidazoline-2-thiol)	96-45-7	used as a catalyst in some acrylic adhesive glues which may be used in adhesive tapes (for example, double sided adhesive tapes which may be used to hold the back-light in place in mobile phones)
00106	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear Diisohexyl phthalate (DiHP)	68515-50-4	Used as a plasticizer for certain plastics and rubbers
00126	Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo]-5-hydroxy-6-(phenylazo)naphthalene-2,7-disulphonate (C.I. Direct Black 38)	1937-37-7	Used in ink for printers
00129	reaction mass of 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate and 2-ethylhexyl 10-ethyl-4-[[2-[(2-ethylhexyl)oxy]-2-oxoethyl]thio]-4-octyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (reaction mass of DOTE and MOTE)		PVC stabilizer

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IEC62474 ID	Substances	CAS number	Example Uses
00131	1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with $\geq 0.3\%$ of dihexyl phthalate (EC No. 201-559-5)	68515-51-5, 68648-93-1	Plasticisers, lubricants, adhesives, coatings, cable compounding, polymer foils, PVC compound coatings, paints, thinners, paint removers, fillers, putties, plasters, ink and toners, greases, release products, polymer preparations and compounds, and semiconductors
00133	1,3-propanesultone	1120-71-4	Electrolyte fluid of rechargeable lithium ion batteries
00141	4,4'-isopropylidenediphenol BPA, Bisphenol A	80-05-7	Antioxidant for plasticizer and PVC, ink, paint and adhesive; used as monomer in epoxy resins and plastics
00142	Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts	See IEC62474 reference list	Plasticizer, lubricant, corrosion inhibitor
00154	Lead	7439-92-1	Steel, aluminum and copper alloys, lead acid batteries, solder and other applications

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APPENDIX D

Packaging Materials Requirements

Packaging and packaging materials shall be marked in accordance with the following guidance. Additional restrictions identified in the GSE are also applicable to Keysight Packaging Materials including but not limited to Restrictions in Packaging Section 6.0 and applicable requirements for wood packaging identified in Section 7.0. This requirement applies to all primary, secondary and tertiary packaging for products, parts, subassemblies, materials and supplies obtained by Keysight Technologies for incorporation or distribution to Keysight customers.

The objective of these stated requirements is to ensure that the choice of packaging materials used is recyclable, including cushioning material, plastic materials, corrugated containers and wood crate systems. Suppliers are discouraged from using permanent glues or adhesives to attach various materials. This applies to molded and fabricated cushioning material, plastic film, bagging materials, paperboard/corrugated fiberboard and wooden crates.

Plastic Material Coding Identification: For materials that are commonly used in packaging systems, the table below provides the applicable coding that is required to be permanently embossed, marked or labeled on all components of the packaging system. Symbols must meet minimum sizing requirements. Smaller identification symbols are permitted when the part or unit size does not allow the minimum size to be placed on the unit or part. The identification marking, and symbol must be placed on the item either on the bottom or other conspicuous location and must be durable, legible and clearly visible. Capital letters must be used for all text.

Plastic codes and corresponding abbreviation code names

Name of plastic	Polyester	High-Density Polyethylene	Polyvinyl Chloride	Low-Density Polyethylene	Polypropylene	Polystyrene	Others
Plastic code	01	02	03	04	05	06	07
Abbreviation code name	PET	HDPE	PVC	LDPE	PP	PS	Others



Example of the marking for plastic recyclable packaging

Paperboard and Corrugated Fiberboard: Regarding the Paper Packaging Material Codes according to National Standard of the People's Republic of China, GB/ T 18455-2010: Use of the Chinese mark with other internationally required marks³ is acceptable as long as equivalent to the Chinese requirements are guaranteed. The mark can be used in conjunction with the international alphanumeric paper designation.

Paper Packaging Material	Initials	Packaging Type
Fiberboard, Corrugated	CFB	Shipping cartons, layer pads, dividers and over packs
Corrugated Cardboard	CB	Stiffeners, corner guards and edge guards
Paperboard	PB	Chipboard cartons
Paper	WPP	Tissue and molded pulp
Non-Corrugated Solid Fiberboard	NCFB	Stiffeners, corner guards and edge guards

³ E.g. 

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Size requirements for the Chinese mark:

The mark size is to be 40 mm by 40 mm. For especially large or small package component sizes the mark may be appropriately enlarged or reduced, or as identified in the National Standard of the People's Republic of China, GB/ T 18455-2010.

Components of the Chinese mark:

The Chinese mark for paper-based packaging materials consists of the chasing arrows triangle with the appropriate alpha designators centered below the arrow. See the example. Placing the alpha designators inside the triangle is also acceptable. Recycling marks are required in accordance with Chinese Standard GB/T 18455-2010 or equivalent international standard

Graphic Example for Chinese Mark


Packaging made of Wood, including Wooden Crates

As per Section 7.0 of the GSE, all wooden crates, packaging made of wood and pallets made of wood must be treated and marked in accordance with the provisions of the International Standard for Phytosanitary Measures (ISPM) #15: *Guidelines for Regulating Wood Packaging Material in International Trade*. Please note that as stated in section 7.0 that Fumigation, Chemical Pressure Impregnation (CPI) or other chemical means are not to be used.

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Specification Revision History

Q	Revised Lead in paints restriction to EU RoHS limit Revised Battery lead restriction in Alkaline-manganese or Zinc-carbon batteries aligning to China Added perchlorates in lithium batteries into Section 5, appendix B and C Added Benzenamine, N-phenyl-, Reaction Products with Styrene & 2,4,4-Trimethylpentene (BNST) into Section 4.2, Appendix B and Appendix C; Added Regulatory Basis in Appendix C REACH: Added Dihexyl phthalate (DHP) into Section 4.2, Appendix B and Appendix C; Added 1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters into Section 4.2, Appendix B and Appendix C; Added 2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320) into Section 4.2, Appendix B and Appendix C; Added 2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328) into Section 4.2, Appendix B and Appendix C; Added 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE) into Section 4.2, Appendix B and Appendix C; Added reaction mass of DOTE and MOTE into Section 4.2, Appendix B and Appendix C; Deleted Lead Acid batteries requirement from section 5.1.	James C. Powell	31-Oct- 2015
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R	<p>Added in General Restrictions: further defined 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE); added, 1,(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350); 1,3-propanesultone ; 2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-327); 4-(1,1,3,3-tetramethylbutyl)phenol, (4-tert-Octylphenol); 4-(1,1,3,3-tetramethylbutyl) phenol, (4-tert-Octylphenol), 4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated [covering well-defined substances and UVCB substances, polymers and homologues] ; 4-(1,1,3,3-tetramethylbutyl)phenol, ethoxylated [covering well-defined substances and UVCB substances, polymers and homologues]; 4,4'- Diaminodiphenylmethane and technical grade MDA/PMDA; 4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol [with ≥ 0.1% of Michler's ketone (EC No. 202-027-5) or Michler's base (EC No. 202-959-2)]; 4-[4,4'-bis(dimethylamino) benzhydrylidene] cyclohexa-2,5-dien-1-ylidene] dimethylammonium chloride (C.I. Basic Violet 3); Benzenamine, N-phenyl-, reaction products with styrene and 2,4,4-trimethylpentene; Benzo[def]chrysene; Bis(2-methoxyethyl) ether (Diglyme); Di-n-hexyl Phthalate (DnHP); Diisodecyl phthalate (DIDP); Diisononyl phthalate (DINP); Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28); Disodium 4-amino-3-[[4'-[(2,4-diaminophenyl)azo][1,1'-biphenyl]-4-yl]azo] -5-hydroxy-6-(phenylazo)naphthalene-2,7-disulphonate (C.I. Direct Black 38; Di-μ-oxo-di-n-butylstanniohydroxyborane/ Dibutyltin hydrogen borate C₈H₁₉BO₃Sn (DBB); Di-μ-oxo-di-n-butylstanniohydroxyborane/ Dibutyltin hydrogen borate C₈H₁₉BO₃Sn (DBB); Imidazolidine-2-thione (2-imidazoline-2-thiol); Nonylphenol, branched and linear and its ethoxylates; Perfluorononan-1-oic-acid and its sodium and ammonium salts; Short Chain Chlorinated Paraffins (SCCP); Trichloroethylene; Trixylyl phosphate; α,α-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4); α,α-Bis[4-(dimethylamino)phenyl]-4 (phenylamino)naphthalene-1-methanol (C.I. Solvent Blue 4); Removed 4,4'-bis(dimethylamino)-4''-(methylamino)trityl alcohol; 4,4'- Diaminodiphenylmethane; Benzenamine, N-phenyl-, Reaction Products with Styrene & 2,4,4-Trimethylpentene (BNST); Dibutyltin hydrogen borate (DBB); Dihexyl phthalate (DHP); 2-(2H-1,2,3-Benzotriazol-2-Y)-4,6-di-tert-butylphenol Section 4.3 Specific Applications; added; Aluminosilicate Refractory Ceramic Fibres; Inorganic ammonium salts</p>	James C. Powell	Nov 01, 2016
S	Reference IEC 62474 substance numbers in sections 4 and Appendix C Added Prop 65 notification requirement.	Robert Tait	Nov 30, 2017
T	<p>Added</p> <ul style="list-style-type: none"> Substances 00139 and 00144-00153 in General Restrictions Substance 00154 in Reportable Substances Appendix A: Added CA Perchlorate Statement requirement for Li-Metal Battery SDS. 	Robert Tait	Nov 30, 2018