

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 Industrial 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 and Packaging Content Restrictions

4.1. The following substances are *prohibited* or *restricted* for use in raw materials, parts, components, packaging 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 and packaging content restrictions do not apply to chemical supplies like pure substances and mixtures.

Additional substance restrictions that apply only to packaging are listed in section 5

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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 article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00002	Diarsenic trioxide	1327-53-3	Additive in wood, metal, glass and plastics	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00003	Asbestos, Asbestos Materials	See IEC62474 reference list	Insulating material, plastic parts, Vermiculite	Must not be present	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII; [USA] Toxic Substances Control Act (TSCA); [Switzerland] Act of Reduction of Risks in Treatment of Specified Hazardous Substances, Preparations, and Articles in Switzerland (ChemRRV) Swiss Ordinance 814.81
00004	Azocolorants and Azodyes	See IEC62474 reference list	Pigment, dyes, colorants	< 0.003% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00014	Dibutyltin (DBT) compounds	See IEC62474 reference list	Stabilizer for PVC, curing catalyst for silicone resin and urethane resin	0.1 mass% of tin in article	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII
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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
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] REGULATION (EU) No 517/2014 on fluorinated greenhouse gases
00020	Hexabromocyclododecane (HBCDD)	See IEC62474 reference list	Flame retardant; mainly used for expanded polystyrene and some types of fiber	Must not be present	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation; [Japan] Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.; [EU] Persistent Organic Pollutants (POPs) Regulation (EU) 2019/1021

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
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:	[EU] Regulation on substances that deplete the ozone layer (EC) No. 1005/2009; [Japan] Law concerning the Protection of the Ozone Layer through the Control of Specified Substances and Other Measures; [USA] Clean Air Act; (Treaty) Montreal Protocol on Substances that Deplete the Ozone Layer
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	Must not be present	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV; [Japan] Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.
00038	Bis (2-ethyl(hexyl)phthalate) (DEHP)	117-81-7	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1%	[EU] RoHS Directive 2011/65/EU and its amendments; [EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00039	Dibutyl phthalate (DBP)	84-74-2	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1%	[EU] RoHS Directive 2011/65/EU and its amendments; [EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00040	Benzyl butyl phthalate (BBP)	85-68-7	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1%	[EU] RoHS Directive 2011/65/EU and its amendments; [EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00041	Diisobutyl phthalate (DIBP)	84-69-5	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1%	[EU] RoHS Directive 2011/65/EU and its amendments; [EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00042	1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	71888-89-6	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00043	1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters	68515-42-4	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00044	Polybrominated biphenyls (PBB)	See IEC62474 reference list	Flame retardant.	< 0.1%	[EU] RoHS Directive 2011/65/EU and its amendments; [China] Law Measures for Restriction of the Use of Hazardous Substances in Electrical Appliances and Electronic Products; [Japan] Law for the Promotion of Effective Utilization of Resources
00045	Polybrominated diphenyl ethers (PBDE)	See IEC62474 reference list	Flame retardant.	< 0.1%	[EU] RoHS Directive 2011/65/EU and its amendments; [China] Law Measures for Restriction of the Use of Hazardous Substances in Electrical Appliances and Electronic Products; [Japan] Law for the Promotion of Effective Utilization of Resources; [Japan] Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00046	Polychlorinated Biphenyls (PCBs) and specific substitutes	See IEC62474 reference list	Insulation oil, lubricant oil, electrical insulation medium, solvent, electrolytic solution, plasticizers, fire retardants, dielectric sealants	Must not be present	[EU] Persistent Organic Pollutants (POPs) Regulation (EU) 2019/1021; [USA] Toxic Substances Control Act (TSCA); [Japan] Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.
00047	Polychlorinated Terphenyls (PCTs)	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	0.005 mass% in material	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII
00048	Polychlorinated naphthalenes	See IEC62474 reference list	Lubricant, paint, stabilizer (electric characteristic, flame-resistant, water-resistant) insulator, flame retardant	Must not be present	[EU] Persistent Organic Pollutants (POPs) Regulation (EU) 2016/1021; [Japan] Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.

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00050	Aluminosilicate Refractory Ceramic Fibres		Thermal insulation for high temperature test equipment	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00051	Zirconia Aluminosilicate, Refractory Ceramic Fibres		Thermal insulation for high temperature test equipment	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation

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00052	Short Chain Chlorinated Paraffins (SCCP)	See IEC62474 reference list	Plasticizer for PVC, flame retardant	Must not be present	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation; [EU] Persistent Organic Pollutants (POPs) Regulation (EU) 2019/1021; [Norway] Regulations relating to restrictions on the manufacture, import, export, sale and use of chemicals and other products hazardous to health and the environment (Consumer Product Regulations) FOR-2004-06-01-922; [Switzerland] Act of Reduction of Risks in Treatment of Specified Hazardous Substances, Preparations, and Articles in Switzerland (ChemRRV) Swiss Ordinance 814.81

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00053	Strontium chromate	7789-06-2	Pigment; corrosion resistant coating	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00054	Bis(tributyltin)oxide (TBTO)	56-35-9	Antiseptic, antifungal agent, paint, pigment, antistaining, refrigerant, foaming agent, extinguishant, solvent cleaner	Must not be present	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation; [Japan] Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.
00056	Tris(2-chloroethyl) phosphate	115-96-8	Flame retardant	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00058	Bis(2-methoxyethyl) ether	111-96-6	Electrolyte in lithium batteries	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00059	Bis(2-methoxyethyl) ether (Diglyme)	117-82-8	Plasticizer	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00060	Pentazinc chromate octahydroxide	49663-84-5	Colorant	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00061	Potassium hydroxyoctaoxodizincatedichromate	11103-86-9	Paint, anti-corrosion	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV

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00064	Bis(pentabromophenyl) ether (decabromodiphenyl ether) (DecaBDE)	1163-19-5	Flame retardant	Must not be present	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation; [USA] Toxic Substances Control Act (TSCA)
00075	Diboron trioxide	1303-86-2	Found in wood veneers, glass/fiber optics and ceramics - for industrial applications	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00076	Dibutyltin dichloride (DBT)	683-18-1	Ingredient in some paint thinner and as heat stabilizer for PVC	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII
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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00079	Silicic acid, barium salt, lead-doped	68784-75-8	Used in UV emitting light bulbs and lamps	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
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	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00081	Diisopentylphthalate	605-50-5	Plasticizer in plastic materials in specialist applications, for example where high solvating plasticizers and stain resistance are required	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00082	N-pentyl-isopentylphthalate	776297-69-9	Plasticizer in plastic materials in specialist applications	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00091	Di-n-hexyl phthalate (DnHP)	84-75-3	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00095	Dipentyl phthalate (DPP)	131-18-0	Plasticizer in PVC and nitrocellulose resin and rubber; in gunpowder, toys, cosmetics, medical devices	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
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 article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV

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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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
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	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00106	1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	68515-50-4	Used as a plasticizer for certain plastics and rubbers	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00124 00125	Perfluorooctane sulfonate (PFOS)	See IEC62474 reference list	Antistatic agent for films and plastics	Must not be present	[EU] Persistent Organic Pollutants (POPs) Regulation (EU) 2019/1021; [Canada] Prohibition of Certain Toxic Substances Regulations SOR/2012-285 and its amendment; [Japan] Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.

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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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00128	2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE)	15571-58-1	PVC stabilizer	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
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-ethylehexyl 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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00130	2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	25973-55-1	UV stabilizer	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00134	2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl) phenol (UV-327)	3864-99-1	UV stabilizer	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV
00135	2, (2H-benzotriazol-2,yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350)	36437-37-3	UV stabilizer	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XIV

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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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00139	Dicyclohexyl phthalate (DCHP)	84-61-7	Plasticizer, dye, pigment, paint, ink, manufacture of adhesive, lubricant	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00144	Chrysene	218-01-9	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00145	Benz[a]anthracene	56-55-3	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation

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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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
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 article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
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 amino plastic resins, and as a biocide in professional and industrial wood preservation.	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00153	Terphenyl, hydrogenated	61788-32-7	Plasticizers, sealants, epoxy adhesives, paints and heat sinks	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00156 00157 00158 00159	Benzo[k]fluoranthene Fluoranthene Phenanthrene Pyrene	207-08-9 206-44-0 85-01-8 129-00-0	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers	< 0.1% by article weight	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation
00160	Perfluorooctanoic acid and its salts	See IEC62474 reference list	Greases, textiles and other coated consumer products, and emulsifiers used for manufacturing the Fluoropolymers and fluoroelastomers	0.0000025 mass% of PFOA including its salts in article or mixture	[EU] Persistent Organic Pollutants (POPs) Regulation (EU) 2019/1021; [Japan] Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.; [Korea (the Republic of)] Persistent Organic Pollutants Control Act

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
00161	PFOA-related substances	See IEC62474 reference list	Greases, textiles and other coated consumer products, and emulsifiers used for manufacturing the Fluoropolymers and fluoroelastomers	0.0001 mass% of one or a combination of PFOA-related substances, in article or mixture	[EU] Persistent Organic Pollutants (POPs) Regulation (EU) 2019/1021; [Korea (the Republic of)] Persistent Organic Pollutants Control Act
00174	Phenol, Isopropylated Phosphate (3:1) (PIP (3:1))	68937-41-7	Flame retardant and/or plasticizer in polymers such as flexible polyurethane foam and PVC, lubricant, hydraulic fluid, adhesives and sealants. Examples: gasket, wire sleeve, tape.	Must not be present	[USA] Toxic Substances Control Act (TSCA)
00182	C9-C14 PFCAs and their salts	See IEC62474 reference list	Adhesives, sealants, lubricants, fuels, hydraulic fluids, metal working, antioxidant/stabilizer for rubber and plastics	0.000025 mass% for the sum of C9-C14 PFCAs and their salts in Article or Mixture	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII
00183	C9-C14 PFCA-related substances	See IEC62474 reference list	Greases, textiles and other coated products, and emulsifiers used for manufacturing the Fluoropolymers and fluoroelastomers	0.000026 mass% for the sum of C9-C14 PFCA-related substances in Article or Mixture	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Basis
NA	Pentachlorothiophenol (PCTP)	133-49-3	Rubber products (articles)	< 1% by article weight	[USA] Toxic Substances Control Act (TSCA)

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.

[USA California] Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 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. Suppliers can use the GSE_Inquiry@keysight.com to make this notification.

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%	[EU] RoHS Directive 2011/65/EU 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

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IEC62474 ID	Substances	CAS number	Example Uses	Threshold (Not to Exceed)	Allowed exemption basis
00012	Chromium (VI) Compounds	See IEC62474 reference list	Metallic coating and all other uses (e.g. in commercial off-the-shelf parts)	<0.1%	[EU] RoHS Directive 2011/65/EU and its amendments, chromium (VI) exemptions in Annexes III & IV
00021	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%	[EU] RoHS Directive 2011/65/EU 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%	[USA California] Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) Case law
00029	Mercury/Mercury Compounds	See IEC62474 reference list	Fluorescent bulb, contact point material, pigment, anti-corrosion, switches, antibacterial treatment	<0.1%	[EU] RoHS Directive 2011/65/EU and its amendments, mercury exemptions in Annexes III & IV
00171	Halogenated Flame Retardants	See IEC62474 reference list	The use of halogenated flame retardants is not allowed in the enclosure and stand of electronic displays. Third Party computer monitors with a screen area > 100 square centimetres for inclusion into Keysight Solutions	Must not be present	All other applications outside the scope of Commission Regulation (EU) 2019/2021 laying down ecodesign requirements for electronic displays

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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	[EU] Battery Directive 2006/66/EC; [Korea] Quality Management and Manufactured Product Safety Management Law (Battery Regulation)
00025	Lead/Lead Compounds	See IEC62474 reference list	Zinc carbon batteries, alkaline button cells	0.004 mass% of battery	[EU] Battery Directive 2006/66/EC; [China] Limitation of mercury, cadmium and lead contents for alkaline and non-alkaline zinc manganese dioxide batteries GB 24427-2009
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	[EU] Battery Directive 2006/66/EC; [China] Limitation of mercury, cadmium and lead contents for alkaline and non-alkaline zinc manganese dioxide batteries GB 24427-2009; [Taiwan] Restrictions on the Manufacture, Import, and Sale of Dry Cell Batteries; [Korea] Quality Management and Manufactured Product Safety Management Law (Battery Regulation)
00033	Perchlorates	See IEC62474 reference list	Lithium batteries; coin cell batteries	0.6 ppm by battery weight	[USA California] Perchlorate Contamination Prevention Act of 2003 AB 826

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- 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. Content Restrictions Specific to Packaging

5.1. In addition to the restricted substances listed in section 4.2 the following substances are prohibited or restricted 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	Basis	Threshold (Not to Exceed)
Arsenic Compounds	In wooden packaging and packaging materials	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII	Must not be present
Cadmium, Chromium VI (Hexavalent Chromium) Compounds, Lead and Mercury	Packaging, packaging materials and packaging inks	EU 94/62/EC Directive	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)	[EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII	Must not be present
Ozone depleting substances CFCs and HFCs	Foaming agent	Law Concerning the Protection of the Ozone Layer through the Control of Specified Substances and others (Japanese law), revision of Article 611 of the Clean Air Act (US law); Regulation (EC) No. 1005/2009 on substances that deplete the ozone layer	Must not be present
Tetraboron disodium heptaoxide, hydrate	Additive in wood veneers, flame retardant in aminoplastic resin	[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation	<0.1% by weight of packaging item

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.

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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.
- 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. Suppliers can use the GSE_Inquiry@keysight.com email to make this notification.
- 8.2.** Additionally, substances published by ECHA in the EU REACH candidate List with a date on inclusion after 10 June 2022 (which covers 224 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>

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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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

Intentionally Added – a situation where a substance is contained in the part, device, or its materials because of deliberate addition, filling, blending, or adhesion, in order to provide a specific characteristic, appearance, property, attribute or quality

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.

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

SDS – Safety Data Sheet
















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 8 July 2021 EU REACH 1907/2006/EC Candidate List (which covers 219 substances) that have been pre-filtered by IEC 62474 as potentially used in electrical and electronic equipment.

IEC62474 ID	Substances	CAS number	Example Uses	Reporting Threshold
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	0.1% by article weight
00013	Cobalt dichloride	7646-79-9	Pneumatic panels to indicate water contamination	0.1% by article weight
00055	Tri-substituted organostannic compounds	See IEC62474 reference list	Paint pigment	0.1% by article weight
00057	4-(1,1,3,3-tetramethylbutyl)phenol	140-66-9	Unreacted process chemical	0.1% by article weight
00065	Sulfurous acid, lead salt, dibasic	62229-08-7	Heat stabilizer for PVC, for example for wiring and cabling insulation	0.1% by article weight
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.	0.1% by article weight
00067	Trilead dioxide phosphonate	12141-20-7	Heat stabilizer for PVC, for example for wiring and cabling insulation	0.1% by article weight
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	0.1% by article weight
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.	0.1% by article weight
00070	Tetralead trioxide sulphate	12202-17-4	Heat stabilizer for PVC, for example for wiring and cabling insulation	0.1% by article weight
00071	Orange lead (lead tetroxide)	1314-41-6	Used in rust-proof primer paints	0.1% by article weight
00072	Pyrochlore, antimony lead yellow	8012-00-8	Used as yellow pigment for colouring plastics and paint	0.1% by article weight
00073	Pentalead tetraoxide sulphate	12065-90-6	Heat stabilizer for plastics; for example, non-transparent PVC	0.1% by article weight
00074	1,2-Diethoxyethane	629-14-1	Solvent used in electrolytes for lithium batteries.	0.1% by article weight

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IEC62474 ID	Substances	CAS number	Example Uses	Reporting Threshold
00077	Lead cyanamidate	20837-86-9	Used in anticorrosion coatings e.g. steel articles	0.1% by article weight
00083	Lead titanium trioxide	12060-00-3	In piezoelectric components, ultrasound transducers, gas igniters, ultrasonic motors, ceramic capacitors and other electronic components that use piezoelectric materials	0.1% by article weight
00084	Lead titanium zirconium oxide	12626-81-2	In piezoelectric components, ultrasound transducers, gas igniters, ultrasonic motors, ceramic capacitors and other electronic components that use piezoelectric materials	0.1% by article weight
00085	Lead oxide sulfate	12036-76-9	Heat stabilizer for PVC used for wiring and cabling insulation.	0.1% by article weight
00086	[Phthalato(2-)]dioxotrilead	69011-06-9	Heat stabilizer for plastics, for example for wiring and cabling insulation.	0.1% by article weight
00087	Dioxobis(stearato)trilead	12578-12-0	Heat stabilizer for plastics, for example for wiring and cabling insulation.	0.1% by article weight
00088	Fatty acids, C16-18, lead salts	91031-62-8	Heat stabilizer for plastics, for example for wiring and cabling insulation.	0.1% by article weight
00089	Lead dinitrate	10099-74-8	Heat stabilizer in nylon and polyesters, also used as a coating on paper for photo thermography.	0.1% by article weight
00090	Di-isodecyl phthalate (DIDP)	68515-49-1; 26761-40-0	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	Intentionally Added
00091	Di-n-hexyl phthalate (DnHP)	84-75-3	Plasticizer, dye, pigment, paint, ink, adhesive, lubricant	Intentionally Added
00092	Hexahydromethylphthalic anhydride	See IEC62474 reference list	Primary use is as a hardener for epoxy resins.	0.1% by article weight
00098	4-Nonylphenol, branched and linear, ethoxylated	See IEC62474 reference list	Nonylphenol ethoxylates are used in paints, lacquers and varnishes in concentrations up to 10% w/w of the mixture.	0.1% by article weight
00107	Diisononyl phthalate (DINP)	28553-12-0; 68515-48-0	Used as a plasticizer for PVC	Intentionally Added

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IEC62474 ID	Substances	CAS number	Example Uses	Reporting Threshold
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	0.1% by article weight
00133	1,3-propanesultone	1120-71-4	Electrolyte fluid of rechargeable lithium ion batteries	0.1% by article weight
00141	4,4'-isopropylidenediphenol	80-05-7	Antioxidant for plasticizer and PVC, ink, paint and adhesive; used as monomer in epoxy resins and plastics	Intentionally Added
00142	Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts	See IEC62474 reference list	Plasticizer, lubricant, corrosion inhibitor	0.1% by article weight
00143	Perfluorohexane-1-sulphonic acid and its salts	See IEC62474 reference list	Impurity in production of PFOS and alternative for PFOS, a surfactant which can be in protective coatings and adhesives which are resistant to water, dirt, oils etc.	0.1% by article weight
00154	Lead	7439-92-1	Steel, aluminum and copper alloys, lead acid batteries, solder and other applications	0.1% by article weight
00155	2,2-bis(4'-hydroxyphenyl)-4-methylpentane	6807-17-6	Raw material for epoxy resins, Raw materials for polycarbonate resin, Thermal paper, Chemicals, Surface coatings, Inks, Adhesives, Synthetic resin additives, Liquid crystal materials, Photosensitizers, Information recording agents, Engineering plastic materials, Electronic functional materials, Optical functional materials; may be used as substitute for BPA	0.1% by article weight
00162	Tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with $\geq 0.1\%$ w/w of 4-nonylphenol, branched and linear (4-NP)	See IEC62474 reference list	stabilizer and antioxidant in the processing of various plastic materials such as PVC, Polyolefines or rubbers	0.1% by article weight
00163	Tetraboron disodium heptaoxide, hydrate	12267-73-1	In wood veneers/ pressed wooden panels as starch additive, flame retardant and stabilizer in aminoplastic resin, wood preservative	0.1% by article weight

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IEC62474 ID	Substances	CAS number	Example Uses	Reporting Threshold
00164	Diisohexyl phthalate	71850-09-4	Used as a plasticizer for certain plastics and rubbers	0.1% by article weight
00165	Perfluorobutane sulfonic acid (PFBS) and its salts	See IEC62474 reference list	Impurity in production of PFOS and alternative for PFOS, a surfactant which can be found in protective coatings and adhesives which are resistant to water, dirt, oils etc. May be used as a flame retardant agent for polycarbonate and as an anti-static additive.	0.1% by article weight
00170	Dibutylbis(pentane-2,4-dionato-O,O')tin	22673-19-4	Used as biocides and as stabilisers in plastics. Used also as a catalyst and in the manufacturing of adhesives, sealants, coatings, dyes, polymer preparations, resins and rubber. Can be found in supplied articles.	0.1% by article weight
00172	Bis(2-(2-methoxyethoxy)ethyl)ether	143-24-8	Solvent in electrolyte in lithium-ion batteries, solvent in other manufacturing process (example: solder flux).	0.1% by article weight
00173	Dioctyltin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs., and any other stannane, dioctyl-, bis(fatty acyloxy) derivs. wherein C12 is the predominant carbon number of the fatty acyloxy moiety	See IEC62474 reference list	Stabilisers and catalysts in the production of e.g. plastics and rubber. Used for the manufacture of the follow article categories: plastic products, fabrics, textiles, apparel, and leather. Professional application of coatings and inks.	0.1% by article weight
00177	4,4'-(1-methylpropylidene)bisphenol	77-40-7	Antioxidant for plasticizer and PVC, ink, paint and adhesive; used as monomer in epoxy resins and plastics	0.1% by article weight
00178	Medium-chain chlorinated paraffins (MCCP)	See IEC62474 reference list	Flame retardant and / or plasticizer in PVC and rubber, paints and coatings, adhesives and sealants, textiles and fabric	0.1% by article weight
00179	orthoboric acid, sodium salt	See IEC62474 reference list	As flame retardant/adhesive ingredients for wood, paper, cotton and other plant-derived materials; glass manufacturing	0.1% by article weight
00180	4-Nonylphenol, branched and linear	See IEC62474 reference list	Paint, glues and polymers	0.1% by article weight

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IEC62474 ID	Substances	CAS number	Example Uses	Reporting Threshold
00181	6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol	119-47-1	Adhesives, sealants, lubricants, fuels, hydraulic fluids, metal working, antioxidant/stabilizer for rubber and plastics	0.1% by article weight

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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 5. 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: Internationally required marks are acceptable. 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



Example of the marking for Paper and Corrugated Fiberboard recyclable packaging

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Packaging made of Wood, including Wooden Crates

As per Section 5.2 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 5.2 that Fumigation, Chemical Pressure Impregnation (CPI) or other chemical means are not to be used.

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Specification Revision History

Revision	Changes	Approval	Date
V	<p>4.2 General Restrictions:</p> <p>[EU] Persistent Organic Pollutants (POPs) Regulation (EU) 2019/1021 (Updated all references from (EC) No.850/2004 to (EU) 2019/1021)</p> <ul style="list-style-type: none"> • 00020 Hexabromocyclododecane (HBCDD); Must not be present • 00046 Polychlorinated Biphenyls (PCBs) and specific substitutes; Must not be present • 00047 Polychlorinated Terphenyls (PCTs) (TBD) (removed PCBs, covered in 00046) • 00048 Polychlorinated naphthalenes: Must Not be present • 00052 Short Chain Chlorinated Paraffins (SCCP); Must not be present • 00124 Perfluorooctane sulfonate (PFOS), Must not be present (combined with 00125) <p>[EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII</p> <ul style="list-style-type: none"> • 00014 Dibutyltin (DBT) compounds; 0.1 mass% of tin in article • 00160 Perfluorooctanoic acid and its salts; 0.0000025 mass% of PFOA including its salts in article or mixture • 00161 PFOA-related substances; 0.0001 mass% of one or a combination of PFOA-related substances, in article or mixture <p>[Japan] Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc.</p> <ul style="list-style-type: none"> • 00035 2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320), Must not be present • 00054 Bis(tributyltin)oxide (TBTO), Must not be present <p>[USA] Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)</p> <ul style="list-style-type: none"> • 00090 Di-isodecyl phthalate (DIDP); Must not be present • 00091 Di-n-hexyl phthalate (DnHP); Must not be present • 00107 Diisononyl phthalate (DINP); Must not be present • 00141 4,4'-isopropylidenediphenol; Must not be present <p>4.3 Specific Applications</p> <ul style="list-style-type: none"> • Lead/Lead Compounds revised from ID 00022 to 00021 (no restriction change) <p>Appendix C</p> <p>[EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation (Updated to reflect Candidate list of June 25, 2020 covering 209 substances)</p> <ul style="list-style-type: none"> • Added Substances 00058, 00060, 00077, 00083, 00084, 00085, 00089, 00098, 00128, 00163, 00164, 00165, 00170 • Following substances covered by Section 4.2 and removed from reportable: 00105, 00126, 00129, 00160, 00161 <p>Appendix D</p> <p>Removed references to National Standard of the People's Republic of China, GB/ T 18455-2010 and associated requirements.</p> <p>Removed Revision History S</p>	Robert Tait	Nov 1, 2020

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Revision	Changes	Approval	Date
W	<p>4.2 General Restrictions:</p> <p>[EU] Persistent Organic Pollutants (POPs) Regulation (EU) 2019/1021</p> <ul style="list-style-type: none"> • 00160 Perfluorooctanoic acid and its salts; 0.000025 mass% of PFOA including its salts in article or mixture (Basis change only from [EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII) • 00161 PFOA-related substances; 0.0001 mass% of one or a combination of PFOA-related substances, in article or mixture (Basis change only from [EU] REACH Regulation (EC) No.1907/2006 ANNEX XVII) <p>[USA] Toxic Substances Control Act (TSCA)</p> <ul style="list-style-type: none"> • 00064 Bis(pentabromophenyl) ether (decabromodiphenyl ether) (DecaBDE); Must not be present • 00174 Phenol, Isopropylated Phosphate (3:1) (PIP (3:1)); Must not be present • NA - Pentachlorothiophenol (PCTP, CAS 133-49-3); 1% by article weight <p>[USA] Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65)</p> <ul style="list-style-type: none"> • 00090 Di-isodecyl phthalate (DIDP); Moved to Appendix C • 00091 Di-n-hexyl phthalate (DnHP); Moved to Appendix C • 00107 Diisononyl phthalate (DINP); Moved to Appendix C • 00141 4,4'-isopropylidenediphenol; Moved to Appendix C <p>4.3 Specific Applications</p> <ul style="list-style-type: none"> • 00171 Halogenated Flame Retardants in the enclosure and stand of electronic displays; Must not be present. [EU] Commission Regulation (EU) 2019/2021 laying down ecodesign requirements for electronic displays <p>Appendix C</p> <p>Added column specifying reporting threshold to cover EU REACH and other regulatory applications. Reflects [EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation of July 8, 2021 covering 219 substances.</p> <ul style="list-style-type: none"> • Added Substances 00172, 00173, 00177, 00178, 00179 • 00090 Di-isodecyl phthalate (DIDP) added with reporting threshold of Intentionally Added [USA] Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) • 00091 Di-n-hexyl phthalate (DnHP) added with reporting threshold of Intentionally Added [USA] Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) • 00107 Diisononyl phthalate (DINP) added with reporting threshold of Intentionally Added [USA] Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) • 00141 4,4'-isopropylidenediphenol added with reporting threshold of Intentionally Added [USA] Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65) <p>Removed Revision History T</p>	Robert Tait	Nov. 1, 2021

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Revision	Changes	Approval	Date
X	<p>4.2 General Restrictions</p> <p>Reflects [EU] REACH Regulation (EC) No.1907/2006 substances listed in Annex XIV</p> <p>Basis changes only, no restriction changes</p> <ul style="list-style-type: none"> • 00001 Diarsenic pentoxide • 00002 Diarsenic trioxide • 00035 2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320) • 00038 Bis (2-ethyl(hexyl)phthalate) (DEHP) • 00039 Dibutyl phthalate (DBP) • 00040 Benzyl butyl phthalate (BBP) • 00041 Diisobutyl phthalate (DIBP) • 00059 Bis(2-methoxyethyl) ether (Diglyme) • 00082 N-pentyl-isopentylphthalate • 00095 Dipentyl phthalate (DPP) • 00100 Trixylyl phosphate • 00130 2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328) • 00134 2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl) phenol (UV-327) • 00135 2, (2H-benzotriazol-2,yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350) <p>Added</p> <ul style="list-style-type: none"> • 00042 1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich; < 0.1% by article weight • 00043 1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters; < 0.1% by article weight • 00053 Strontium chromate; < 0.1% by article weight • 00056 Tris(2-chloroethyl) phosphate; < 0.1% by article weight • 00058 Bis(2-methoxyethyl) ether; < 0.1% by article weight • 00060 Pentazinc chromate octahydroxide; < 0.1% by article weight • 00061 Potassium hydroxyoctaoxidizincatedichromate; < 0.1% by article weight • 00080 1,2-Benzenedicarboxylic acid, dipentylester, branched and linear; < 0.1% by article weight • 00081 Diisopentylphthalate; < 0.1% by article weight • 00091 Di-n-hexyl phthalate (DnHP); < 0.1% by article weight • 00106 1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear; < 0.1% by article weight • 00128 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE) ; < 0.1% by article weight <p>Reflects [EU] REACH Regulation (EC) No.1907/2006 substances listed in Annex XVII</p> <ul style="list-style-type: none"> • 00182 C9-C14 PFCAs and their salts; 0.000025 mass% for the sum of C9-C14 PFCAs and their salts in Article or Mixture • 00183 C9-C14 PFCA-related substances; 0.000026 mass% for the sum of C9-C14 PFCA-related substances in Article or Mixture <p>Additional Regulations references added to Basis: no restriction changes;</p> <ul style="list-style-type: none"> • 00160 Perfluorooctanoic acid and its salts • 00161 PFOA-related substances <p>Example Uses Updated</p> <ul style="list-style-type: none"> • 0003 Asbestos, Asbestos Materials; added Vermiculite <p>Appendix C</p> <p>Reflects [EU] REACH Regulation (EC) No.1907/2006 Candidate List for Authorisation of June 10, 2022 covering 224 substances.</p> <ul style="list-style-type: none"> • The following substances were removed to reflect their promotion to Section 4.2 General Restrictions: 00042, 00043, 00053, 00056, 00058, 00060, 00061, 00080, 00081, 00106, 00128 • Added Substances: 00180, 00181 <p>Removed Revision History U</p>	Robert Tait	Nov. 1, 2022