DELL CONTROLLED PRINT

Materials Restricted for Use

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1. Revision History

For revision history of previous versions, please refer to Appendix D.

Rev.	PCO #	Revision Description	Approved	Date
A13	PCO54708	2.2 Scope 1. Updated material declaration requirement from Declaration of Conformity to Full Material Declaration, Section 3.4 EPEAT substance requirements 2. Updated requirements Appendix C : Materials Compliance Testing 3. Changed references from Supplier Declaration of Conformity to Full Material Declaration	Scott O'Connell	02/04/2025

2. Introduction

Dell Technologies' vision is to avoid the use of substances in its products that could seriously harm the environment or human health and to ensure that we act responsibly and with caution. Dell Technologies material restrictions are based on consideration for legal requirements, international treaties and conventions, and specific market requirements.

This specification lists substances banned or restricted for use in Dell Technologies products and in the manufacture of Dell Technologies products. If restricted substances are introduced and/or detected in products, potential courses of action may include developing corrective actions to requalify parts to meet this specification, delaying the launch of products and/or removing non-compliant suppliers from the Dell Technologies approved vendor lists.

2.1 Purpose

To communicate to Dell Technologies design teams and suppliers materials restrictions required for parts in all Dell Technologies-branded products. The specification should be used when selecting materials for product parts and packaging.

2.2 Scope

All *parts* in Dell Technologies-branded products that are supplied to Dell Technologies and/or designed by Dell Technologies Inc. must meet this specification. Compliance with this specification is communicated to Dell via Full Material Declaration (FMD), which will be requested by Dell Technologies compliance systems. The scope includes all of the components, parts, assemblies, batteries and packaging of each product. The restricted substances cannot be contained in the product and its components above the designated thresholds for the controlled applications listed in Section 3. Some restrictions also apply to the manufacturing of components or products.

2.3 References

Dell Specifications:

1. Dell P/N ENV0199, Dell BFR/CFR/PVC-Free Specification (formerly "halogen-free")
2. Dell P/N ENG0014187, Dell Regulatory Critical Components Peripheral Guide Sheets
3. Regulatory Quality Procedure – RQP4.10/004

European Union Regulations / Directives / Decisions:

4. Regulation of the European Parliament and of the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals, 1907/2006/EC, December 2006 (REACH Regulation)
5. Directive of the European Parliament and of the Council on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, 2011/65/EU, June 2011 (RoHS Directive) and 2015/863/EU, June 2015 (addition of four phthalates)
6. Regulation of the European Parliament and of the Council on persistent organic pollutants (EU) 2019/1021
7. Regulation of the European Parliament and of the Council on fluorinated greenhouse gases, 573/2024, February 2024
8. Regulation of the European Parliament and of the Council on substances that deplete the ozone layer (EC) No. 1005/2009

9. Directive of the European Parliament and of the Council on Packaging and Packaging waste, 94/62/EC, December 1994 (Packaging Directive)
10. Directive 2006/66/EC of the European Parliament and of the Council on Batteries and Accumulators and Waste Batteries and Accumulators, September 2006 (Battery Directive)
11. Directive 2012/19/EU of the European Parliament and the Council on Waste Electrical and Electronic Equipment, July 2012 (WEEE directive)
12. Commission Decision 2009/251/EC requiring Member States to ensure that products containing the biocide dimethylfumarate are not placed or made available on the market, March 2009

Other Reduction of Hazardous Substance Regulations outside of European Union:

13. Restriction of Hazardous Substances (RoHS) in Electrical and Electronic Equipment (EEE) in Singapore (Singapore RoHS)
14. Guidance to reduction of the restricted chemical substances in electrical and electronic equipment, CNS15663 (Taiwan RoHS)
15. Regulating the permitted limits for a number of hazardous substances in electric and electronic products, in Circular 30/2011/TT-BCT (Vietnam RoHS)
16. E-Waste (Management) Rules, Ministry of Environment & Forests, Government of India (India RoHS)
17. Management Methods for Restriction of the Use of Hazardous Substances in Electrical and Electronic Products (China RoHS 2)
18. Technical Regulation on restrictions as to the use of some dangerous substances in electric and electronic devices (Ukraine RoHS)
19. Technical Regulations for Limiting Hazardous Substances in Electrical and Electronic Devices (Saudi Arabia RoHS)
20. The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations (UK RoHS)The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (Turkey RoHS)
21. The Hazardous Waste (E-waste) Management Rules, Ministry of Environment, Forests & Climate Change, Government of the People's Republic of Bangladesh (Bangladesh RoHS)

Other Regulations / Standards by Country:

22. Registration, Evaluation, Authorization and Restriction of Chemicals, statutory instrument 2019/758 (UK REACH)
23. Austria - BGB - 1990/194: Formaldehydverordnung, §2, 12/2/1990
24. Canada Prohibition of Certain Toxic Substances Regulations, 2012 (SOR/2012-285)
25. Canadian Environmental Protection Act SOR/SOR/2008-178
26. California Safe Drinking Water and Toxic Enforcement Act of 1986 (Section 25249.5- 25249.13 of the California Health and Safety Code), commonly referred to as "California Proposition 65"
27. California Electronic Waste Recycling Act SB 20, amended by SB 50 and AB 575
28. China CEC technical requirement for environmental labeling products for computers and displays and server
29. Geprufte Sicherheit for ProdSG / Safety Mark certification for German Product Safety
30. Japanese Law concerning the Examination and Regulation of Manufacture etc. of Chemical Substances (Class 1 chemical substances)

31. Japan revised Law for Promotion of Effective Utilization of Resources (J-MOSS)
32. Japanese Law Concerning the Protection of the Ozone Layer through the Control of Specified Substances and others
33. Japan Law Concerning Prevention from Radiation Hazards, 1986
34. Japan Mercury Law
35. Norway Product Regulations FOR-2004-06-01-922
36. 1990 revision of Article 611 of the US Clean Air Act
37. American Apparel & Footwear Association (AAFA) Restricted Substance List
38. EPA Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)
39. U.S. Consumer Product Safety Improvement Act
40. U.S. Nuclear Regulatory Commission Title 10 CFR Part 20 (Appendix C)
41. United States: Toxic Substances Control Act (TSCA)
42. Washington State Safer Products Program
43. IEC62474 Material Declaration for Products of and for the Electrotechnical Industry
44. IEEE 1608.1 Standard for Environmental Assessment of Personal Computer Products, Including Notebook Personal Computers, Desktop Personal Computers, and Personal Computer Displays, 2018
45. NSF/ANSI 426 – 2017 Environmental Leadership and Corporate Social Responsibility Assessment of Servers
46. TCO Development: TCO Certified Desktops; TCO Certified Displays; TCO Certified Notebooks; TCO Certified Projectors; TCO Certified Tablets

2.4 Definitions

Agile PG&C: Compliance system used to combine compliance data from suppliers with product bills of materials.

Antimicrobial: An agent that prevents or inhibits microorganisms

Article: Object which during production is given a special shape, surface or design which determines its function to a greater degree than does its chemical composition (e.g. all Dell parts and products are classified as Articles).

Assembly: An integrated set of components. A populated printed circuit board is an assembly and not a component because individually functioning components can be removed.

CAS #: Chemical Abstract System numbers are assigned to chemicals for unique identification. The CAS numbering system is an international convention. For example, the CAS# for lead is 7439-92-1.

Component: a combination of homogenous materials that have been formed into a single manufactured mechanical or electrical part. Examples of components may include microprocessors, plastic enclosures, coin cell batteries, capacitors, etc. Sub-assemblies and semi-finished goods are not considered components. Examples of sub-assemblies/semi-finished goods may include populated motherboards/daughter cards, power supplies and adaptors, hard drives, tape drives, mouse, etc.

Elemental chlorine free (ECF): Packaging material produced with pulp that has been bleached using a chlorine compound such as chlorine dioxide (ClO2), but without the use of elemental chlorine (Cl).

External cables: cables and cords that are likely to be accessible to the consumer during ordinary use

Halogenated plastics: Plastics/polymers that contain or are treated with one or more of the following elements: fluorine, chlorine, bromine, iodine, and/or astatine. Examples include, but are not limited to, polyvinyl chloride (PVC) and tetrafluoroethylene (TFE, "Teflon").

Homogenous material: one material of uniform composition throughout or a material, consisting of a combination of materials, that cannot be disjointed or separated into different materials by mechanical actions such as unscrewing, cutting, crushing, grinding and abrasive processes.

Intentionally added: deliberate use of a substance in the formulation of a part or product, where the presence of the substance in the final product provides a specific characteristic, appearance or quality

Mechanical plastic part: plastic parts that do not internally carry an electrical signal such as housings, brackets, bezels, latches, etc. that form the basic structure of the product and/or have mechanical functions. Plastic parts such as fans, connectors, printer fuser assemblies, etc. are not considered "mechanical plastic parts" in the context of this specification.

Non-compliance: A failure to meet the requirements of the specification. Non-compliance requires corrective action.

Non-electrical/Non-electronic parts and products (Dell Technologies-Branded): Electricity is not required to operate these parts and products. Examples include, but not limited to, apparel products (e.g. shirts, pants, hats…), stationary products (e.g. pens, pencils, erasers, staplers, key chains, paper pads and notebooks …), office equipment accessories (e.g. computer bags, locks, mouse pads…) and toys. Packaging materials are excluded from this definition.

Not detectable: a substance in a part or homogenous material is not detected at the lowest detectable limit using standard analytical techniques.

Packaging: Materials used to protect products from damage due to storage or transportation (e.g., boxes, shipping supplies, cushioning & foam, bags, shrink wrap, tape/adhesives). Includes inks and dyes used to label packages.

PPM: parts per million, unit of measurement for weight percentage. 1 ppm = 1 mg/kg = 0.0001 % by weight.

Processed chlorine free (PCF): Packaging material produced with pulp from virgin and/or recycled content that has been bleached without any type of chlorine, or that has not been bleached at all. Recycled content may have originally been bleached with chlorine or chlorine compounds.

RoHS substances: Those substances restricted under the European RoHS Directives 2011/65/EU and 2015/863/EU and other RoHS-type legislation (China, India, Turkey, Ukraine, Bangladesh etc.), including cadmium, chromium VI, lead, mercury, polybrominated biphenyls (PBB) and polybrominated diphenyl ethers (PBDE), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP).

Solder (in reference to the RoHS exemption for lead in solders for servers, storage and networking products): alloys used to create metallurgical bonds between two or more metal surfaces to achieve an electrical and/or physical connection". In this context, the term 'solder' also includes all materials that become part of the final solder joint, including solder finishes on components or printed circuit boards.

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

Threshold Limit: the maximum concentration at which a restricted substance can be present or above which a declarable substance needs to be reported.

Totally chlorine free (TCF): Packaging material produced with pulp from virgin content that has been bleached without any type of chlorine, or that has not been bleached at all.

3. Product Content Restrictions

3.1 Material Restriction Requirements

Table 1 lists substances that Dell Technologies has banned or restricted. For each listed substance, a threshold limit has been established to account for unavoidable impurities consistent with regulatory requirements. Table 1 also lists allowed exemptions and references to specific restricted substances and CAS numbers (Appendix B)**.** Refer to Appendix C for substance testing protocols and requirements. Compliance with this specification is communicated to Dell Technologies via Full Material Declaration (FMD). In the case of groups, e.g. substance xyz and its compounds, the restriction in Table 1 covers all the substances and compounds. Substances and CAS numbers referred to in Appendix B lists are examples of the restricted substances.

TABLE 1 - Banned or Restricted Substances

Substance	Threshold Limit (mg substance / kg homogenous material =ppm)	Explanations / Exemptions / Effective dates	Reference Appendix B / CAS #
Cadmium and its compounds	75	Restriction applies to ear contact parts of headphones, headsets.	Table B
	100	Restriction applies for other materials.	Table B
Chromium VI and its compounds	1000		Table D
Mercury and its compounds	1000	See Appendix A for applicable RoHS exemptions.	Table G
Polybrominated Biphenyls (PBB)	1000	Substances may not be intentionally added to parts/products.	Table I
Polybrominated Diphenyl Ethers (PBDE)	1000	Substances may not be intentionally added to parts/products.	Table I
Lead and its compounds	90	Restriction applies to paint or surface coatings of on ear contact parts of headphones, headsets.	Table F
	300	Restriction applies to lead and compounds in cable jacketing material of frequently handled external cables as well as ear contact parts of headphones, headsets	Table F
	1000	Restriction applies for all other lead applications. See Appendix A for applicable RoHS exemptions.	Table F
Alkanes C10-C13, chloro, Short Chained Chlorinated Paraffins (SCCP)	1000		Table S

TABLE 1 - Banned or Restricted Substances

Substance	Threshold Limit (mg substance / kg homogenous material =ppm)	Explanations / Exemptions / Effective dates	Reference Appendix B / CAS #
Alkanes C14-C17, chloro, Medium Chain Chlorinated Paraffins (MCCPs)	1000		Table S
Antimony and its compounds	1000	Restriction applies to mechanical plastic parts above 25 grams.	Table V
Asbestos and its compounds	Not detectable		Table A
Azocolorants and Azodyes	30	Restriction only applies to textile and leather articles that may come into direct and prolonged contact with the human skin or oral cavity.	Table K
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich	1000		71888-89-6
1,2-Benzenedicarboxylic acid, dipentylester, branched and linear	1000		84777-06-0
1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate (EC No. 201-559-5)	1000		68515-51-5, 68648-93-1
1,6,7,8,9,14,15,16,17,17,18,18-Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene (“Dechlorane Plus”™)	Intentionally added	Substances may not be intentionally added to parts/products.	13560-89-9 135821-74-8 135821-03-3
2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328)	Intentionally added	Substances may not be intentionally added to parts/products.	25973-55-1
2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-327)	1000		3864-99-1
2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350)	1000		36437-37-3
2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE)	1000		15571-58-1

TABLE 1 - Banned or Restricted Substances

Substance	Threshold Limit (mg substance / kg homogenous material =ppm)	Explanations / Exemptions / Effective dates	Reference Appendix B / CAS #
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)	1000		
Bis(2-methoxyethyl) ether	1000		111-96-6
4-(1,1,3,3-tetramethylbutyl)phenol	1000		140-66-9
4-Aminoazobenzene	1000		60-09-3
4-Nonylphenol, branched and linear, ethoxylated	1000		26027-38-3 7311-27-5 20427-84-3 34166-38-6 27942-27-4 14409-72-4 104-35-8 37205-87-1 127087-87-0 156609-10-8
Bisphenol-A (4,4'-isopropylidenediphenol)	300	Restriction applies to external plastics	80-05-7
	1000		
Brominated/Chlorinated flame retardants (excluding PBB, PBDE)	1000	Restriction applies to mechanical plastic parts; plastic parts greater than 25 grams. Exemption applies to internal plastic components such as circuit boards, electronic components, fans, cables, printer fuser assembly and electrical assemblies contained in Dell products unless designated as Halogen Free or BFR/CFR-Free products.	Table L
Halogenated flame retardants	Intentionally added	Substances may not be intentionally added to external enclosure parts of displays, notebooks, AIO, mobile workstations, tablets, and display stands	
Diarsenic pentaoxide	1000	Semiconductors exempt.	1303-28-2

TABLE 1 - Banned or Restricted Substances

Substance	Threshold Limit (mg substance / kg homogenous material =ppm)	Explanations / Exemptions / Effective dates	Reference Appendix B / CAS #
Diarsenic trioxide	1000	Semiconductors exempt.	1327-53-3
Dibutyltin (DBT) compounds	1000	Threshold relates to the mass of tin.	Table T
Dioctyltin (DOT) compounds	1000	Restriction applies to (a) textile and leather articles intended to come into contact with the skin, (b) childcare articles, (c) two-component room temperature vulcanization molding kits (RTV-2 molding kits).	Table T
Dimethyl Fumarate (DMF)	0.1		624-49-7
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)	1000		1937-37-7
Ethylhexyl diphenyl phosphate (EHDPP)	1000		1241-94-7
Fluorinated greenhouse gases (GHG) (HFC, PFC, SF6)	Not detectable	Restriction applies to both manufacturing processes and products.	Table Q
Formaldehyde	Not detectable	Restriction only applies to wood products.	50-00-0
Hexabromocyclododecane (HBCDD) and all major diastereoisomers	100	Substances may not be intentionally added to parts/products.	25637-99-4; 3194-55-6; 134237-50-6; 134237-51-7; 134237-52-8
Imidazolidine-2-thione; (2-imidazoline-2-thiol)	1000		96-45-7
Lead Chromate	1000		7758-97-6
Nickel and its compounds	1000	Metallic nickel or nickel alloy exempt in all applications except external chassis/case parts likely to result in prolonged skin exposure (10 minutes on three or more occasions within two weeks, or 30 minutes on one or more occasions within two weeks). No exemptions for organo-nickel compounds.	Table H
N,N-dimethylformamide	1000		68-12-2

TABLE 1 - Banned or Restricted Substances

Substance	Threshold Limit (mg substance / kg homogenous material =ppm)	Explanations / Exemptions / Effective dates	Reference Appendix B / CAS #
Ozone depleting substances (Class I & Class II CFCs and HCFCs)	Not detectable	Restriction applies to both manufacturing processes and products.	Table C, E. See also Annexes A, B, C, E of Montreal Protocol
Pentazinc chromate octahydroxide	1000		49663-84-5
Perfluorohexane-1-sulphonic acid and its salts – 'PFHxS'	25 ppb for PFHxS including its salts 1000 ppb for the individual PFHxS-related compounds or a combination of those compounds		355-46-4 and others
Perfluorocarboxylic acids containing 9 to 14 carbon atoms in the chain (C9-C14 PFCAs), their salts and C9-C14 PFCA-related substances	25 ppb for the sum of C9-C14 PFCAs and their salts or 260 ppb for the sum of C9-C14 PFCA-related substances		Table Y
Perfluorooctane sulfonates (PFOS), C8F17SO2X (X = OH, metal salt (O-M*), halide, amide, and other derivatives including polymers)	Intentionally added or 1 microgram/m2 of coated material for textiles or other coated materials Intentionally added or 1000 for all other materials (as the sum of PFOS)		Table O
Perfluorooctanoic acid (PFOA), and its salts ; Pentadecafluorooctanoic acid	25 ppb unintentional trace contaminant only		335-67-1 Table W
PFOA-related compounds	1 ppm unintentional trace contaminant only		Table W
Phenol,2-(2H-benzotriazol-2-yl)-4,6-bis(1,1-dimethylethyl)-	Not detectable		3846-71-7
Phenol, Isopropylated Phosphate (3:1) – 'PIP (3:1)'	Intentionally added	Substance may not be intentionally added to parts/products.	68937-41-7

TABLE 1 - Banned or Restricted Substances

Substance	Threshold Limit (mg substance / kg homogenous material =ppm)	Explanations / Exemptions / Effective dates	Reference Appendix B / CAS #
Phthalate: 1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	1000		68515-42-4
Phthalate: 1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear	1000		68515-50-4
Phthalate: Bis (2-ethylhexyl)phthalate (DEHP)	1000 (sum of DEHP, BBP and DBP)	Restriction applies to paint or surface coatings of on ear contact parts of headphones, headsets.	117-81-7
	1000	Restriction applies for all other applications.	
Phthalate: Benzyl butyl phthalate (BBP)	1000 (sum of DEHP, BBP and DBP)	Restriction applies to paint or surface coatings of on ear contact parts of headphones, headsets.	85-68-7
	1000	Restriction applies for all other applications.	
Phthalate: Benzyl Chloride	1000		100-44-7
Phthalate: Dibutyl phthalate (DBP)	1000 (sum of DEHP, BBP and DBP)	Restriction applies to paint or surface coatings of on ear contact parts of headphones, headsets.	84-74-2
	1000	Restriction applies for all other applications.	
Phthalate: Dihexyl phthalate (DnHP)	1000		84-75-3
Phthalate: Diisobutyl (DIBP)	1000		84-69-5
Phthalate: Diisodecyl phthalate (DIDP)	1000		26761-40-0 68515-49-1
Phthalate: Diisononyl phthalate (DINP)	1000		68515-48-0 28553-12-0
Phthalate: Di(methoxyethyl) phthalate (DMEP)	1000		117-82-8
Diisopentyl phthalate (DIPP)	1000		605-50-5
Phthalate: Dipentyl phthalate (DPP)	1000		131-18-0
Phthalate: Di-n-octyl phthalate (DNOP)	1000		117-84-0
Phthalate: N-pentyl-isopentylphthalate (nPiPP)	1000		776297-69-9

TABLE 1 - Banned or Restricted Substances

Substance	Threshold Limit (mg substance / kg homogenous material =ppm)	Explanations / Exemptions / Effective dates	Reference Appendix B / CAS #
Phthalate: Diethyl phthalate (DEP)	1000		84-66-2
Phthalate: Tris(o-cresyl)-phosphate	1000		78-30-8
Polychlorinated Biphenyls (PCBs) and Terphenyls (PCTs)	Not detectable		Table J
Polychlorinated naphthalene (PCNs)	Not detectable		Table N
Polycyclic Aromatic Hydrocarbons (PAH)	10 PPM (Sum of 18 PAH) and 1 PPM each for: Benzo[a]pyren, Benzo[e]pyrene, Benzo[a]anthracene, Chrysen, Benzo[b]fluoranthene, Benzo[j]fluoranthene, Benzo[k]fluoranthene, Dibenzo[a,h]-anthracene	Restriction applies to external plastics and soft surfaces that can experience frequent skin contact. Refer to Dell specification ENG0014187 for additional details. Concentration limit is the sum of all 18 PAHs.	Table P
Polyvinyl chloride (PVC)	1000	Restriction applies to mechanical plastic parts, plastic parts greater than 25 grams. Cables, connectors, electronic components, battery trays, magnetic tape, and similar non-mechanical plastic parts are exempt unless designated as Halogen Free or PVC-Free products.	9002-86-2
Potassium hydroxyoctaoxodizincatedichromate	1000		11103-86-9
Radioactive substances	Not detectable		Table R
Red Phosphorous	1000	Restriction applies to Red Phosphorous flame retardants in molding compounds.	7723-14-0
Strontium chromate	1000		7789-06-2
Tributyl tin (TBT), Triphenyl tin (TPT) and Tributyl Tin Oxide (TBTO) compounds	Not detectable		Table M
Tri-n-butyl phosphate (TNBP)	1000	Restriction applies to exterior product enclosures.	126-73-8

TABLE 1 - Banned or Restricted Substances

Substance	Threshold Limit (mg substance / kg homogenous material =ppm)	Explanations / Exemptions / Effective dates	Reference Appendix B / CAS #
Tri-o-cresyl phosphate or Tricresyl phosphate (TCP)	1000	Restriction applies to mechanical plastic parts above 25 grams. Exempted in PCB laminates, electronic components and cable insulations.	78-30-8; 1330-78-5
Triphenyl phosphate	1000	Restriction applies to exterior product enclosures.	115-86-6
Tris(2-chloroethyl)phosphate (TCEP)	1000		115-96-8
Trixylyl phosphate	1000		25155-23-1

3.2 Material Declaration Requirements

To encourage industry alignment with IEC 62474 "Material Declaration for Products of and for the Electrotechnical Industry", Dell Technologies is requesting supplier disclosure of the list of substances (Table 2 below). It is important to note that the thresholds listed in Table 2 are at the homogenous material level although the regulation or standard where the substance is listed may be specified at the article or product level.

TABLE 2 – Material Declaration Requirements at Homogeneous Material Level

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Examples of Use	Reference Appendix B / CAS #
Antimony and its compounds	1000	Pigment, paint, catalyst, lead free solder, stabilizer, n-type dopant, flame retardant catalyst.	Table V
1,1'-[ethane-1,2-diylbisoxy]bis[2,4,6-tribromobenzene]	1000	Additive flame retardant in ABS, PC HIPS, thermoplastics and thermoset resins, coatings	37853-59-1
1,2-bis(2-methoxyethoxy)ethane (TEGDME; triglyme)	1000	Solvent may be used in battery electrolytes for lithium batteries. May be in found in printing inks.	112-49-2
1,2-Diethoxyethane	1000	Solvent used in electrolytes for lithium batteries.	629-14-1
1,2-dimethoxyethane; ethylene glycol dimethyl ether (EGDME)	1000	Solvent used in battery electrolytes for lithium batteries. May be in found in printing inks and paint strippers.	110-71-4
1,3-propanesultone	1000	Electrolyte fluid of rechargeable lithium ion batteries	1120-71-4
2,2-bis(4'-hydroxyphenyl)-4-methylpentane	1000	e.g. Raw material for epoxy resins, Raw materials for polycarbonate resin, Surface coatings, Synthetic resin additives, Liquid crystal materials, Photosensitizers, Information recording agents, Engineering plastic materials, Electronic functional materials; may be used as substitute for BPA	6807-17-6
2,2',6,6'-tetrabromo-4,4'-isopropylidenediphenol	1000	Additive flame retardant in ABS, PC HIPS, thermoplastics and thermoset resins, coatings	79-94-7

TABLE 2 – Material Declaration Requirements at Homogeneous Material Level

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Examples of Use	Reference Appendix B / CAS #
2-(2H-benzotriazol-2-yl)-4-(1,1,3,3-tetramethylbutyl)phenol (UV-329)	1000	UV absorber/protection agent. Typical applications include air care products, coating products, adhesives and sealants, lubricants and greases, polishes and waxes, and polycarbonate covers, such as those for sensors and lights.	3147-75-9
2,4,6-tri-tert-butylphenol	1000	May be used either as an intermediate to or directly as an antoxidant/stabiliser in plastic materials	732-26-3
2-(dimethylamino)-2-[(4-methylphenyl)methyl]-1-[4-(morpholin-4-yl)phenyl]butan-1-one	1000	Photo-initiator for UV inks and coatings. Typical applications include displays, coatings, inks, resists.	119344-86-4
4,4'-(1-methylpropylidene)bisphenol	1000	Antioxidant for plasticizer and PVC, ink, paint and adhesive; used as monomer in epoxy resins and plastics	77-40-7
4,4'-Dihydroxybenzophenone	1000	Manufacture of plastics	611-99-4
6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol	1000	Adhesives, sealants, lubricants, fuels, hydraulic fluids, metal working, antioxidant/stabilizer for rubber and plastics	119-47-1
Aluminosilicate Refractory Ceramic Fibers	1000	Thermal insulation for high temperature test equipment.	-
Ammonium pentadecafluorooctanoate (APFO)	1000	APFO is used as an emulsion stabilizer to manufacture polyvinylidine fluoride (PVDF) and other fluorinated polymers and elastomers and can be found in concentrations up to 1% w/w in these plastics.	3825-26-1
Barium diboron tetraoxide	1000	Used in paints and coatings and in some ceramic electronic components	13701-59-2
Benzo[ghi]perylene	1000	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers	191-24-2

TABLE 2 – Material Declaration Requirements at Homogeneous Material Level

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Examples of Use	Reference Appendix B / CAS #
Benzo[k]fluoranthene	1000	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers. Note that substance is restricted (threshold 1 ppm) for external plastics and soft surfaces that can experience frequent skin contact	207-08-9
Beryllium and its compounds	1000	Ceramics, metal alloy, copper-beryllium alloy, catalyst, precipitation hardening alloy, copper-beryllium alloy for spring, solder.	Table U
Beryllium oxide	1000	Ceramics	1304-56-9
Bis(2-(2-methoxyethoxy)ethyl)ether	1000	Solvent in electrolyte in lithium-ion batteries	143-24-8
Bis(2-ethylhexyl) tetrabromophthalate	1000	Used as an additive flame retardant and as a plasticiser for flexible polyvinylchloride and for use in wire and cable insulation, film and sheeting, carpet backing, coated fabrics, wall coverings, sealant and adhesives	26040-51-7
Bis(4-chlorophenyl) sulphone	1000	Additive for thermoplastic resin (fluoroethane) and fluoropolymers for rubber production	80-07-9
Bisphenol-F (4,4'-methylenediphenol)	1000	Manufacture of plastics	620-92-8
Bisphenol-S (4,4'-sulphonyldiphenol)	1000	Manufacture of polycarbonate resins (PC)	80-09-1
Boric acid	1000	In wood veneers/ pressed wooden panels as starch additive, flame retardant and stabilizer in amino-plastic resin, wood preservative, as flame retardant in wood, cotton and other plant derived material.	10043-35-3, 11113-50-1
Brominated Flame Retardant (excl. PBB, PBDE, HBCDD and TBBPA)	1000	Flame retardant use on electrical and mechanical components.	Table L

TABLE 2 – Material Declaration Requirements at Homogeneous Material Level

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Examples of Use	Reference Appendix B / CAS #
Bumetrizole (UV-326)	1000	UV protection agent. Formulations are used for coatings, textile dyes and impregnation products, production of polymers like rubber production and processing and rigid foams and flexible foams, adhesives and sealants, lubricants, and greases.	3896-11-5
Chlorinated Flame Retardant	1000	Flame retardant use on electrical and mechanical components.	Table L
Cobalt	1000	Reporting requirement applies to batteries only	7440-48-4
Cobalt dichloride	1000	Pneumatic panels to indicate water contamination.	7646-79-9
Decabromo-diphenyl-ethane (DBDPE)	Intentional use of substances in parts/products	Flame retardant	84852-53-9
Decamethylcyclopentasiloxane	1000	Siloxanes are monomers used to manufacture silicones. Residuals may remain in silicone polymers and copolymers.	541-02-6
Diboron trioxide	1000	Found in wood veneers, glass/fiber optics and ceramics - for industrial applications.	1303-86-2
Dibutylbis(pentane-2,4-dionato-O,O')tin	1000	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.	22673-19-4
Dibutyltin dichloride (DBTC)	1000	Ingredient in some paint thinner and as heat stabilizer for PVC.	683-18-1
Diisooctyl phthalate	1000		27554-26-3

TABLE 2 – Material Declaration Requirements at Homogeneous Material Level

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Examples of Use	Reference Appendix B / CAS #
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	1000	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.	3648-18-8 91648-39-4
Diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide	1000	Photopolymerization initiator; Coating material/paint; UV-curable resin; Resin additive; Silk screen printing ink; Cable assembly (adhesive); Surface treatment marking ink; Solder mask (photoinitiator)	75980-60-8
Disodium octaborate	1000	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.	12008-41-2
Disodium tetraborate, anhydrous	1000	In wood veneers/ pressed wooden panels as starch additive, flame retardant and stabilizer in amino-plastic resin, wood preservative.	1303-96-4, 1330-43-4, 12179-04-3,
Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28)	1000	Dye for textiles and paper	573-58-0
[Phthalato(2-)]dioxotrilead	1000	Heat stabilizer for plastics, for example for wiring and cabling insulation	69011-06-9
Dioxobis(stearato)trilead	1000	Heat stabilizer for plastics, for example for wiring and cabling insulation	12578-12-0
Dodecamethylcyclohexasiloxane	1000	Siloxanes are monomers used to manufacture silicones. They may remain as unreacted in silicone polymers and copolymers, used in many	540-97-6

TABLE 2 – Material Declaration Requirements at Homogeneous Material Level

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Examples of Use	Reference Appendix B / CAS #
		electrotechnical equipment product categories.	
Fatty acids, C16-18, lead salts	1000	Heat stabilizer for plastics, for example for wiring and cabling insulation	91031-62-8
Fluoranthene	1000	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers. Note that substance is restricted (threshold 1 ppm) for external plastics and soft surfaces that can experience frequent skin contact	206-44-0; 93951-69-0
Hexahydromethylphthalic anhydride	1000	Primary use is as a hardener for epoxy resins.	25550-51-0
Hexahydro-4-methylphthalic anhydride	1000	Primary use is as a hardener for epoxy resins.	19438-60-9
Hexahydro-1-methylphthalic anhydride	1000	Primary use is as a hardener for epoxy resins.	48122-14-1
Hexahydro-3-methylphthalic anhydride	1000	Primary use is as a hardener for epoxy resins.	57110-29-9
Isobutyl 4-hydroxybenzoate	1000	Used in the manufacture of substances and in coating products, fillers, putties, plasters, modelling clay, and inks and toners.	4247-02-3
Lead cyanamidate	1000	Used in anticorrosion coatings e.g. steel articles	20837-86-9
Lead dinitrate	1000	Heat stabilizer in nylon and polyesters, also used as a coating on paper for photo thermography	10099-74-8
Lead oxide sulfate	1000	Heat stabilizer for PVC used for wiring and cabling insulation	12036-76-9
Lead titanium zirconium oxide	1000	In piezoelectric components, ultrasound transducers, gas igniters, ultrasonic motors, ceramic capacitors and other electronic components that use piezoelectric materials	12626-81-2

TABLE 2 – Material Declaration Requirements at Homogeneous Material Level

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Examples of Use	Reference Appendix B / CAS #
Melamine	1000	A monomer combined with formaldehyde and other agents to produce melamine resins. Used as an intermediate chemical for the production of flame retardants and as flame retardant itself. Used in coatings and inks.	108-78-1
Neodymium	1000	Reporting requirement applies only to HDD and their parts	7440-00-8
Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts	1000	Plasticizer, lubricant, corrosion inhibitor	335-76-2 3830-45-3 3108-42-7
Octamethylcyclotetrasiloxane	1000	Siloxanes are monomers used to manufacture silicones. They may remain as unreacted in silicone polymers and copolymers, used in many electrotechnical equipment product categories.	556-67-2
Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol	1000	Protective paints and coatings, lacquers and varnishes, adhesives and sealants, rubber formulations, polymer production, antioxidant in rubber	68512-30-1
Orthoboric acid, sodium salt	1000	As flame retardant/adhesive ingredients for wood, paper, cotton and other plant-derived materials; glass manufacturing	25747-83-5 22454-04-2 14312-40-4 1333-73-9 13840-56-7 14890-53-0
Pentalead tetraoxide sulphate	1000	Heat stabilizer for plastics; for example, non-transparent PVC	12065-90-6

TABLE 2 – Material Declaration Requirements at Homogeneous Material Level

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Examples of Use	Reference Appendix B / CAS #
Per- and polyfluoroalkyl substances (PFASs)	Intentional use of substances in parts/products	Reduction of friction, prevention of wear, semiconductors, coatings, battery electrodes, capacitors, wiring insulation, LCD displays, printed circuit boards Dell intends to communicate via this specification restrictions on PFAS, possibly as early as mid-2027 for all uses in electronics except where exempted as defined in future revisions of this specification.	Table Z
Perchlorates	6 ppb	Reporting requirement applies to lithium batteries, coin cell batteries	Table X
Perfluorobutane sulfonic acid (PFBS) and its salts	1000	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.	25628-08-4 34454-97-2 375-73-5 375-72-4
Perfluoroheptanoic acid and its salts	1000	Greases, textiles and other coated products, and emulsifiers used for manufacturing the Fluoropolymers and fluoroelastomers. Used as a stain or water repellent	375-85-9 20109-59-5 6130-43-4 21049-36-5
Perfluorononan-1-oic-acid and its sodium and ammonium salts	1000	Surfactant in the production of the fluoropolymer polyvinylidene fluoride (PVDF)	375-95-1, 4149-60-4, 21049-39-8
Phenanthrene	1000	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers. Note that substance is restricted (threshold 1 ppm) for external plastics and soft surfaces that can experience frequent skin contact.	85-01-8
Phthalate: Dicyclohexyl phthalate	1000	plasticizer, dye, pigment, paint, ink, manufacture of adhesive, lubricant	84-61-7

TABLE 2 – Material Declaration Requirements at Homogeneous Material Level

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Examples of Use	Reference Appendix B / CAS #
Phthalate: Diundecyl phthalate (DuDP)	1000	plasticizer	3648-20-2
Phthalate: Diisohexyl phthalate	1000	Used as a plasticizer for certain plastics and rubbers	71850-09-4
Polyvinyl Chloride (PVC)	1000	Cables, connectors, electronic components, battery trays, magnetic tape, and similar non-mechanical plastic parts.	9002-86-2
Pyrene	1000	Impurities in carbon black, which is used as coloring agent in plastics and softener in rubbers. Note that substance is restricted (threshold 1 ppm) for external plastics and soft surfaces that can experience frequent skin contact	129-00-0 1718-52-1
Pyrochlore, antimony lead yellow	1000	Used as yellow pigment for coloring plastics and paint	8012-00-8
reaction mass of 2,2,3,3,5,5,6,6-octafluoro-4-(1,1,1,2,3,3,3-heptafluoropropan-2-yl)morpholine and 2,2,3,3,5,5,6,6-octafluoro-4-(heptafluoropropyl)morpholine	1000	Heat transfer fluid	
Silicic acid (H2Si2O5), barium salt (1:1), lead-doped	1000	Used in UV emitting light bulbs and lamps	68784-75-8
Sulfurous acid, lead salt, dibasic	1000	Heat stabilizer for PVC, for example for wiring and cabling insulation	62229-08-7
Terphenyl, hydrogenated	1000	Plasticizers, sealants, epoxy adhesives, paints and heat sinks	61788-32-7
Tetraboron disodium heptaoxide, hydrate	1000	In wood veneers/ pressed wooden panels as starch additive, flame retardant and stabilizer in aminoplastic resin, wood preservative	12267-73-1
Tetrabromobisphenol A (TBBPA) additive and reactive	1000	Flame retardant used in PCB Laminates and other electrical components.	30496-13-0
Trilead dioxide phosphonate	1000	Heat stabilizer for PVC, for example for wiring and cabling insulation	12141-20-7

TABLE 2 – Material Declaration Requirements at Homogeneous Material Level

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Examples of Use	Reference Appendix B / CAS #
Tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with ≥ 0.1% w/w of 4-nonylphenol, branched and linear (4-NP)	1000	Stabilizer and antioxidant in the processing of various plastic materials such as PVC, Polyolefines or rubbers	3050-88-2 31631-13-7 106599-06-8
Zirconia Aluminosilicate Refractory Ceramic Fiber	1000	Thermal insulation for high temperature test equipment.	-

3.3 BFR/CFR/PVC-Free "Halogen Free" Requirements

All parts and/or products designed to satisfy "halogen-free" requirements must satisfy Dell Technologies' BFR/CFR/PVC-Free Specification (formerly "Dell Halogen-Free Specification"), p/n ENV0199 (in Agile) in addition to this specification. Parts and/or products without a "halogen-free" requirement are not required to comply with ENV0199 but with this specification.

3.4 EPEAT substance requirements

Products which are required to be registered with EPEAT must meet the requirements listed in the Dell specification ENV0425.

Table 3 references optional EPEAT criteria that individual products may need to comply with depending on EPEAT registration. Individual product requirements are communicated to suppliers separately.

Table 3 – Optional EPEAT criteria

Criterion	Explanation
Reduction of substances on the European Union REACH Regulation Candidate List of SVHCs for Authorization	See EPEAT-COC-2025 Criterion 6.1.4
Further reduction of bromine and chlorine content of plastic materials / in plastic parts	See EPEAT-COC-2025 criterion 6.1.6
Reduction of PFAS content in plastic parts	See EPEAT-COC-2025 Criterion 6.1.7
Reduction of beryllium content	See EPEAT-COC-2025 criterion 6.1.8
Suitability and risk assessment of materials in prolonged skin contact	See EPEAT-COC-2025 criterion 6.1.9
Record of declarable substances	Required for all products, not only for EPEAT registered products.
Restriction of PFAS in packaging	Required for all products, not only for EPEAT registered products.

Table 3 – Optional EPEAT criteria

Criterion	Explanation
Chemical assessment and selection	Flame retardants and plasticizers in plastic parts > 25 g must be assessed in accordance with the GreenScreen for Safer Chemicals method and assigned a GreenScreen Benchmark score of 2 or more. Exemptions listed in IEEE Std 1680.1™-2018 and in NSF/ANSI 426 – 2018 apply.
Record of IEC 62474 declarable substances	Required for all products

3.5 TCO substance requirements

Following requirements apply for products designed to be TCO certified:

Halogens (mandate 7.2.1, TCO Certified Generation 10):

- Product housing, printed circuit board (PCB) laminates, and external cable parts above 0.5 grams must not contain intentionally added (additive or reactive) halogenated flame retardant, plasticizer or vinyl polymer stabilizer substances.
- Exempted are all other parts, such as electronic components and PCB laminates sealed inside electronic components.
- The largest PCB by area in the power supply unit (internal/external) must be tested for bromine and chlorine.

Maximum concentration values tolerated for a restricted substance is 0.1% by weight of the material in homogeneous materials.

Non-halogenated substances (mandate 7.3.1, TCO Certified Generation 10):

- Product housing parts, printed circuit board (PCB) laminates, and external cable parts above 0.5 grams must only contain intentionally added (additive or reactive) non-halogenated flame retardants and vinyl polymer stabilizers that appear on TCO Certified Accepted Substance List. .
- Exempted are all other parts, such as electronic components and PCB laminates sealed inside electronic components.

Plasticizers (mandate 7.4.1, TCO Certified Generation 10):

- Product housing and cable/wire parts above 0.5 grams must only contain intentionally added plasticizers that appear on TCO Certified Accepted Substance List. Exempted are connectors and wires sealed inside electronic components.

- The product must not contain Bis (2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP), and Diisobutyl phthalate (DIBP). No parts of the product are exempted.
- All substances of a plasticizer mixture must be accounted for. Non-accepted ingredients must not exceed concentration levels of 0.1% by weight of the plasticizer.

3.6 Taiwan Green Mark substance requirements

Parts and/or products designed to be eligible for the Taiwan Green Mark must satisfy substance restrictions listed in Table 4.

Table 4 – Taiwan Green Mark Substance Restrictions

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Explanation / Exemption / Effective Date	Reference Appendix B / CAS #
Cadmium and its compounds	2	Restriction applies to plastic parts greater than 25 grams.	Table B
Cadmium and its compounds	5	Built-in batteries	Table B
Chromium VI and its compounds	10	Restriction applies to plastic parts greater than 25 grams.	Table D
Lead and its compounds	2	Restriction applies to plastic parts greater than 25 grams.	Table F
Lead and its compounds	15	Built-in batteries	Table F
Mercury and its compounds	2	Restriction applies to plastic parts greater than 25 grams.	Table G
Mercury and its compounds	0,25	Built-in batteries	Table G
Brominated flame retardants PBB & PBDE	10	Restriction applies to plastic parts greater than 25 grams.	Table I
Short Chained Chlorinated Paraffins (SCCP)	10	Restriction applies to plastic parts greater than 25 grams.	Table S

4. Product Packaging Content Restrictions

Table 5 lists substances that Dell Technologies has banned or restricted in product packaging materials supplied to or designed by Dell Technologies Inc. These substances cannot be used in the manufacturing of or contained in product packaging materials supplied to or designed by Dell Technologies Inc. In some instances, a threshold limit has been established to account for unavoidable impurities. The material is acceptable if the restricted substances are present at a quantity below the threshold limit for a controlled application. For packaging recycle marking requirements (SPI marks and country-specific marks), please see Dell Technologies WW Packaging Recycle Marking Specification (ENV0427, in Agile).

Refer to Appendix B for a detailed list of CAS #'s for each substance below.

Table 5 – Packaging Content Restrictions

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Explanation / Exemption / Effective Date	Reference Appendix B / CAS #
Cadmium, Chromium VI, Lead and Mercury compounds	100 (sum of concentrations)	None	Tables B, D, F, G
Ozone depleting substances (Class I & Class II CFCs and HCFCs)	Not detectable	None	Table C, E. See also Annexes A, B, C, E of Montreal Protocol
Halogenated plastics or polymers (ex: PVC)	Not detectable	None	See Section 2.4 for definition
Formaldehyde	Not detectable	Restriction only applies to wood products. Transportation pallets are excluded from this restriction	50-00-0
Mineral oil aromatic hydrocarbons (MOAH) with 1 to 7 aromatic rings	0,1% mass concentration in the ink		
Mineral oil aromatic hydrocarbons (MOAH) with 3 to 7 aromatic rings	1ppm mass concentration in the ink		
Mineral oil saturated hydrocarbons (MOSH) with 16 to 35 carbon atoms	0,1% mass concentration in the ink		
Per- and polyfluoroalkyl substances (PFASs)	Intentional use of substance	No exemption Effective October 1, 2024	Table Z

Use of elemental chlorine as a bleaching agent to bleach virgin or recovered fibers in product packaging and printed documentation is prohibited. The use of recovered fibers that were previously bleached is acceptable. Packaging materials that are elemental chlorine free (ECF), processed chlorine free (PCF), or totally chlorine free (TCF) meet Dell's requirement.

Dell Technologies restricts the use of free-rise polyurethane based foam-in-place.

5. Battery Content Restrictions

Table 6 lists substances that Dell Technologies has restricted in batteries supplied to or designed by Dell Technologies Inc. above the indicated threshold limit for unavoidable impurities. Battery technology used in Dell Technologies products cannot be based on lead**, mercury or cadmium. Further batteries must comply with applicable restrictions set out Regulation (EC) No 1907/2006 (REACH)

Refer to Appendix B for a detailed list of CAS #'s for each substance below.

Dell Technologies requires reporting of the use of Perchlorates if those are contained in lithium batteries, coin cell batteries at a concentration of 1000 ppm or more (see Table 2 and refer to Table X for CAS #'s).

Table 6 – Battery Content Restrictions

Substance	Threshold Limit (mg/kg=ppm)	Exemptions	Reference Appendix B
Cadmium and its compounds	5	None	Table B
Lead and its compounds	40	Lead-acid batteries weighing 5kg or more (UPS)**	Table F
Mercury and its compounds	1	None	Table G
** Uninterruptible Power Supply (UPS) units with batteries weighing more than 5kg may utilize lead-acid technology. Batteries for this application are subject to certain fees and material labeling requirements.			

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6. Non-Electrical/Non-Electronic Parts and Products Requirements

All Dell Technologies branded non-electrical and non-electronic parts and/or products must satisfy the minimum requirements below (this list may not be comprehensive and suppliers should comply with local laws and regulations where the products are sold):

Table 7 - Non-Electrical/Non-Electronic Parts and Products Content Restrictions

Substance	Threshold Limit (mg/kg=ppm)
Lead and its compounds (Pb)	90 PPM
Cadmium and its compounds (Cd)	100 PPM
Mercury and its compounds (Hg)	Not Detectable
Hexavalent Chromium and its compounds (Cr+6)	Not Detectable
Phthalate DEHP, BBP, DBP, DINP, DIDP, DNOP, DIBP and all other phthalates	1000 PPM for each phthalate

Table 7 - Non-Electrical/Non-Electronic Parts and Products Content Restrictions

Substance	Threshold Limit (mg/kg=ppm)
Nickel and its compounds	1000 PPM on all surfaces with expected direct and prolonged skin exposure (10 minutes on three or more occasions within two weeks, or 30 minutes on one or more occasions within two weeks).
Perfluorooctane sulfonates (PFOS) and its derivatives (Table O)	Intentionally added or 1 microgram/m2 of coated material for textiles or other coated materials
	Intentionally added of 1000 ppm for all other materials (as the sum of PFOS)
Azocolorants and Azodyes	30 PPM. Restriction applies to textile and leather articles that may come into direct and prolonged contact with the human skin or oral cavity. Refer to Table K.
Additional requirements for textiles, and apparels only (e.g. shirts, pants, coats, hats, gloves, shoes, backpacks, sleeves, cases…)	Adhere to the latest requirements from the American Apparel & Footwear Association (AAFA) Restricted Substance List (RSL)
Per- and polyfluoroalkyl substances (PFASs)	Intentional use of substance. Refer to Table Z.

Table 8 - Non-Electrical/Non-Electronic Parts and Products Material Declaration Requirement

Substance	Threshold Limit (mg substance / kg homogeneous weight =ppm)	Examples of Use	Reference Appendix B / CAS #
Substances of Very High Concern	1000		Refer to ECHA Candidate List of substances of very high concern for Authorisation

7. Antimicrobial & Biocidal Substance Restrictions

Antimicrobial and/or Biocidal substances not limited to those defined by US EPA FIFRA and EU Biocidal Products Regulation 528/2012 (BPR) are restricted worldwide for use in all Dell Technologies products, even if the antimicrobial/biocidal substance is approved for use by the US EPA or EU BPR.

8. Expectations on suppliers

8.1 Change notification

If the material, component, assembly or product being supplied to Dell does not meet one or more of the applicable requirements of this specification, the supplier must immediately notify Dell. This notification also applies if the supplier or a subcontractor(s) makes changes in their operations that will cause a material, component, assembly or product to no longer comply with this specification.

8.2 Non-compliance resolution

If a restricted substance is used in a nonexempt application above the threshold limit, the following actions may be required to resolve any deviations from this specification:

1. Requalification of parts to comply with specification/ phase out and replacement of use, which may result in removal of non-compliant suppliers from the Dell AVL
2. Delay of product launch
3. Stop ship of product to affected regions

Appendix A: Applicable RoHS Exemptions

Only the following RoHS exemptions can be used on Dell parts.

Exemption Number	Exemption	Scope and dates of applicability
6(a)-I	Lead as an alloying element in steel for machining purposes containing up to 0.35% lead by weight and in batch hot dip galvanised steel components containing up to 0.2% lead by weight	
6(b)-I	Lead as an alloying element in aluminium containing up to 0,4 % lead by weight, provided it stems from lead-bearing aluminium scrap recycling	
6(b)-II	Lead as an alloying element in aluminium for machining purposes with a lead content up to 0,4 % by weight	
6(c)	Copper alloy containing up to 4 % lead by weight	
7(a)	Lead in high melting temperature type solders (i.e. lead- based alloys containing 85 % by weight or more lead)	
7(c)-I	Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound	
7(c)-II	Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher	
13(a)	Lead in white glasses used for optical applications	

Exemption Number	Exemption	Scope and dates of applicability
15(a)	Lead in solders to complete a viable electrical connection between the semiconductor die and carrier within integrated circuit flip chip packages where at least one of the following criteria applies: • a semiconductor technology node of 90 nm or larger; • a single die of 300 mm2 or larger in any semiconductor technology node; • stacked die packages with die of 300 mm2 or larger, or silicon interposers of 300 mm2 or larger.	

Appendix B: List of CAS Numbers

Table A – Asbestos and its Compounds

Example Compounds	CAS Number
Asbestos	1332-21-4
Actinolite	77536-66-4
Amosite (Grunerite)	12172-73-5
Anthophyllite	77536-67-5
Chrysotile	12001-29-5
Crocidolite	12001-28-4
Tremolite	77536-68-6

Table B - Cadmium and its Compounds

Example Compounds	CAS Number
Cadmium	7440-43-9
Cadmium oxide	1306-19-0
Cadmium sulfide	1306-23-6
Cadmium chloride	10108-64-2
Cadmium sulfate	10124-36-4
Other cadmium compounds	-

Table C – Chlorofluorocarbons (CFC's)

Example Compounds	CAS Number
Trichlorofluoromethane	75-69-4
Dichlorodifluoromethane (CFC12)	75-71-8
Chlorotrifluoromethane (CFC 13)	75-72-9
Pentachlorofluoroethane (CFC 111)	354-56-3
Tetrachlorodifluoroethane (CFC 112)	76-12-0
Trichlorotrifluoroethane (CFC 113) 1,1,2 Trichloro-1,2,2 trifluoroethane	354-58-5 76-13-1
Dichlorotetrafluoroethane (CFC 114)	76-14-2
Monochloropentafluoroethane (CFC 115)	76-15-3
Heptachlorofluoropropane (CFC 211)	422-78-6 135401-87-5
Hexachlorodifluoropropane (CFC 212)	3182-26-1
Pentachlorotrifluoropropane (CFC 213)	2354-06-5 134237-31-3
Tetrachlorotetrafluoropropane (CFC 214) 1,1,1,3-Tetrachlorotetrafluoropropane	29255-31-0 2268-46-4

Table C – Chlorofluorocarbons (CFC's)

Example Compounds	CAS Number
Trichloropentafluoropropane (CFC 215) 1,1,1-Trichloropentafluoropropane 1,2,3-Trichloropentafluoropropane	1599-41-3 4259-43-2 76-17-5
Dichlorohexafluoropropane (CFC 216)	661-97-2
Monochloroheptafluoropropane (CFC 217)	422-86-6
Bromochlorodifluoromethane (Halon 1211)	353-59-3
Bromotrifluoromethane (Halon 1301)	75-63-8
Dibromotetrafluoroethane (Halon 2402)	124-73-2
Carbon Tetrachloride (Tetrachloromethane)	56-23-5
1,1,1, - Trichloroethane (methyl chloroform) and its isomers except 1,1,2-trichloroethane	71-55-6
Bromomethane (Methyl Bromide)	74-83-9
Bromodifluoromethane and isomers (HBFC's)	1511-62-2
Other Chlorofluorocarbons	-

Table D - Chromium VI and its Compounds

Example Compounds	CAS Number
Chromium (VI) oxide	1333-82-0
Barium chromate	10294-40-3
Calcium chromate	13765-19-0
Chromic acetate	1066-30-4
Chromium trioxide	1333-82-0
Lead (II) chromate	7758-97-6
Sodium chromate	7775-11-3
Sodium dichromate	10588-01-9
Strontium chromate	7789-06-2
Potassium dichromate	7778-50-9
Potassium chromate	7789-00-6
Zinc chromate	13530-65-9
Other hexavalent chromium compounds	-

Table E – Hydrochlorofluorocarbons (HCFC's)

Example Compounds	CAS Number
Dichlorofluoromethane (HCFC 21)	75-43-4
Chlorodifluoromethane (HCFC 22)	75-45-6
Chlorofluoromethane (HCFC 31)	593-70-4

Table E – Hydrochlorofluorocarbons (HCFC's)

Example Compounds	CAS Number
Tetrachlorofluoroethane (HCFC 121) 1,1,1,2-tetrachloro-2-fluoroethane (HCFC 121a) 1,1,2,2-tetracloro-1-fluoroethane	134237-32-4 354-11-0 354-14-3
Trichlorodifluoroethane (HCFC 122) 1,2,2-trichloro-1,1-difluoroethane	41834-16-6 354-21-2
Dichlorotrifluoroethane(HCFC 123) Dichloro-1,1,2-trifluoroethane 2,2-dichloro-1,1,1-trifluroethane 1,2-dichloro-1,1,2-trifluroethane (HCFC-123a) 1,1-dichloro-1,2,2-trifluroethane (HCFC-123b) 2,2-dichloro-1,1,2-trifluroethane (HCFC-123b)	34077-87-7 90454-18-5 306-83-2 354-23-4 812-04-4 812-04-4
Chlorotetrafluoroethane (HCFC 124) 2-chloro-1,1,1,2-tetrafluoroethane 1-chloro-1,1,2,2-tetrafluoroethane (HCFC 124a)	63938-10-3 2837-89-0 354-25-6
Trichlorofluoroethane (HCFC 131) 1-Fluoro-1,2,2-trichloroethane 1,1,1-trichloro-2-fluoroethane (HCFC131b)	27154-33-2;(134237-34-6) 359-28-4 811-95-0
Dichlorodifluoroethane (HCFC 132) 1,2-dichloro-1,1-difluoroethane (HCFC 132b) 1,1-dichloro-1,2-difluoroethane (HFCF 132c) 1,1-dichloro-2,2-difluoroethane 1,2-dichloro-1,2-difluoroethane	25915-78-0 1649-08-7 1842-05-3 471-43-2 431-06-1
Chlorotrifluoroethane (HCFC 133) 1-chloro-1,2,2-trifluoroethane 2-chloro-1,1,1-trifluoroethane (HCFC-133a)	1330-45-6 1330-45-6 75-88-7
Dichlorofluoroethane(HCFC 141) 1,1-dichloro-1-fluoroethane (HCFC-141b) 1,2-dichloro-1-fluoroethane	1717-00-6; (25167-88-8) 1717-00-6 430-57-9
Chlorodifluoroethane (HCFC 142) 1-chloro-1,1-difluoroethane (HCFC142b) 1-chloro-1,2-difluoroethane (HCFC142a)	25497-29-4 75-68-3 25497-29-4
Hexachlorofluoropropane (HCFC 221)	134237-35-7
Pentachlorodifluoropropane (HCFC 222)	134237-36-8
Tetrachlorotrifluropropane (HCFC 223)	134237-37-9
Trichlorotetrafluoropropane (HCFC 224)	134237-38-0

Table E – Hydrochlorofluorocarbons (HCFC's)

Example Compounds	CAS Number
Dichloropentafluoropropane, (Ethyne, fluoro-) (HCFC 225) 2,2-Dichloro-1,1,1,3,3-pentafluoropropane(HCFC 225aa) 2,3-Dichloro-1,1,1,2,3-pentafluoropropane (HCFC 225ba) 1,2-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225bb) 3,3-Dichloro-1,1,1,2,2-pentafluoropropane (HCFC 225ca) 1,3-Dichloro-1,1,2,2,3-pentafluoropropane (HCFC 225cb) 1,1-Dichloro-1,2,2,3,3-pentafluoropropane(HCFC 225cc) 1,2-Dichloro-1,1,3,3,3-pentafluoropropane (HCFC 225da) 1,3-Dichloro-1,1,2,3,3-pentafluoropropane (HCFC 225ea) 1,1-Dichloro-1,2,3,3,3-pentafluoropropane(HCFC 225eb)	127564-92-5; (2713-09-9) 128903-21-9 422-48-0 422-44-6 422-56-0 507-55-1 13474-88-9 431-86-7 136013-79-1 111512-56-2
Chlorohexafluoropropane (HCFC 226)	134308-72-8
Pentachlorofluoropropane (HCFC 231)	134190-48-0
Tetrachlorodifluoropropane (HCFC 232)	134237-39-1
Trichlorotrifluoropropane (HCFC 233) 1,1,1-Trichloro-3,3,3-trifluoropropane	134237-40-4 7125-83-9
Dichlorotetrafluoropropane (HCFC 234)	127564-83-4
Chloropentafluoropropane (HCFC 235) 1-Chloro-1,1,3,3,3-pentafluoropropane	134237-41-5 460-92-4
Tetrachlorofluoropropane (HCFC 241)	134190-49-1
Trichlorodifluoropropane (HCFC 242)	134237-42-6
Dichlorotrifluoropropane (HCFC 243) 1,1-dichloro-1,2,2-trifluoropropane 2,3-dichloro-1,1,1-trifluoropropane 3,3-Dichloro-1,1,1-trifluoropropane	134237-43-7 7125-99-7 338-75-0 460-69-5
Chlorotetrafluoropropane (HCFC 244) 3-chloro-1,1,2,2-tetrafluoropropane	134190-50-4 679-85-6
Trichlorofluoropropane (HCFC 251) 1,1,3-trichloro-1-fluoropropane	134190-51-5 818-99-5
Dichlorodifluoropropane (HCFC 252)	134190-52-6
Chlorotrifluoropropane (HCFC 253) 3-chloro-1,1,1-trifluoropropane (HCFC 253fb)	134237-44-8 460-35-5
Dichlorofluoropropane (HCFC 261) 1,1-dichloro-1-fluoropropane	134237-45-9 7799-56-6
Chlorodifluoropropane (HCFC 262) 2-chloro-1,3-difluoropropane	134190-53-7 102738-79-4
Chlorofluoropropane (HCFC 271) 2-chloro-2-fluoropropane	134190-54-8 420-44-0
Other Hydrofluorocarbons	-

Table F - Lead and its Compounds

Example Compounds	CAS Number
Lead	7439-92-1
Lead (II) sulfate	7446-14-2
Lead (II) carbonate	598-63-0
Lead chromate molybdate sulphate red	12656-85-8
Lead hydrocarbonate	1319-46-6
Lead acetate	301-04-2
Lead (II) acetate, trihydrate	6080-56-4
Lead phosphate	7446-27-7
Lead selenide	12069-00-0
Lead (IV) oxide	1309-60-0
Lead (II,IV) oxide	1314-41-6
Lead (II) sulfide	1314-87-0
Lead (II) oxide	1317-36-8
Lead (II) carbonate basic	1319-46-6
Lead hydroxidcarbonate	1344-36-1
Lead (II) phosphate	7446-27-7
Lead (II) chromate	7758-97-6
Lead (II) titanate	12060-00-3
Lead sulfate, sulphuric acid, lead salt	15739-80-7
Lead sulfochromate yellow	1344-37-2
Lead sulphate, tribasic	12202-17-4
Lead stearate	1072-35-1
Other lead compounds	-

Table G - Mercury and its Compounds

Example Compounds	CAS Number
Mercury	7439-97-6
Mercuric chloride	33631-63-9
Mercury (II) chloride	7487-94-7
Mercuric sulfate	7783-35-9
Mercuric nitrate	10045-94-0
Mercuric (II) oxide	21908-53-2
Mercuric sulfide	1344-48-5
Other mercury compounds	-

Table H - Nickel and its Compounds

Example Compounds	CAS Number
Nickel	7440-02-0
Nickel acetate	373-02-4
Nickel carbonate	3333-67-3
Nickel carbonyl	13463-39-3
Nickel hydroxide	12054-48-7 or 11113-74-9
Nickelocene	1271-28-9
Nickel oxide	1313-99-1
Nickel subsulfide	12035-72-2
Other nickel compounds	-

Table I – Polybrominated Biphenyls (PBBs) and their Ethers / Oxides (PBDEs)

Example Compounds	CAS Number
Bromobiphenyl and its ethers	2052-07-5 (2-Bromobiphenyl) 2113-57-7 (3-Bromobiphenyl 92-66-0 (4-Bromobiphenyl) 101-55-3 (ether)
Decabromobiphenyl and its ethers	13654-09-6 1163-19-5 (ether)
Dibromobiphenyl and its ethers	92-86-4 2050-47-7 (ether)
Heptabromobiphenylether	68928-80-3 446255-20-5
Hexabromobiphenyl and its ethers	59080-40-9 36355-01-8 (hexabromo-1,1'-biphenyl) 67774-32-7 (Firemaster FF-1) 36483-60-0 (ether) 446255-03-4 (ether)
Nonabromobiphenylether	63936-56-1
Octabromobiphenyl and its ethers	61288-13-9 32536-52-0 (ether)
Pentabromobidphenyl ether (note: Commercially available PeBDPO is a complex reaction mixture containing a variety of brominated diphenyloxides.	32534-81-9 (CAS number used for commercial grades of PeBDPO)
Polybrominated Biphenyls	59536-65-1
Tetrabromobiphenyl and its ethers	40088-45-7 40088-47-9 (ether)
Tribromobiphenyl ether	49690-94-0
Other PBBs / PBDEs	-

Table J - Polychlorinated Biphenyls (PCBs) and Terphenyls (PCTs)

Example Compounds	CAS Number
Polychlorinated Biphenyls	1336-36-3
Aroclor	12767-79-2
Chlorodiphenyl (Aroclor 1260)	11096-82-5
Kanechlor 500	27323-18-8
Aroclor 1254	11097-69-1
Terphenyls	26140-60-3
Other PCBs and PCTs	-

Table K – Azo colorants (aromatic amines that may be formed by azo dyes)

Example Compounds	CAS Number
biphenyl-4-ylamine	92-67-1
benzidine	92-87-5
4-chloro-o-toluidine	95-69-2
2-naphthylamine	91-59-8
o-aminoazotoluene	97-56-3
5-nitro-o-toluidine	99-55-8
4-chloroaniline	106-47-8
4-methoxy-m-phenylenediamine	615-05-4
4,4'-methylenedianiline	101-77-9
3,3'-dichlorobenzidine	91-94-1
3,3'-dimethoxybenzidine	119-90-4
3,3'-dimethylbenzidine	119-93-7
4,4'-methylenedi-o-toluidine	838-88-0
6-methoxy-m-toluidine	120-71-8
4,4'-methylene-bis(2-chloroaniline)	101-14-4
4,4'-oxydianiline	101-80-4
4,4'-thiodianiline	139-65-1
o-toluidine	95-53-4
4-methyl-m-phenylenediamine	95-80-7
2,4,5-trimethylaniline	137-17-7
o-anisidine	90-04-0
4-amino azobenzene	-

Table L – Brominated/Chlorinated flame retardants/additives (other than PBBs, PBDEs, HBCD and HBCDD)

Example Compounds	CAS Number
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(14) [Aliphatic/alicyclic brominated compounds]	-
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(15) [Aliphatic/alicyclic brominated compounds in combination with antimony compounds]	-
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(16) [Aromatic brominated compounds excluding brominated diphenyl ether and biphenyls)]	-
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(17) [Aromatic brominated compounds excluding brominated diphenyl ether and biphenyls) in combination with antimony compounds]	-
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(22) [Aliphatic/alicyclic chlorinated and brominated compounds]	-
Brominated flame retardant which comes under notation of ISO 1043-4 code number FR(42) [Brominated organic phosphorus compounds]	-
Poly(2,6-dibromo-phenylene oxide)	69882-11-7
Tetra-decabromo-diphenoxy-benzene	58965-66-5
1,2-Bis(2,4,6-tribromo-phenoxy) ethane	37853-59-1
3,5,3’,5’-Tetrabromo-bisphenol A (TBBA)	79-94-7
TBBA, unspecified	30496-13-0
TBBA-epichlorhydrin oligomer	40039-93-8
TBBA-TBBA-diglycidyl-ether oligomer	70682-74-5
TBBA carbonate oligomer	28906-13-0
TBBA carbonate oligomer, phenoxy end capped	94334-64-2
TBBA carbonate oligomer, 2,4,6-tribromo-phenol terminated	71342-77-3
TBBA-bisphenol A-phosgene polymer	32844-27-2
Brominated epoxy resin end-capped with tribromophenol	139638-58-7
Brominated epoxy resin end-capped with tribromophenol	135229-48-0
TBBA-(2,3-dibromo-propyl-ether)	21850-44-2
TBBA bis-(2-hydroxy-ethyl-ether)	4162-45-2
TBBA-bis-(allyl-ether)	25327-89-3
TBBA-dimethyl-ether	37853-61-5
Tetrabromo-bisphenol S	39635-79-5
TBBS-bis-(2,3-dibromo-propyl-ether)	42757-55-1

Table L – Brominated/Chlorinated flame retardants/additives (other than PBBs, PBDEs, HBCD and HBCDD)

Example Compounds	CAS Number
2,4-Dibromo-phenol	615-58-7
2,4,6-tribromo-phenol	118-79-6
Pentabromo-phenol	608-71-9
2,4,6-Tribromo-phenyl-alltl-ether	3278-89-5
Tribromo-phenyl-allyl-ether, unspecified	26762-91-4
Bis(methyl)tetrabromo-phtalate	55481-60-2
Bis(2-ethlhexyl)tetrabromo-phtalate	26040-51-7
2-Hydroxy-propyl-2-(2-hydroxy-ethoxy)-ethyl-TBP	20566-35-2
TBPA, glycol-and propylene-oxide esters	75790-69-1
N,N'-Ethylene –bis-(tetrabromo-phthalimide)	32588-76-4
Ethylene-bis85,6-dibromo-norbornane-2,3-dicarboximide)	52907-07-0
2,3-Dibromo-2-butene-1,4-diol	3234-02-4
Dibromo-neopentyl-glycol	3296-90-0
Dibromo-propanol	96-13-9
Tribromo-neopentyl-alcohol	36483-57-5
Poly tribromo-styrene	57137-10-7
Tribromo-styrene	61368-34-1
Dibromo-styrene grafted PP	171091-06-8
Poly-dibromo-styrene	31780-26-4
Bromo-/Chloro-paraffins	68955-41-9
Bromo-/Chloro-alpha-olefin	82600-56-4
Vinylbromide	593-60-2
Tris-(2,3-dibromo-propyl)-isocyanurate	52434-90-9
Tris(2,4-Dibromo-phenyl) phosphate	49690-63-3
Tris(tribromo-neopentyl) phosphate	19186-97-1
Chlorinated and brominated phosphate esther	125997-20-8
Pentabromo-toluene	87-83-2
Pentabromo-benzyl bromide	38521-51-6
1,3-Butadiene homopolymer,brominated	68441-46-3
Pentabromo-benzyl-acrylate, monomer	59447-55-1
Pentabromo-benzyl-acrylate, polymer	59447-57-3
Decabromo-diphenyl-ethane	84852-53-9
Tribromo-bisphenyl-maleinimide	59789-51-4
Brominated trimethylphenyl-lindane	59789-51-4
Tetrabromo-chyclo-octane	31454-48-5
1,2-Dibromo-4-(1,2 dibromo-methyl)-cyclo-hexane	3322-93-8
TBPA Na salt	25357-79-3

Table L – Brominated/Chlorinated flame retardants/additives (other than PBBs, PBDEs, HBCD and HBCDD)

Example Compounds	CAS Number
Tetrabromo phthalic anhydride	632-79-1
Other Brominated Flame Retardants	-
Tetrakis(2-chloroethyl) dichloroisopentyldiphosphate	38051-10-4
Tris(1-chloro-2-propyl)phosphate	13674-84-5
Tris(1,3-dichloro-2-propyl)phosphate	13674-87-8
Tris(2,3-dichloro-1-propyl)phosphate	66108-37-0
Other Chlorinated Flame Retardants	-

Table M – Tributyl tin (TBT), Triphenyl tin (TPT) and Triphenyl tin oxide (TPTO)

Example Compounds	CAS Number
Tributyl tin bromide	1461-23-0
Tributyl tin oxide	56-35-9
Tributyl tin acetate	56-36-0
Tributyl tin laurate	3090-36-6
Tributyl tin fluoride	1983-10-4
Triphenyl tin	668-34-8
Triphenyl tin chloride	639-58-7
Triphenyl tin hydroxide	76-87-9
Triphenyl tin acetate	900-95-8
Triphenyl tin fluoride	379-52-2

Table N – Polychlorinated Naphthalene (PCN)

Example Compounds	CAS Number
Trichloronaphthalene	1321-65-9
Tetrachloronaphthalene	1335-88-2
Pentachloronaphthalene	1321-64-8
Octachloronaphthalene	2234-13-1

Table O – Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF)

Example Compounds	CAS Number
Perfluorooctanesulfonyl fluoride	307-35-7
2-Propenoic acid, 2-methyl-, 2-[ethyl[(heptadecafluorooctyl)sulfonyl]amino] ethyl ester	376-14-7

Table O – Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF)

Example Compounds	CAS Number
2-Propenoic acid, 2-[butyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl ester	383-07-3
2-Propenoic acid, 2-[ethyl[(heptadecafluorooctyl)sulfonyl]amino]ethyl ester	423-82-5
N-allylheptadecafluorooctanesulphonamide	423-86-9
heptadecafluorooctanesulphonamide	754-91-6
1-Propanaminium, 3-[[(heptadecafluorooctyl)sulfonyl]amino]-N,N,N-trimethyl-,iodide	1652-63-7
Heptadecafluorooctanesulfonic acid	1763-23-1
Potassium heptadecafluoro-1-octanesulfonate	2795-39-3
Lithium heptadecafluorooctanesulphonate	29457-72-5
Ammonium heptadecafluoro-1-octanesulfonate	29081-56-9
Bis(2-hydroxyethyl)ammonium perfluorooctanesulfonate	70225-14-8
Heptadecafluorooctanesulfonic acid tetraethylammonium salt	56773-42-3
1-Decanaminium, N-decyl-N,N-dimethyl-, salt with 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-1-octanesulfonic acid (1:1;1-Decanaminium, N-decyl-N,N-dimethyl-, salt with 1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-1-octanesulfonic acid (1:1)	251099-16-8
N-ethyl-1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluorooctane-1-sulfonamide	4151-50-2
1,1,2,2,3,3,4,4,5,5,6,6,7,7,8,8,8-heptadecafluoro-N-methyloctane-1-sulfonamide	31506-32-8
N-ethylheptadecafluoro-N-(2-hydroxyethyl)octanesulphonamide	1691-99-2
Heptadecafluoro-N-(2-hydroxyethyl)-N-methyloctanesulphonamide	24448-09-7

Table P – Polycyclic Aromatic Hydrocarbons (PAHs)

Example Compounds	CAS Number
Acenaphthen	83-32-9
Acenaphthylen	208-96-8
Anthracen	120-12-7
Benzo[a]anthracen	56-55-3
Benzo[b]fluoranthen	205-99-2
Benzo[j]fluoranthen	205-82-3
Benzo[k]fluoranthen	207-08-9
Benzo[ghi]perylen	191-24-2
Benzo[a]pyren	50-32-8

Table P – Polycyclic Aromatic Hydrocarbons (PAHs)

Example Compounds	CAS Number
Benzo[e]pyren	192-97-2
Chrysene	218-01-9
Dibenzo[a,h]anthracen	53-70-3
Fluoranthen	206-44-0
Fluoren	86-73-7
Indeno[1,2,3-cd]pyren	193-39-5
Naphthalin	91-20-3
Phenanthrene	85-01-8
Pyrene	129-00-0
Other PAHs	-

Table Q – Fluorinated Greenhouse Gases

Example Compounds	CAS Number
Carbon tetrafluoride (Perfluoromethane)	75-73-0
Perfluoroethane (Hexafluoroethane)	76-16-4
Perfluoropropane (Octafluoroproane)	76-19-7
Perfluorobutane (Decafluorobutane)	355-25-9
Perfluoropentane (Dodecafluoropentane)	678-26-2
Perfluorohexane (Tetradecafluorohexane)	355-42-0
Perfluorocyclobutane	115-25-3
Sulfur Hexafluoride (SF6)	2551-62-4
HFC-23 CHF3	75-46-7
HFC-32 CH2F2	75-10-5
HFC-41 CH3F	593-53-3
HFC-43-10mee C5H2F10	138495-42-8
HFC-125 C2HF5	354-33-6
HFC-134 C2H2F4	359-35-3
HFC-134a CH2FCF3	811-97-2
HFC-152a C2H4F2	75-37-6
HFC-143 C2H3F3	430-66-0
HFC-143a C2H3F3	420-46-2
HFC-227ea C3HF7	431-89-0
HFC-236cb CH2FCF2CF3	677-56-5
HFC-236ea CHF2CHFCF3	431-63-0
HFC-236fa C3H2F6	690-39-1

Table Q – Fluorinated Greenhouse Gases

Example Compounds	CAS Number
HFC-245ca C3H3F5	679-86-7
HFC-245fa CHF2CH2CF3	460-73-1
HFC-365mfc CF3CH2CF2CH3	406-58-6

Table R – Radioactive Substances

Example Compounds	CAS Number
Uranium-238	7440-61-1
Radon	10043-92-2
Americium-241	14596-10-2
Thorium-232	7440-29-1
Cesium (Radioactive Isotopes only)	7440-46-2 (Cs-137 010045-97-3)
Strontium (Radioactive Isotopes only)	(elemental 7440-24-6) (Sr-90 10098-97-2)
Other radioactive substances	-

Table S – Alkanes, Short Chain Chlorinated Paraffins C_{10-13} (SCCPs) and Medium Chain Chlorinated Paraffins C_{14-17} (MCCPs)

Example Compounds	CAS Number
Alkanes, C10-13, chloro	85535-84-8
Alkanes, C10-12, chloro	108171-26-2
Alkanes, C12-13, chloro	71011-12-6
Alkanes, chloro	61788-76-9
Other Short Chain Chlorinated Paraffins	-
Tetradecane, chloro derivs.	198840-65-2
Alkanes, C14-16, chloro	1372804-76-6
Alkanes, C14-17, chloro	85535-85-9
di-, tri- and tetrachlorotetradecane	-
Chlorinated polyethylene	64754-90-1

Table T – Dibutyltin (DBT) and Dioctyltin (DOT) Compounds

Example Compounds	CAS Number
Dibutyltin oxide	818-08-6
Dibutyltin diacetate	1067-33-0
Dibutyltin dilaurate	77-58-7
Dibutyltin maleate	78-04-6
Other dibutyltin compounds	-

Table T – Dibutyltin (DBT) and Dioctyltin (DOT) Compounds

Example Compounds	CAS Number
Dioctyl Tin Oxide	870-08-6
Dioctyltin dilaurate	3648-18-8
Other Dioctyltin compounds	-

Table U – Beryllium and compounds

Example Compounds	CAS Number
Beryllium metal	7440-41-7
Beryllium-aluminium alloy	12770-50-2
Beryllium-copper alloy	11133-98-5
Beryl	1302-52-9
Beryllium chloride	7787-47-5
Beryllium fluoride	7787-49-7
Beryllium hydroxide	13327-32-7
Beryllium sulfate	13510-49-1
Beryllium sulfate tetrahydrate	7787-56-6
Beryllium carbonate basic	1319-43-3
Beryllium nitrate	13597-99-4
Beryllium nitrate trihydrate	7787-55-5
Beryllium nitrate tetrahydrate	13510-48-0
Beryllium phosphate	13598-15-7
Beryllium silicate	13598-00-0
Zinc beryllium silicate	39413-47-3
Other beryllium compounds	

Table V – Antimony and its compounds

Example Compounds	CAS Number
Antimony	7440-36-0
Antimony Trioxide	1309-64-4
Antimony Pentoxide	1314-60-9

Table W – Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds

Example Compounds	CAS Number
Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds "Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds" means the following: (i) perfluorooctanoic acid, including any of its branched isomers; (ii) (ii) its salts; (iii) (iii) PFOA-related compounds which, for the purposes of the Convention, are any substances that degrade to PFOA, including any substances (including salts and polymers) having a linear or branched perfluoroheptyl group with the moiety $(C_7F_{15})C$ as one of the structural elements. The following compounds are not included as PFOA-related compounds: (i) C_8F_{17}-X, where X = F, Cl, Br; (ii) fluoropolymers that are covered by $CF_3[CF_2]_n$-R', where R'=any group, n> 16; (iii) perfluoroalkyl carboxylic acids (including their salts, esters, halides and anhydrides) with ≥ 8 perfluorinated carbons; (iv) perfluoroalkane sulfonic acids and perfluoro phosphonic acids (including their salts, esters, halides and anhydrides) with ≥ 9 perfluorinated carbons; (v) perfluorooctane sulfonic acid and its derivatives (PFOS), as listed in this Annex.	335-67-1 and others

Table X – Perchlorates

Example Compounds	CAS Number
Lithium Perchlorate	7791-03-9
Ammonium Perchlorate	7790-98-9
Barium perchlorate	13465-95-7
Lead perchlorate	13637-76-8
Magnesium Perchlorate	10034-81-8
Nickel perchlorate	13637-71-3
Potassium Perchlorate	7778-74-7
Sodium Perchlorate	7601-89-0
Other Perchlorates	

Table Y – Perfluorooctanoic acid (PFOA), its salts and PFOA-related compounds

Example Compounds	CAS Number
Linear and branched perfluorocarboxylic acids of the formula C_nF_{2n+1}-C(= O)OH where n = 8, 9, 10, 11, 12, or 13 (C9-C14 PFCAs), including their salts, and any combinations thereof; Any C9-C14 PFCA-related substance having a perfluoro group with the formula C_nF_{2n+1}- directly attached to another carbon atom, where n = 8, 9, 10, 11, 12, or 13, including their salts and any combinations thereof; Any C9-C14 PFCA-related substance having a perfluoro group with the formula C_nF_{2n+1}- that it is not directly attached to another carbon atom, where n = 9, 10, 11, 12, 13 or 14 as one of the structural elements, including their salts and any combinations thereof. The following substances are excluded from this designation • C_nF_{2n+1}-X, where X = F, Cl, or Br where n = 9, 10, 11, 12, 13 or 14, including any combinations thereof, • C_nF_{2n+1}-C(= O)OX' where n> 13 and X'=any group, including salts.	72629-94-8 307-55-1 2058-94-8 375-95-1 376-06-7 335-76-2

Table Z – Per- and polyfluoroalkyl substances (PFASs)

Example Compounds	CAS Number
PFASs are defined as fluorinated substances that contain at least one fully fluorinated methyl or methylene carbon atom (without any H/Cl/Br/I atom attached to it), i.e. with a few noted exceptions, any chemical with at least a perfluorinated methyl group (–CF3) or a perfluorinated methylene group (–CF2–) is a PFAS. (*OECD (2021), Reconciling Terminology of the Universe of Per- and Polyfluoroalkyl Substances: Recommendations and Practical Guidance, OECD Series on Risk Management, No. 61, OECD Publishing, Paris.*)	Refer to the 'Comprehensive Global Database of PFASs' on the OECD Portal on Per and Poly Fluorinated Chemicals. Portal: https://www.oecd.org/chemicalsafety/portal-perfluorinated-chemicals/ Database: https://www.oecd.org/chemicalsafety/risk-management/global-database-of-per-and-polyfluoroalkyl-substances.xlsx

Appendix C : Materials Compliance Testing

To ensure adequate due diligence is performed to satisfy regulatory material compliance, in addition to Full Material Declaration (FMD), Dell Technologies requires suppliers to maintain supporting analytical laboratory data on file for parts/products supplied to Dell. Suppliers are required to provide this information to Dell within 10 business days upon request by Dell.

Purpose: This section provides instructions on sample preparation, test methods and recommended 3rd party laboratories for analytical laboratory testing. Dell expects all suppliers to conform to these requirements as part of their material due diligence activities.

Scope: All parts in Dell-branded products that are supplied to Dell and/or designed by Dell must satisfy this specification. Compliance with this specification is communicated to Dell via Full Material Declaration. The scope includes all of the components, parts, assemblies and packaging of each product.

References:

- Dell P/N ENV0199, Dell **BFR/CFR/PVC-Free** Specification
- Directive of the European Parliament and of the Council on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, 2011/65/EU, June 2011 (RoHS Directive) and 2015/863/EU, June 2015 (addition of four phthalates)
- Directive of the European Parliament and of the Council on Packaging and Packaging waste, 94/62/EC. December 1994
- IEC 62321 Determination of certain substances in electrotechnical products – Parts 1 through to 8, updates in 2013, 2015 and 2017

Definitions:

- AAS: Atomic Absorption Spectroscopy
- AFS: Atomic Fluorescence Spectrometry
- Brominated/chlorinated flame retardants (BFRs and CFRs): flame retardants that contain or are treated with bromine and/or chlorine. These elements are typically added to reduce the flammability of components such as epoxy resins and thermoplastics. Example include, but are not limited to, tetrabromobisphenol-A, brominated epoxy oligomer (BEO) and polybrominated diphenyl ethers (PBDEs).
- CV-AAS: Cold Vapor Atomic Absorption Spectrometry
- CV-AFS: Cold Vapor Atomic Fluorescence Spectrometry
- Electronic Component: a combination of homogeneous materials that have been formed into a single manufactured mechanical or electrical part. Examples of electronic components may include microprocessors, plastic enclosures, capacitors…
- GC/MS: Gas Chromatography/Mass Spectrometry
- ICP-OES: Inductively Coupled Plasma Optical Emission Spectrometry
- ICP-MS: Inductively Coupled Plasma-Mass Spectrometry
- IEC: International Electro technical Commission http://www.iec.ch/
- Polymer Material: An organic substance made of many repeating chemical units or molecules. Materials in this category include plastics, rubber, elastomers…
- XRF: X-Ray Fluorescence material screening equipment

Sample Preparation for RoHS Compliance Testing:

Disassembly

RoHS compliance thresholds, as provided in ENV0424 apply to each homogenous material within the product/component, NOT to the entire product/component. "Homogenous material" is defined as a material that cannot be mechanically disjointed into different materials. The term is understood as "of uniform composition throughout". As it is impractical to test each homogenous material in a given sample, products may need to be disassembled to the sub-component level to approximate the homogenous material level of compliance.
For example, a hard disk drive would need to be disassembled into multiple parts – metal casing, plastic casing, PCB, electrical components, drive disks themselves, and etc. Each of these parts should be tested individually. For a cable - the cable jacket and connector would each similarly need to be tested.

Laboratory facilities

All industry and regulatory certified laboratories (e.g. ISO17025 certified laboratories) are acceptable to Dell. Laboratories without accreditation will not comply with this specification. Examples of acceptable laboratories are listed below

- SGS Laboratories
- Intertek Testing Services
- TUV
- Bureau Veritas
- UL

Each laboratory has individual requirements for the amounts of material needed for testing. Most laboratories request between 10 and 20 grams of a homogenous material to yield accurate results.

Analytical Testing Methods for RoHS Substances

Dell will only accept RoHS testing to specification IEC 62321, latest edition. Below summarizes the test equipment/procedure used for RoHS testing.

Substances	**Polymer and Non-Metals**	**Metals**
Cadmium (Cd) and compounds	ICP-OES, ICP-MS, AAS	ICP-OES, ICP-MS, AAS
Hexavalent Chromium (Cr+6) compounds	Alkaline Digestion / Colorimetric Method	Spot test procedure / Boiling water extraction procedure (EPA 3060A is not an acceptable test method
Lead (Pb) and compounds	ICP-OES, ICP-MS, AAS	ICP-OES, ICP-MS, AAS
Mercury (Hg) and compounds	ICP-OES, ICP-MS, CV-AAS, CVAFS	ICP-OES, ICP-MS, CV-AAS, CV-AFS
PolyBrominated Biphenyls (PBB)	GC/MS	Not Applicable
PolyBrominated Diphenyl Ethers (PBDE)	GC/MS	Not Applicable
Phthalates	GC/MS	Not Applicable

Detailed test parameters and methodologies are found in the IEC 62321 specification.

Recommended Analytical Testing Methods for Halogens - Bromine and Chlorine ("Halogen-Free")

A number of test methods have been established for determining the concentration of total bromine and chlorine in electronic products. Dell will accept the following tests.

Articles to be Tested	**Analytical Testing Method**
Printed circuit board (PCB) laminates	IPC-TM-650 2.3.41; IEC 61189-2:2006; EN 14582 (Method A & B); IEC 62321-3-2:2020
Other materials	IEC 61189-2:2006; EN 14582 (Method A & B); IEC 62321-3-2:2020

Tests beyond this list will require approval from Dell.

X-Ray Fluorescence

Bench top/handheld X-ray fluorescence (XRF) can be used as a SCREENING tool only for ENV0424 and/or ENV0199 as part of the supplier's active verification programs. Due to accuracy limitations of XRF, Dell will not accept XRF results as a substitute to the tests above for official compliance documentation provided to Dell upon request.

Appendix D: Revision history for revisions prior to last

A00	PCO29189	Initial Release converted over from 6T198	Matt Marshall	May 2015
A01	PCO30586	Scope: Communication of compliance uses Agile PG&C instead of N6685. References: Added legal as well as ecolabel references. Definitions: A definition of halogenated plastics has been re-introduced. Table 1: 1. Dioctyltin (DOT) compounds: Reduced scope of restriction to align with EU REACH. 2. HBCDD: Lowered threshold to 100ppm (proposed EU POPs regulation) 3. Removed Perchlorate. 4. Added Red Phosphorous. Table 2 and Table 3: 1. Merged into a single table, requiring reporting of all substances at the homogeneous material level (following judgment by the European Court of Justice). 2. Packaging restrictions: Removed restriction on expanded polystyrene (EPS foam). Added a restriction on free-rise polyurethane based foam-in-place. 3. Battery restrictions: Deleted Mercury exemption for button cell batteries. 4. Supplier declaration process: Communication of compliance uses Agile PG&C instead of N6685. Appendix A: Deleted exemptions 7(b) and 8(b).	Maureen Martinez	09/27/15
A02	PCO34984	Table 1 - Banned or Restricted Substances 1. Chromium VI and its compounds - metallic and non-metallic applications unified under a single threshold of 1000 PPM 2. Lead and its compounds – “frequently handled” added to restriction on cable jacketing material for external cables. 3. BNST - Exemption added for EMC BNST permit for sale of product into Canada in 2016 and 2017 for any legacy EMC parts designed before 2015.	Stephen Greene	3/14/17

		4. Dibutyltin (DBT) compounds – "Threshold relates to the mass of tin" added to explanation. 5. Hexabromocyclododecane (HBCDD) and all major diastereoisomers – "Substances may not be intentionally added to parts/product." added to explanation for threshold in Japanese Law concerning the Examination and Regulation of Manufacture etc. of Chemical Substances (Class 1 chemical substances). 6. Polycyclic Aromatic Hydrocarbons (PAH) – Specification changed from 64MNT to specification ENG0014187 (additional information on PAH and German Safety Mark). 7. Red Phosphorous – "Restriction applies to Red Phosphorous flame retardants in molding compounds." added to clarify specific applications where substance is banned. Table L - Brominated/Chlorinated flame retardants/additives (other than PBBs, PBDEs, HBCD and HBCDD) 8. HBCD and HBCDD now excluded from list of BRF because the substances are restricted in Table 1 9. Four CFR added: a. 38051-10-4, Tetrakis(2-chloroethyl) dichloroisopentyldiphosphate b. 13674-84-5, Tris(1-chloro-2-propyl)phosphate c. 66108-37-0, Tris(2,3-dichloro-1-propyl)phosphate d. No CAS, Chlorinated Flame Retardants (CFR), Other Chlorinated Retardants Flame		
A03	PCO37551	Introduction, references: updated legal references Table 1 1. Removed exemption for EMC BNST permit for sale of product into Canada in 2016 and 2017 2. PFOA and its salts added (including references in Table W, new) Table 2 1. Added 1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with	Markus Stutz	01/03/2018

		≥ 0.3% of dihexyl phthalate (EC No. 201-559-5), 68515-51-5 and 68648-93-1 2. Added , 1,3-propanesultone, 1120-71-4 3. Added 2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350), 36437-3-37 4. Added 2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328), 25973-55-1 5. Added 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE), 15571-58-1 6. Added 2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-327), 3864-99-1 7. Added Cadmium oxide, 1306-23-06 8. Added CAS 12267-73-3 to the entry on Disodium tetraborate, anhydrous 9. Added Disodium 3,3'-[[1,1'-biphenyl]-4,4'-diylbis(azo)]bis(4-aminonaphthalene-1-sulphonate) (C.I. Direct Red 28), 573-58-0 10. Added 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 11. Added [Phthalato(2-)]dioxotrilead, 69011-06-9 12. Added Dioxobis(stearato)trilead, 12578-12-0 13. Added Fatty acids, C16-18, lead salts, 91031-62-8 14. Imidazolidine-2-thione; (2-imidazoline-2-thiol), 96-45-7 15. Added Lead chromate, 7758-97-6 16. Added Lead chromate molybdate sulphate red (C.I. Pigment Red 104), 12656-85-8 17. Added Lead cyanamidate, 20837-86-9 18. Added Lead dinitrate, 10099-74-8 19. Added Lead oxide sulfate, 12036-76-9 Lead sulfochromate yellow (C.I. Pigment Yellow 34), 1344-37-2 20. Added Lead titanium zirconium oxide, 12626-81-2		

		21. Added Nonadecafluorodecanoic acid (PFDA) and its sodium and ammonium salts, 335-76-2, 3830-45-3 and 3108-42-7 22. Added Pentalead tetraoxide sulphate, 12065-90-6 23. Added Perfluorohexane-1-sulphonic acid and its salts, 355-46-4, 68259-08-5, 3871-99-6 and 2923-26-4 24. Added Perfluorononan-1-oic-acid and its sodium and ammonium salts, 375-95-1, 4149-60-4 and 21049-39-8 25. Added Pyrochlore, antimony lead yellow, 8012-00-8 26. Added 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), no CAS # 27. Added Silicic acid (H2Si2O5), barium salt (1:1), lead-doped, 68784-75-8 28. Added Strontium chromate, 7789-06-2 29. Added Sulfurous acid, lead salt, dibasic, 62229-08-7 30. Added Trilead dioxide phosphonate, 12141-20-7 31. Added Trixylyl phosphate, 25155-23-1 Table 4, packaging restrictions: added Formaldehyde, 50-00-0 Appendix A: 1. Deleted exemption 5(a) 2. Added time limitation date for exemption 6(a), added exemption 6(a)-I 3. Added time limitation date for exemption 6(b), added exemptions 6(b)-I and 6(b)-II		

		4. Added time limitation date for exemption 13(b), added exemptions 13(b)-I, 13(b)-II and 13(b)-III Appendix B: added Table W as reference for the new Table 1 entry on PFOA and its salts Appendix C: updated reference to Dell BFR/CFR/PVC-Free Specification		
A04	PCO39844	Introduction, references: Table 1 1. Added Phthalate: Diisononyl phthalate (DINP), 68515-48-0 and 28553-12-0 2. Added 1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich, 71888-89-6 3. Added Phthalate: 1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP), 68515-42-4 4. Added Benzyl Chloride, 100-44-7 5. Added Tris(o-cresyl)-phosphate, 78-30-8 6. Removed Benzenamine N-phenyl, reaction products with styrene and 2,4,4-trimethylpentene (BNST), 68921-45-9 Table 1 / Table L: 7. Added Tris(1,3-dichloro-2-propyl)phosphate, 13674-87-8 Table 1 / Table P: 8. Added second CAS # (1718-53-2) for Benz[a]anthracene Table 2: 9. Added Cadmium hydroxide, 21041-95-2 10. Added 1,6,7,8,9,14,15,16,17,17,18,18-Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene (“Dechlorane Plus”™), 13560-89-9, 135821-74-8 and 135821-03-3 11. Added CAS numbers for 4-Nonylphenol, branched and linear, ethoxylated 12. Added Beryllium Oxide, 1304-56-9 (moved from Table U) 13. Added Cobalt, 7440-48-4 14. Added Neodymium, 7440-00-8	Markus Stutz	08/13/2018

		15. Deleted Phthalate: Diisononyl phthalate (DINP), 28553-12-0 16. Deleted 1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich, 71888-89-6 17. Deleted Diisoheptyl phthalate (DIHP), 71888-89-6 18. Deleted Phthalate: 1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP), 68515-42-4 19. Added Benzo[ghi]perylene, 191-24-2 20. Added Octamethylcyclotetrasiloxane, 556-67-2 21. Added Decamethylcyclopentasiloxane, 541-02-6 22. Added Dodecamethylcyclohexasiloxane, 540-97-6 23. Added Disodium octaborate, 12008-41-2 24. Added Terphenyl, hydrogenated, 61788-32-7 25. Separated the entry for Hexahydromethylphthalic anhydride, Hexahydro-4-methylphthalic anhydride, Hexahydro-1-methylphthalic anhydride and Hexahydro-3-methylphthalic anhydride into four individual entries. Appendix A: 26. Deleted exemption 3(a) 27. Deleted exemption 3(b) 28. Deleted exemption 3(c) 29. Deleted exemption 4(a) 30. Deleted exemption 4(b)-I 31. Deleted exemption 4(b)-II 32. Deleted exemption 4(b)-III 33. Deleted exemption 4(c)-I 34. Deleted exemption 4(c)-II 35. Deleted exemption 4(c)-III 36. Deleted exemption 4(e) 37. Deleted exemption 5(b) 38. Deleted exemption 6(a) 39. Deleted exemption 6(b)		

		40. Added time limitation date for exemption 15, added exemption 15(a) 41. Deleted exemption 34 Section 4: exempted transportation pallets from the formaldehyde restriction on wooden products Appendix B: Appendix C: Updated introduction		
A05	PCO40734	Table 1: 1. Editorial changes 2. Removed 'Phthalates with a GreenScreen benchmark score of less than 2' (requirement will be moved to another Dell specification) Table 2: 3. Added 4,4'-Dihydroxybenzophenone, 611-99-4 4. Added Bisphenol-F (4,4'-methylenediphenol), 620-92-8 5. Added Bisphenol-S (4,4'-sulphonyldiphenol), 80-09-1 6. Added Diundecyl phthalate (DuDP), 3648-20-2 7. Added Phthalate: Dicyclohexyl phthalate, 84-61-7 8. Added Triphenyl phosphate, 115-86-6 Section 6 / Table 5: 9. Editorial changes Appendix A: 10. Deleted exemption 13(b) 11. Editorial changes	Markus Stutz	11/14/2018
A06	PCO42825	Added section on change notification Added section on non-compliance resolution Table 1: 1. Added CAS numbers 134237-50-6; 134237-51-7 and 134237-52-8 to the Hexabromocyclododecane (HBCDD) substance group 2. Added Bis(2-methoxyethyl) ether (111-96-6) 3. Added Strontium Chromate (7789-06-2) 4. Added Potassium hydroxyoctaoxodizincatedichromate (11103-86-9)		

		5. Added Pentazinc chromate octahydroxide (49663-84-5) 6. Added Diisopentyl phthalate (DIPP, 605-50-5) 7. Added 1,2-Benzenedicarboxylic acid, dipentylester, branched and linear (84777-06-0) 8. Added Phthalate: Di(methoxyethyl) phthalate (DMEP) (117-82-8) 9. Added Phthalate: Dipentyl phthalate (DPP) (131-18-0) 10. Added Phthalate: N-pentyl-isopentylphthalate (nPiPP) (776297-69-9) 11. Added 4-(1,1,3,3-tetramethylbutyl)phenol (140-66-9) 12. Added 4-Nonylphenol, branched and linear, ethoxylated (10 CAS numbers) Table 2: 1. Deleted Bis(2-methoxyethyl) ether (now restricted as per Table 1) 2. Deleted Strontium Chromate 3. Deleted Potassium hydroxyoctaoxodizincatedichromate 4. Deleted Pentazinc chromate octahydroxide 5. Deleted Diisopentyl phthalate (DIPP) 6. Deleted 1,2-Benzenedicarboxylic acid, dipentylester, branched and linear 7. Deleted Phthalate: Di(methoxyethyl) phthalate (DMEP) 8. Deleted Phthalate: Dipentyl phthalate (DPP) 9. Deleted Phthalate: N-pentyl-isopentylphthalate (nPiPP) 10. Deleted 4-(1,1,3,3-tetramethylbutyl)phenol 11. Deleted 4-Nonylphenol, branched and linear, ethoxylated 12. Added 2,2-bis(4'-hydroxyphenyl)-4-methylpentane (6807-17-6) 13. Added Benzo[k]fluoranthene (207-08-9) 14. Added Fluoranthene (206-44-0; 93951-69-0) 15. Added Phenanthrene (85-01-8) 16. Added Pyrene (129-00-0, 1718-52-1)		
A07	PCO46108	Introduction, definitions: editorial changes Table 1 - Banned or Restricted Substances: 1. Added Perfluorohexane-1-sulphonic acid (355-46-4) 2. Table 1 / Table F: Added Lead sulfochromate yellow (1344-37-2)	Markus Stutz	11/19/20

		3. Table 1 / Table F: Added Lead chromate molybdate sulphate red (12656-85-8) 4. Added Phthalate: 1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear (68515-50-4) 5. Added Phthalate: Dihexyl phthalate (DnHP) (84-75-3) 6. Added 1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate (EC No. 201-559-5) (68515-51-5, 68648-93-1) 7. Added Trixylyl phosphate (25155-23-1) 8. Added 2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328) (25973-55-1) 9. Added 2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-327) (3864-99-1) 10. Added 2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350) (36437-37-3) 11. Added 4-Aminoazobenzene (60-09-3) 12. Added 1,3-propanesultone (1120-71-4) 13. Added N,N-dimethylformamide (68-12-2) 14. Added 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) 15. Added Imidazolidine-2-thione; (2-imidazoline-2-thiol) (96-45-7) 16. Removed exemption for PFOS 17. Added DBDPE (84852-53-9) 18. Added Dechlorane Plus (13560-89-9) 19. Added Triphenyl phosphate (115-86-6) 20. Added Tri-n-butyl phosphate (TNBP) (126-73-8) 21. Added Diisodecyl phthalate (DIDP) (26761-40-0, 68515-49-1) 22. Added Bisphenol-A (4,4'-isopropylidenediphenol) (80-05-7) Table 2 – Reporting requirements:		

		23. Added Tris(4-nonylphenyl, branched and linear) phosphite (TNPP) with ≥ 0.1% w/w of 4-nonylphenol, branched and linear (4-NP) (3050-88-2, 31631-13-7, 106599-06-8) 24. Added Tetraboron disodium heptaoxide, hydrate (12267-73-1) 25. Added Diisohaxyl phthalate (71850-09-4) 26. Added Perfluorobutane sulfonic acid (PFBS) and its salts (25628-08-4, 34454-97-2, 375-73-5, 375-72-4 27. Added Dibutylbis(pentane-2,4-dionato-O,O')tin (22673-19-4) 28. Deleted Perfluorohexane-1-sulphonic acid and its salts (355-46-4, 68259-08-5, 3871-99-6, 2923-26-4) 29. Deleted Lead sulfochromate yellow (1344-37-2) 30. Deleted Lead chromate molybdate sulphate red (12656-85-8) 31. Deleted Phthalate: 1,2-Benzenedicarboxylic acid, dihexyl ester, branched and linear (68515-50-4) 32. Deleted Phthalate: Dihexyl phthalate (DnHP) (84-75-3) 33. Deleted 1,2-benzenedicarboxylic acid, di-C6-10-alkyl esters; 1,2-benzenedicarboxylic acid, mixed decyl and hexyl and octyl diesters with ≥ 0.3% of dihexyl phthalate (EC No. 201-559-5) (68515-51-5, 68648-93-1) 34. Deleted Trixylyl phosphate (25155-23-1) 35. Deleted 2-(2H-benzotriazol-2-yl)-4,6-ditertpentylphenol (UV-328) (25973-55-1) 36. Deleted 2,4-di-tert-butyl-6-(5-chlorobenzotriazol-2-yl)phenol (UV-327) (3864-99-1) 37. Deleted 2-(2H-benzotriazol-2-yl)-4-(tert-butyl)-6-(sec-butyl)phenol (UV-350) (36437-37-3) 38. Deleted 4-Aminoazobenzene (60-09-3) 39. Deleted 1,3-propanesultone (1120-71-4) 40. Deleted N,N-dimethylformamide (68-12-2) 41. Deleted 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) 42. Imidazolidine-2-thione; (2-imidazoline-2-thiol) (96-45-7) 43. Deleted 1,6,7,8,9,14,15,16,17,17,18,18-Dodecachloropentacyclo[12.2.1.16,9.02,13.05,10]octadeca-7,15-diene ("Dechlorane Plus"™) (13560-89-9) 44. Deleted Triphenyl phosphate (115-86-6) 45. Deleted Diisodecyl phthalate (DIDP) (26761-40-0) 46. Deleted PFOA (335-67-1) 47. Deleted Bisphenol-A (4,4'-isopropylidenediphenol) (80-05-7) Eco-label material requirements 48. Added a section about EPEAT substance requirements 49. Added a section about TCO substance requirements 50. Added a section about Taiwan Green Mark substance requirements Product packaging content restrictions: 51. Added restriction on mineral oils & mineral oil-based inks 52. Editorial changes Battery content reduction 53. Added restriction on Perchlorates for lithium batteries, coin cell batteries (CAS numbers in Table X) Appendix A: 54. Restricted the use of RoHS exemptions 13(b)-I, 13(b)-II and 13(b)-III 55. Editorial changes Appendix B 56. Added Table X (Perchlorates)		
A08	PCO46931	Table 1 - Banned or Restricted Substances: 1. Added Phenol, Isopropylated Phosphate (3:1) (68937-41-7)	Markus Stutz	04/29/2021

		2. Added Ethylhexyl diphenyl phosphate (EHDPP) (1241-94-7) Table 2 – Reporting requirements: 3. Added Bis(2-(2-methoxyethoxy)ethyl)ether (143-24-8) 4. Added Dioctyltin dilaurate, stannane, dioctyl-, bis(coco acyloxy) derivs. (3648-18-8, 91648-39-4)		
A09	PCO48087	Table 1 – Banned or Restricted Substances: 1. Table 1 / Table S: added examples of MCCP to Table S 2. Removed 1,3-propanesultone (1120-71-4) 3. Aligned PFOS restriction with IEC62474 4. Removed references to RoHS exemptions for Cadmium 5. Added materials distinction for BPA restrictions Table 2 – Reporting requirements 6. Added Orthoboric acid, sodium salt 7. Added 4,4'-(1-methylpropylidene)bisphenol 8. Added 1,3-propanesultone (1120-71-4) 9. Added Perchlorates (CAS #'s in Table X) 10. Removed CAS 12267-73-3 to the entry on Disodium tetraborate, anhydrous 11. Removed Cadmium hydroxide, 21041-95-2 12. Removed Cadmium oxide, 1306-19-0 13. Removed Cadmium sulphide, 1306-23-6 Table 6 – Battery Content Restrictions 14. Removed Perchlorates (moved to reporting requirement in Table 2) Table 7 - Non-Electrical/Non-Electronic Parts and Products Content Restrictions 15. Added PFOS Appendix A: Applicable RoHS Exemptions 16. Deleted exemption 13(b)-I, 13(b)-II and 13(b)-III as those had been granted by Dell only until February 1, 2021	Markus Stutz	11/30/2021

		Appendix B: List of CAS Numbers 17. Alignments to IEC62474, editorial changes		
A10	PCO51177	Table 1 – Banned or Restricted Substances: 1. Added PFCAs (C9-C14), their salts and related substances 2. Added 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE), 15571-58-1 3. Added 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) 4. Removed Decabromo-diphenyl-ethane (DBDPE) (84852-53-9) 5. Changed threshold for PIP(3:1) 6. Added Lead Chromate (7758-97-6) Table 2 – Reporting requirements 7. Added 6,6'-di-tert-butyl-2,2'-methylenedi-p-cresol, 119-47-1 8. Added Per- and polyfluoroalkyl substances (PFASs), intentional use in parts/ products 9. Added Decabromo-diphenyl-ethane (DBDPE) (84852-53-9) 10. Removed Added 2-ethylhexyl 10-ethyl-4,4-dioctyl-7-oxo-8-oxa-3,5-dithia-4-stannatetradecanoate (DOTE), 15571-58-1 11. Removed 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) 12. Added 1,1'-[ethane-1,2-diylbisoxy]bis[2,4,6-tribromobenzene] (37853-59-1) 13. Added 2,2',6,6'-tetrabromo-4,4'-isopropylidenediphenol (79-94-7)	Katie Reilly	11/23/2022

		14. Added Barium diboron tetraoxide (13701-59-2) 15. Added Bis(2-ethylhexyl) tetrabromophthalate (26040-51-7) 16. Added Isobutyl 4-hydroxybenzoate (4247-02-3) 17. Added Melamine (108-78-1) 18. Added Perfluoroheptanoic acid and its salts, multiple CAS numbers 19. Added reaction mass of 2,2,3,3,5,5,6,6-octafluoro-4-(1,1,1,2,3,3,3-heptafluoropropan-2-yl)morpholine and 2,2,3,3,5,5,6,6-octafluoro-4-(heptafluoropropyl)morpholine 20. Removed Lead Chromate (7758-97-6) Section 3.5 TCO substance requirements 21. Updated requirements Table 5 – Packaging Content Restrictions 22. Added further detail to the restriction on mineral oil based inks. Table 8 – Non-electrical & non-electronic products 23. Added material declaration requirements for SVHCs and PFAS Appendix A, applicable RoHS exemptions : 24. Added June 1, 2024 sunset date for exemption 4(f) Appendix B: List of CAS Numbers 25. Added Table Y, PFCAs (C9-C14), their salts and related substances 26. Alignments to IEC62474, editorial changes		
A11	PCO53093	Table 1 – Banned or Restricted Substances: 1. Adjusted threshold for Perfluorohexane-1-sulphonic acid and its salts – 'PFHxS' 2. Added restriction for halogenated flame retardants in display enclosure parts 3. Adjusted threshold for Dechlorane Plus 4. Adjusted threshold for UV-328 Table 2 – Reporting requirements: 5. Added Bis(4-chlorophenyl) sulphone (80-07-9)	Katie Reilly	04/09/2024

		6. Added Diphenyl(2,4,6-trimethylbenzoyl)phosphine oxide (75980-60-8) 7. Adjusted threshold for perchlorates 8. Added 2,4,6-tri-tert-butylphenol (732-26-3) 9. Added 2-(2H-benzotriazol-2-yl)-4-(1,1,3,3-tetramethylbutyl)phenol (UV-329) (3147-75-9) 10. Added 2-(dimethylamino)-2-[(4-methylphenyl)methyl]-1-[4-(morpholin-4-yl)phenyl]butan-1-one (119344-86-4) 11. Added Bumetrizole (UV-326) (3896-11-5) 12. Added Oligomerisation and alkylation reaction products of 2-phenylpropene and phenol (68512-30-1) 13. Added Diisooctyl phthalate (27554-26-3) 14. Added timeline for the restriction of PFAS Section 3.5 TCO substance requirements Product packaging content restriction 15. Added Per- and polyfluoroalkyl substances (PFASs) Battery content restriction 16. Limited exemption for lead in lead-acid batteries to batteries weighing 5kg or less 17. Removed exemption for lead in solder in battery packs Non-Electrical/Non-Electronic Parts and Products requirements 18. Added restriction for PFAS 19. Added restriction for Azocolorants (same restriction as in Table 1) 20. Removed reporting requirement for PFAS Appendix A – applicable RoHS exemptions 21. Removed exemption 4f Appendix B – List of CAS Numbers Table P: removed CAS number 1718-53-2		
A12	PCO53979	2.3 References 4. Updated references Section 3.5 TCO substance requirements 5. Updated requirements	Katie Reilly	09/23/2024