Specification
General Specification for Allowable Levels of Lead (Pb) in Dell Products

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Approval Authorities	Approval Signatures	Revision	Date Approved
Environmental Affairs	Mark Newton	X00	10/27/03

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1. Revision History

Rev.	ECO	Revision Description	Approved	Date
X00	N/A	Initial release	Scott O'Connell	10/27/03
A00	155878	Added Prop 65 reference, revised lead in metal parts threshold (Section 3.1), revised lead in paint, ink and lacquer threshold (Section 3.5), revised lead in batteries section (Section 3.7), eliminated IPC definition of "lead-free"	Scott O'Connell	12/2/03
A01	161252	Added reference to Declaration of Conformity requirement in Section 4.4	Scott O'Connell	4/27/04

2. Introduction

2.1 Purpose

This specification provides guidance to Dell component suppliers and contracted manufacturers for the use of lead (Pb) and lead containing compounds in all Dell and Dell branded products. The purpose of this specification is to ensure that Dell is able to meet current and anticipated regulatory and customer requirements regarding the use of lead in its products. This specification stipulates threshold limits for the use of lead in Dell components. Dell Specification "Materials Restricted for Use" (Dell P/N 6T198) provides additional guidance on the restriction of other regulated substances.

2.2 Scope

All Dell products must meet this specification. Dell and OEM engineering teams of Dell branded products must ensure compliance of designs to this specification. All parts supplied to Dell must meet this specification.

2.3 References

- Dell Materials Restricted for Use Spec (Dell P/N 6T198) located in Agile. Compliance with the 6T198 specification is reported to Dell via the supplier declaration (Dell P/N 7X435).
- Dell Supplier Declaration On Restricted or Banned Materials (Dell P/N 7X435) located in Agile.
- Agile accessible via the ValueChain website (https://valuechain.dell.com/) for Suppliers/Vendors.
- IPC/EIA J-STD 006A (May 2001) for Electronic Grade Solder Alloys.
- Directive of the European Parliament and of the Council on Marketing and Use of Dangerous Substances, 76/769/EEC, July 1976.
- Council Directive 91/157/EEC on Batteries and Accumulators Containing Certain Dangerous Substances, March 1991.
- Directive of the European Parliament and of the Council on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, 2000/159/COD, October 2002. (RoHS Directive)
- Directive of the European Parliament and of the Council on Waste Electrical and Electronic Equipment, 2000/0158/COD, October 2002. (WEEE Directive)
- Directive of the European Parliament and of the Council on End of Life Vehicles, 2000/53/EC, September 2000. (ELV Directive)
- Directive of the European Parliament and of the Council on Packaging and Packaging waste, 94/62/EC, December 1994.
- 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"
- German Ordinance concerning the avoidance and recycling of packaging waste (Packaging Ordinance – VerpackV), August 1998.
- 91/157/EEC as amended by Directive 98/101/EC, Batteries and accumulators containing certain dangerous substances.

2.4 Definitions

- Lead-free: Contains less than 0.1% (1000ppm) lead by weight, generally defined at the component level.
- Intentionally added: Deliberately used in the formulation of a material or component where its continued presence is desired in the final product to provide a specific characteristic, appearance or quality.
- Component: Any mechanical part or any electrical device that can be removed without destroying its function. Examples of components may include microprocessors, coin cell batteries, capacitors, etc.
- 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.
- Threshold: The maximum concentration of lead by weight (mass of lead/mass of component) that is allowed in a component or assembly.

3. Compliance Criteria

3.1 Lead in Metal Parts

Metallic parts include chassis, shields, screws, and other mechanical parts. The European Restrictions on Hazardous Substances (RoHS) Directive stipulates that steel alloys can contain up to 0.35% (3500 ppm) lead by weight, aluminium alloys can contain up to 0.4% (4000 ppm) lead by weight, and copper alloys can contain up to 4% (40,000 ppm) lead by weight. Dell does not presently restrict the use of lead in solder, electronic components, printed circuit board assemblies (PCBA), or interconnects.

3.2 Lead in Cables

0.03% (300 ppm) is the maximum limit for lead in Dell cable jacketing.
An industry settlement of California Proposition 65 stipulates that the lead content present in frequently handled cable jacketing cannot exceed 300 ppm. Lead shall not be intentionally added. All external cable materials (sheath/jacket, insulation, shell/overmold, strain relief, etc.) supplied to Dell are required to contain less than 300 ppm of lead. Metallic interconnections (lead in connector contacts) are presently not subject to this restriction.

3.3 Lead in Plastics

0.03% (300 ppm) is the maximum limit for lead in Dell plastic parts.
Lead cannot be intentionally added to Dell plastics used for any application. Glass reinforced plastics are particularly susceptible to containing lead as an impurity in the glass fiber. In this instance, lead present is not considered to be "intentionally added" to the plastic, however the 300 ppm threshold still applies.

3.4 Lead in Glass or Ceramic

0.1% (1000 ppm) is the maximum limit for lead in Dell glass parts.
Lead present in cathode ray tube (CRT) glass is not subject to this restriction however the use of lead in other forms of glass or ceramic (except for electronic components, e.g. piezoelectric devices) is restricted by the RoHS Directive. Therefore, lead cannot be intentionally added to glass or ceramic used in Dell products (lenses, etc.) with the exception of CRTs or electronic components.

3.5 Lead in Paint, Ink, or Lacquer

0.01% (100 ppm) is the maximum limit for lead in paint, ink, or lacquer present in Dell products. Lead cannot be intentionally added to paints, lacquers, inks, or other coatings used in Dell products.
Lead in these applications is restricted by the Directive of the European Parliament and of the Council on Marketing and Use of Dangerous Substances (amendment 89/677/EEC, adds lead in paints restriction to 76/769/EEC).

3.6 Lead in Product Packaging

0.01% (100 ppm) is the maximum limit for lead in product packaging materials used by Dell.
Since 2001, the German Packaging Ordinance has limited the amount of lead permissible in product packaging to 0.01% (100 ppm). Therefore, lead cannot be intentionally added to product packaging materials used by Dell.

3.7 Lead in Batteries

Although RoHS does restrict lead for electronic applications after July 2006, RoHS clearly states that it does not supersede battery legislation 91/157/EEC as amended by Directive 98/101/EEC. This law allows the use of lead-acid technology for battery cell and pack applications such as uninterruptible power supply units (UPS). If lead used in battery cells and packs exceeds 0.04% (400 ppm), the lead-acid battery must be marked with hazardous material markings ("wheelie bin" logo) per 91/157/EEC.

3.8 Lead in Electronics and Interconnects

There are presently no restrictions for the presence of lead in solder, electronic devices, electronic assemblies, or interconnects used by Dell. The RoHS Directive stipulates that industry shall adopt lead-free alternatives for

electronic applications by July 2006. All products covered by the RoHS Directive (see Exemptions in Section 4.3 below) supplied to Dell after June 30, 2006 must be Pb-free.

3.9 Lead in Other Applications

0.1% (1000 ppm) is the default maximum limit for lead in components used by Dell.
All components not specifically addressed in sections 3.1 - 3.7 shall contain less than 0.1% (1000 ppm) lead.

4. Additional Compliance Criteria for Suppliers of Pb-free Electronic Components and Assemblies.

4.1 Definition of lead-free electronics

- In accordance with the European End of Life Vehicle (ELV) Directive and the likelihood that the European Restrictions on Hazardous Substances (RoHS) Directive shall similarly define Pb-free components as those containing <0.1 wt% (1000 ppm), Dell presently requires that lead-free components shall not contain more than 0.1% lead by weight.
- Lead free solder alloys shall not contain more than 0.1% lead.

4.2 Logistics and Procurement

- All suppliers shall provide Dell lead-free electronic assemblies and components in advance of July 1, 2006 in accordance to the European Restrictions on Hazardous Substances (RoHS) Directive.
- All suppliers shall provide to Dell a product roadmap indicating the planned changes, capacity, and timeframe for availability of lead-free products.
- All changes from existing parts containing lead to lead-free parts must be documented by the supplier and approved by Dell.
- All lead-free versions of parts, assemblies, qualification samples, and other components shall have new supplier P/N's assigned. Suppliers shall use industry standard Pb-free marking conventions if available. Pb-free parts that are currently supplied to Dell do not require new part numbers.
- All lead-free components shall have the outer packaging boxes and inner package material (tray, tube, reel) marked with traceable information that indicates that lead is not present in the components. This must also appear on the component itself if there is room for such a marking. Industry accepted labeling or marking systems shall be used if available.
- Device datasheets shall clearly indicate the termination solder composition, maximum component temperature rating, recommended & absolute reflow profile limits, and the moisture sensitivity rating.

4.3 Exemptions

- High lead-content alloys (>85% Pb) are allowed for high-temperature component applications (e.g. die attach and flip-chip solder bumps).
- Lead used in solder for servers, storage and storage array systems (exemption granted until 2010),
- Lead used in solder for network infrastructure equipment for switching, signaling, transmission as well as network management for telecommunication (exemption granted until 2010).
- Lead used in electronic ceramic or glass components (e.g. piezoelectronic devices).
- Refurbished equipment or components originally manufactured prior to July 1, 2006.
- Spare parts for the repair of electronic equipment put on the EU market before July 1, 2006.

4.4 Compliance Verification

- A Supplier Declaration of Conformity (Dell part number N6685, in Agile) indicating compliance with this specification shall be provided by the supplier to Dell. This Declaration must be verifiable and will be requested by Dell during product development.
- Sample devices and qualification data shall be available to Dell prior to the release of the new product.