

Supertex Position Statement on Green/Lead-Free RoHS Compliant Products

Introduction

Environmental concerns around the world are fueling the need for lead-free solutions in electronic components and systems within the semiconductor and electronics industries. Potential health hazards posed by Lead (Pb) contamination are a major concern to everyone. Supertex's Green/Lead (Pb)-Free initiative ensures the complete removal of lead from our entire device portfolio, without adversely affecting technical specifications or your own manufacturing processes. Supertex is now in a position to supply Green/Lead (Pb)-Free RoHS-compliant products. Compliance includes other international regulations restricting the use of lead in electronic components, mainly those applicable in Japan.

Background

The European Directives on waste electrical and electronic equipment (WEEE) and removal of hazardous substances (RoHS) became European law on February 13, 2003, and member states must implement the law by August 13, 2004. Member states must ensure that by July 1, 2006, new electrical and electronic equipment placed on the market does not contain Lead (Pb) or any of the restricted hazardous materials identified in the legislation such as Mercury (Hg), Cadmium (Cd), Hexavalent Chromium (Cr VI), Polybrominated Biphenyls (PBB) and Polybrominated Diphenyl Ethers (PBDE). To achieve compliance to Green/Lead (Pb)-Free compliance, Supertex has adopted the use of lead-free Matte tin 100% Tin (Sn).

Green Package

A semiconductor package is considered "Green" when four elements--lead (Pb), bromine (Br), chlorine (Cl) and antimony (Sb₂O₃)--are not intentionally added during the manufacturing process. A Green product contains materials with less than 1000ppm of lead content and less than 900ppm of halogen and antimony content. To achieve these levels in the semiconductor manufacturing process, Supertex uses only mold compounds and substrate materials that contain less than 900ppm of chlorine and bromine, known as halogens, and avoids the use of brominated flame retardant (Sb₂O₃ listed by IARC as a carcinogen) where technically and economically possible.

GREEN PACKAGE	SUBSTANCE	UPPER LIMIT	PACKAGE MATERIAL
Lead-Free	Pb	<1000ppm	Lead finish, Solder balls
Halogen-Free	Cl + Br	<900ppm	Mold Compound, Laminate, Solder resist
Antimony-Free	Sb ₂ O ₃	<900ppm	Mold Compound, Laminate, Solder resist

Supertex uses this Green mold compound plus a Lead (Pb)-Free plating for finishing the leads of integrated circuits. The material used in this manufacturing step is pure tin. Further, Supertex does not support the use of non-Green mold compounds plus Pb-Free plating products. This means the Supertex manufacturing process is totally Green, which, by definition, includes Pb-Free.

Conclusion

Supertex strives to minimize the amount of disruption that the switch to Green/Lead (Pb)-Free products might entail. We look forward to working with our customers to provide them with the most cost-effective and reliable Green/Lead (Pb)-Free packaging solution for their needs.

The original RoHS directive follows on the next page.

**DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of
27 January 2003
on the restriction of the use of certain hazardous substances in electrical and electronic equipment**

THE EUROPEAN PARLIAMENT AND THE
COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European
Community, and in particular Article 95 thereof,

Having regard to the proposal from the Commission (1),

Having regard to the opinion of the Economic and Social
Committee (2),

Having regard to the opinion of the Committee of Regions
(3),

Acting in accordance with the procedure laid down in Article
251 of the Treaty in the light of the joint text approved by the
Conciliation Committee on 8 November 2002 (4),

Whereas:

- (1) The disparities between the laws or administrative
measures adopted by the Member States as regards the
restriction of the use of hazardous substances in electrical
and electronic equipment could create barriers to trade
and distort competition in the Community and may thereby
have a direct impact on the establishment and functioning
of the internal market. It therefore appears necessary to
approximate the laws of the Member States in this field
and to contribute to the protection of human health and the
environmentally sound recovery and disposal of waste
electrical and electronic equipment.
- (2) The European Council at its meeting in Nice on 7, 8 and 9
December 2000 endorsed the Council Resolution of 4
December 2000 on the precautionary principle.
- (3) The Commission Communication of 30 July 1996 on the
review of the Community strategy for waste management
stresses the need to reduce the content of hazardous
substances in waste and points out the potential benefits
of Community-wide rules limiting the presence of such
substances in products and in production processes.
- (4) The Council Resolution of 25 January 1988 on a
Community action program to combat environmental
pollution by cadmium (5) invites the Commission to pursue
without delay the development of specific measures for
such a program. Human health also has to be protected
and an overall strategy that in particular restricts the use of
cadmium and stimulates research into substitutes should
therefore be implemented. The Resolution stresses that
the use of cadmium should be limited to cases where
suitable and safer alternatives do not exist.

(5) The available evidence indicates that measures on the
collection, treatment, recycling and disposal of waste
electrical and electronic equipment (WEEE) as set out in
Directive 2002/96/EC of 27 January 2003 of the European
Parliament and of the Council on waste electrical and
electronic equipment (6) are necessary to reduce the
waste management problems linked to the heavy metals
concerned and the flame retardants concerned. In spite of
those measures, however, significant parts of WEEE will
continue to be found in the current disposal routes. Even if
WEEE were collected separately and submitted to
recycling processes, its content of mercury, cadmium,
lead, chromium VI, PBB and PBDE would be likely to pose
risks to health or the environment.

(6) Taking into account technical and economic feasibility, the
most effective way of ensuring the significant reduction of
risks to health and the environment relating to those
substances which can achieve the chosen level of
protection in the Community is the substitution of those
substances in electrical and electronic equipment by safe
or safer materials. Restricting the use of these hazardous
substances is likely to enhance the possibilities and
economic profitability of recycling of WEEE and decrease
the negative health impact on workers in recycling plants.

(7) The substances covered by this Directive are scientifically
well researched and evaluated and have been subject to
different measures both at Community and at national
level.

(8) The measures provided for in this Directive take into
account existing international guidelines and
recommendations and are based on an assessment of
available scientific and technical information. The
measures are necessary to achieve the chosen level of
protection of 13.2.2003 L 37/19 Official Journal of the
European Union EN human and animal health and the
environment, having regard to the risks which the absence
of measures would be likely to create in the Community.
The measures should be kept under review and, if
necessary, adjusted to take account of available technical
and scientific information.

(9) This Directive should apply without prejudice to
Community legislation on safety and health requirements
and specific Community waste management legislation, in
particular Council Directive 91/157/EEC of 18 March 1991
on batteries and accumulators containing certain
dangerous substances (6).

(10) The technical development of electrical and electronic
equipment without heavy metals, PBDE and PBB should
be taken into account. As soon as scientific evidence is
available and taking into account the precautionary
principle, the prohibition of other hazardous substances
and their substitution by more environmentally friendly
alternatives which ensure at least the same level of
protection of consumers should be examined.

(1) OJ C 365 E, 19.12.2000, p. 195 and OJ C 240 E, 28.8.2001, p. 303.

(2) OJ C 116, 20.4.2001, p. 38.

(3) OJ C 148, 18.5.2001, p. 1.

(4) Opinion of the European Parliament of 15 May 2001 (OJ C 34 E,
7.2.2002, p. 109), Council Common Position of 4 December 2001 (OJ
C 90 E, 16.4.2002, p. 12) and Decision of the European Parliament
of 10 April 2002 (not yet published in the Official Journal). Decision of
the European Parliament of 18 December 2002 and Decision of the
Council of 16 December 2002.

(5) OJ C 30, 4.2.1988, p. 1. (6) See page 24 of this Official Journal.

(6) OJ L 78, 26.3.1991, p. 38. Directive as amended by Commission
Directive 98/101/EC (OJ L 1, 5.1.1999, p. 1).

Article 3

- (11) Exemptions from the substitution requirement should be permitted if substitution is not possible from the scientific and technical point of view or if the negative environmental or health impacts caused by substitution are likely to outweigh the human and environmental benefits of the substitution. Substitution of the hazardous substances in electrical and electronic equipment should also be carried out in a way so as to be compatible with the health and safety of users of electrical and electronic equipment (EEE).
- (12) As product reuse, refurbishment and extension of lifetime are beneficial, spare parts need to be available.
- (13) The adaptation to scientific and technical progress of the exemptions from the requirements concerning phasing out and prohibition of hazardous substances should be effected by the Commission under a committee procedure.
- (14) The measures necessary for the implementation of this Directive should be adopted in accordance with Council Decision 1999/468/EC of 28 June 1999 laying down the procedures for the exercise of implementing powers conferred on the Commission (1),

HAVE ADOPTED THIS DIRECTIVE:

Article 1

Objectives

The purpose of this Directive is to approximate the laws of the Member States on the restrictions of the use of hazardous substances in electrical and electronic equipment and to contribute to the protection of human health and the environmentally sound recovery and disposal of waste electrical and electronic equipment.

Article 2

Scope

1. Without prejudice to Article 6, this Directive shall apply to electrical and electronic equipment falling under the categories 1, 2, 3, 4, 5, 6, 7 and 10 set out in Annex IA to Directive No 2002/96/EC (WEEE) and to electric light bulbs, and luminaires in households.
2. This Directive shall apply without prejudice to Community legislation on safety and health requirements and specific Community waste management legislation.
3. This Directive does not apply to spare parts for the repair, or to the reuse, of electrical and electronic equipment put on the market before 1 July 2006.

Definitions

For the purposes of this Directive, the following definitions shall apply:

- (a) 'electrical and electronic equipment' or 'EEE' means equipment which is dependent on electric currents or electromagnetic fields in order to work properly and equipment for the generation, transfer and measurement of such currents and fields falling under the categories set out in Annex IA to Directive 2002/96/EC (WEEE) and designed for use with a voltage rating not exceeding 1 000 volts for alternating current and 1 500 volts for direct current;
- (b) 'producer' means any person who, irrespective of the selling technique used, including by means of distance communication according to Directive 97/7/EC of the European Parliament and of the Council of 20 May 1997 on the protection of consumers in respect of distance contracts (2):
- (i) manufactures and sells electrical and electronic equipment under his own brand;
- (ii) resells under his own brand equipment produced by other suppliers, a reseller not being regarded as the 'producer' if the brand of the producer appears on the equipment, as provided for in subpoint (i); or
- (iii) imports or exports electrical and electronic equipment on a professional basis into a Member State. Whoever exclusively provides financing under or pursuant to any finance agreement shall not be deemed a 'producer' unless he also acts as a producer within the meaning of subpoints (i) to (iii).

Article 4

Prevention

1. Member States shall ensure that, from 1 July 2006, new electrical and electronic equipment put on the market does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE). National measures restricting or prohibiting the use of these substances in electrical and electronic equipment which were adopted in line with Community legislation before the adoption of this Directive may be maintained until 1 July 2006.
2. Paragraph 1 shall not apply to the applications listed in the Annex.
3. On the basis of a proposal from the Commission, the European Parliament and the Council shall decide, as soon as scientific evidence is available, and in accordance with the principles on chemicals policy as laid down in the Sixth Community Environment Action Program, on the prohibition of other hazardous substances and the substitution thereof by more environment-friendly alternatives which ensure at least the same level of protection for consumers.

(1) OJ L 184, 17.7.1999, p. 23.

(2) OJ L 144, 4.6.1997, p. 19. Directive as amended by Directive 2002/65/EC (L 271, 9.10.2002, p. 16).

Article 5

Adaptation to scientific and technical progress

1. Any amendments which are necessary in order to adapt the Annex to scientific and technical progress for the following purposes shall be adopted in accordance with the procedure referred to in Article 7(2):

(a) establishing, as necessary, maximum concentration values up to which the presence of the substances referred to in Article 4(1) in specific materials and components of electrical and electronic equipment shall be tolerated;

(b) exempting materials and components of electrical and electronic equipment from Article 4(1) if their elimination or substitution via design changes or materials and components which do not require any of the materials or substances referred to therein is technically or scientifically impracticable, or where the negative environmental, health and/or consumer safety impacts caused by substitution are likely to outweigh the environmental, health and/or consumer safety benefits thereof;

(c) carrying out a review of each exemption in the Annex at least every four years or four years after an item is added to the list with the aim of considering deletion of materials and components of electrical and electronic equipment from the Annex if their elimination or substitution via design changes or materials and components which do not require any of the materials or substances referred to in Article 4(1) is technically or scientifically possible, provided that the negative environmental, health and/or consumer safety impacts caused by substitution do not outweigh the possible environmental, health and/or consumer safety benefits thereof.

2. Before the Annex is amended pursuant to paragraph 1, the Commission shall *inter alia* consult producers of electrical and electronic equipment, recyclers, treatment operators, environmental organizations and employee and consumer associations. Comments shall be forwarded to the Committee referred to in Article 7(1). The Commission shall provide an account of the information it receives.

Article 6

Review

Before 13 February 2005, the Commission shall review the measures provided for in this Directive to take into account, as necessary, new scientific evidence.

In particular the Commission shall, by that date, present proposals for including in the scope of this Directive equipment which falls under categories 8 and 9 set out in Annex IA to Directive 2002/96/EC (WEEE).

The Commission shall also study the need to adapt the list of substances of Article 4(1), on the basis of scientific facts and taking the precautionary principle into account, and present proposals to the European Parliament and Council for such adaptations, if appropriate.

Particular attention shall be paid during the review to the impact on the environment and on human health of other hazardous substances and materials used in electrical and electronic equipment. The Commission shall examine the feasibility of replacing such substances and materials and shall present proposals to the European Parliament and to the Council in order to extend the scope of Article 4, as appropriate.

Article 7

Committee

1. The Commission shall be assisted by the Committee set up by Article 18 of Council Directive 75/442/EEC (1).

2. Where reference is made to this paragraph, Articles 5 and 7 of Decision 1999/468/EC shall apply, having regard to Article 8 thereof.

The period provided for in Article 5(6) of Decision 1999/468/EC shall be set at three months.

3. The Committee shall adopt its rules of procedure.

Article 8

Penalties

Member States shall determine penalties applicable to breaches of the national provisions adopted pursuant to this Directive. The penalties thus provided for shall be effective, proportionate and dissuasive.

Article 9

Transposition

1. Member States shall bring into force the laws, regulations and administrative provisions necessary to comply with this Directive before 13 August 2004. They shall immediately inform the Commission thereof.

When Member States adopt those measures, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. The methods of making such a reference shall be laid down by the Member States.

2. Member States shall communicate to the Commission the text of all laws, regulations and administrative provisions adopted in the field covered by this Directive.

Article 10

Entry into force

This Directive shall enter into force on the day of its publication in the *Official Journal of the European Union*.

Article 11

Addressees

This Directive is addressed to the Member States.

Done at Brussels, 27 January 2003.

For the European Parliament
The President
P. COX

For the Council
The President
G. DRYG

ANNEX

Applications of lead, mercury, cadmium and hexavalent chromium, which are exempted from the requirements of Article 4(1)

1. Mercury in compact fluorescent lamps not exceeding 5 mg per lamp.
2. Mercury in straight fluorescent lamps for general purposes not exceeding:
 - halophosphate 10 mg
 - triphosphate with normal lifetime 5 mg
 - triphosphate with long lifetime 8 mg.
3. Mercury in straight fluorescent lamps for special purposes.
4. Mercury in other lamps not specifically mentioned in this Annex.
5. Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.
6. Lead as an alloying element in steel containing up to 0,35 % lead by weight, aluminium containing up to 0,4 % lead by weight and as a copper alloy containing up to 4 % lead by weight.
7. — Lead in high melting temperature type solders (i.e. tin-lead solder alloys containing more than 85 % lead),
 - lead in solders for servers, storage and storage array systems (exemption granted until 2010),
 - lead in solders for network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunication,
 - lead in electronic ceramic parts (e.g. piezoelectronic devices).
8. Cadmium plating except for applications banned under Directive 91/338/EEC (1) amending Directive 76/769/EEC (2) relating to restrictions on the marketing and use of certain dangerous substances and preparations.
9. Hexavalent chromium as an anti-corrosion of the carbon steel cooling system in absorption refrigerators.
10. Within the procedure referred to in Article 7(2), the Commission shall evaluate the applications for:
 - Deca BDE,
 - mercury in straight fluorescent lamps for special purposes,
 - lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission as well as network management for telecommunications (with a view to setting a specific time limit for this exemption), and
 - light bulbs, as a matter of priority in order to establish as soon as possible whether these items are to be amended accordingly.

(1) OJ L 186, 12.7.1991, p. 59.
(2) OJ L 262, 27.9.1976, p. 201.