

Lead Free Legislation and Issues

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United States

- **Emergency Planning and Community Right to Know Act
Toxic Release Inventory: reduced reporting threshold for Pb to 100 pounds: January 2001 (applies to manufacture, processing, or use).**

Japan

- **Recycling Law increased fees for recycling Pb-containing items: April 2001.**
- **Very strong market driven push**

European Union

WEEE



- **DIRECTIVE 2002/96/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 27 January 2003 on waste electrical and electronic equipment**
 - **Producer responsibility (August 13, 2005)**
 - Separate Collection
 - Reuse
 - Recycling
 - Recovery

CATEGORIES OF ELECTRICAL AND ELECTRONIC EQUIPMENT COVERED BY WEEE DIRECTIVE

- **Large household appliances**
- **Small household appliances**
- **IT & Telecommunication equipment**
- **Consumer equipment**
- **Lighting equipment**
- **Electrical and electronic tools**
- **Toys**
- **Medical equipment systems (with the exception of all implanted and infected products)**
- **Monitoring and control instruments**
- **Automatic dispensers**

European Union

ROHS

- **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**
 - **Proposed directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (restricts use of Pb, mercury, cadmium, hexavalent chromium, and certain halogenated flame retardants (PBB, PBDE)).**

ROHS

- **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).**

CATEGORIES OF ELECTRICAL AND ELECTRONIC EQUIPMENT COVERED BY ROHS

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- **Consumer equipment**
- **Lighting equipment**
- **Electrical and electronic tools**
- **Toys**
- **Automatic dispensers**
- **Electric light bulbs and luminaires in households**

Exceptions

- **Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.**
- **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.**

Exceptions

- **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).**

Exceptions

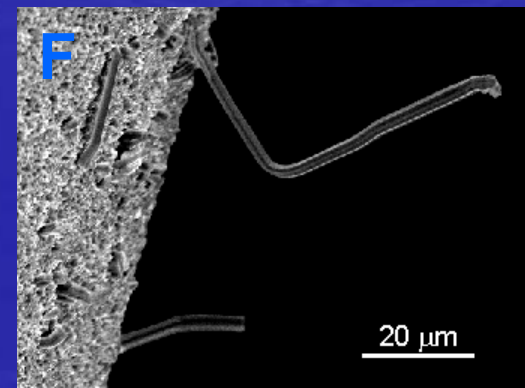
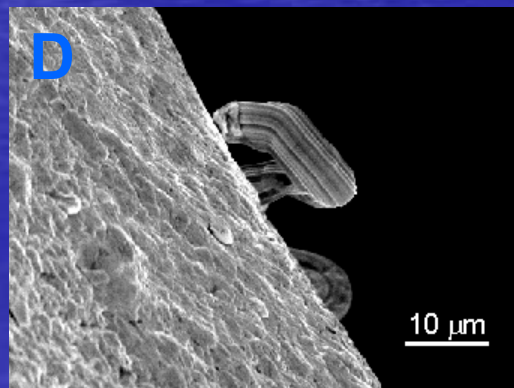
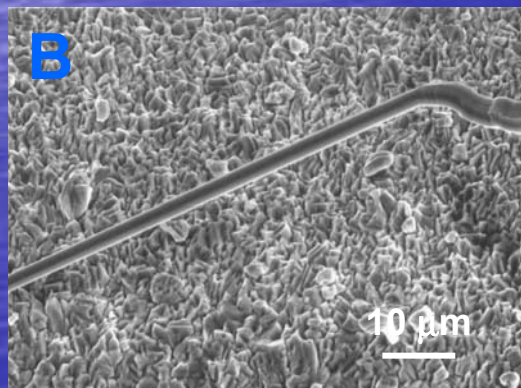
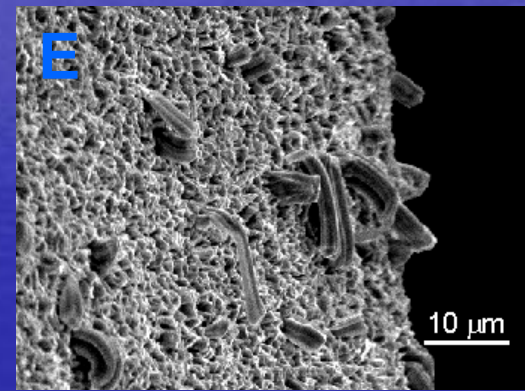
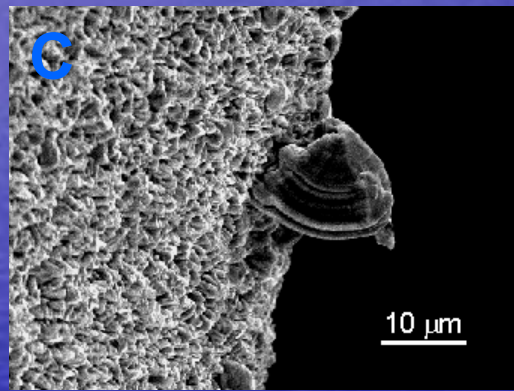
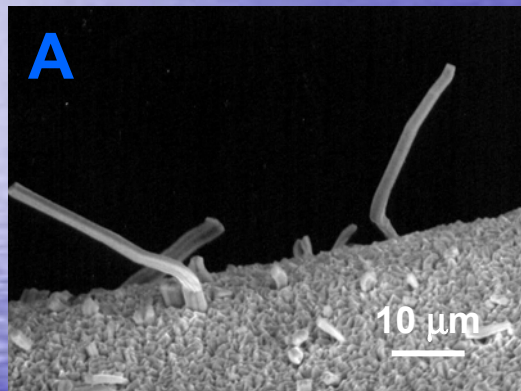
- **Within the procedure referred to in Article 7(2), the Commission shall evaluate the applications for:**
 - **Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signaling, transmission as well as network management for telecommunications (with a view to setting a specific time limit for this exemption)**
- **Exceptions to be reviewed every 4 years**

Impact

- **Higher reflow temperature of lead free solders**
 - 245 to 260°C
 - **Polymers for SMT and paste-in-hole connectors**
 - **Warpage**
 - Board
 - Connector

Impact

- Sn Whiskers



Impact

- **Thermal Cycle Reliability**
 - **Better: 0 to 100°C**
 - **Comparable: -40 to 125°C**
 - **Worse: >125°C**
 - **Worse with long slow cycles**
 - **Worse with components that place high strain on solder joint**

Lead Free Solder

2512 Resistors - Failure Data after 4600 Cycles from -40°C to +150°C

