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## Hazardous Materials - Restriction

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**ABSTRACT:** World over , electrical and electronic manufacturers are one way to eliminating substances like lead ,mercury ,chromium ,cadmium and polybrominated diphenyl ether directive of the European Union (EU). The directive 2002/95/EC of the European parliament and the council, passed on Jan27. 2003,bans the entry of equipments containing these hazardous materials in to the European Marken from July 1,2006.

The nutrition presents the challenge of a complete change in the global manufacturing scenario be it design component selection or manufacturing of equipments as all the electrical and electronic equipment have banned in on or the other form. Out of all the restricted materials lead and chromium in particular, will be the most difficult to replace as these are used in large quantities in electronic produces.

### I.INTRODUCTION

#### 1.1. Health Hazards of Resticted Elements:

##### 1.1.1. Lead(pb):

Lead is the core component of the solder used in the manufacturing of the printed circuit boards(PCBs).The lead containing water, when consumed, can affect almost every organ and the system of the human body. Lead almost damages kidneys and the reproductive system, the effects are the same whether it is breathed or swallowed. High lead levels in blood decreases the immunity causing weakness in fingers, wrists and affect the memory ,lead may also cause anemia –a disorder of blood. Lead is known as toxic substance present in the earth surface. But it is widely used in the world. Because

1. It can be easily remolded & refined.
2. Having highest recycling rate.
3. Having natural properties like low melting point, high strength, high thermal cycling, corrosion resistance& long life.
4. Lead binds strongly to a large number of molecules, such as amino acids, hemoglobin, many enzymes, RNA & DNA & thus disrupts many metabolic path way.

Unfortunately, till date there is no technology to destroy lead completely once it is extracted.

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1.1.2. CHROMIUM (Cr): The hexavalent chromium is called a carcinogen- an agent that causes. Chromium may cause irritation in the nose, throat and lungs. Repeated or prolonged exposure can even damage the mucous membrane of nasal passages and result in ulcers. People who are working under the plating atmosphere are prone to lung cancer.

1.1.3. MERCURY (Hg): Although mercury is used in a very small quantity in lighting and dental filling applications, it still has a very bad effect on our nervous system resulting in repetitive headaches, tremors (in hands, feet, eyelids and tongue). Muscular weakness, tinnitus (ringing in the ears) paraesthesia (abnormal skin sensation) impaired visual fields and visual acuity, depression, memory loss, chest pain.

1.1.4. CADMIUM (Cd):

Cadmium is an extremely toxic metal commonly found in industrial workplaces, particularly where any metal is being processed or stimulated. Due to its low permissible exposure limit (PEL), over exposures may occur even in situations where traces of cadmium are found. In the present, smelter dust cadmium is used extensively in electroplating.

The most serious consequences of chronic cadmium poisoning is cancer. The first observed chronic effect is generally kidney damage. This has been observed in Japan where residents were exposed to cadmium in rice crops irrigated with cadmium-contaminated water. Cadmium may also cause anemia, teeth discoloration and loss of smell.

### IS IT POSSIBLE TO ELIMINATE ROHS ELEMENTS

To some extent, mercury, cadmium and chromium can be eliminated as they are mostly used in lighting and plating applications. The removal of lead from the PCB production process represents a challenge for manufacturers. At present, "eutectic" is a widely used solder. It is basically a 63.37% alloy of tin and lead.

In order to eliminate lead from solder alloy, one has to use elements like silver, copper and bismuth and to form an alloy with tin.

This brings a number of concerns:

1. Higher processing temperatures.
2. Using the new solder alloys in production will require higher melting temperatures of 20 to 40°C than the existing one.
3. Intermittent reflow temperature settings and peaks are critical.
4. Selection of components becomes critical as one has to select the component in compliance to the RoHS directive and also see the capability of the component to withstand elevated solder temperatures.

### II. ACTIONS ACROSS THE WORLD

To meet the EU directive, manufacturers are planning to use a combination of tin, silver and copper/bismuth alloy as the most suitable alloy for plating and soldering. This requires a complete change in the plating and soldering equipment and process. The use of lead-free components calls for a very large investment cost and time, most component

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manufacturers are ready to bear these expenses and many have already started converting their component to ROHs compliance and made information available on their websites.

### III.CONCLUSION

Materials that cannot be destroyed easily can be dangerous, in this regard electronic industry should not consider the EU, direction as a threat, but take it as a challenge and eliminate all the hazardous subcutaneous substance to create a healthy environment.

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