

# TECHNICAL INFORMATION BOOKLET

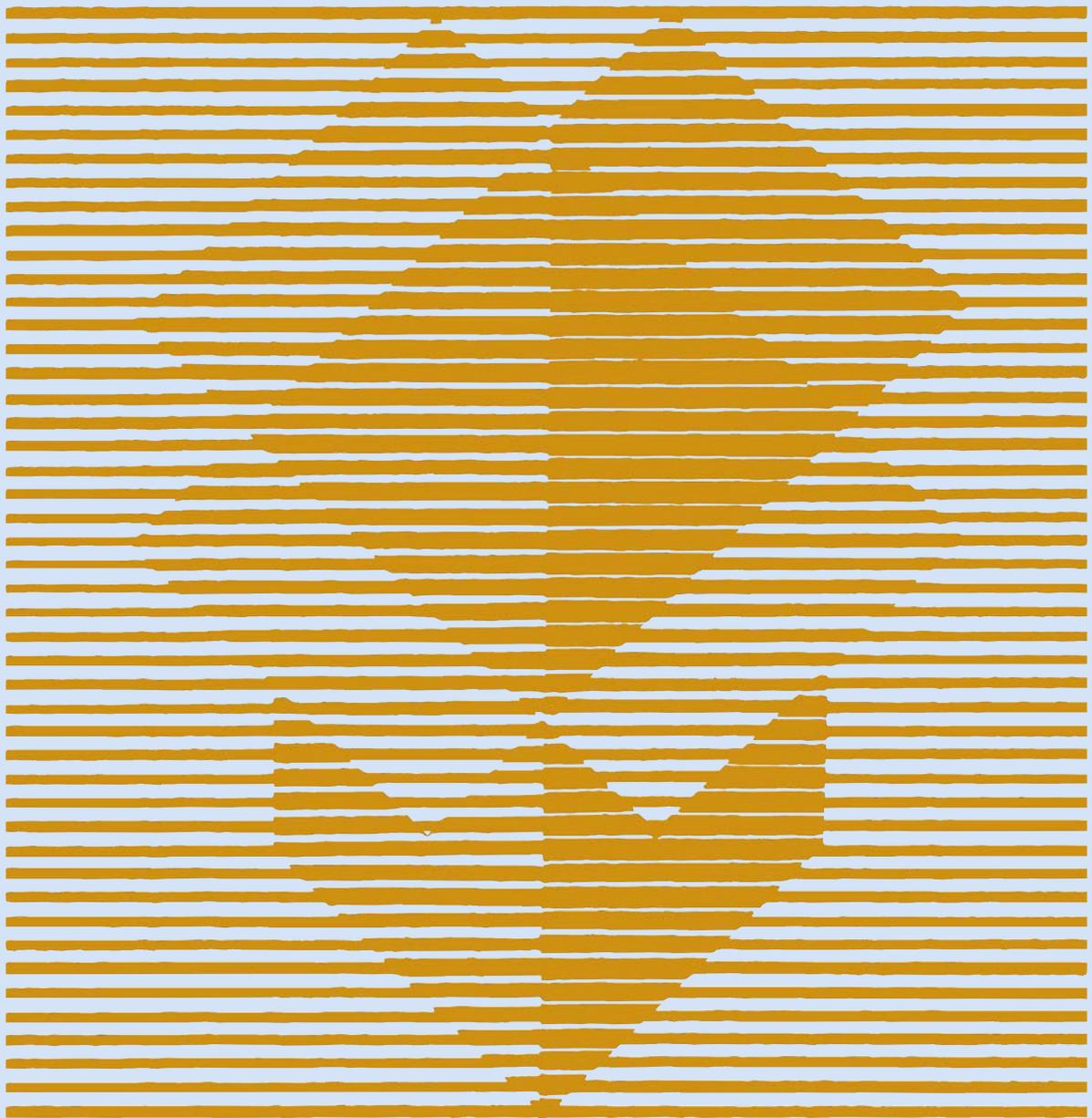
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**FCBM 39:07**

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## **Restricted Heavy Metals Specification in Packaging Material**

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**FEDERATION OF CORRUGATED BOX  
MANUFACTURERS OF INDIA**

## **FOREWORD**

Modern life styles have triggered increasing use of packaging while this is a positive sign, this also has given rise to the problem of disposal of packaging materials and solid waste management. One of the areas of serious concerns is the presence of heavy metals in packaging materials.

This booklet outlines the specifications of restricted heavy metals in corrugated boxes.

FCBM has been bringing out Standards and Technical Information Booklets that have proved to be very useful to both manufacturers and users of corrugated boxes.

I do hope the readers will find this booklet very useful.

I, on behalf of FCBM, congratulate the R&D Committee headed by Shri Ram Kumar Sunkara for the excellent work which is pertinent to our modern times.

**Kirit B. Doshi**

*President*

*Federation of Corrugated Box*

*Manufacturers of India*

# Restricted Heavy Metals Specification in Packaging Material

## 1. Introduction

### 1.1 Abstract

Global environmental policy's recognizes the need for environmental protection relative to solid waste disposal. On the basis of available scientific and medical evidence, the presence of heavy metals in packaging material is of concern in the management of solid waste.

### 1.2 Purpose

This specification identifies the heavy metal elements which are restricted, and stipulates the maximum concentration levels of these elements acceptable globally as contained in any corrugated packaging material or corrugated packaging component.

## 2. Scope

This specification applies to all corrugated packaging products made of paper and paper board.

This specification is to include, but is not limited to, the following packaging materials and packaging components.

- Corrugated
- Paperboard
- Paper
- Chipboard
- Inks
- Strapping
- Adhesives
- Coatings

## 3. Heavy Metals in Packaging Materials

This specification is based on the concept that materials used in packaging are not to include toxic agents that can create problems in disposal or recycling systems. While toxic materials in packaging (e.g., heavy metals) pose no inherent danger to the user when the package is purchased or used, they do present a concern in the solid waste management system. These materials frequently are used as plastics additives and coloring agents.

Under certain conditions toxic constituents may be formed or released by reactions of packaging materials. As the discarded package is subjected to treatment in the disposal system (incineration in resource recovery facilities or buried in landfills), toxic components may be released into the air (stack emissions) or onto the land and potentially into groundwater (leachate from land disposal of package or incinerator ash, etc.). Although packaging is not the major contributor of these toxic agents in the solid waste stream, removal of these toxic substances from packaging can make solid waste management safer.

#### **4. Specification**

No packaging material or packaging component shall contain any amount of lead, cadmium, mercury, or hexavalent chromium as an element which has been intentionally introduced as a part of its manufacture, forming, distribution, or printing.

The sum concentration level of incidental amounts of lead, cadmium, mercury, and hexavalent chromium present in any packaging material or packaging component shall not exceed 100 parts per million (100 ppm) by weight (0.01%).

#### **5. Terms and Definitions**

**Cadmium** – A metallic element used in plastics manufacture as a heat stabilizer and as a pigment constituent. It is a carcinogen and a toxin.

**Hexavalent Chromium** – A chromium compound used as a constituent of inorganic pigments. It is carcinogenic and corrosive on living tissue.

**Lead** – A metallic element used in plastics manufacture as a heat stabilizer and in inorganic pigments for opacity. It is a cumulative toxin.

**Mercury** – A metallic element used in inorganic pigments. It is a neurotoxin.

**Package** – A container providing a means of marketing, protecting, or handling a product, including a unit package, and intermediate package, and a shipping container.

**Packaging Component** – Any individual assembled part of a package such as, but not limited to, any interior or exterior blocking, bracing, cushioning, weather proofing, exterior, strapping, coatings, closures, inks, and labels.

#### **6. Testing of Heavy Metals**

The heavy metals are Lead, Cadmium, Mercury, Hexavalent Chromium. These are tested under two conditions.

1. Paper is converted to ash at 600 degrees centigrade and using AAS method (Atomic Absorption Spectrophotometric) the amount of heavy metals is determined. The maximum permissible limit is total content should not be more than 100 ppm.
2. Paper is soaked in water for 24 hours. (Referred to as 24 hours water extraction) then heated to 600 degrees and tested for heavy metals. In this case the content has to be 0 ppm.

#### **7. Test Methods**

Following are the test methods used for determining heavy metals:

ENV 12497  
ENV 12498  
SCAN- CM 54:97  
T – 438

## 8. Typical Amount of Heavy Metals in Kraft Paper

Metal	Range in ppm
Lead Content	1.00 to 20.00
Cadmium Content	0.00 to 1.50
Mercury Content	0.00 to 32.00
Hexavalent Chromium Content	1.00 to 4.00

## 9. Atomic Absorption Spectrophotometric Method (AAS Method)

Atomic absorption spectrometry (AAS) is an analytical technique that measures the concentrations of elements. Atomic absorption is so sensitive that it can measure down to parts per billion of a gram ( $\mu\text{g dm}^{-3}$ ) in a sample. The technique makes use of the wavelengths of light specifically absorbed by an element.

### How it works

Atoms of different elements absorb characteristic wavelengths of light. Analysing a sample to see if it contains a particular element means using light from that element. For example with lead, a lamp containing lead emits light from excited lead atoms that produce the right mix of wavelengths to be absorbed by any lead atoms from the sample. In AAS, the sample is atomised – i.e., converted into ground state free atoms in the vapour state – and a beam of electromagnetic radiation emitted from excited lead atoms is passed through the vaporized sample. Some of the radiation is absorbed by the lead atoms in the sample. The greater the number of atoms there is in the vapour, the more radiation is absorbed. The amount of light absorbed is proportional to the number of lead atoms. A calibration curve is constructed by running several samples of known lead concentration under the same conditions as the unknown. The amount the standard absorbs is compared with the calibration curve and this enables the calculation of the lead concentration in the unknown sample.

## 10. Testing Houses

The paper samples can be tested for heavy metals at following testing centers:

### Regional Testing Centres

Four Regional Testing Centres under Small Industries Development Organisation, situated at Chennai, Kolkata, Delhi and Mumbai.

- **Head office:**  
The Development Commissioner,  
(Small Scale Industry),  
7th Floor, Nirman Bhawan,  
Maulana Azad Road,  
New Delhi - 110 011.
- **The Director,  
Regional Testing Centre (NR),**  
Capt. Sahid Gaur Marg,  
Okhla Industrial Estate,  
New Delhi - 110 020.
- **The Director,  
Regional Testing Centre (SR),**  
65/1, G.S.T. Road,  
Guindy (SISI Campus),  
Chennai - 600 032, Tamil Nadu.
- **The Director,  
Regional Testing Centre (WR),**  
SISI Campus, Sakinaka,  
Kurla Andheri Road,  
Mumbai - 400 072, Maharashtra.
- **The Director,  
Regional Testing Centre (ER),**  
111/112, B.T. Road,  
Kolkata - 700 025,  
West Bengal.

### National Test Houses

- **North Region, Ghaziabad:**  
The Scientist-in-Charge,  
National Test House (NR),  
Kamala Nehru Nagar,  
Ghaziabad - 201 002.  
Tel.: (0120) 2789906 / 813 / 493  
Fax: (0120) 2789883  
E-mail: nthnr@vsnl.net.in
- **West Region, Mumbai:**  
The Director,  
National Test House (WR),  
Plot No. F-10, MIDC, Marol,  
Andheri (E), Mumbai - 400 093.  
Tel.: (022) 2834 1483 / 2832 7276 /  
2835 2350  
Fax: (022) 2834 1767  
E-mail: nthwr@mtnl.net.in
- **South Region, Chennai:**  
The Scientist-in-Charge,  
National Test House (SR),  
Tharamani, Chennai - 600 113.  
Tel.: (044) 2243 2374/1157  
Fax: (044) 2243 3158  
E-mail: nthsr@tn.nic.in
- **East Region, Kolkata:**  
The Director,  
National Test House (ER),  
Block-CP, Sector - V, Salt Lake,  
Kolkata - 700 091.  
Tel.: (033) 2367 3871 / 3429 / 30 / 31  
Fax: (033) 2367 3868 / 3871  
E-mail: nthsal@wb.nic.in

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Published in the interest of manufacturers and users of corrugated boxes.  
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