

CANADIAN PRINTING INK MANUFACTURERS ASSOCIATION

SOLVING “HEAVY METAL” COMPLIANCE



CMIA
P
I
M
A
C

The term “heavy metals” has been used as a group name for metals and semi-metals that have been associated with contamination and potential toxicity or eco-toxicity. There is no standard *regulatory* definition of “heavy metal”. Some regulations list the applicable “heavy metals” of concern others do not. Many times the list of “heavy metals” differs from one regulation to the next.

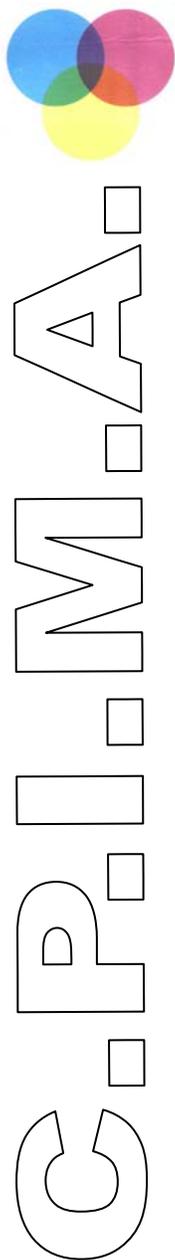
When North American customers request “heavy metal” compliance, they are usually referring to the Toxic in Packaging Legislation (C.O.N.E.G.), the ASTM Standard Consumer Safety Specification on Toy Safety F 963 (ASTM F 963-11), or the European Standard on Safety of Toys EN 71 Part 3 : 2009.

The Toxics in Packaging (C.O.N.E.G.) legislation is designed to phase out the use and presence of mercury, lead, cadmium and hexavalent chromium in packaging. The total of the four metals is not to be greater than 100 ppm. The European version of this legislation is 94/62/EC Directive on Packaging and Packaging Waste.

The “Toy Standards” -- ASTM F963 and EN71-- identify possible hazards that may not be readily recognized by the public, and that may be encountered in the normal use for which a toy is intended or after reasonably foreseeable abuse. These standards include restrictions on the *soluble* levels of Antimony, Arsenic, Barium, Cadmium, Chromium, Mercury, Selenium and total Lead in surface coating materials used for toys. The ISO Global Toy Standard (IS 8124-3) also addresses these elements. The incidental (i.e. contaminant) soluble levels for these eight specific elements in surface coating materials must not exceed the limits outlined below:

Element	ASTM F963-11	EN71-3 2013 (Category III)	IS 8124-3: 2010
Lead	90 mg/kg	90 mg/kg	90 mg/kg
Antimony	60 mg/kg	560 mg/kg	60 mg/kg
Arsenic	25 mg/kg	47 mg/kg	25 mg/kg
Barium	1000 mg/kg	18,750 mg/kg	1000 mg/kg
Cadmium	75 mg/kg	17 mg/kg	75 mg/kg
Chromium (III & VI)	60 mg/kg	III – 60 mg/kg VI – 0.2 mg/kg	60 mg/kg
Mercury	60 mg/kg	94 mg/kg	60 mg/kg
Selenium	500 mg/kg	460 mg/kg	500 mg/kg

The European Standard Toy Standard was revised in 2009 to include ten new metals, and three different limits based on the varying degree of ingestion of different types of material. Level Category III deals with toy coatings.



Element	EN71-3 2009 (Category III)	Element	EN71-3 2009 (Category III)
Aluminium	70,000 mg/kg	Nickel	930 mg/kg
Boron	15,000 mg/kg	Strontium	56,000 mg/kg
Cobalt	130 mg/kg	Tin	180,000 mg/kg
Copper	7,700 mg/kg	Organic Tin	12 mg/kg
Manganese	15,000 mg/kg	Zinc	46,000 mg/kg

Depending on where the final consumer lives, the toy related coating materials must also comply with:

1. U.S. Federal Code of Regulations section 16 CFR 1303 - *Ban of Lead-Containing Paint and Certain Consumer Products Bearing Lead-Containing Paint*; (<http://www.access.gpo.gov/nara/cfr/waisidx/cfr-table-search.html>) or
2. Canadian Hazardous Products Act, Chapter H-3, Part 2 of Schedule 1 (amended December 2010) restricting the amount of Lead, antimony, arsenic, barium, cadmium, mercury, and selenium present in the decorative or protective coating of toys, equipment and other products for use by a child in learning or play.

Thirteen of these nineteen elements are rarely, if ever, used in printing ink formulations. Aluminium, Barium, Cobalt, Copper, Manganese and Zinc however, can be present in an ink depending on the ink colour and drying system.

Barium is a component of warm red and other pigments that may be used in spot colours. Aluminium is the main component of “silver” inks, while copper and zinc are components of “gold” inks. Copper is also present in some blues, greens and reds. Cobalt and Manganese compounds are used as driers in many oxidative-drying inks.

Printer must specify which Toy Standard for which compliance is required as this may limit the choice of pigments. They are advised to request Barium-free inks when printing children’s toys or packaging that must meet ASTM F963 compliance.

Compliance with the above regulations and standards will not guarantee compliance with Brand owners restricted materials guidelines. These internally developed guidelines include materials that may not currently be subjected to regulatory control. For example, one Brand owner prohibits the use of molybdenum containing pigments, another prohibits the use of certain benzidine yellows. To ensure that the ink meets the customer’s requirements, the printer should provide the ink manufacturer with the relevant guidelines.