

Battery-operated/electronic toys: HMTc Standard

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CORRESPONDENCE

Corrections are logged publicly on the article page, each with its date, the affected value, and the source that resolved it.

Abstract

The Heavy Metal Tested & Certified heavy-metal-safety standard for battery-operated/electronic toys in Children's Toys, Arts, and Crafts, evaluated on element MIGRATION from scraped-off toy material (EN 71-3 Category III, mg/kg of material): a migration ceiling, not a total-content ceiling. 8 of 11 panel analytes publish a numeric limit taken from the strictest applicable government maximum; the remainder are held under mandatory control or a substantiated not-material determination.

1 | How every number on this standard is set

HMTc Method v2.0 (government-limit default; strictest applicable sovereign maximum in the row's native basis, disclosed read-across where the exact cell is unregulated; never occurrence-derived). Category 21 publishes on the element-migration basis only, pooling the EU, US and Mexican migration instruments, with each row pinned to the EN 71-3 material category or categories its scope actually spans.

2 | Master limit table

All values in ppb (µg/kg), as sold basis. A brand meeting every value qualifies for the mark.

ANALYTE	TIER	HMTc LIMIT	BASIS
Lead (Pb)	Tier 1	23,000	government maximum level
Cadmium (Cd)	Tier 1	17,000	government maximum level

Total arsenic (tAs)	Tier 2	25,000	government maximum level
Inorganic arsenic (iAs)	Tier 1	n/m	not material in this matrix
Mercury, total (tHg)	Tier 1	60,000	government maximum level
Methylmercury (MeHg)	Tier 1	n/m	not material in this matrix
Nickel (Ni)	Tier 2	930,000	government maximum level
Tin (Sn)	Tier 2	180,000,000	screening ceiling (European Union)
Aluminium (Al)	Tier 2	28,130,000	government maximum level
Total chromium (Cr)	Tier 2	60,000	screening ceiling (US FDA)
Hexavalent chromium (Cr-VI)	Tier 2	53	government maximum level

3 | Derivation – where each number comes from

Every cell traces to one named sovereign maximum level (the strictest for the nearest analog), or to an explicit control, not-material, or species-bounded determination. No occurrence statistic selects a certification value.

ANALYTE	HMTC	SOVEREIGN ANALOG / DETERMINATION
Lead (Pb)	23,000	government maximum level
Cadmium (Cd)	17,000	government maximum level
Total arsenic (tAs)	25,000	government maximum level

Inorganic arsenic (iAs)	n/m	No sovereign toy-safety instrument sets an inorganic-arsenic limit. Directive 2009/48/EC Annex II Part III point 13, EN 71-3, ISO 8124-3:2020 Table 1, ASTM F963-17 4.3.5 and NOM-252-SSA1-2011 Table 1 all regulate TOTAL arsenic migration from toy material; inorganic arsenic is a dietary speciation with no article-migration counterpart. Arsenic in an accessible housing, keypad, lens, cable sheath or plated contact is bounded by the published total-arsenic migration ceiling by identity (iAs <= tAs), so a separate inorganic-arsenic ceiling would add no control.
Mercury, total (tHg)	60,000	government maximum level
Methylmercury (MeHg)	n/m	Methylmercury is produced by microbial methylation in aquatic systems and reaches humans by diet. an accessible housing, keypad, lens, cable sheath or plated contact carries no methylation pathway and no dietary route, and no sovereign toy instrument sets a methylmercury limit: every toy mercury limit (2009/48/EC point 13, ASTM F963-17 4.3.5, ISO 8124-3:2020, NOM-252-SSA1-2011, Canada SOR/2011-17 and SOR/2016-193) is on total mercury. Any organomercury fraction is bounded by the published total-mercury migration ceiling by identity (MeHg <= tHg).
Nickel (Ni)	930,000	government maximum level
Tin (Sn)	180,000,000	government maximum level
Aluminium (Al)	28,130,000	government maximum level
Total chromium (Cr)	60,000	government maximum level
Hexavalent chromium (Cr-VI)	53	government maximum level

4 | Cite this standard

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STATUS AND LICENCE

A normative certification standard, editorially reviewed and version-controlled in-house; every value traces to a named sovereign maximum level, disclosed in the derivation. © 2026 Institute of Contaminant Standards / Heavy Metal Certified. All rights reserved.

DATA AVAILABILITY

The works this reference draws on are listed in full in the references above and on the briefing page at <https://heavymetalcertified.com/standards/toys-battery-electronic>. Primary legal instruments and expert-body assessments are named with their public identifiers; the underlying occurrence and toxicology corpus is maintained on the Heavy Metal Index.

COMPETING INTERESTS

This briefing is published by the Heavy Metal Tested & Certified (HMTc) program, operated by the Institute of Contaminant Standards. Its statements about government regulations, toxicology, and occurrence are sourced to the cited primary and expert-body records and to the independently maintained Heavy Metal Index; the program's own certification thresholds are not used as evidence for any factual claim made here.

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This revision 2026-08. The full dated record is maintained at <https://heavymetalcertified.com/standards/toys-battery-electronic>.