Balls: HMTc Standard

Karen Pendergrass · 0000-0002-2348-7259 · Heavy Metal Tested & Certified, Institute of Contaminant Standards

CITE AS

Pendergrass, K. (2026). Balls: HMTc Standard (Standard No. 10.83138/hmtc.std.21.toys-balls). Institute of Contaminant Standards. https://doi.org/10.83138/hmtc.std.21.toys-balls

© 2026 Institute of Contaminant Standards / Heavy Metal Certified. All rights reserved.

CORRESPONDENCE

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

KEYWORDS

heavy metals, food safety, dietary exposure

PUBLICATION HISTORY

This revision 2026-08.

Abstract

The Heavy Metal Tested & Certified heavy-metal-safety standard for balls 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	HMTC LIMIT	BASIS
Lead (Pb)	23,000	government maximum level (European Union)
Cadmium (Cd)	17,000	government maximum level (European Union)

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

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 (European Union)
Cadmium (Cd)	17,000	government maximum level (European Union)
Total arsenic (tAs)	25,000	government maximum level (US FDA)

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 a rubber, foam, plastic or textile ball wall and its printing 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 (US FDA)
Methylmercury (MeHg)	n/m	Methylmercury is produced by microbial methylation in aquatic systems and reaches humans by diet. a rubber, foam, plastic or textile ball wall and its printing 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 (European Union)
Tin (Sn)	180,000,000	screening ceiling (European Union)
Aluminium (Al)	28,130,000	government maximum level (European Union)
Total chromium (Cr)	60,000	screening ceiling (US FDA)
Hexavalent chromium (Cr-VI)	53	government maximum level (European Union)

4 | Cite this standard

Pendergrass, K. (2026). *Balls: HMTc standard* (Standard No. 10.83138/hmtc.std.21.toys-balls). Institute of Contaminant Standards. https://doi.org/10.83138/hmtc.std.21.toys-balls

© 2026 Institute of Contaminant Standards / Heavy Metal Certified. All rights reserved.

References

[1] European Union
Binds Pb, Cd, Ni, Cr-VI, Sn, Al.
MAXIMUM LEVEL

[2] US FDA
Binds tAs, tHg, Cr.
MAXIMUM LEVEL

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.

COMPETING INTERESTS

This standard 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.

DATA AVAILABILITY

The works this standard draws on are listed in full in the references above and on the standard page at https://heavymetalcertified.com/standards/toys-balls. 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.

PUBLICATION HISTORY

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