# Vegetable juices, non-root: HMTc Standard

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CITE AS

Pendergrass, K. (2026). Vegetable juices, non-root: HMTc Standard. Institute of Contaminant Standards.

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CORRESPONDENCE

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KEYWORDS

heavy metals, food safety, dietary exposure

PUBLICATION HISTORY

This revision 2026-08.

## Abstract

The Heavy Metal Tested & Certified heavy-metal-safety standard for vegetable juices, non-root in Beverages, evaluated on ready-to-drink liquid, as consumed (wet weight, single strength); a concentrate or a powder-to-liquid product is assessed as reconstituted to single strength per the manufacturer's own directions, which is the basis EU 2023/915 and Codex CXS 193 write into their juice cells and Hong Kong Cap 132V Note 11 writes into its beverage entries. 5 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-only): the strictest applicable sovereign maximum level for this exact beverage form and analyte in the row's declared native basis, with disclosed read-across where the exact cell is unregulated, a substantiated not-material determination where a species is bounded or is a method artifact, and a control where no defensible sovereign number and no supportable near-neighbour exist. Never occurrence-derived. Ready-to-drink and dry-commodity bases are never mixed and no brewing, dilution or reconstitution factor is invented.

## 2 | Master limit table

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

| ANALYTE | HMTC LIMIT | BASIS |
|---|---|---|
| Lead (Pb) | 30 | read-across (EU 2023/915) |

| | | |
|---|---|---|
| Cadmium (Cd) | 50 | read-across (Hong Kong) |
| Total arsenic (tAs) | 500 | screening ceiling (Hong Kong) |
| Inorganic arsenic (iAs) | 20 | read-across (EU 2023/915) |
| Mercury, total (tHg) | 10 | read-across (Hong Kong) |
| Methylmercury (MeHg) | n/m | not material in this matrix |
| Nickel (Ni) | 250 | government maximum level (EU 2024/1987) |
| Tin (Sn) | 100,000 | government maximum level (EU 2023/915) |
| Aluminium (Al) | control | measured every lot; no human-food maximum |
| Total chromium (Cr) | 500 | screening ceiling (Hong Kong) |
| Hexavalent chromium (Cr-VI) | n/m | not material in this matrix |

## 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) | 30 | read-across (EU 2023/915); fruit juices, fruit juices from concentrate, concentrated fruit juices, and fruit nectars other than exclusively from berries and other small fruits |
| Cadmium (Cd) | 50 | read-across (Hong Kong) |
| Total arsenic (tAs) | 500 | screening ceiling (Hong Kong); Vegetables |
| Inorganic arsenic (iAs) | 20 | read-across (EU 2023/915); fruit juices, concentrated fruit juices as reconstituted, and fruit nectars |
| Mercury, total (tHg) | 10 | read-across (Hong Kong); Vegetables, other than edible fungi |

| | | |
|---|---|---|
| Methylmercury (MeHg) | n/m | Methylmercury has no formation pathway in a non-root vegetable juice: there is no marine bioaccumulation step in the supply chain and no anaerobic, sulfate-reducing methylation environment in the product or its process. Methylmercury is a component of total mercury (MeHg <= tHg) and is governed by and bounded by the total-mercury cell; no separate methylmercury ceiling is published. |
| Nickel (Ni) | 250 | government maximum level (EU 2024/1987) |
| Tin (Sn) | 100,000 | government maximum level (EU 2023/915) |
| Aluminium (Al) | control | No credible sovereign sets an aluminium maximum level for a non-root vegetable juice. The only sovereign aluminium values in a dietary basis are the packaged--drinking-water quality standards (US 21 CFR 165.110 secondary allowable level 200 ug/kg, EU 2020/2184, Health Canada 2900 ug/kg), which govern water sold as water and are Category 8 instruments, and the FSANZ infant-formula aluminium limits, which are Category 1 and are excluded from this category's anchor set by the taxonomy boundary rule. In this form aluminium is a packaging and processing signal (aluminium cans and can linings, closures, filter aids, additive carry-over) rather than a raw-material contaminant. |
| Total chromium (Cr) | 500 | screening ceiling (Hong Kong); Vegetables, other than pulses |

| | | |
|---|---|---|
| Hexavalent chromium (Cr-VI) | n/m | Hexavalent chromium is not stable in a non-root vegetable juice. At the pH of this product form (typically pH 3.9 to 4.6 for tomato-based juices and mildly acidic for other non-root vegetable juices, with organic acids and ascorbate present) Cr(VI) is reduced to Cr(III) by the organic acids, sugars, ascorbate and polyphenols present in the matrix, so a positive Cr(VI) result is an artifact of the total-chromium determination rather than a species present in the beverage as consumed. The reference-method basis for this determination is the in-house species arbitration at data/workbench/standards/-2026-07-31-chromium-formula--adjudication.md, which found that the superseded ion-exchange plus electrothermal-AAS methods that generated the historical Cr(VI) values in liquid food matrices are not reproduced by the modern reference method: saraiva2021 (species-specific isotope dilution HPLC-ICP-MS, limit of quantification 0.049 ug/kg) quantified no Cr(VI) in any milk or formula sample while resolving Cr(III) and total chromium at single-digit ug/kg. That adjudication was drawn on a near-neutral aqueous food matrix; the acidic beverage matrices in this row are a more strongly reducing environment still, so the artifact conclusion carries a fortiori. The health-relevant species is controlled through the total-chromium cell and the reflex rule below, and this determination is a method finding, not an occurrence-derived value: no number is taken from it. |

## 4 | Cite this standard

Pendergrass, K. (2026). *Vegetable juices, non-root: HMTc standard*. Institute of Contaminant Standards.

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## References

[1] EU 2023/915
Binds Pb, Sn, iAs. fruit juices, fruit juices from concentrate, concentrated fruit juices, and fruit nectars other than exclusively from berries and other small fruits.
MAXIMUM LEVEL

[2] Hong Kong
Binds Cd, tAs, tHg, Cr.
MAXIMUM LEVEL

[3] EU 2024/1987
Binds Ni.
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/vegetable-juices-non-root. 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/vegetable-juices-non-root.