



HEAVY METALS - TOTAL

Other Names See below for heavy metal substances that have total content limits in the AFIRM RSL

CAS Number	Substance
7440-38-2	Arsenic (As)
7440-43-9	Cadmium (Cd)
7439-92-2	Lead (Pb)
7439-97-6	Mercury (Hg)

May Be Found In

- Metal alloys & coatings
- Pigments & dyes
- PVC

Heavy Metals are a loosely defined group of elements that have metallic properties including the ability to conduct heat and electricity. In most cases, classification of a heavy metal is based on molecular weight, atomic number, or related physical properties.

Uses in the Supply Chain

Heavy metals, including arsenic, cadmium, lead, and mercury may be found in pigments and dyes, metal alloys and coating, and in the PVC stabilization process. Cadmium may be found in low quality dyes. Arsenic, cadmium, lead, and mercury may be found in pigments, but have largely been phased out. Metal alloys and coatings may contain arsenic, cadmium, and lead. PVC stabilization may be accomplished with the use of cadmium or lead.

Why Heavy Metals are Restricted

- Heavy metals are associated with the following environmental and human toxicity characteristics:
 - Aquatic toxicity: arsenic, cadmium
 - Carcinogenicity: arsenic, cadmium
 - Kidney, brain and/or reproductive toxicity: lead, mercury
 - High acute toxicity: arsenic, cadmium, mercury

Sourcing Compliant Materials from Your Suppliers

Ensure suppliers can provide materials that comply with AFIRM RSL limits.¹

- Pay special attention to suppliers of metal trims and PVC materials.
 - Ensure metal alloys, weldings or surface coatings do not contain arsenic, cadmium, or lead.
 - Ensure cadmium and lead are not used for PVC stabilization.
- Metals may be released from metal-complex dyes if not those dyes are not properly bound to the material.
- Share this sheet with your material suppliers and instruct them to work with their chemical suppliers to source heavy metal-compliant formulations using the guidance in the next section.
- Have your suppliers verify their materials meet the AFIRM heavy metal limits with a certification or, if necessary, by providing a test report from a third-party laboratory.
 - Perform risk-based checks of your suppliers' materials by submitting samples to a third-party laboratory for testing to ensure heavy metal limits are not exceeded.



Sourcing Compliant Formulations from Your Chemical Suppliers

- Contact your chemical suppliers and explain that you require formulations with no intentionally-added heavy metals (As, Cd, Pb, Hg).
 - The total concentration of heavy metals in formulations should comply with ZDHC MRSL limits whenever applicable.²
 - Pay particular attention to the following formulations:
 - Low quality pigments
 - Check the Safety Data Sheets (SDS) of all chemical formulations to ensure that none of the listed heavy metals is an ingredient.
 - Perform risk-based checks of your chemical suppliers' formulations by submitting samples to a third-party laboratory for testing to ensure the ZDHC MRSL limits are not exceeded whenever applicable.
-

Safer Alternatives

- There are many alternatives to pigments and trims containing heavy metals. You may need to make a higher upfront investment and conduct periodic compliance testing to ensure you obtain these heavy metal-free alternatives.
- The following plastic stabilizers do not contain heavy metals or restricted organotin:
 - Calcium-zinc stabilizers may be used in the form of metal carboxylates. These stabilizers are suitable for production of products with a high degree of clarity, good mechanical properties, excellent organoleptic properties and good weatherability.
 - Organic-based stabilizers are calcium-zinc stabilizers with zinc nearly or completely replaced with organic co-stabilizers. Benefits of these stabilizers include low migration, low odor, low VOC emissions, good initial color, and excellent transparency.

Additional Information

- Visit ECHA's Candidate List of substances of very high concern to view dossiers for many restricted substances <https://echa.europa.eu/candidate-list-table>.
- Agency for Toxic Substances and Disease Registry (ATSDR) (<https://www.atsdr.cdc.gov/ToxProfiles/>)

References

¹ Apparel and Footwear International RSL Management Group (Ed.). (2018, January 31). Restricted Substances List (RSL). Retrieved <http://afirm-group.com/afirm-rsl/>

² Manufacturing Restricted Substances List (Publication). (2015, December). Retrieved <http://www.roadmaptozero.com/programme/manufacturing-restricted-substances-list-mrsl-conformity-guidance/>