



Total Heavy Metals

Other Names:

CAS Number	Substance
7440-38-2	Arsenic (As)
7440-43-9	Cadmium (Cd)
7439-92-1	Lead (Pb)
7439-97-6	Mercury (Hg)
18540-29-9	Chromium (VI)

May Be Found In:

- Metal alloys and coatings
- Pigments and dyes
- PVC
- Metal components

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 stabilisation 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 stabilisation may be accomplished with the use of cadmium or lead.

Why Total 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 which comply with the AFIRM limits.¹
- Pay special attention to suppliers of metal trims and PVC materials.
- Ensure metal alloys, welding or surface coatings do not contain arsenic, cadmium, or lead.
- Ensure cadmium and lead are not used for PVC stabilisation.
- Metals may be released from metal-complex dyes if those dyes are not properly bound to the material.
- Share this guidance sheet with your material suppliers. Using the guidance in the next section, instruct them to work with their chemical suppliers to source chemical formulations that comply with these requirements. If needed, highlight the existence of harmful substances in materials via chemical management trainings from the ZDHC Academy, existing guidelines, and laws.
- Request suppliers to submit a confirmation of material compliance and/or a test report from a third-party laboratory. When materials are received, consider performing random, risk-based testing to ensure current heavy metal limits are not exceeded.
- Make sure all your suppliers have a solid chemical management system in place.

Sourcing Compliant Formulations from Your Chemical Formulators

- Explain that you require your dyes and pigments to be compliant with current ZDHC MRSL limits and with no intentionally added heavy metals (As, Cd, Pb, Hg). Ask your chemicals supplier for an accepted MRSL Conformance Certificate.
- Pay particular attention to low quality pigments.
- For all formulations, request SDS documentation to ensure none of the CAS Numbers above are listed as ingredients.
- Explain to chemicals suppliers that you require chemical formulations to comply with current ZDHC MRSL limits.
 - Search for formulations on the ZDHC Gateway Chemical Module. If your preferred formulations are not listed, encourage providers to register their formulations.
 - Ask for a ZDHC ChemCheck report.

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 stabilisers do not contain heavy metals or restricted organotins:
 - Calcium-zinc stabilisers may be used in the form of metal carboxylates. These stabilisers are suitable for production of products with a high degree of clarity, good mechanical properties, excellent organoleptic properties and good weatherability.
 - Organic-based stabilisers are calcium-zinc stabilisers with zinc nearly or completely replaced with organic co-stabilisers. Benefits of these stabilisers include low migration, low odour, low VOC emissions, good initial colour, and excellent transparency.

Additional Information

Agency for Toxic Substances and Disease Registry (ATSDR) (<https://www.atsdr.cdc.gov/ToxProfiles/>).

References

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

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