GUIDANCE SHEET

ORGANOTIN COMPOUNDS

Class or Substance Name

Organotin Compounds (Organotins): Organostannic Compounds

Substance List by CAS Number

Organotin compounds (organotins) are substances composed of tin directly bound to different organic groups. Organotins exist in compounds and have multiple associated CAS Numbers. The organotins subject to restriction include:

Tributyltin (TBT) Compounds
Trimethyltin (TMT) Compounds
Triphenyltin (TPhT) Compounds
Tetrabutyltin (TeBT) Compounds
Tricyclohexyltin (TCyHT) Compounds
Trioctyltin (TOT) Compounds
Tripropyltin (TPT) Compounds
Dibutyltin (DBT) Compounds
Dioctyltin (DOT) Compounds
Dimethyltin (DMT) Compounds
Monobutyltin (MBT) Compounds
Monoctyltin (MOT) Compounds

Description of Use in Apparel and Footwear

Organotins are often used as a heat stabiliser in PVC or as catalysts in the production of polymeric materials (for example, polyurethane (PU), polyester or self-crosslinking silicone polymers). They also may be used as biocides or preservatives in textile and leather. Silicone-based finishes (for example, for elastomeric properties and water repellency) may also contain organotins.

Legislation around the world restricts the use of some organotins in apparel, footwear and accessories. Leading apparel and footwear brands have banned the use of organotins in production of their products.

ORGANOTINS MAY BE FOUND IN:

- PVC materials such as:
  - Synthetic leather
  - Plastisol prints
  - Synthetic shoe insoles
- PU coatings
- PU binders, glues and adhesives

Why are Organotins Restricted?[1]

- Some organotins may persist in the environment and can be toxic to aquatic life above certain exposure levels.
- Above certain exposure levels, some organotins may act as immunotoxins.
- Above certain exposure levels, some organotins may impair human fertility or cause harm to unborn children.

Guidance: Sourcing Organotin-Compliant Materials from Your Material Suppliers (Textiles, Components and Trim Parts)

- Contact your suppliers and explain that you require materials with no intentionally-added organotins. Material organotin concentrations should be compliant with the following limits.[2]

MBT: Adults < 1 ppm, Babies < 0.5 ppm	**DBT:** < 0.2 ppm
TBT, TMT, TPhT, TCyHT, TOT, TPT: Sum < 1 ppm	**All others:** Sum < 1 ppm

  - Pay special attention to suppliers of PVC materials since organotins are often used as a stabiliser in PVC production (for example, plasticised PVC).
  - Consider that PU materials, including synthetic leather and coatings, may contain organotins since they are widely used as catalysts during PU production.
  - Self cross-linking silicone or polyester polymers may contain organotins used as catalysts during production.
  - Leather and textiles treated with biocides may contain organotins.

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[1] Hazard traits from EC Scientific Committee on Health and Environmental Risks (SCHER): "Revised Assessment of the Risks to Health and the Environment Associated with the use of the four organotin compounds TBT, DBT, DOT, and TPT"

[2] Limits taken from AFIRM Restricted Substances Guidance (http://www.afirm-group.com/rsl-guidance/). These are the lowest agreed upon limits on organotins in products among AFIRM brands. Check with brands for their individual limits.

- Share this information sheet with your material suppliers and instruct them to work with their chemical suppliers to source organotin-compliant chemical formulations using the guidance in the next section.
- Have your suppliers verify that their manufactured materials meet the above organotin 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 the above organotin limits are not exceeded.

Guidance: Sourcing Organotin-Compliant Chemical Formulations from Your Chemical Suppliers

- Contact your chemical suppliers and explain that you require chemical formulations with no intentionally added organotins. Concentrations of dibutyltin (DBT) in formulations used to process materials should be <20 ppm. Concentrations of all other listed organotins in formulations should be <5 ppm each.[3]
  - Suppliers of PVC materials may use organotins as stabilisers.
  - Suppliers of PU coatings may use organotins as catalysts in production.
  - Suppliers of self cross-linking silicone or polyester polymers, including fibers, may use organotins as catalysts in production.
  - Suppliers of biocides or preservatives may use organotins in their formulations.
- Have your chemical suppliers verify that their chemical formulations meet the DBT <20 ppm limit and <5 ppm limit for other organotins with a certification or, if necessary[4], by providing a test report from a third-party testing laboratory.
- Check the Material Safety Data Sheets (MSDS) of all chemical formulations to ensure that none of the organotin compounds above is listed as an ingredient.
- Perform risk-based checks of your chemical suppliers' formulations by submitting samples to a third-party laboratory for testing to ensure the organotin formulation limits are not exceeded.
- Discuss with your chemical supplier whether the below safer alternatives are suitable substitutes for your production needs.

Safer Organotin Alternatives

- Calcium-zinc stabilisers may be used in the form of metal carboxylates. These stabilisers offer clarity, good mechanical properties and good weatherability. Any selected alternative must be ZDHC MRSL compliant.
- Organic-based stabilisers are calcium-zinc stabilisers with zinc replaced by organic co-stabilisers. They offer low migration, low odor, low VOC emissions and good color and transparency. Any chosen alternative must be ZDHC MRSL compliant.
- Bismuth, titanate, titanium and zirconium catalysts can be used for PU production, though any chosen alternative must be ZDHC MRSL compliant.
- Titanate catalysts can be used for polyester production, though any chosen alternative must be ZDHC MRSL compliant.

Additional information about these alternatives is available at the following link:
http://ec.europa.eu/enterprise/sectors/chemicals/files/studies/organotins_en.pdf

[3] Limits taken from ZDHC Manufacturing Restricted Substances List (MRSL) (http://www.roadmaptozero.com/df.php?file=pdf/MRSL.pdf) and are the limits on unintended organotins in chemical formulations accepted by ZDHC member brands.
[4] At a later date, ZDHC will publish guidance on when testing of chemical formulations is appropriate.

For additional information, contact a ZDHC brand member.