Product Safety Assessment

ADVASTAB™ Methyl Tin Heat Stabilizers

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- CAS No. 57583-35-4 (Dimethyl tin)
- Bis(2-ethylhexylthioglycolate) dimethyl tin
- CAS No. 201687-58-3 (Reverse ester)
- ADVASTAB™ TM-161 Heat Stabilizer
- ADVASTAB TM-167 Heat Stabilizer
- ADVASTAB TM-181FS Heat Stabilizer
- ADVASTAB TM-181FSP Heat Stabilizer
- ADVASTAB TM-181FSM Heat Stabilizer
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- ADVASTAB TM-167 Heat Stabilizer
- ADVASTAB TM-181FS Heat Stabilizer
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- ADVASTAB TM-697 Heat Stabilizer
- ADVASTAB TM-698 Heat Stabilizer
- ADVASTAB TM-699 Heat Stabilizer
- ADVASTAB TM-699F Heat Stabilizer
- ADVASTAB TM-900F Heat Stabilizer
- ADVASTAB WS-379 Heat Stabilizer
- CAS No. 57583-34-3 (Methyl tin)
- Tris(2-ethylhexylthioglycolate) methyl tin
- Mixed alkylmetallic mercaptosteral sulfides
- ADVASTAB TM-181 Heat Stabilizer
- ADVASTAB TM-181FSP Heat Stabilizer
- ADVASTAB TM-181FSM Heat Stabilizer
- ADVASTAB TM-181GG Heat Stabilizer
- ADVASTAB TM-182 Heat Stabilizer
- ADVASTAB TM-186 Heat Stabilizer
- ADVASTAB TM-2080 Heat Stabilizer
- ADVASTAB TM-283SP Heat Stabilizer
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- ADVASTAB TM-286SP Heat Stabilizer
- ADVASTAB TM-3412 Heat Stabilizer
- ADVASTAB TM-404 ER Heat Stabilizer
- ADVASTAB TM-467 Heat Stabilizer
- ADVASTAB TM-480 Heat Stabilizer
- ADVASTAB TM-599A Heat Stabilizer
- ADVASTAB TM-691 Heat Stabilizer
- ADVASTAB TM-696 Heat Stabilizer
- ADVASTAB TM-698 Heat Stabilizer
- ADVASTAB TM-950F Heat Stabilizer
- CARSTAB™ TH-811 Heat Stabilizer

Product Overview
- ADVASTAB™ methyl tin heat stabilizers consist of two families commonly known as thioglycolates and reverse esters. Both families are mixtures of mono- and dimethyl tin mercaptides. They are clear, amber colored liquids that have low volatility and low water solubility.¹ For further details, see Product Description.
- Approximately 70% of the total annual world production of non-pesticidal organotin compounds is used in PVC heat stabilizers. Methyl tin heat stabilizers are just one group of

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organotin stabilizers. Major applications include stabilizers for plastics used in pipe, food packaging, window profile, and siding.\(^2\) For further details, see Product Uses.

- Dow does not sell methyl tin heat stabilizers directly to consumers. Workers in manufacturing or fabrication facilities may be exposed to these products. These stabilizers bond directly to the materials in which they are used, and it is unlikely that they will leach out of the final products. For further details, see Exposure Potential.

- In the industrial setting, contact with methyl tin stabilizers may cause eye or skin irritation. They can be absorbed through intact skin and may be harmful if absorbed. Ingestion may cause abdominal pain, gastrointestinal irritation, nausea, vomiting, and diarrhea. Inhalation of vapor or mist can cause irritation of the nose, throat, and lungs. Prolonged or repeated overexposure can cause central nervous system effects, immune system effects, kidney injury, or adverse reproductive effects. In the reverse ester products, hydrogen sulfide, a decomposition by-product, may be present in the headspace of the containers and inhalation of hydrogen sulfide can be fatal.\(^3\) For further details, see Health Information.

- ADVASTAB™ methyl tin heat stabilizers are insoluble in water. Some products will biodegrade, but most are considered not readily biodegradable. They have the potential to harm aquatic organisms. However, harmful concentrations of these materials are unlikely to be reached considering the industry-wide practices in place to limit environmental releases.\(^4,5\) For further details, see Environmental Information.

- ADVASTAB methyl tin heat stabilizers are stable at recommended storage and use conditions, but can decompose at elevated temperatures. Decomposition can result in pressure build-up in closed systems and the release of potentially toxic gases.\(^6,7\) For further details, see Physical Hazard Information.

** Manufacture of Product **

- **Capacity** – Dow produces over 10,000 metric tons (22 million pounds) of ADVASTAB™ methyl tin heat stabilizers per year at facilities in Cincinnati, Ohio.

- **Process** – ADVASTAB™ methyl tin heat stabilizers are produced by reacting a mixture of mono- and dimethyltin chlorides with an ester in the presence of a base. The ester that is used determines the family type of the product. The reverse ester family incorporates sulfur groups in place of some of the ester in the production process. The final product is isolated by phase separation, filtration to remove solids, and stripping to remove any volatile compounds.

** Product Description**\(^8,9\)

ADVASTAB™ methyl tin heat stabilizers consist of two families commonly known as thioglycolates and reverse esters. Both families are mixtures of mono- and dimethyl tin mercaptides. They are clear, amber colored liquids that have low volatility and low water solubility.\(^10\) Some products are approved for use in polyvinyl chloride (PVC) pipe used for potable water, and other products are approved for use in food-contact applications. These products are also approved for PVC pipe that carries water used for food processing, vinyl window frames, and vinyl siding.

As a result of safety and environmental assessments for organotin substances, government restrictions have been or are being considered for tri-substituted organotins, in particular tributyltin (TBT) and triphenyltin (TPT) compounds. Dioctyl tin (DOT) and dibutyl tin (DBT) PVC stabilizers in some applications also have restrictions.\(^11\) ADVASTAB methyl tin heat stabilizers do not contain any of these substances.
Product Uses\textsuperscript{12,13,14}

Approximately 70\% of the total annual world production of non-pesticidal organotin compounds is used in PVC stabilizers.

ADVASTAB\textsuperscript{TM} methyl tin heat stabilizers are especially useful in the following PVC processing applications:

- Pipe
- Plastics additives packaging film
- Window profiles
- Foam pipe
- Foam profiles
- Fence, deck and rail
- Siding
- Pipe fittings
- Durables miscellaneous
- Building and Constructions miscellaneous
- Foam sheet

Exposure Potential\textsuperscript{15,16}

ADVASTAB\textsuperscript{TM} methyl tin heat stabilizers are used in the production of industrial and consumer products. Based on the uses for these products, the public could be exposed through:

- **Workplace exposure** – Exposure can occur either in a facility that manufactures methyl tin heat stabilizers or in the various industrial or manufacturing facilities that use them. They are generally produced, distributed, stored, and consumed in closed systems. Those working with these products in manufacturing operations could be exposed during maintenance, sampling, testing, or other procedures. Workers in fabrication facilities could also be exposed to these materials. Each manufacturing and fabrication facility should have a thorough training program for employees and appropriate work processes and safety equipment, including personal protective equipment, in place to limit exposure. See Health Information.

- **Consumer exposure to products containing ADVASTAB methyl tin heat stabilizers** – Dow does not sell these products for direct consumer use, but they are used as additives to make PVC pipes for water handling and food packaging materials. Because these stabilizers bond directly to the materials in which they are used, it is unlikely that they will leach out of the final products. The use of these products in these applications is subject to regulatory control. See Health Information.

- **Environmental releases** – In the event of a spill, the focus is on containing the spill to prevent contamination of soil and surface or ground water. For small spills, these products should be absorbed with sand, soil, or sawdust. Some of these products will biodegrade, but most are considered not readily biodegradable. The products are considered harmful to aquatic organisms and may cause long-term adverse effects in the aquatic environment. See Environmental, Health, and Physical Hazard Information.

- **Large release** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, the material should be captured, collected, and reprocessed or disposed of according to applicable governmental requirements. Eliminate nearby sources of ignition. See Environmental, Health, and Physical Hazard Information.

- **In case of fire** – Deny any unnecessary entry into the area and consider the use of unmanned hose holders. Use water spray or fog, carbon-dioxide or dry-chemical extinguishers, or foam to fight the fire. Foam is preferred. Use of a direct water stream may spread the fire. Firefighters should wear positive-pressure, self-contained breathing
apparatus (SCBA) and protective firefighting clothing. Follow emergency procedures carefully. See Environmental, Health, and Physical Hazard Information.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Health Information

Health information for ADVASTAB™ methyl tin heat stabilizers is summarized on the relevant Safety Data Sheets. It is important to note that health risks associated with individual products may vary based on their formulation or intended use. These materials may contain minor components or additives that have additional health risks. The Safety Data Sheet is the preferred source for specific health information. An overview of health information for ADVASTAB methyl tin heat stabilizers appears below.

Eye contact – Contact with these products may cause eye irritation.

Skin contact – May cause skin irritation. Can be absorbed through intact skin and may be harmful if absorbed through the skin. These products may cause sensitization by skin contact.

Ingestion – Ingestion may cause abdominal pain, gastrointestinal irritation, nausea, vomiting, and diarrhea.

Inhalation – Inhalation of vapor or mist can cause irritation of nose, throat, and lungs. In the reverse ester products, hydrogen sulfide (H₂S), a decomposition by-product, may be present in the container headspace and inhalation may be fatal.

Repeated exposure – Prolonged or repeated overexposure can cause central nervous system effects, immune system effects, kidney injury, or adverse reproductive effects.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Environmental Information

Methyltin compounds are naturally present in the environment and likely result from aerobic and anaerobic methylation of inorganic tin. ADVASTAB™ methyl tin heat stabilizers are not soluble in water. Some are more biodegradable than others. They have the potential to harm aquatic organisms; however, harmful concentrations of these products are unlikely to be reached due to the industry-wide stewardship practices that are in place to limit environmental releases.

Environmental releases of ADVASTAB methyl tin heat stabilizers are expected to be minimal. Should releases occur they would generally be to water. These materials will tend to partition to aquatic sediments and to suspended particulate matter in the water. Evaporation of these products is expected to be negligible.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

Physical Hazard Information

ADVASTAB™ methyl tin heat stabilizers are stable at recommended storage and use temperatures, but can decompose at elevated temperatures. Keep in a dry, cool, and well-ventilated place. Keep container tightly closed. Avoid contact with eyes, skin and clothing. Wash thoroughly after handling. Vapors can be evolved when material is heated during processing.
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Operations. Decomposition can lead to pressure build-up in closed systems and the release of toxic gases. During a fire, irritating and highly toxic gases and/or fumes may be generated.

ADVASTAB™ methyl tin heat stabilizers will not undergo polymerization. However, the reverse esters, at elevated temperatures and in the presence of additives such as strong acids, can form ethylene sulfide, which can polymerize and deposit on equipment with the potential to plug pipes.

Additional Information for Reverse Ester Products Only
Keep container tightly closed. Hydrogen sulfide (H₂S), a decomposition by-product of this material, may be present in the headspace of the container and inhalation may be fatal. Lack of adequate ventilation may result in airborne levels of hydrogen sulfide in storage areas above established exposure limits. Read and follow label and storage instructions carefully.

For more information, request the Safety Data Sheet from the Dow Customer Information Group.

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Regulatory Information
Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of ADVASTAB™ methyl tin heat stabilizers. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet or Contact Us.

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Additional Information
- Safety Data Sheets can be found on Dow’s web page for ADVASTAB™ methyl tin stabilizers (www.dow.com/products/product_line_detail.page?product-line=1120007)
- Contact Us (Dow Customer Information Group at www.dow.com/assistance/dowcig.htm)
- Contact Us for REACH (http://reach.dow.com/contact.htm)
- Production of methyl tin compounds related to possible conditions in the Environment, Applied Organometallic Chemistry, Hamasaki, T; Nagase, H; et al, Published online November 1, 2004 (http://www3.interscience.wiley.com/journal/109745904/abstract)

For more business information about ADVASTAB™ methyl tin heat stabilizers, visit Dow’s web page for ADVASTAB stabilizers or by selecting ADVASTAB on Dow’s Product Lines A-Z web page.

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