Product Safety Assessment

AMPLIFY™ EA Functional Polymers

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Names
• AMPLIFY™ functional polymer
• AMPLIFY™ EA functional polymer

Product Overview
• AMPLIFY™ functional polymers are polyolefin plastics that have been engineered to meet specific end-use requirements or characteristics. They are manufactured by The Dow Chemical Company in the four product groups:
  – AMPLIFY EA functional polymers are ethylene-ethyl acrylate (EEA) copolymers.
  – AMPLIFY GR functional polymers are maleic anhydride grafted polyolefins.
  – AMPLIFY IO functional polymers are modified ethylene-acrylic acid ionomers.
  – AMPLIFY TY functional polymers are maleic anhydride grafted polyolefins targeted for high performance applications.
This product safety assessment discusses AMPLIFY EA functional polymers. To learn more about AMPLIFY GR functional polymers, AMPLIFY IO functional polymers, or AMPLIFY TY functional polymers, visit Dow’s Product Safety Assessment Finder or the AMPLIFY Functional Polymers Products web page.
• AMPLIFY EA polymers are ethylene-ethyl acrylate (EEA) copolymers. A copolymer is a polymer consisting of two or more monomers, in this case ethylene and ethyl acrylate. A monomer is a simple molecule that can join together to form a polymer. AMPLIFY EA polymers are highly flexible and strong. They are often blended with other polymers to protect against brittleness and cracking at extreme temperatures. AMPLIFY EA polymers are manufactured as white pellets or granules.1,2 For further details, see Product Description.
• AMPLIFY EA polymers are mainly used in high-performance packaging applications. They are used as tie-layers in multilayer films, laminates, and sheet products. They are also used for the manufacture of flexible hose and tubing and as “color carriers” to be mixed with pigments in durable goods.3,4 For further details, see Product Uses.
• AMPLIFY functional polymers are not sold for direct consumer use. However; because they are used in consumer products and packaging, consumers may come in contact with them. AMPLIFY EA polymers used in food and medical packaging applications comply with U.S. Food and Drug Administration (FDA) Code of Federal Regulations (CFR) Title 21, sections 175.105 or 177.1320.5,6 Workplace exposure is possible at an AMPLIFY manufacturing

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facility or at facilities using these polymers to manufacture other products. For further details, see Exposure Potential.

- Eye contact with polymer solid or dust may cause irritation or corneal injury due to mechanical action (scratch the eyes). Elevated temperatures during thermal processing may generate vapor levels sufficient to cause eye or respiratory irritation. Skin contact is essentially nonirritating, and no adverse respiratory effects are anticipated from single exposure to polymer dust. The minor component ethyl acrylate may cause headache and nausea due to odor. The odor of ethyl acrylate is noticeable at very low concentrations. For further details, see Health Information.

- AMPLIFY™ EA functional polymers are expected to be inert in the environment. They are not expected to accumulate in the food chain and are not biodegradable. If introduced into water, these polymers will float. Ingestion by fish or wildlife may present a choking hazard. For further details, see Environmental Information.

- AMPLIFY EA polymers are stable under recommended storage conditions. Exposure to temperatures well above recommended processing temperatures can cause these polymers to decompose. For further details, see Physical Hazard Information.

**Manufacture of Product**

- **Location** – Dow produces AMPLIFY™ EA functional polymers at facilities located in North America.
- **Process** – AMPLIFY EA polymers are produced in high-pressure reactors using a free-radical polymerization process.

**Product Description**

AMPLIFY™ functional polymers are polyolefin plastics that have been engineered to meet specific end-use requirements or characteristics. AMPLIFY EA functional polymers are ethylene-ethyl acrylate (EEA) copolymers. They are sold for industrial use as white colored pellets or granules and have a pungent odor. AMPLIFY EA polymers have high thermal stability, adding flexibility and strength to other polymer resins to protect against brittleness and cracking at both low and high temperature extremes.

**Product Uses**

AMPLIFY™ functional polymers are used to manufacture plastic products and packaging. AMPLIFY EA polymers are mainly used for high-performance packaging applications. These polymers blend well with pigments and are used to add color. Applications include:

- **Polymer modification** – for improved performance
- **Color and additive carriers**
- **Tie layer** – used as a thin film layer that becomes tacky when heated to bond two different types of materials together; used to bond multilayer films, laminates, and sheet products
- **High-performance packaging applications** – includes food packaging
- **Flexible hose and tubing** – for manufacture
- **Profile and tube extrusion**
Exposure Potential

AMPLIFY™ EA functional polymers are not sold directly to consumers, but are present in products or packaging consumers use. Based on the uses for these polymers, the public could be exposed through:

- **Workplace exposure** – Exposure can occur in manufacturing facilities or facilities that use these polymers to make other products. Avoid breathing process fumes. If exposure causes eye or respiratory discomfort, use a full-face respirator. Mechanical handling equipment can cause formation of dusts. Layers of combustible dusts should not be permitted to accumulate. To reduce the potential for dust explosions, maintain good housekeeping and electrically bond and ground equipment. Each facility should have a thorough training program for employees and appropriate work processes and safety equipment in place. See Health Information.

- **Consumer exposure to products containing AMPLIFY EA functional polymers** – AMPLIFY EA polymers used in food and medical packaging applications comply with U.S. Food and Drug Administration (FDA) Code of Federal Regulations (CFR) Title 21, sections 175.105 or 177.1320. In brief, these regulations state ethylene-ethyl acrylate copolymers may be safely used as components of articles intended for use in packaging, transporting, or holding food when used according to prescribed conditions. See Health Information.

- **Environmental releases** – AMPLIFY polymers are non-volatile (do not evaporate), inert, solids. If released to soil or water, they will stay in soil or water. These polymers float and are not biodegradable. Spilled polymer may cause a slipping hazard. In the event of a spill, contain material if possible. Prevent material from entering soil, ditches, sewers, waterways, or ground water. Sweep up small spills and collect material in suitable and properly labeled containers. Use appropriate safety equipment. See Environmental, Health, and Physical Hazard Information.

- **Large releases** – Industrial spills or releases are infrequent and generally contained. If a large spill does occur, the material should be collected and reprocessed or disposed of properly. As a service to its customers, Dow can provide names of resources to help identify waste management, recycling, and reprocessing companies.

- **In case of fire** – Keep people away. Isolate the fire and deny unnecessary entry. Firefighters should wear positive-pressure, self-contained breathing apparatus (SCBA) and protective firefighting clothing, or fight fire from a safe distance. Use a water fog or fine water spray, dry chemical fire extinguishers, carbon dioxide fire extinguishers, or foam to fight fire. A direct water stream may spread the fire. Follow safety precautions. See Environmental, Health, and Physical Hazard Information.

For more information, see the relevant Safety Data Sheet.

Health Information

**Eye Contact** – Eye contact with AMPLIFY™ EA polymer solid or dust may cause irritation or corneal injury due to mechanical action (scratch the eyes). Elevated temperatures during product processing may generate vapor levels sufficient to cause eye irritation, such as mild discomfort and redness.

**Skin Contact** – Skin contact with polymer pellets or granules is essentially nonirritating. Skin contact with heated polymer during processing operations may cause thermal burns. No adverse effects are anticipated by skin absorption.
**Inhalation** – Vapors or fumes released during thermal processing may cause respiratory irritation. The minor component residual ethyl acrylate may cause headache and nausea due to odor. The odor of ethyl acrylate is noticeable at very low concentrations.

**Ingestion** – These polymers have very low toxicity if swallowed. Harmful effects are not anticipated from swallowing small amounts; however, swallowing may cause choking.

AMPLIFY™ EA polymers are safe for food and beverage applications and comply with one or more of the following U.S. Food and Drug Administration (FDA) regulations:

- Regulation 21 CFR 175.105
- Regulation 21 CFR 177.1320 (with restrictions)

For specific FDA regulatory status or EU regulatory information, consult the relevant Technical Information Sheet. For more information, see the relevant Safety Data Sheet and Regulatory Data Sheet.

**Environmental Information**

AMPLIFY™ EA functional polymers are non-volatile, inert plastics. If introduced into soil, they are expected to remain in soil. They will float in water. These materials will not bind to soil or sediment. AMPLIFY polymers are not biodegradable. Although polymers are considered essentially non-biodegradable, they are likely to degrade slowly in the environment by a combination of physical, chemical, and biological processes. Surface degradation can occur upon exposure to sunlight.

AMPLIFY EA polymers are not likely to accumulate in the food chain due to their high molecular weight. Although these materials are non-toxic, in pellet or bead form they may mechanically cause adverse effects if ingested by waterfowl or aquatic life (choking hazard).

For more information, see the relevant Safety Data Sheet.

**Physical Hazard Information**

AMPLIFY™ EA functional polymers are stable under recommended storage conditions. Exposure to temperatures well above normal processing temperatures can cause these polymers to decompose. Processing may release irritating fumes and other decomposition products, such as aldehydes, alcohols, organic acids, and trace amounts of hydrocarbons. At temperatures exceeding the melt temperature, polymer fragments can be released.

Spilled polymer pellets are a slipping hazard.

For more information, see the relevant Safety Data Sheet.

**Regulatory Information**

Regulations may exist that govern the manufacture, sale, transportation, use, and/or disposal of AMPLIFY™ EA functional polymers. These regulations may vary by city, state, country, or geographic region. Information may be found by consulting the relevant Safety Data Sheet, Technical Information Sheet, or Contact Us.

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Additional Information

- Safety Data Sheet (http://www.dow.com/webapps/msds/msdssearch.aspx)
- Contact Us (http://www.dow.com/amplify/contact/contact.htm)
- AMPLIFY™ Functional Polymers website (http://www.dow.com/amplify/index.htm)
- AMPLIFY Functional Polymers Fact Sheet, The Dow Chemical Company, Form No. 273-02201
- AMPLIFY™ EA Functional Polymers: The Right Mix for a Multitude of Applications, The Dow Chemical Company, Form No. 273-02301
  (http://msdssearch.dow.com/PublishedLiteratureDOWCOM/dh_00e2/0901b803800e2b0b.pdf ?filepath=amplify/pdfs/noreg/273-02301.pdf&fromPage=GetDoc)
- AMPLIFY™ EA and GR Functional Polymers Product Portfolio, The Dow Chemical Company, Form No. 273-01001
  (https://workspace.bsnconnect.com/sites/ElastomersTS/EET%20Literature%20Archive/Elastomers/273-01001.pdf#search=Form%20No%20273-01001%20)
- U.S. Food and Drug Administration (FDA), Department of Health and Human Services website, Code of Federal Regulations Title 21 webpage (search 175.105 or 177.1320)
  (http://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfCFR/CFRSearch.cfm)


References

2. AMPLIFY EA 101 Functional Polymer Material Safety Data Sheet, The Dow Chemical Company
3. AMPLIFY™ EA Functional Polymers: The Right Mix for a Multitude of Applications, The Dow Chemical Company, Form No. 273-02301-0907 SMG

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