EASTMAN

Eastman medical polymers

Safe and sustainable alternatives for the healthcare industry

State-of-the-art materials
for the world of medical science

For generations, Eastman has delivered innovative raw materials for the medical market. Our medical grade polymers create breakthrough devices and packaging that meet or exceed stringent compliance and market demands.

Eastman innovation also helps facilities achieve higher sustainability scores by delivering solutions manufactured without BPA, halogens, or *ortho*-phthalates.

Sustainability highlights

- Bisphenol A (BPA) free
- Halogen free
- Not manufactured with *ortho*-phthalates
- Ease of recyclability in the medical waste stream
- Improved durability for harsh environments

The Eastman medical polymer portfolio

- DuraStar™ polymers
- Eastar™ copolyesters
- Eastman Eastalite™ copolyester
- Eastman Tritan™ copolyesters (transparent and opaque)
- Ecdel™ elastomers
- Tenite™ cellulosics

Eastman Tritan™ copolyester

Performance without compromise

Medical devices and equipment

To help you bring new medical applications to market, our experts provide unmatched technical, application development, and marketing support throughout your product development cycle—including material selection, design, prototyping, testing, launch, and troubleshooting.

- Superior durability—less breakage and waste
- Resistant to aggressive cleaners and disinfectants
- Reliable performance in medical environments
- Outstanding clarity and color retention
- Design flexibility—supports complex shapes
- Improved processability compared to traditional copolyesters
- No annealing

Rigid medical packaging

It's quite simple. To earn trust in the contents of a package, you need to first create trust in the package itself.

With reliable choices in medical grade polymers, Eastman is better prepared than ever to help create rigid medical packaging that protects valuable and vital contents.

- Eastar 6763 is *Cradle to Cradle Certified*™ Bronze
- Excellent puncture resistance and impact strength
- Excellent seal strength and tamper resistance
- Suitable for a variety of sterilization modalities
- Ease of thermoforming for complex designs and shapes
- Confidence-building clarity and color retention

Compatible with aggressive cleaners and disinfectants

The use of new sustainable cleaners and more aggressive disinfectants can result in severe cracking for many materials—and premature failure of medical devices and equipment. This photo demonstrates the excellent resistance of Eastman Tritan™ copolyester to chemical attack from Virex® Tb, a common disinfectant in hospitals and clinics.

Eastar™ 6763 copolyester

Safety without chemicals of concern

Many healthcare facilities have implemented Environmentally Preferable Purchasing (EPP) guidelines to reduce their overall environmental impact and improve patient safety. However, avoiding the use of certain materials can be difficult due to the limited availability of suitable alternatives with the desired balance of value and performance needed for medical devices and supplies.

Eastman copolyesters can help meet the EPP guidelines adopted by many hospitals and Group Purchasing Organizations (GPO) and are suitable for use in a variety of medical device applications without compromising performance.

- Meets hospital EPP guidelines
  - Bisphenol A (BPA) free[1]
  - No halogens (chlorine, bromine, etc.)
  - Manufactured without *ortho*-phthalate plasticizers
- Meets California Proposition 65 threshold limits
- Complies with medical regulations
  - ISO 10993 (Part 1—fluid contact <30 days)
  - United States Pharmacopeia (USP) Class VI
  - FDA Class I, II, and III (not suitable for implants)
  - Tritan complies with ISO 80369 guidelines for rigidity.
- Compatible with antimicrobial technology
- Longer product life, resulting in reduced waste due to failures
- Greater toughness—potentially less secondary packaging required
- Suitable for reuse in postindustrial waste streams
- Reduced potential for hazardous emissions during incineration of medical waste
- No separate annealing step—can reduce time and energy compared to polycarbonate

In addition, the advantages of specific Eastman medical polymers can help further transform an innovative concept into a successful, functional part that meets marketplace demands and increases patient safety and comfort.

- Eastman Tritan™ copolyester is free of endocrine activity (estrogenic and androgenic)[1]
- Eastar™ 6763 copolyester and Eastman Eastalite™ copolyester are made without styrene.
- Eastar 6763 is compatible with established rigid medical packaging recycle streams.
- Tritan opaque provides chemical resistance to reduce cracking, breaking, and premature failure in opaque medical devices.
- Flame-retardant additives used in Tritan opaque do not contain antimony, bromine, or chlorine.
- Rich colors of opaque Tritan may eliminate the need for painting—reducing VOC emissions.

[1]*Third-party data available on request*

Sustainability through reducing, recycling, reusing

Eastman polymers for the medical device market

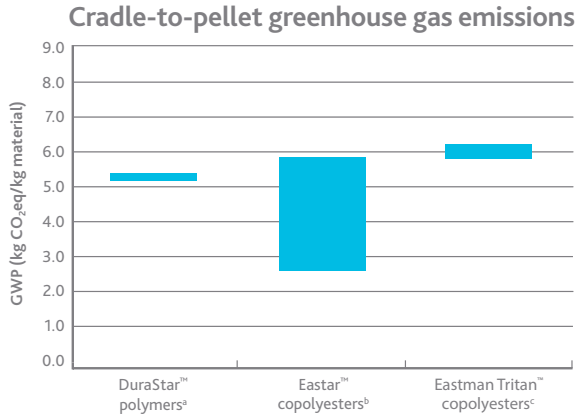
Carbon and energy profiles

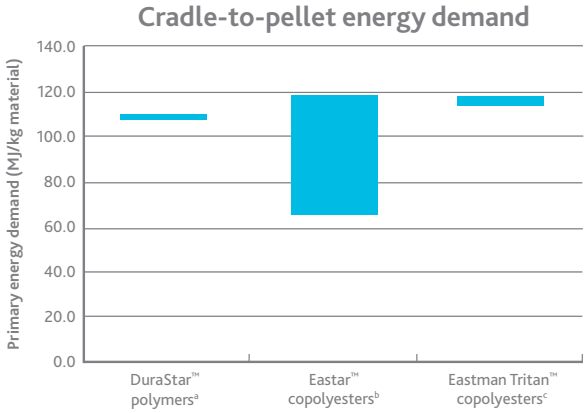
Cradle-to-gate life cycle assessment (LCA)[2] studies for Eastman copolyesters have been conducted internally to evaluate their environmental profiles and to inform decision-making within Eastman. The scope of the LCA studies included all major process steps in the manufacture of Eastman copolyesters from cradle to Eastman's exit gate, including raw material extraction, supply chain, transportation, utility generation, and all intermediate processing steps. Conversion, use, and end-of-life treatment of the copolyesters beyond Eastman's exit gate were not considered in the analysis. Likewise, infrastructure and corporate overhead were excluded.

Benefits

Enjoy the benefits of Eastar, Tritan, and other Eastman medical polymers with carbon and energy footprints comparable to competitive materials.

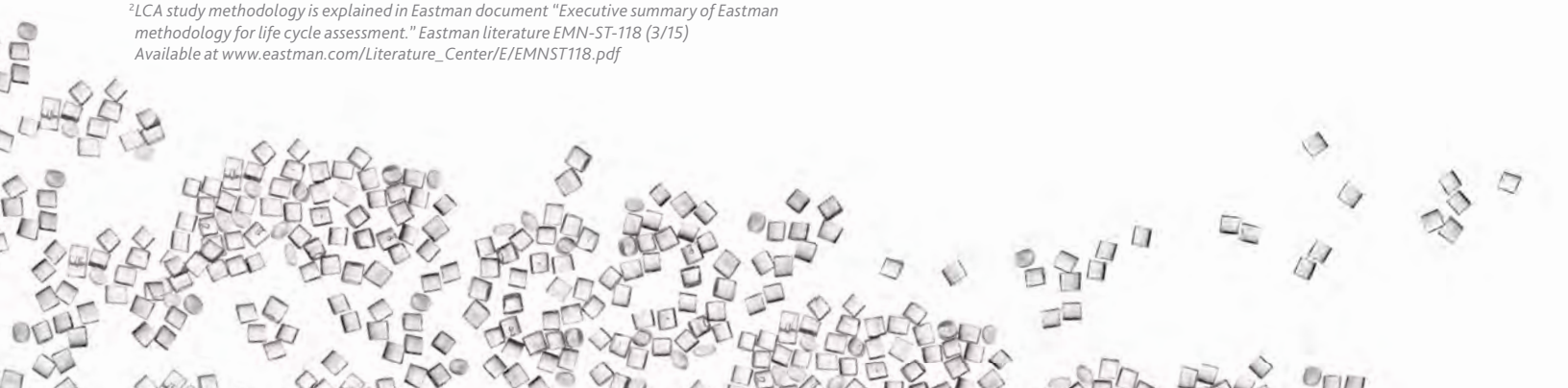
- Longer product life, resulting in reduced waste due to failures
- Greater toughness—potentially less secondary packaging required
- Eastar™ copolyester 6763 is compatible with established rigid medical packaging recycle streams.
- Suitable for reuse in postindustrial waste streams
- Reduced potential for hazardous emissions during incineration of medical waste
- Rich colors of opaque Eastman Tritan™ MXF121 copolyester may eliminate the need for painting—reducing VOC emissions.
- No separate annealing step—can reduce time and energy compared to polycarbonate





[a] *EMN LCA TR-2011-10545*
[b] *EMN LCA TR-2011-09644, TR-2011-10131, TR-2011-10392*
[c] *EMN LCA TR-2011-09958*

[2] *LCA study methodology is explained in Eastman document "Executive summary of Eastman methodology for life cycle assessment." Eastman literature EMN-ST-118 (3/15) Available at www.eastman.com/Literature_Center/E/EMNST118.pdf*



Reliability for environmentally preferred products

Count on Eastman medical polymers to help you advance sustainability initiatives—and Eastman to be a reliable supplier of innovation, support, and product availability. The performance, safety, and sustainability of these polymers deliver benefits throughout the medical value chain.

For brand owners

- Lower total cost of ownership (TCO)
- High quality appearance
- Improved performance
- Safe and sustainable

For hospitals and clinics

- EPP-compliant products
- Improved accuracy and reliability
- Reduced environmental impact
- Improved sustainability

For patients

- Peace of mind—devices look clean and "new"
- Low toxicity
- Reliable performance
- Sustainable alternative

"At Eastman, sustainability is about creating value. We believe a truly sustainable company is one that creates significantly more value in the world than the resources it uses."

David Golden
Senior Vice President, Chief Legal and Sustainability Officer, and Corporate Secretary

"Eastman has a long-standing history of commitment to safety, environmental stewardship, and corporate responsibility . . . Sustainability is foundational to our growth strategy and helps create value as our company's portfolio continues to evolve (for our customers)."

Mark Costa
Chairman and Chief Executive Officer

For more information on Eastman medical polymers, call 1-800-EASTMAN or visit www.eastman.com/medical.

EASTMAN

The results of **insight**™

Eastman Corporate Headquarters
P.O. Box 431
Kingsport, TN 37662-5280 U.S.A.

U.S.A. and Canada, 800-EASTMAN (800-327-8626)
Other Locations, +(1) 423-229-2000

www.eastman.com/locations

Safety Data Sheets providing safety precautions that should be observed when handling and storing Eastman Chemical Company ("Eastman") products are available online or by request. You should obtain and review the available material safety information before handling any of these products. If any materials mentioned are not Eastman products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be observed.

It is the responsibility of the medical device manufacturer ("Manufacturer") to determine the suitability of all component parts and raw materials, including any Eastman product, used in its final product to ensure safety and compliance with requirements of the United States Food and Drug Administration (FDA) or other international regulatory agencies.

Eastman products have not been designed for nor are they promoted for end uses that would be categorized either by the United States FDA or by the International Standards Organization (ISO) as implant devices. Eastman products are not intended for use in the following applications: (1) in any bodily implant applications for greater than 30 days, based on FDA-Modified ISO-10993, Part 1, "Biological Evaluation of Medical Devices" tests (including any cosmetic, reconstructive, or reproductive implant applications); (2) in any cardiac prosthetic device application, regardless of the length of time involved, including, without limitation, pacemaker leads and devices, artificial hearts, heart valves, intra-aortic balloons and control systems, and ventricular bypass assisted devices; or (3) as any critical component in any medical device that supports or sustains human life.

For manufacturers of medical devices, biological evaluation of medical devices is performed to determine the potential toxicity resulting from contact of the component materials of the device with the body. The ranges of tests under FDA-Modified ISO-10993, Part 1, "Biological Evaluation of Medical Devices" include cytotoxicity, sensitization, irritation or intracutaneous reactivity, systemic toxicity (acute), subchronic toxicity (subacute), implantation, and hemocompatibility. For Eastman products offered for the medical market, limited testing information is available on request. The Manufacturer of the medical device is responsible for the biological evaluation of the finished medical device.

The suitability of an Eastman product in a given end-use environment is dependent on various conditions including, without limitation, chemical compatibility, temperature, part design, sterilization method, residual stresses, and external loads. It is the responsibility of the Manufacturer to evaluate its final product under actual end-use requirements and to adequately advise and warn purchasers and users thereof.

SP-MBS-1162B 6/18