EASTMAN

The results of **insight**™

Helping you shape **what's next**

in rigid medical packaging.

EASTMAN™ Medical Polymers

Committed to helping achieve your goals. **And more.**

Innovation that improves results.

Eastman Chemical Company is better prepared than ever to help achieve the long-term goals of the medical industry. Eastman is a reliable supplier of innovative medical-grade polymers for protective and functional rigid medical packaging, as well as non-implantable medical devices, flexible packaging, and labware.

The current portfolio of Eastman™ Medical Polymers includes both proven and transformational rigid medical packaging solutions:

- **Eastar™ copolyester 6763** continues to be the industry standard for rigid medical packaging — as it has for the past 20 years.
- **Eastman Tritan™ copolyester MP100** is an enhanced-performance copolyester that combines toughness and heat resistance for selected market segments.

Results that go beyond the expected.

The benefits that result from working with Eastman go well beyond the growing portfolio of innovative medical-grade polymers. Eastman also offers unmatched design, engineering, and manufacturing expertise — as well as extensive knowledge of the medical market. Just the kind of results the industry needs today.

Customers can leverage this combination of technical support and reliable performance to speed development time, expedite shelf-life validation, and bring applications to market efficiently. No wonder Eastman is the go-to source for helping shape **what's next** in rigid medical packaging.

Eastar™ copolyester 6763

Your confidence. **Earned.**

Earning your confidence every day.

Eastar™ copolyester 6763 has been the material of choice for rigid medical packaging for more than 20 years and continues to earn your confidence by providing a unique balance of properties:

Properties that maximize reliability and minimize risk

- Superior clarity — before and after sterilization
- Excellent puncture resistance and impact toughness
- Choice of sterilization methods without post-radiation color shift*
- Confidence-building functional and aesthetic package integrity

Properties that optimize processability

- Clear amorphous polymer — does not crystallize
- Thermoforms easily
- Eliminates stress whitening
- Reduced particulate generation

Eastar™ copolyester and Eastman Tritan™ copolyester are not suitable for autoclave sterilization.

Property comparison of traditional rigid packaging polymers

	Eastman Tritan™ copolyester MP100	Eastar™ copolyester 6763	Acrylic	Acrylonitrile (AN)	Polyvinyl chloride (PVC)	Comments
No stress whitening	●	●	○	○	○	Rejection criteria during inspection
Clarity	●	●	◔	◔	◕	Acrylic, AN, and PVC lose clarity in thicker gauges.
Gloss	●	●	◑	◑	◕	Eastar 6763 has twice the gloss of acrylic.
Impact toughness	●	◕	◔	◑	◕	—
Ease of cutting	●	●	◑	◑	●	Residual particulate and angel hairs with acrylic
Sensitivity to dust	●	●	○	○	●	Acrylic requires extra packaging to eliminate dust creation during transit.
General processability	●	●	◑	◑	◕	Eastar 6763 is the market leader in processability.
Sterilization						
EtO	●	◕	●	◕	◕	PVC is not suitable for radiation. AN discolors permanently upon radiation.
Gamma	●	●	◑	◑	○	
E-beam	●	●	◑	◑	◑	
Gas plasma	●	●	—	—	—	

● Best ◕ Good ◑ Average ◔ Fair ○ Poor

With growing confidence — a growing medical polymer portfolio.

While Eastar™ copolyester 6763 continues to be the foundation polymer for rigid medical packaging, the new portfolio of Eastman™ Medical Polymers is even more robust and better able to help you shape what's next.

Eastman Tritan™ copolyester MP100

Your rigid standards. Exceeded.

Redefining the standard for toughness and heat resistance.

Eastman Tritan™ copolyester MP100 is the result of the company's ongoing commitment to the medical industry. It is an enhanced-performance copolyester for specialized applications where needs have not been satisfied or increasingly rigid standards have not been met by existing polymers.

The launch of Eastman Tritan™ copolyester M100 follows a successful introduction of medical-grade Tritan for molded medical devices and housings in 2009. It provides designers of rigid medical packaging with a remarkable balance of properties:

- Tritan has many of the advantages of Eastar™ copolyester 6763, including clarity, toughness, chemical resistance, and predictable processing throughout the extrusion, thermoforming, and heat-sealing processes.
- Tritan offers higher heat resistance and greater inherent toughness, compared with Eastar and other polymers, including acrylic multi-polymer and acrylonitrile resins.

Comparison of physical properties*

	Eastman Tritan™ copolyester MP100	Eastar™ copolyester 6763	Acrylonitrile (AN)	Acrylic multi-polymer	PVC	SBC	HPP	CPP (clarified poly-propylene)
Heat resistance, glass transition (°C)	110	82	84	100	85	82	109 (softening temp, not T_g)	88 (softening temp, not T_g)
Toughness, instrumented impact	20 (40 mil)	11.5 (40 mil)	10 (40 mil)	4.0 (40 mil)	11.4 (40 mil)	4.6 (40 mil)	1.8 (40 mil)	10 (40 mil)
Energy @ max load, J; (thickness)	12 (20 mil)	6.0 (20 mil)	<4.0 (20 mil)	<2.0 (20 mil)	5.7 (20 mil)	2.4 (20 mil)	1.0 (20 mil)	5 (20 mil)
Toughness, notched Izod impact @ 23°C (ft•lbf/in.)	18.4	1.9	5.0	1.6	7.9	0.65	1.2	10.9
Toughness, elongation to break (%)	210	130	NA	28	45	165	254	275
Stiffness or flexibility, flexural modulus (kpsi)	225	300	490	350	386	178	250	152
Clarity, haze (%)	1.4	1.8	2.7	11.7	3.6	2.3 – 53	40.0	34.0

**Results for injection molded plaques of 1/8" thickness, except where noted (instrumented impact)*

All in one package — the properties to help you shape what's next.

Outstanding heat resistance

- Higher sterilization chamber temperatures may allow faster ethylene oxide (EtO) cycle time and reduced risk of warping and sticking.
- More rapid accelerated aging protocols for faster and more reliable shelf-life qualification; fewer go-to-market delays
- Slower aging process for greater confidence

Best-in-class toughness

- Proven in notched Izod impact tests, dart impact tests, and drop tests
- Protection for sterile contents — and the environment
- Allows redesign for lightweighting and downgauging; reduced secondary packaging

Outstanding post-sterilization clarity and color

- Quickly returns to crystal clarity following gamma sterilization
- Higher-quality appearance throughout packaging life cycle

Let Eastman show you how Eastman™ Medical Polymers, technical expertise, and innovative design solutions can help you shape what's next. To see more, visit www.eastman.com/medical or call 1-800-EASTMAN (1-800-327-8626).

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Material Safety Data Sheets providing safety precautions, that should be observed when handling and storing 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 in order 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 (sub-acute), implantation, and hemocompatibility. For Eastman products offered for the medical market, limited testing information is available upon 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 upon 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.

MBS-345A 02/10
Printed in U.S.A.