


**EASTMAN**

A close-up, low-angle shot of a yellow safety helmet with a clear, curved face shield. The helmet is positioned diagonally across the frame. The face shield is transparent, showing some reflections and a small label on the right side. The helmet's shell is a bright yellow, and the chin strap and adjustment mechanisms are visible in blue and black. The background is a soft, out-of-focus white and light grey.

# A unique vision for face protection

Combine **impact strength**  
with **chemical resistance**.



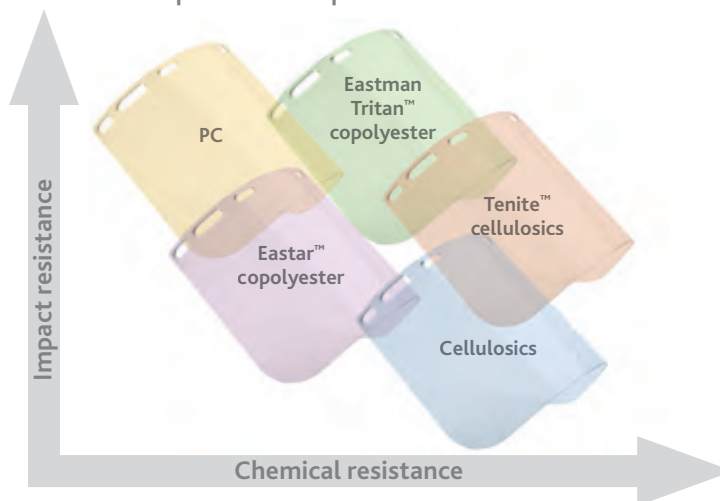
# It's easy to see the combined advantages.

Eastman Tritan™ copolyester and Tenite™ cellulosic plastics provide molders of clear, optical-grade face-protection products with high-impact, chemical-resistant alternatives to polycarbonate (PC).

Tritan and Tenite cellulose acetate propionate (CAP) offer superior chemical resistance and other performance and processing advantages compared with PC. By providing solutions for both injection molding and die-cut extruded sheet, Tritan and CAP help create maximum efficiency and value in the safety segment.

This unique balance helps manufacturers meet the growing need to reduce vision impairments caused by crazing, whitening, and other aberrations related to lack of chemical resistance.

Face protection impact + chemical resistance





**Table 1. Material property comparison for face-protection applications**

	Eastman Tritan™ copolyester	Polycarbonate (PC)	Tenite™ cellulosics	Eastar™ copolyester
Impact strength	++	++	+	+
Chemical resistance	++	+	+++	++
Optical clarity	++	++	+++	++
Heat resistance	++	+++	+	+
Scratch resistance	++	++	+++	+

**Legend**  
 + Good  
 ++ Better  
 +++ Best

## Chemical resistance—a high-visibility need

Any change in the surface of a protective face shield can impair vision and reduce safety, including crazing or whitening following exposure to common chemicals. That's why chemical resistance is an important criterion for high-impact face protection products—especially in military applications.

By providing a unique combination of impact strength and chemical resistance, Tritan and CAP are ideal for molders and OEMs who recognize their needs are not being met by PC (see Table 1). In addition, the superior flow properties of CAP allow injection molding of 1-mm thickness—half the thickness of injection molded PC. This allows easier molding and lighter shields for greater wearer comfort.

*Bullard face shield made with  
Tenite™ cellulosics propionate.*





# A closer look at **durability, safety, and visibility**

## Look for **balance—not compromise**

Eastman Tritan copolyester and Tenite CAP are remarkably tough, chemical-resistant plastics that satisfy previously unmet needs of industrial safety applications by delivering reliable clarity, durability, and value.

Unlike PC, Tritan and CAP combine high-impact resistance with outstanding chemical resistance. This combination provides molders and OEMs with a unique high-value balance of durability, lasting clarity (90% light transmission; less than 1% haze), and safety.



## Measuring up to **tough face-protection standards**

PC is not the only option for meeting impact-resistance specifications in clear face-protection products. Tritan and CAP also demonstrate the impact resistance to meet the ANSI 87.1+ standard for eye protection while offering outstanding chemical resistance and other advantages.

Tritan also demonstrates outstanding toughness compared with PC, measured by elongation to break tests.

Meets the ANSI 87.1+ standard

Chemical resistance



# Outperforming PC for chemical resistance

Lack of chemical resistance in face-protection parts molded from PC can lead to crazing or whitening. These changes can impair vision, create a safety hazard, and make the part unfit for use—regardless of its other properties.

Tritan and Tenite CAP matched or outperformed PC in 12 of 13 test exposures to common chemicals. The biggest difference was after exposure to ammonia, a popular ingredient in cleansers.

Table 2. Summary of changes following chemical vapor exposure\*

	Eastman Tritan™ copolyester	Polycarbonate (PC)	Tenite™ cellulosics
Acetic acid	1	1	1
20% ammonium hydroxide	1	1	1
ASTM Reference Fuel C	3	4	1
Diethyl ether	3	2	1
Ethyl acetate	2	3	2
Ethylene dichloride	1	1	1
Furfural	1	1	2
<i>n</i> -Hexane	3	2	1
Methyl ethyl ketone	2	3	2
Methanol	1	1	1
2-Nitropropane	3	4	2
Toluene	1	4	2
Acetone	3	3	1

*\*Scale of 1 to 4: 1 = low tendency to craze or crack; 4 = high tendency to craze or crack  
For this test, samples are exposed to chemicals under variable strain at 25°C for a period of 24 hours.*

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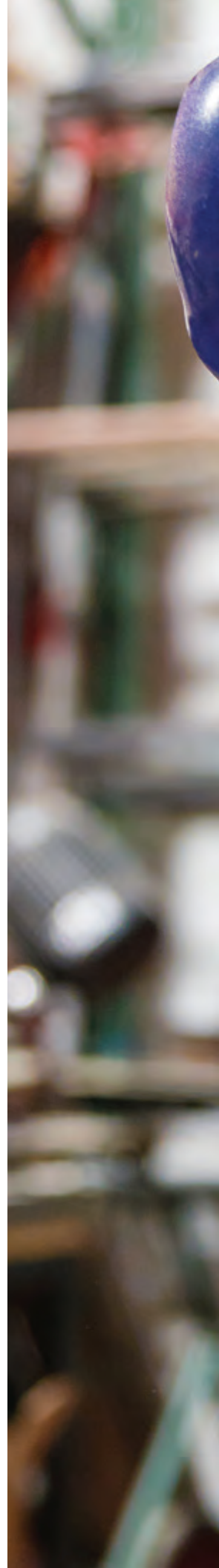


# Keeping one eye on your production challenges

## Meeting your processing needs face to face

Eastman Tritan™ copolyester offers secondary processing advantages over PC, heritage copolyesters, and other polymers.

- Parts can be molded from Tritan with less residual stress and superior hydrolytic stability than parts made from PC. So, without annealing, they provide the peace of mind of less risk of cracking, crazing, or failure.
- Because the thermoforming temperature of Tritan is lower than PC, molded parts have shorter heating and cooling cycles and can allow better forming detail than PC.
- Parts molded from Tritan do not exhibit stress whitening, which can exceed rejection criteria in polymers like impact-modified acrylics, acrylonitrile, and PVC. Molded parts do not exhibit many of the aberrations that are common with some polymers, helping ensure better visual clarity.
- Tritan can be tinted or UV coated and works well with antifog and antiscratch coatings.
- The chemical resistance and toughness of Tritan allow molded parts to withstand the stresses and strains demanded by common assembly practices:
  - Solvent and adhesive bonding
  - Ultrasonic and laser welding
  - Cold swaging
  - Hot or cold bending
  - Fastening with screws, rivets, and bolts
- Parts also can be die punched and drilled without significant microcracking in the entrance or exit. Contact Eastman for recommended drill bit types and drilling speeds.







## Supported by **Eastman**— with a **clear vision** for **the industry**

Tritan copolyester and Tenite cellulose are products of Eastman, a world leader in polymer technology.

Eastman goes beyond specifying innovative polymers like Tritan and CAP to working with OEMs to add value to the entire process—and peace of mind to customers throughout the safety-product value chain.

Eastman has the technical expertise and applications experience to deliver total solutions for customers—enabling manufacturers to develop products, bring them to market quickly, and be confident that they will be backed by strong technical support.

[www.eastman.com/tritan](http://www.eastman.com/tritan)





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