EASTMAN

Clear reasons to rethink water filtration housings

Eastman innovation for both the residential and commercial markets

The water filtration industry can

Eastman **TRITAN**™
copolyesters

EASTAR™
copolyesters

Consumers have increasing concerns about water quality and a lack of confidence in municipality processes. This creates a growing market for point-of-use (POU) and point-of-entry (POE) water filtration products.

Until now, the residential and commercial filtration markets have been dominated by opaque products, partly because traditional clear materials fall short of National Sanitation Foundation (NSF) performance requirements for hydrostatic and burst pressure, and pressure fatigue.

Changing to clear housings means more reasons to change filters.

Today, many consumers (especially do-it-yourselfers) prefer transparent housings that let them watch filters at work—and see when the media needs to be replaced.

This is good news for brand owners, because it leads to increased sales of the water filtration media and improved customer satisfaction.

finally see a **new clear option.**

Eastman offers two copolyesters with the right clarity and toughness.

Eastman Tritan™ and Eastar™ copolyesters can meet the demand for clear filtration housings while satisfying tough NSF performance requirements—and reducing durability and potential liability issues of other clear polymers, such as styrene acrylonitrile (SAN) copolymers and polycarbonate (PC). Tests comparing transmittance and haze show clear advantages—especially for the outstanding clarity provided by Tritan.

The glasslike clarity of Eastman Tritan™ and Eastar™ copolyesters allows greater tinting flexibility, compared with the noticeable blue cast of SAN. The high chemical resistance of Tritan can help maintain clarity by reducing stress cracking from incompatibility with cleaners, bug sprays, or glycol winterizing fluids.

The following pages show how Eastman Tritan™ and Eastar™ copolyesters measure up to NSF toughness requirements.

Figure 1

Total light transmittance of clear materials

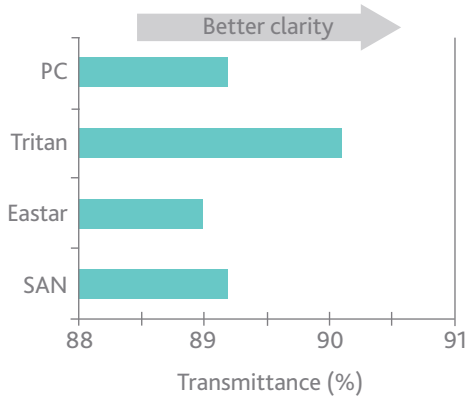
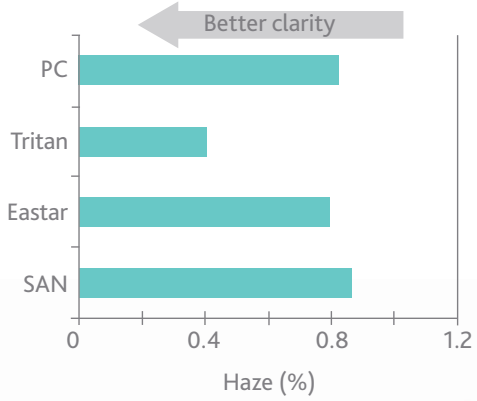


Figure 2

Haze analysis of clear materials



Clearly tough enough for NSF requirements. And more.

To reduce product failures, such as bursting or breaking, NSF compliance is a critical measure of fitness for use.

Eastman Tritan™ and Eastar™ copolyesters are NSF-certified materials that can be used in filters designed to meet standards for hydrostatic and burst pressure, and pressure fatigue.

Table 1

Hydrostatic and burst pressure requirements for water filter housings

Mode of testing	Pressure	Dwell	Standard
Hydrostatic pressure	360 psig	5 minutes	NSF/ANSI 53-2009e
Burst pressure	480 psig	Instant/ 1 second	

Water hammer strength and fatigue pressure testing were conducted on filter housings made from Tritan and Eastar EN076 to develop designs that surpass NSF requirements. Existing application successes further help ensure success when working with these clear and tough materials.

Table 2

Fatigue pressure requirements for water filter housings

Mode of testing	Pressure	Dwell	Standard
Fatigue cycling	150 psig	10,000 cycles	NSF/ANSI 53-2009e
	180 psig	20,000 cycles	EN 14898

Measuring up to tough standards while reducing thickness and weight

Point-of-use (POU) filter housings manufactured for under-sink residential systems were compared for sidewall thickness and weight. Housings made of Eastman Tritan™ copolyester, Eastar™ copolyester, talc-filled polypropylene (PP), and SAN were designed to meet standards of operating pressure at 100 psi; hydrostatic pressure at 300 psi for 15 minutes; burst pressure at 400 psi for 5 minutes; and cycle testing of 0 to 150 psi for 100,000 cycles, as prescribed by NSF 58. Table 3 shows that robust housings could be designed from Eastar with 40% less weight than SAN—and from Tritan with 21% less weight.

Table 3

Comparing thickness and weight required for filter housings (3.0-inch ID)

Material	Wall thickness (inches)	Housing weight (grams)	Estimated weight reduction vs. SAN (%)
Talc-filled PP* (opaque)	0.26	662	–7
SAN	0.19	621	—
Eastar EN076	0.14	373	40
Tritan TX1001	0.19	488	21

**The estimated talc-filled PP part is actually 7% heavier than SAN.*

NOTE: Commercial SAN and PP filter housings tested require additional reinforcement in the neck and thread areas to meet toughness requirements, resulting in weight requirements greater than those required by sidewall thickness alone.

Eastman copolyesters also stand tall in drop-impact testing.

Housings made from Eastman Tritan™ copolyester, Eastar™ copolyester, talc-reinforced PP, and SAN were filled with water and capped for drop-impact testing. Using the Bruceton Staircase method, they were dropped from heights starting at 4 feet, then varying the height up or down in 1-foot increments, depending on pass or break, respectively, up to a maximum height of 10 feet. Table 4 shows that Tritan clearly outperformed competitive materials while results for Eastar were between PP and SAN.

Table 4

Comparing drop-impact strength of filter housings

Filter housing material	Lowest height at which failure occurred (in feet)	Median height at which failure occurred (in feet)
Talc-filled PP (nicked)	7	8.6
Talc-filled PP (shattered)	8	9.8
SAN 1 (shattered)	4	5.3
SAN 2 (shattered)	3	4.2
Eastar EN076	6	8.8
Tritan TX1001	No failures at up to 10 feet	>10

Meeting the growing need for chemical resistance

Chemical resistance is increasingly important for applications where the filter housing comes into contact with chemicals, such as those used in sanitation, pest control, and water system winterization.

Eastman Tritan™ copolyester provides greater resistance to cracking and crazing, which diminish clarity and reduce functional integrity. The material offers superior performance and durability for filtration systems in RVs or boats which require routine winterization with food-contact-grade glycols. For filtration systems with replaceable filter media, the chemical resistance and hydrolytic stability of Tritan enable cleaning of the housings in a dishwasher as an alternative to hand cleaning with bleach.

Learn more at eastman.com/waterfiltration.

Comparison summary
of Eastman copolyesters with other materials

Compared with SAN

- Eastman Tritan™ copolyester is significantly tougher and more resistant to chipping during transportation.
- Both Tritan and Eastar offer greater chemical resistance and do not contain styrene.
- Tritan may eliminate an annealing step to relieve residual stress when processing SAN.
- Tritan may reduce scrap from breakage and can offer more options for secondary operations, such as welding.
- Tritan and Eastar™ copolyesters do not have the blue cast of SAN—especially noticeable in water filter housings because of their thickness.

Compared with polycarbonate (PC)

- Eastman Tritan™ copolyester is at least as tough as PC.
- Tritan offers greater chemical resistance and dishwasher durability.
- Tritan may eliminate the need for annealing, often required to relieve residual stress in molded PC parts.
- Tritan and Eastar copolyesters are made without BPA—a big advantage for brand owners who want to answer consumers' needs for BPA-free products.

Compared with talc-filled PP

- Eastman Tritan™ copolyester is significantly tougher.
- Tritan and Eastar™ copolyesters are clear.
- Tritan has very low odor and taste contribution, resulting in better organoleptics. Eastar has not been tested, but performance is expected to be similar to Tritan.

For more information about testing and comparisons, contact Eastman Customer Service at 1-800-325-4330.

Eastman is ready to start collaborating with you today.

You'll receive the greatest benefit from Eastman Tritan™ and Eastar™ copolyesters if you involve Eastman early in the design and tooling of a new product. That's when Eastman can add the most value to optimizing your design and processing—and bringing your new product to market efficiently.

Eastman can work with engineers and designers to reduce cost and complexity, including assistance with mold designs and providing data that can support NSF compliance requirements.

Eastman has a proven track record of collaborating with customers on new applications and market solutions—and is a reliable global supplier of innovative and unique clear polymer solutions for food contact, medical, and other applications.

Eastman is prepared to support your sustainability initiatives for the future.

Eastman also is committed to sustainable innovation, production, and process optimization in polymers.

- 2013 Responsible Care® company of the year (American Chemistry Council)
- 2012 and 2013 ENERGY STAR® Partner of the Year (U.S. Environmental Protection Agency)
- 2012 Newsweek Green Rankings®—fourth out of 34 U.S. companies in the Materials Sector

Eastman copolyesters can contribute to your sustainability initiatives in several specific ways:

- Eastman Tritan™ and Eastar™ copolyesters are made without BPA, halogens (e.g., chlorine, bromine), or *ortho*-phthalate plasticizers.
- Both are made without styrene.
- The toughness of Tritan can reduce breakage, product failure, and waste.
- By eliminating the annealing step required by some clear materials, Tritan can reduce energy usage and costs.
- Eastman Tritan™ and Eastar™ copolyesters are GREENGUARD Indoor Air Quality Certified®.

For more information about Eastman Tritan™ and Eastar™ copolyesters and the benefits of collaborating with Eastman, visit Eastman.com or call 1-800-EASTMAN (800-327-8626).

www.TritanSafe.com

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The results of **insight**™

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