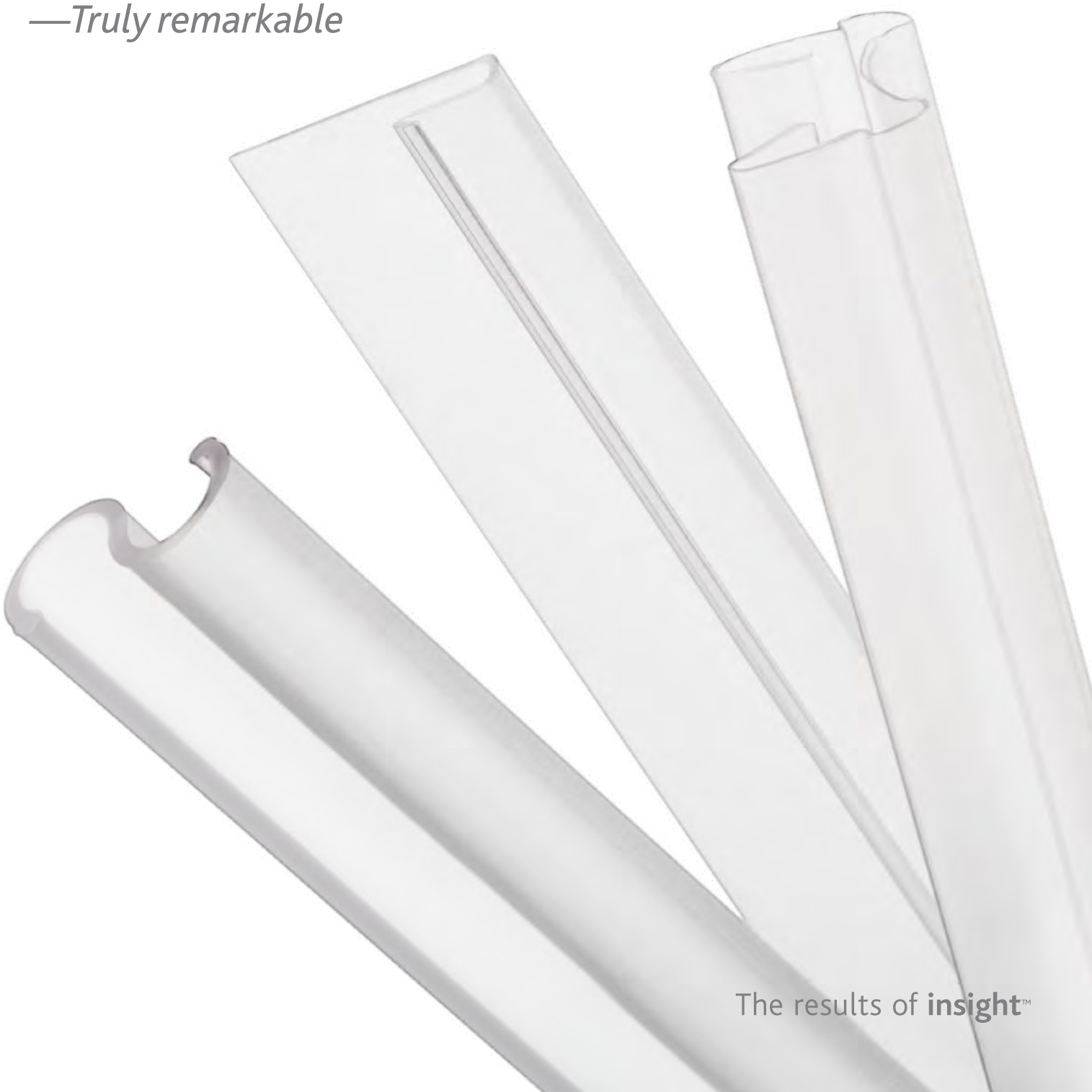
EASTMAN

Profiles designed for a tough environment

—Truly remarkable



The results of **insight**™

Eastman Provista™ copolymer and Tenite™ cellulosics are polymer formulations specifically designed for profile applications. Their durability, ease of processing and fabricating, and chemical resistance prove them to be ideal material solutions for the retail and architecture markets.

Benefits of Eastman profile polymers

Profiles extruded from Provista copolymer and Tenite cellulosics offer a combination of features and benefits you won't find with other materials.

Provista

Provista was specifically designed for the profile market where high melt strength makes the resin an excellent choice when extruding complicated shapes. Provista benefits include:

- Sparkling clarity—water clear and high gloss that will not stress-whiten
- Pleasant feel
- Processing ease—high melt strength allows faster line speeds and tool design flexibility, resulting in improved throughput and economics
- Chemical resistance—high resistance to environmental stress cracking and crazing
- Good impact strength—tough and flexible for a long functional life
- Environmentally friendly—BPA and BPS free; nonhalogenated
- FDA clearances available/NSF 51 approval
- UL rating of 94HB down to 1.5 mm
- GREENGUARD Certification® options
- *Cradle to Cradle Certified*™ Bronze for certain grades

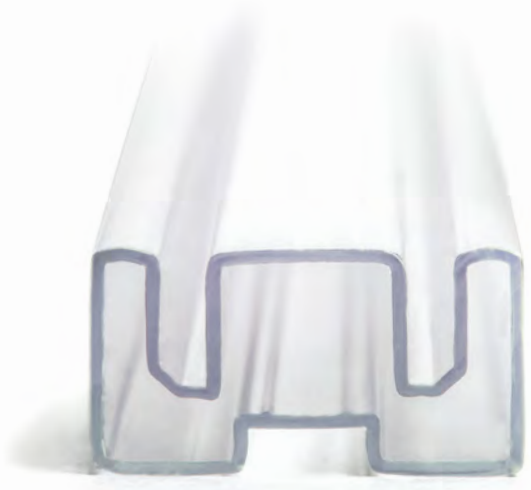
Tenite

Tenite cellulosic plastics, the first of the modern thermoplastics, have been used for more than 60 years in profile applications. Advantages of Tenite include:

- Biobased—derived from 100% renewable softwood material
- Pleasant feel
- Sparkling clarity and high gloss
- Design friendly—high melt strength and resistance to melt fracture make it easier to design and process complex shapes and thick, heavy parts
- Fabrication—easy and clean and profiles are resistant to cracking, crazing, and burning
- Superb toughness—ability to withstand abuse
- Chemical resistance—high resistance to environmental stress cracking and crazing
- Processing speed—high-speed processing because of melt strength and resistance to melt fracture

"Profiles made of Provista copolymer are tough and flexible for a long functional life while retaining their bright colors, sparkling clarity, and high gloss. The material will not stress-whiten or yellow over an extended period of time."

—Sales manager of a German company specializing in profile extrusion



Materials comparison chart

Criteria	Provista	Provista ST	Tritan TX1800	Provista GP	Tenite butyrate	Tenite propionate	Acrylic	PC	PVC	NPG-based PETG
Impact strength	◑	●	●	◑	●	●	○	●	◑	◑
Clarity	◑	◑	◑	◑	◑	◑	●	◑	○	○
Chemical resistance	◑	◑	●	◑	●	●	◑	○	●	◑
Machining/ fabrication	◑	◑	◑	◑	●	●	○	◑	○	◑
Best suited for	Relatively **complex profiles** with good all-around performance	Complex profiles requiring **superior impact performance**	Complex profiles requiring increased **temperature resistance**	**Simple profiles**; good economic alternative to PVC	**Complex profiles** requiring chemical resistance; toughness; easy fabrication; weatherability	**Complex profiles** requiring chemical resistance; toughness; easy fabrication				
Example application	Integrated circuits packaging; light tubes; pricing channels	Shipping tubes; corner and furniture guards	Shelving; guards; higher-temperature environments	Corner and furniture guards; shelving; food separation in freezer	Tubes; containers; hardware packaging; pricing channels; outdoor profiles	Tubes; containers; tool/hardware packaging; pricing channels				

● Best
◑ Good
○ Average

Property comparison chart

Property	ASTM test method	Provista	Provista ST	Tritan TX1800	Provista GP	Tenite butyrate 575E3720010 clear, trsp	Tenite propionate 375E4000012 clear, trsp
Clarity—haze (%)	D1003	0.6	1.3	<1	0.8	3.0	3.0
Flexural modulus (MPa)	D790	2100	1900	1522	2100	1379	1448
Tensile strength @ yield (MPa)	D638	50	47	45	50	33	32
Specific gravity	D792	1.27	1.25	1.18	1.27	1.19	1.20
Heat deflection temperature @ 0.455 MPa (°C)	D648	70	73	101	70	74	75

Note: Properties reported here are typical of average lots.

Markets

Retail

Profiles made of Eastman polymers are the answer to breakage and cost concerns associated with store fixtures and displays. The sparkling clarity and durability of Eastman polymers make them ideal for showcasing products in a harsh retail environment. And the design possibilities are limited only by your imagination.

Eastman profiles can be found in many retail applications, such as:

- Pricing channels—where clarity, durability, and chemical resistance are important
- Store fixture profiles—where clarity and durability are required
- Signage channels such as "H" and "J" type profiles—where clarity, durability, and chemical resistance are needed
- Packaging tubes—where clarity, durability, and favorable processing economics are drivers

Architecture

Eastman plastics offer designers and architects freedom when designing building materials. Plastics are lightweight and easy to install and can be made into highly durable, appealing installations that can withstand the wear and tear of heavy use. Eastman profiles can help you build something beautiful, sustainable, and truly remarkable.

You'll find Eastman profiles in a variety of architectural applications, including:

- Light fixtures where toughness and either clarity or light diffusion are desired
- Wall and furniture protection, handrails, and corner guards where both clear and colored applications are needed
- Plastic angle moldings—where both clear and colored applications are needed

Fabricating and forming Eastman Provista™ copolymer

Provista profiles heat and cool rapidly and can be formed at low temperatures without predrying, which translates into major labor, energy, and capital savings. Using proper methods outlined here, you can create intricate, precisely fabricated, eye-catching designs.

Bending

Cold bending can be used to produce simple shapes from Provista profiles. The maximum amount of bend will depend on the extruded shape, thickness, and rate of deflection. An electric strip heater set at optimum profile temperature may be used for hot bending.

Sawing

Most saws commonly used for wood or metal should satisfactorily cut Provista profiles. These include circular saws, band saws, saber saws, jigsaws, hacksaws, or handsaws. Circular and band saws usually produce the smoothest, cleanest cuts.

Drilling

Provista profiles can be readily drilled using a standard drill press or handheld drill. The drill bits should be sharp and clean and designed for use with plastic.

Polishing

Provista can be polished using a variety of techniques such as mechanical, flame, or solvent polishing. This fabrication method is very technique dependent with best results being achieved when a uniform rate of movement is used.

Edge finishing using mechanical polishers is best done by starting with the flattest edge possible. Use fairly light pressure on the part, and be sure to keep a constant feed rate across the polishing surface.

For best results when flame polishing, use a butane or propane flame after the sawed edge has been deburred, jointed, routed, or diamond polished. Flame treatment can embrittle the sheet edge.

To solvent polish Provista profiles, use methyl ethyl ketone (MEK) or methylene chloride. This method of polishing is typically more difficult than mechanical or flame polishing.

Mechanical fastening

Because of its outstanding toughness, Provista adapts to mechanical fastening more readily than some other materials. This method is useful when assembling or installing large or heavy parts or when a suitable solvent or adhesive system is not available.

Bonding

Solvent bonding is generally preferred when joining components made from Provista. Use of proper solvent, good technique, and cure time should result in a clear, haze-free joint that is strong and durable. When joining dissimilar materials, the use of adhesives is often recommended. The adhesive selection must be compatible with each material involved.

Decorating

There are numerous commercially available inks and paints that can be used to decorate Provista profiles. When choosing ink or paint, consideration should be given to the fitness-for-use requirements of the decorated parts.

"We experimented with a number of resins, but except for Provista copolymer, they all came up short. Because the profile is so complex, it is extremely difficult to maintain the shape during extrusion, but Provista did."

—Program engineer for a writing instrument company

Fabricating and forming Tenite™ cellulosics

Machining

Tenite can be worked with most tools used for machining wood or metal. Tool speeds should be such that the plastic material does not melt from frictional heat. In general, the highest speed at which overheating the tool or plastic does not occur will give best results.

Bending

Hot or cold bending can be used to produce simple shapes from Tenite profiles. The maximum amount of bend will depend on the extruded shape, thickness, and rate of deflection. An electric strip heater set at optimum profile temperature may be used for hot bending.

Drilling

Drills designed especially for plastics are available, and their use is suggested for drilling Tenite cellulosic plastics; however, standard twist drills used for drilling metal or wood can be satisfactory as long as speeds and feed rates are kept modest.

Sawing

Tenite can be sawed with any saw used for wood or metal—circular saws, band saws, saber saws, jigsaws, hacksaws, or handsaws. Some of these saws, however, are better suited for sawing plastics because they produce smoother or faster cuts than others. Circular and band saws usually produce the best surfaces, and they can be used in most sawing operations.

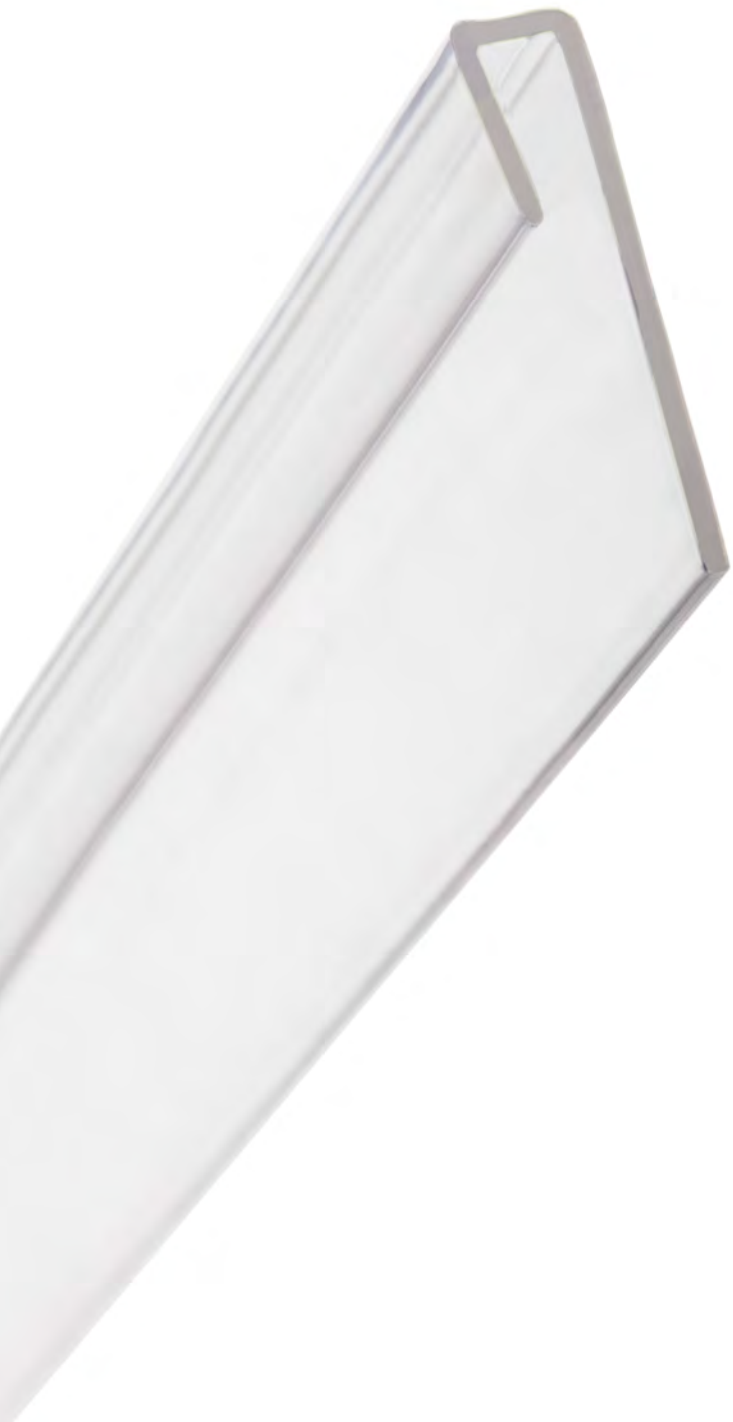
Solvent polishing

An effective method of eliminating fine surface scratches and producing a high gloss on cellulose plastics is solvent polishing. The article is usually dipped or wiped with a suitable solvent and then dried. Some solvent mixtures that have been used successfully for dip-polishing Tenite butyrate and propionate articles follow.

Tenite butyrate and Tenite propionate
70% Isopropyl alcohol 30% Toluene
80% Acetone 20% Eastman PM acetate
95% Isopropyl alcohol 5% Eastman PM acetate

"Clarity is the main feature of the butyrate. It is easily extruded and has helped us develop complex extrusions that set us apart from the competition."

—Retail POP manufacturing manager



Printing

Articles manufactured from Tenite may be printed with conventional printing equipment. Special printing inks are required because the ink is not absorbed by the plastic as it is by paper or cloth. Since the ink is not absorbed into the plastic, it is subject to abrasion. The effect of abrasion can be minimized by applying a light coat of clear lacquer over the printing.

Weathering options

Eastman offers UV-protected material options for enhanced performance outdoors, allowing maximum retention of impact resistance and low color shift.

Provista UVI

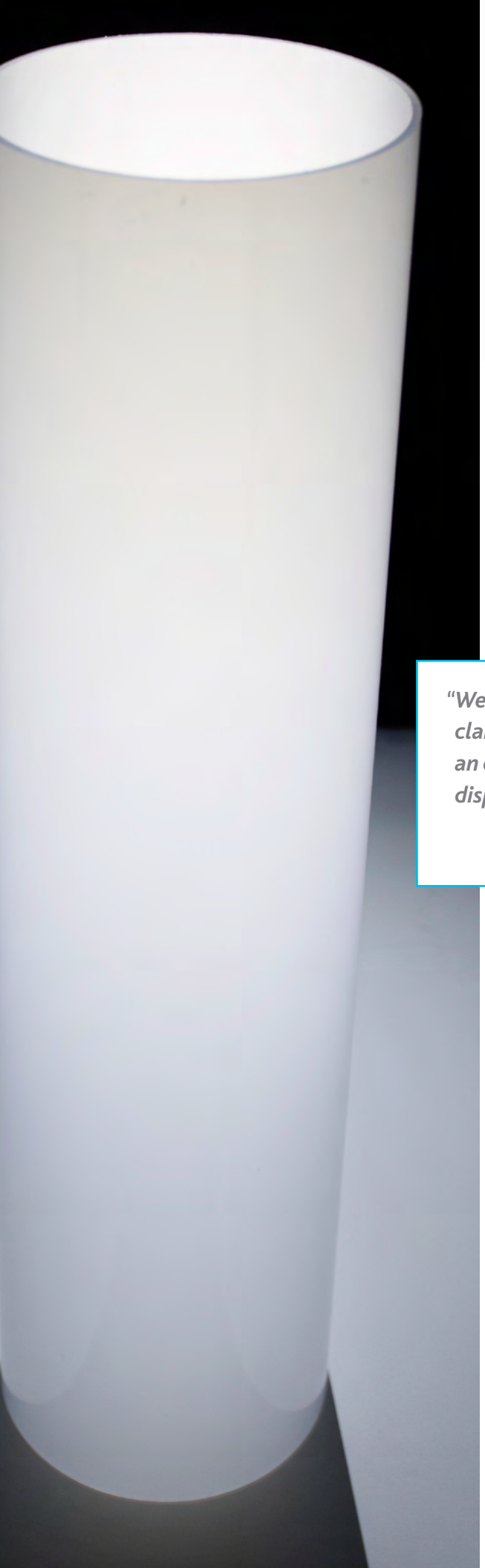
Provista UVI is a copolymer with an intermediate level of an indoor UV package added to prevent yellowing caused by some residual, inconsistent sunlight through external windows. Accelerated florescent lighting exposure study results show little, if any, effect for up to five years.

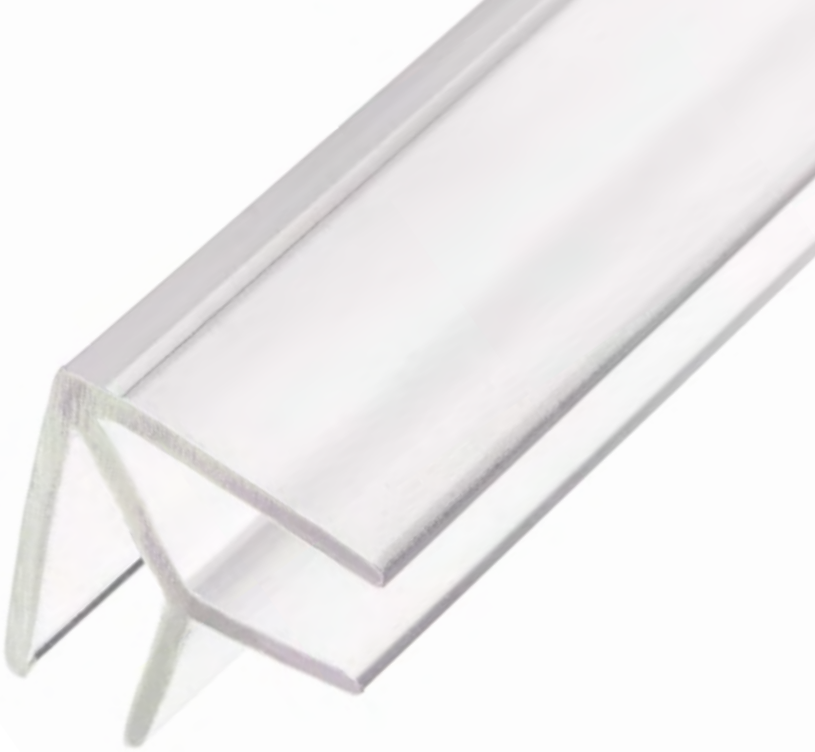
Provista UVO

Provista UVO is a copolymer with a maximum level of an outdoor UV package added to inhibit yellowing caused by sunlight.

Tenite butyrate 576E3720010 clear, trsp

Tenite cellulose acetate butyrate 576-10 contains an ultraviolet inhibitor (UVI) for added protection in outdoor applications.

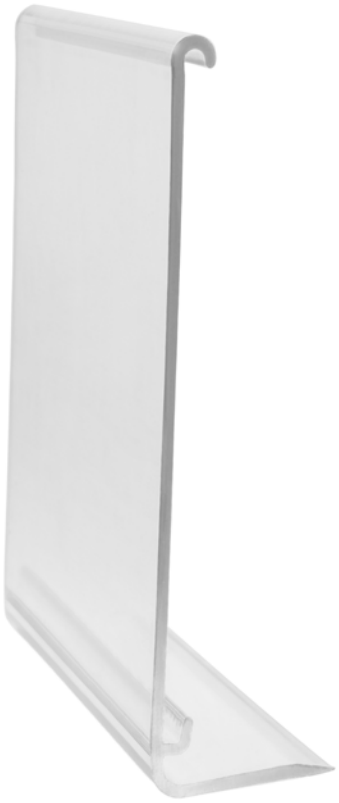




"We selected Provista copolymer over clear PVC because of its clarity. PVC tends to have a bluish tint, and other materials have an odor that can be a problem when you have a large amount of displays in one store."

—POP supplier company manager

For more information about Provista and Tenite or the processing guides, visit www.eastman.com or contact your Eastman representative.



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EASTMAN

The results of **insight**™

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