



Eastman TETRASHIELD™

protective resin systems

High-performance resins for metal food-packaging coatings

A good can preserves more than food. It preserves trust.

Coatings manufacturers and can makers looking to develop higher-performing coatings without compromise can turn to Eastman Tetrashield™ protective resin systems. The TMCD molecule used in Tetrashield resins has a unique structure that delivers a balance of chemical resistance, high solids and flexibility.

Tetrashield is based on the technology found in Eastman Tritan™ copolyester, a leading material in food contact applications. It addresses materials of concern such as BPA and styrene.



Why TetraShield?



Durability

- Better balance of hardness and flexibility
- Better chemical resistance for hard-to-hold food
- Longer shelf stability



Productivity

- Faster dissolution rates
- Shorter production time and reduced cost
- Improved production rates due to decreased coating thickness and reduced layer count



Safety

- Enables high-solids BPA-NI formulation
- Delivers global regulatory compliance
- Aids in more efficient use of materials and reducing energy-intensive manufacturing steps

Benefits



Formulators

- Meets emerging safety and food-contact regulations
- Formulation flexibility to efficiently customize solutions
- Industry-leading technical support and starting point formulations
- More efficient build and faster film drying while maintaining excellent application parameters



Can makers

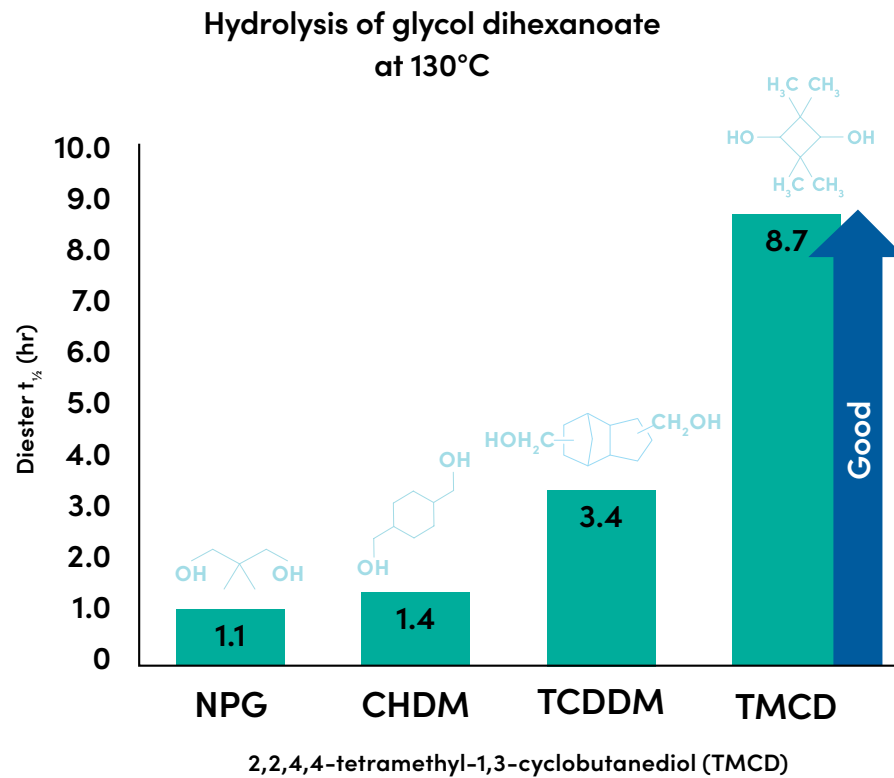
- Withstands demanding manufacturing processes
- Excellent application parameters that fit into existing production methods
- Film build and film-drying benefits for process efficiency



Brand owners

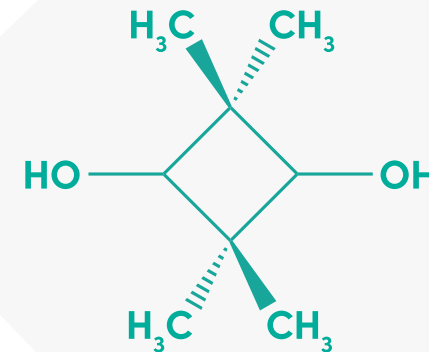
- Addresses materials of concern such as BPA and styrene
- Improves shelf life
- Contributes to consumer trust and brand protection

TMCD molecule enables a new class of highly durable polyester resins.



Cycloaliphatic structure

- High T_g
- Hardness
- Rigid but not aromatic



Tetramethyl structure

- Solubility
- Lower viscosity
- Compatibility
- Shields ester linkages

Shielded secondary hydroxyls

- Hydrolytic stability
- Stain and chemical resistance

Product range

Tetrashield resins are designed to enhance coating performance as well as improve yield through coating with high solids content in food cans, caps and closures, and general line applications.



- Improved sterilization resistance
- Enhanced corrosion protection
- Ability for higher applied formulation solids due to lower resin viscosity
- Flexibility and toughness to withstand fabrication
- Solid form factor increases formulation flexibility while reducing storage and handling costs
- Faster dissolution compared to high-molecular-weight polyester

Typical physical properties of resins

Tetrashield resin	Delivery form	Acid value (mg KOH/g resin)	Hydroxyl value (mg KOH/g resin)	T _g (°C)	Molecular weight (PS eq.)	HSP
MP2100	Solid pellets	3	15	74	10,500	D = 18.0 P = 3.1 H = 7.8
MP2101	Solid pellets	3	7	97	16,900	D = 18.8 P = 8.1 H = 5.0
MP2303	Solid pellets	4	18	92	10,500	D = 19.0 P = 5.6 H = 6.5
MP2104	Solid pellets	4	15	78	12,000	D = 18.6 P = 5.2 H = 6.6

	MP2100	MP2104	MP2303	MP2101	
Characteristic values	Acid value (mg KOH/g resin)	3	4	4	3
	Hydroxyl value (mg KOH/g resin)	15	15	18	7
	T _g (°C)	74	78	92	97
	Molecular weight (PS eq.)	10,500	12,000	10,500	16,900
Physical properties	Solid/viscosity	●	◐	●	◐
	Reactivity	◐	●	●	◐
	Flexibility (deep drawn)	◐	◐	◐	●
	Suitable for hard-to-hold food	◐	●	●	●
	Acid resistance*	◐	●	●	●
	Sulfur resistance*	●	●	●	●
Fields of application	White enamel	●	●	●	●
	Gold enamel	◐	●	◐	◐
	Three-piece cans	●	●	●	●
	DRD cans	●	●	◐	●
	FAEOE	◐	◐	◐	●

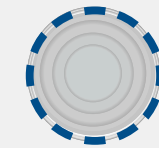
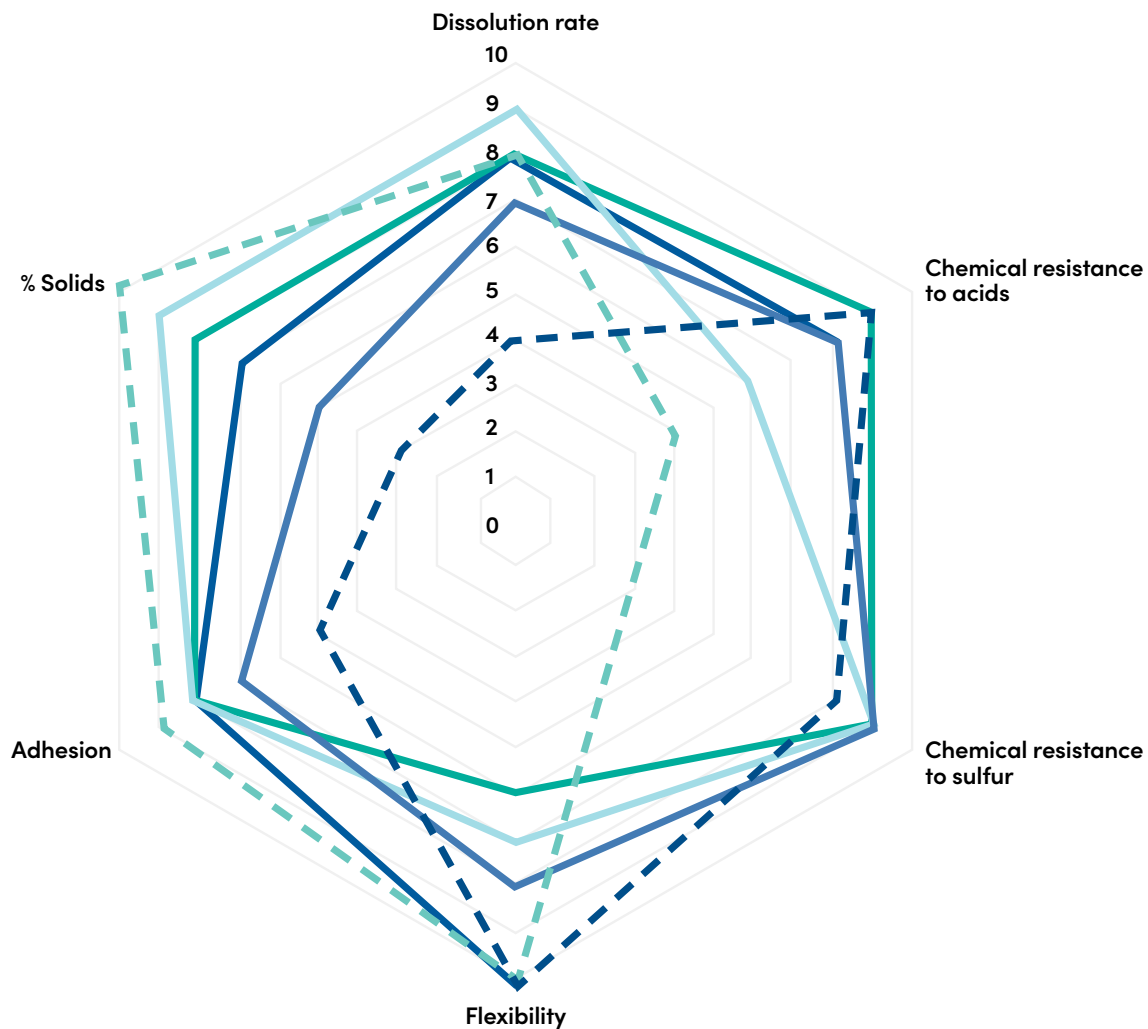
*Sterilization and pack test in food stimulant
(acid: acetic and salt; sulfur: cysteine)

Best/most suitable

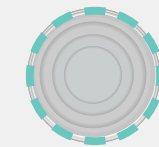
Worst/least suitable



A portfolio of differentiated resins that cover various performance criteria



High T_g , high molecular weight
49% solids*



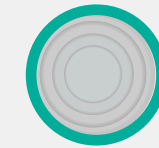
Low T_g , medium molecular weight
62% solids*



Tetrashield MP2100
58% solids*



Tetrashield MP2101
51% solids*



Tetrashield MP2303
57% solids*



Tetrashield MP2104
54% solids*

*Percent solids refer to the formulated coatings, allowing a higher solids content compared to other commercially available resins.

Enhancing coating performance with a broad product portfolio

Eastman has a range of additives and other products that can be combined with Tetrashield resin systems to deliver additional benefits to the coating.



Neutralizing amines

Functioning as beneficial supplementary pigment dispersants, Eastman amines enhance tint strength, grind stability and overall coating performance.



Solvents

Eastman manufactures oxygenated solvents that are extremely useful in developing high-quality, VOC-compliant coatings. Formulators can select from a wide variety of products to formulate solventborne and waterborne coatings.

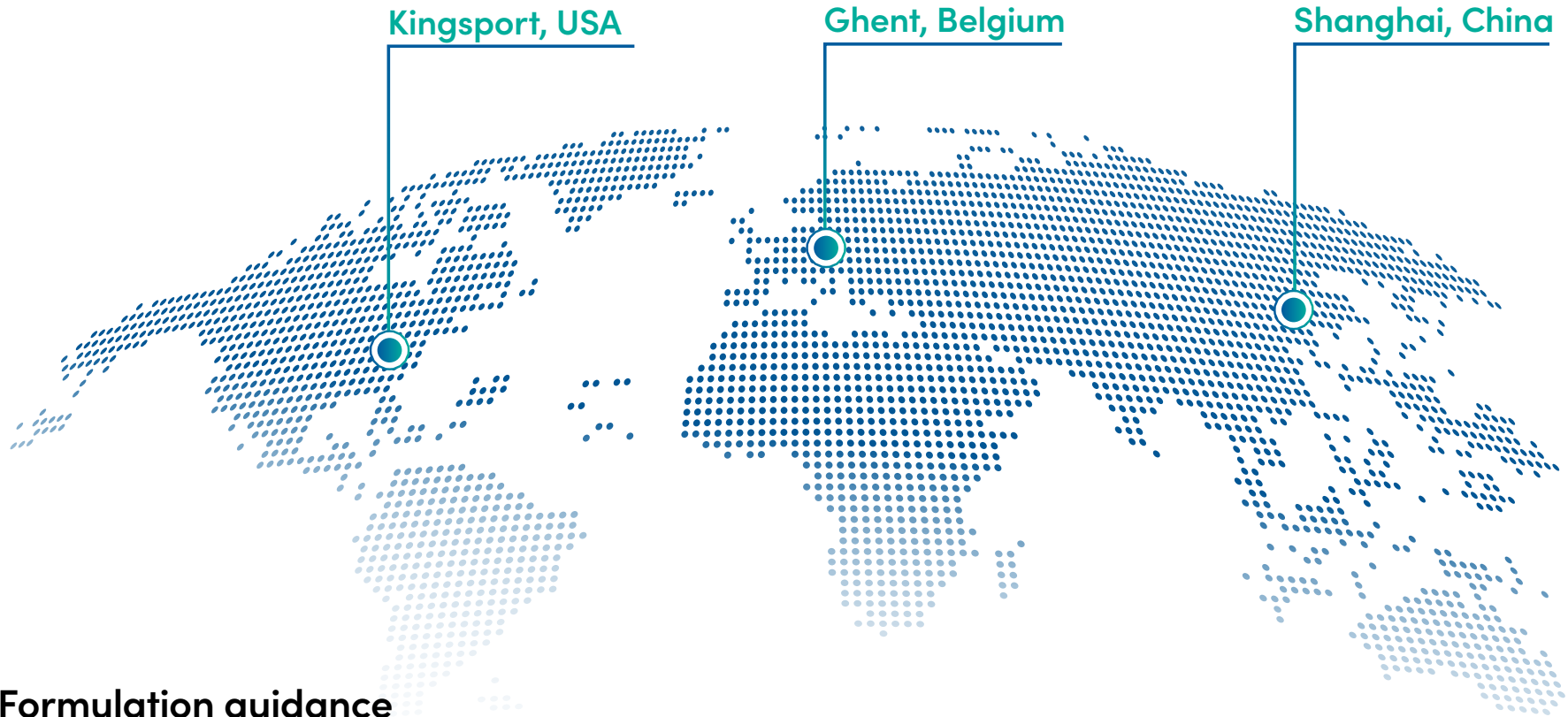
Cellulose esters

Eastman Solus™ performance additives deliver excellent flow and leveling that make application easy.



Our global technical support

Eastman provides industry-leading technical service and starting point formulations from our three global innovation centers.



Formulation guidance

- Tetrashield MP resins can be formulated with solvents commonly used as liquid carriers for coatings applications. Examples of suitable solvents are glycol ethers, ketones, aromatic hydrocarbons and glycol ether esters.
- The catalyst selected is dependent on the cross-linker type, and Tetrashield resins offer broad compatibility with a variety of cross-linker types commonly used in the can coatings industry.
- The amount and type of solvent, catalyst and cross-linker used varies per application. To request starting point formulations, contact your local technical service representative.

Preserving customer trust with Tetrashield

Eastman Tetrashield™ protective resin systems have a proven track record in the metal food packaging coatings industry. But don't take our word for it. Customers across our broad product portfolio trust Tetrashield because of its high performance. And Eastman's dedicated and continual customer engagement ensures they receive the right coatings solution. Always.





What do our customers say about us?

“Eastman has worked with us for over a decade. We value our partnership because of the innovation that Eastman invests in with its materials and its people. It’s very important to be ready and to always be innovative, not only with the technical aspect but also in sustainability and product safety. We’ve noticed an increase in the development of sustainable material by Eastman, and this is very important to us as it is a need in the food packaging industry.”

— A key European customer



What do our customers say about us?

“Stronger barrier-building properties, improved chemical resistance and a dedicated regional team — these traits have made Eastman, with its Tetrashield MP2100 protective resin, a trusted partner of ours since 2019. We first began using Tetrashield while looking to upgrade our canning operations. We quickly found that Tetrashield delivered quality performance for metal packaging coatings. Their technical support and continued guidance has made it stand out more, with help coming from Spanish-speaking representatives. Eastman is improving its vision on how it is engaging Latin American customers and providing the support we need while relating to the culture.”

— A key Latin American customer

Contact the technology center to learn more about:



Testing and analytical services

Application-related testing capabilities such as FAEOE, sanitary ends and DRD presses to accelerate product qualification and can coating formula optimization



Formulation services

Tailored formulations for various applications and performance requirements available on request

To learn more, go to
eastman.com/tetrashield.

