



Eastman **TETRASHIELD™**  
protective resin systems

**Tetrashield IC3000**  
**protective resin**  
**system** for  
one-component (1K)  
industrial coatings

**EASTMAN**



## Eastman Tetrashield™ IC3000 protective resin system

is a highly durable resin system that improves the performance of pigmented 1K topcoats. Industrial one-pack coatings made with Tetrashield IC3000 optimize the coating process for OEMs and suppliers in the agricultural and construction equipment sector and other related industrial applications by providing extended coating life.

### Key attributes

- Extended weathering resistance
- Higher resistance to pigment bleed in high-chroma coatings
- Improved mar/scratch resistance
- Allows for reduction in formulation VOC content and enhanced productivity

### Typical resin physical properties

Solvent	<i>n</i> -Butyl acetate
% Nonvolatiles	74–76
Viscosity, poise (Brookfield DV-II, spindle #5, 50 rpm, 25°C)	12–32
Color, APHA	< 63
Acid number, mg KOH/g	< 10
Hydroxyl number, mg KOH/g	120–150
Density, lb/U.S. gal (kg/L)	8.8 (1.05)

### Cross-linker selection

The preferred cross-linker choice in combination with Tetrashield IC3000 is a partially butylated melamine resin. Recommended incorporation level of the melamine is 30% on total resin solids; however, a proper design to balance desired performance is ideal. If highly methylated melamine systems are selected, formulators should carefully balance the cross-linker package to achieve optimum gloss and appearance. For high-solids monocoat formulations, low-viscosity, highly reactive butylated melamine resins are optimal. In geographical regions of concern, it is suggested to carefully balance melamine selection to achieve high solids and desired reaction speed while minimizing formaldehyde content.

### Catalyst selection

Full film properties are achieved by using blocked *p*-toluenesulfonic acid (PTSA) chemistry at a recommended dosage level of 1.5–1.7 per hundred resin (PHR) on catalyst-supplied form. An alternate catalyst choice is a blocked dodecylbenzene sulfonic acid (DDBSA) type with a dosage at 4.8–5.0 PHR on catalyst as supplied. If electrostatic spray resistivity is too low, blocked DDBSA-type catalysts may be utilized to increase resistivity.

## Additives and formulation techniques

Tetrashield IC3000 has efficient dispersing and grinding properties, and it can be formulated with most common additives used in pigmented topcoats.

### **Sag control agent/rheology modifiers**

Sag control agent (SCA)-modified thermosetting acrylics are recommended and provide good sag limit control and application properties when utilized with Tetrashield IC3000. Fumed silica is effective alone or in combination with standard SCA polymers to adjust rheological behavior. Addition of the SCA resin during the letdown stage should be incremental and done under continuous agitation to keep the dispersion intact.

### **Light stabilizer package**

To achieve maximum durability, adding a UV stabilizer package that contains 0.5% hindered-amine light stabilizers (HALS) and 1.0% UV absorbers (UVA) of total formulation (by weight) is recommended. Light stabilizer package levels should be adjusted based on specific OEM performance levels. Tinuvin™ 123 type (HALS) and Tinuvin™ 1130, Tinuvin™ 900, Tinuvin™ 928, or Tinuvin™ 384 type (UVA) are all suitable for Tetrashield IC3000 pigmented topcoat applications.

### **Surface additives**

Various silicone, silicone-containing, and polyacrylate surface additives can be used to enhance specific appearance properties. When selecting surface additive chemistries, performing appropriate testing to ensure compatibility with the resin system is recommended.

### **Reducing solvent(s)**

To achieve high application solids, ketones such as Eastman methyl amyl ketone (MAK) are recommended. However, aromatic solvents such as xylene, aromatic 100, and aromatic 150 are also efficient reduction solvents to reach desired application viscosity.

## Tetrashield IC3000 red 1K topcoat formulation

Raw material	Weight (%)	lb/100 gal	gal/100 gal	Supplier
<b>Mill base</b>				
Tetrashield IC3000	7.32	63.45	7.31	Eastman
Aromatic 100	2.23	19.30	2.66	—
DISPERBYK-161	3.70	32.06	3.77	BYK
Solsperse™ 32600	0.41	3.54	0.43	Lubrizol
Irgazin™ Red L3660 HD	9.25	80.15	5.89	BASF
Ti-Pure™ R-960	3.08	26.72	0.83	Chemours Titanium Technologies
Aromatic 100	1.93	16.70	2.30	—
<i>Subtotal</i>	<i>27.91</i>	<i>241.92</i>	<i>23.20</i>	<i>—</i>
<b>Mill wash</b>				
Tetrashield IC3000	2.54	22.04	8.46	Eastman
Aromatic 100	1.54	13.36	3.48	—
<i>Subtotal</i>	<i>31.99</i>	<i>277.32</i>	<i>33.36</i>	<i>—</i>
<b>Letdown</b>				
Tetrashield IC3000	23.89	207.05	23.85	Eastman
Cymel™ 1168	12.38	107.33	11.91	Allnex
Setalux™ 91795 VX-60	4.62	107.33	4.90	Nuplex
Eastman DB solvent	2.77	24.04	3.04	Eastman
Aromatic 100	9.25	80.15	11.05	—
Tinuvin™ 123	0.15	1.34	0.17	BASF
Tinuvin™ 384-2	0.31	2.67	0.30	BASF
BYK-331 solution, 10 wt% in xylene	0.39	3.34	0.45	BYK
BYK-306 solution, 10 wt% in xylene	0.46	4.01	0.55	BYK
BYK-325 solution, 10 wt% in xylene	0.46	4.01	0.54	BYK
DISPERBYK-180	0.39	3.34	0.37	BYK
Nacure™ 2500	0.65	5.68	0.70	King Industries
IC3000 industrial thinner*	12.28	106.45	14.58	Eastman
<b>Total</b>	<b>100.00</b>	<b>866.80</b>	<b>100.00</b>	<b>—</b>

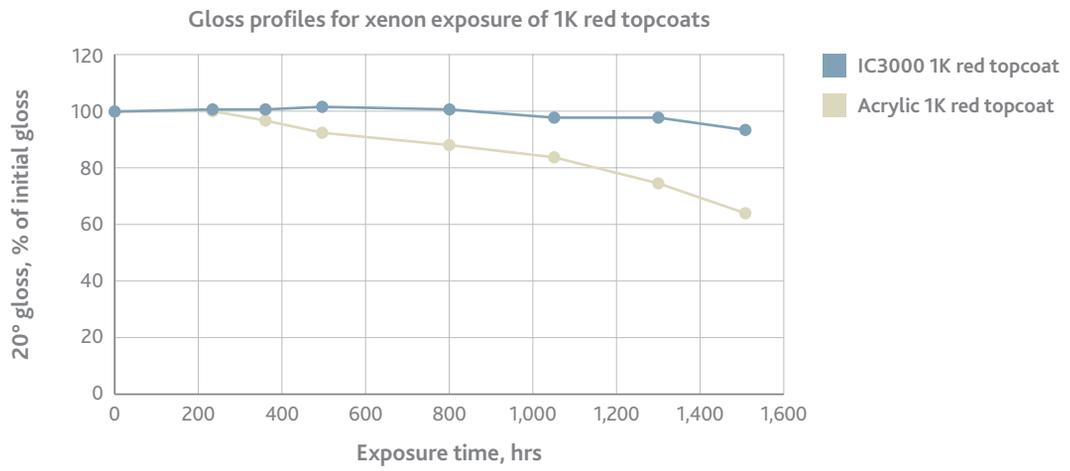
\*Thinner is 80 parts Aromatic 100 and 20 parts Aromatic 150; thin to DIN #4 28 in.  
Recommended curing conditions: 140°C for 30 minutes

IC3000 red 1K topcoat formulation physicals		IC3000 red 1K topcoat typical performance properties		
		Property	Test	Typical value
% Nonvolatiles, weight	54.9	Application viscosity	Din 4, sec	27–29
% Nonvolatiles, volume	46.8	Application solids, %	110°C, 60 min	48–49
Pigment-to-binder weight ratio	0.31:1	Gloss	20°	85–90
Melamine % of total resins	30.2	Hardness	Koenig pendulum, sec	120–125
VOC, g/L	470	Gloss retention, %	Crockmeter, 10 dbl rubs	56–58
VOC, lb/gal	3.9	Cupping	Erichsen	No cracking at 5.6 mm
Pounds per gallon	8.7			

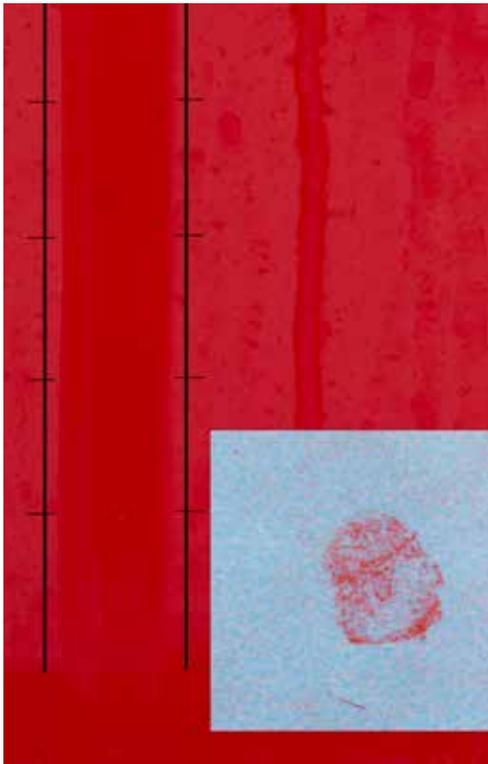
## Tetrashield IC3000 red 1K topcoat benchmark performance

Tetrashield IC3000 red 1K topcoat was tested alongside a 1K red commercial system. The IC3000-based monocoat surpassed the commercial system for pigment bleed resistance and weathering resistance while simultaneously showing an increase in direct impact resistance.

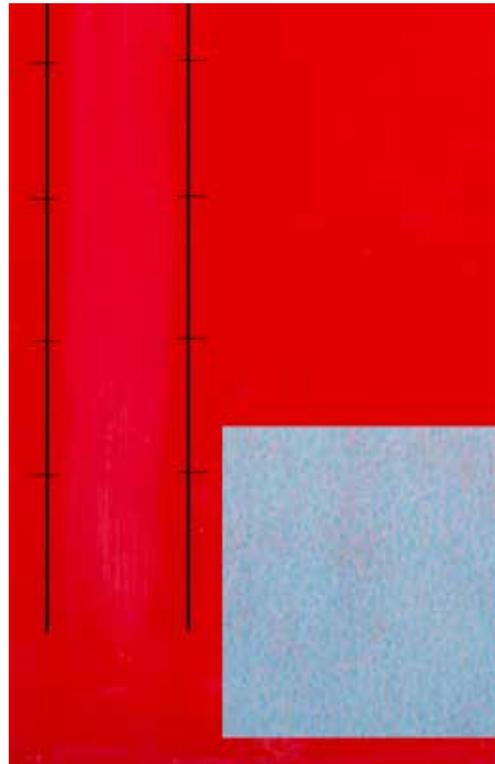
Attribute	Test; specification	Commercial acrylic red 1K topcoat	Tetrashield IC3000 red 1K topcoat
Appearance	Appearance; smooth and glossy	Pass	Pass
60° gloss	Gloss on 60°; 93 min	92	91
Cure—MEK double rubs	50 double rubs; no color transfer	<b>Color transfer</b>	<b>No color transfer</b>
Hardness	Pencil hardness; H min.	H+	H+
Adhesion	Crosscut adhesion; 0/100	0/100	0/100
Flexibility	Conical mandrel (6 mm); no damage	Pass	Pass
Impact resistance, direct	Direct impact; 15 lb-in. with no damage	<b>20 lb-in.</b>	<b>60 lb-in.</b>
Abrasion/mar resistance	Koenig hardness; record	156	148
Flexibility	Cupping test; record	8.45	9.82
Wading resistance	25 rubs (muslin cloth); no color transfer	Pass	Pass
Corrosion resistance—water	Water immersion (500 hrs/37±2°C); pass	Pass	Pass
Corrosion resistance—humidity	Humidity resistance IS 101; 500 hrs	Pass	Pass
Corrosion resistance—salt spray	Salt spray ASTM B 117; 1,200 hrs	Pass	Pass
Weatherability	Xenon (SAE J2527); 1,500 hrs with 85% gloss ret	<b>60%</b>	<b>90%</b>



Pigment bleed resistance after 1,500 hours of xenon weathering (Crockmeter)



Acrylic 1K red topcoat



TetraShield IC3000 1K red topcoat

## Appearance after xenon exposure



Acrylic 1K red topcoat



Tetrashield IC3000 1K red topcoat

With Eastman Tetrashield™ protective resin systems, you can formulate coatings that provide superior protection with a unique balance of durability and flexibility. Improve weatherability and enhance scratch resistance at a more affordable price.

By enabling lower-VOC formulations and creating opportunities for OEMs to reduce energy use in their process, Tetrashield systems also protect our environment.

Tetrashield IC3000 has been shown in laboratory tests to extend UV stability, improve mar and scratch resistance, and enable optimization of the coating process for both OEMs and formulators. This high performance polyester resin can be formulated into pigmented topcoats while allowing OEMs to reduce coatings layers.

There's more to preserve here than metal. Protect it with Tetrashield.

For more information, visit [Eastman.com/Tetrashield](https://www.eastman.com/Tetrashield).



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