

# Eastman chlorinated polyolefins for the coatings market

Waterborne adhesion promoters for untreated polypropylene or TPO plastics

## Features and benefits

- Promote adhesion to polypropylene and TPO plastics
- Useful for stir-in, one-step system, or primer formulas
- Useful for adhesives, inks, and coatings
- Available in aqueous dispersion form

**Table 1. Typical properties<sup>a</sup>—waterborne chlorinated polyolefins**

	CP 310W	CP 347W	CP 349W
Solids, wt%	30	25	26
Wt/vol			
g/L	1,012	1,020	1,025
lb/gal	8.4	8.5	8.6
pH @ 25°C	9.5	9.5	9–10
Brookfield viscosity, cP (mPa·s)	10	10	10
CPO solids, wt%	24	20	20
% Chlorination <sup>b</sup>	20.5	20.5	20.5
Water, wt%	69	74	69
Organic solvents, wt%	0	2 <sup>c</sup>	5 <sup>c</sup>
Amine	Ammonia	AMP	AMP

<sup>a</sup>Properties reported here are typical of average lots. Eastman makes no representation that the material in any particular shipment will conform exactly to the values given. <sup>b</sup>Applies to the base polymer solids, not the dispersion itself. <sup>c</sup>Contains ethylene glycol to aid in freeze-thaw stability and to lower surface tension

## CP 310W waterborne CPO adhesion promoter dispersion

CP 310W is an oil-in-water type emulsion containing an Eastman chlorinated polyolefin (CPO). CP 310W contains no organic solvents and less than 3% ammonia as the neutralizing amine. Its main use in coatings is as an adhesion promoter for polypropylene-based substrates.

CP 310W can be used as the main component of a water-reducible adhesion-promoting primer. It may be used as a stir-in additive in some water-reducible paint systems.

## Suggested applications

### Adhesion-promoting primer

CP 310W is most effective as a primer when reduced with water to about 8%–10% solids to apply a thin film (3–10 microns dry). Air-dry the primer at room temperature or force-dry 10 minutes at 74°C (165°F) before applying the topcoat.

Some applications may improve wetting of the substrate by the addition of flow aids or thickeners. *n*-Propyl alcohol (50% on solids) or DSX™-1514 polyurethane thickener (10% on solids) are examples. Foam may be reduced by adding isobutyl alcohol (10% on solids), methyl amyl alcohol (5% on solids), or BYK-022 or 023 (0.1% on solids).

### Example formulation

Ingredient	Wt%
CP 310W	29.1
DSX-1514	0.9
BYK-022	0.01
Water	69.99

### Stir-in additive

Generally, CP 310W is compatible with aqueous dispersion resins and is an effective adhesion-promoting additive in acrylic dispersions at about 10% CPO solids on resin solids.

## Performance data

### Primer

A sample of CP 310W was evaluated as a primer for a thermoplastic polyolefin (TPO) and for polypropylene (PP) homopolymer. Tables 2, 3, and 4 show the results.

**Table 2. Initial % adhesion<sup>a</sup>**

	Lacquer		2K urethane		Enamel		Polyester base/clear	
	PP	TPO	PP	TPO	PP	TPO	PP	TPO
CP 310W	20	95	10	80	95	100	100	100
Control <sup>b</sup>	90	100	10	100	95	100	100	100

<sup>a</sup>ASTM D 3359B. Percent adhesion of tested paint (lacquer, 2K urethane, refinish enamel, base/clear) over CPO primer left on substrate after applying and removing tape over scribed area. CP 310W reduced to 10% solids before application. <sup>b</sup>Solvent-based primer (5% Eastman CP 343-1 in toluene)

**Table 3. Water immersion,<sup>a</sup> hours before failure at 38°C (100°F)**

	Lacquer		2K urethane		Enamel		Polyester base/clear	
	PP	TPO	PP	TPO	PP	TPO	PP	TPO
CP 310W	—	24	—	48	>500	500	>500	>500
Control <sup>b</sup>	24	48	—	312	>500	500	500	>500

<sup>a</sup>ASTM D870. Hours sample survives immersion before failing tape adhesion test (ASTM D3359B) with <50% adhesion. <sup>b</sup>Solvent-based primer (5% Eastman CP 343-1 in toluene)

**Table 4. Humidity resistance,<sup>a</sup> hours before failure at 38°C (100°F)**

	Lacquer	2K urethane	Enamel	Polyester base/clear
	TPO	TPO	TPO	TPO
CP 310W	24	48	500	>500
Control <sup>b</sup>	100	>500	500	>500

<sup>a</sup>ASTM D4585. Hours sample survives Cleveland humidity test before failing tape adhesion test (ASTM D3359B) with <50% adhesion. <sup>b</sup>Solvent-based primer (5% Eastman CP 343-1 in toluene)

### Stir-in additive

CP 310W was tested as a stir-in additive in three developmental waterborne enamels obtained from coatings manufacturers at 10 wt% based on total coating weight. Table 5 shows the results.

**Table 5. Initial % adhesion<sup>a</sup>**

	Paint A		Paint B		Paint C	
	PP	TPO	PP	TPO	PP	TPO
With CP 310W	0	100	40	98	0	100
Without CP 310W	0	0	0	0	0	10

<sup>a</sup>ASTM D3359B. Percent adhesion of tested waterborne enamel left on substrate after applying and removing tape over scribed area.

## CP 347W water-reducible CPO adhesion promoter dispersion

CP 347W is an oil-in-water type emulsion based on an Eastman CPO and 2-amino-2-methyl-1-propanol with 2 wt% ethylene glycol. Its chief use in coatings is as an adhesion promoter for polypropylene-based substrates.

CP 347W dispersion can be used as the main component of a water-reducible adhesion-promoting primer. It may be used as a stir-in additive in some water-reducible paint systems.

### Suggested applications

#### Primer

Reduce with water to the desired application solids (5%–10%) and spray apply as is or with flow and wetting additives, e.g., *n*-propyl alcohol (50% on solids) or DSX™-1514 polyurethane thickener (10% on solids).

A thin film (5–10 microns) is suggested. Air-dry the primer at room temperature or force-dry 10 minutes at 74°C (165°F) before applying the topcoat.

#### Stir-In additive

Add 10%–20% CP 347W solids based on resin solids to water-reducible paint or ink prior to application. Adjust CP 347W level for optimum performance.

**Table 6. Initial % adhesion<sup>a</sup>**

	2K polyester polyurethane		Waterborne base/acrylic clear		Polyester base/clear	
	PP	TPO	PP	TPO	PP	TPO
	CP 347W	0	20	100	100	100
Control <sup>b</sup>	0	98	100	100	100	100

<sup>a</sup>ASTM D 3359B. Percent adhesion of tested paint over adhesion-promoter primer left on substrate after applying and removing tape over scribed area. Substrates are polypropylene homopolymer and thermoplastic olefin. <sup>b</sup>Solvent-based primer (5% Eastman CP 343-1 in toluene)

**Table 7. Water immersion,<sup>a</sup> hours before failure at 38°C (100°F) on PP**

	Waterborne base/acrylic/clear	Polyester base/clear
CP 347W	>500	>500
Control <sup>b</sup>	>500	>500

<sup>a</sup>ASTM D 870. Hours sample survives immersion before failing tape adhesion test (ASTM D3359B) with <70% adhesion. <sup>b</sup>Solvent-based primer (5% Eastman CP 343-1 in toluene)

**Table 8. Humidity resistance,<sup>a</sup> hours before failure at 49°C (120°F) on TPO**

	2K polyester polyurethane	Waterborne base/acrylic/clear	Polyester base/clear
CP 347W	—	>500	>500
Control <sup>b</sup>	72	>500	>500

<sup>a</sup>ASTM D4585. Hours sample survives Cleveland humidity test before failing tape adhesion test (ASTM D3359B) with <70% adhesion. <sup>b</sup>Solvent-based primer (5% Eastman CP 343-1 in toluene)

## CP 349W water-reducible CPO adhesion promoter

CP 349W is an oil-in-water type emulsion based on an Eastman CPO and 2-amino-2-methyl-1-propanol with 5 wt% ethylene glycol. Its main use in coatings is as an adhesion promoter for coatings for polypropylene-based substrates.

CP 349W dispersion can be used as the main component of a water-reducible adhesion-promoting primer. It may be used as a stir-in additive in some water-reducible paint systems.

### Suggested applications

#### Primer

Reduce with water to the desired application solids (5%–10%) and spray apply as is or with flow and wetting additives, e.g., *n*-propyl alcohol (50% on solids) or DSX™-1514 polyurethane thickener (10% on solids). A thin film (5–10 microns) is suggested. Air-dry the primer at room temperature or force-dry 10 minutes at 74°C (165°F) before applying the topcoat.

#### Stir-in additive

Add 10%–20% CP 349W solids based on resin solids to water-reducible paint or ink prior to application. Adjust CP 349W level for optimum performance.

**Table 9. Initial % adhesion<sup>a</sup>**

	2K polyester polyurethane		Waterborne base/acrylic clear		Polyester base/clear	
	PP	TPO	PP	TPO	PP	TPO
CP 349W	0	98	100	100	100	100
Control <sup>b</sup>	0	98	100	100	100	100

<sup>a</sup>ASTM D3359B. Percent adhesion of tested paint over adhesion promoter primer left on substrate after applying and removing tape over scribed area. Substrates are polypropylene homopolymer and thermoplastic olefin. <sup>b</sup>Solvent-based primer (5% Eastman CP 343-1 in toluene)

**Table 10. Water immersion, <sup>a</sup> hours before failure at 39°C (100°F) on PP**

	Waterborne base/acrylic clear	Polyester base/clear
CP 349W	>500	>500
Control <sup>b</sup>	>500	>500

<sup>a</sup>ASTM D870. Hours sample survives immersion before failing tape adhesion test (ASTM D3359B) with <70% adhesion. <sup>b</sup>Solvent-based primer (5% Eastman CP 343-1 in toluene)

**Table 11. Humidity resistance, <sup>a</sup> hours before failure at 49°C (120°F) on TPO**

	2K polyester polyurethane	Waterborne base/acrylic clear	Polyester base/clear
CP 349W	72	>500	>500
Control <sup>b</sup>	72	>500	>500

<sup>a</sup>ASTM D4585. Hours sample survives Cleveland humidity test before failing tape adhesion test (ASTM D3359B) with <70% adhesion. <sup>b</sup>Solvent-based primer (5% Eastman CP 343-1 in toluene)

## Waterborne CPOs—storage and handling

Water-reducible adhesion promoter dispersions generally exhibit good stability properties. In studies, samples of each dispersion showed no performance change after five freeze-thaw cycles. **If freezing occurs, thaw and mix before using.**

For more information on Eastman chlorinated polyolefins for use in the coatings market, go to [eastman.com](http://eastman.com) or contact your Eastman representative.



**Eastman Corporate Headquarters**  
P.O. Box 431  
Kingsport, TN 37662-5280 U.S.A.

U.S.A. and Canada, 800-EASTMAN (800-327-8626)  
Other Locations, +(1) 423-229-2000

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

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