

# Information Sheet

Cardura™ E10P Glycidyl Ester

## Low VOC Waterborne Dispersions

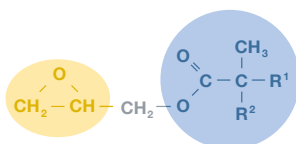


### The Need for Low VOC Coatings

### The trend towards waterborne dispersions

Increasingly stringent environmental legislations continue to drive the need for lower VOC coatings. This is also true for industrial coatings. The demand for waterborne coatings is rapidly increasing, especially in areas where regulations enforce this such as in China. Low or zero-solvent waterborne dispersions are the best way to achieve lowest possible VOC levels but these are not easy to produce. With Cardura E10P glycidyl ester, it is easier to produce low viscosity acrylic polyols (APO) that can be used to make low or zero-solvent secondary dispersions, for 1K and 2K waterborne coating applications.

### Cardura Glycidyl Ester



### Cardura glycidyl ester quick facts

Cardura E10P glycidyl ester is a versatile building block, with a unique hydrophobic bulky structure and is used in the production of a broad range of high-quality polymers such as acrylic and polyester polyols. The key characteristics of Cardura E10P glycidyl ester are:

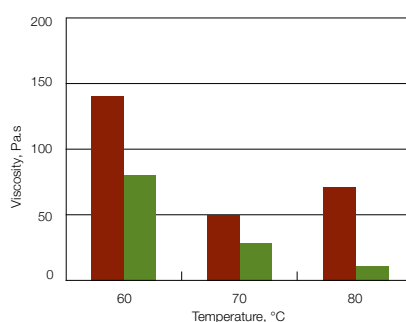
- Easily reacted with acids for incorporation in acrylic and polyester polyols
- High boiling point (>250 °C)
- Hydrophobic
- Low surface tension
- Superior outdoor durability
- Makes the coatings resistant to acidic conditions

### Easy Process

### Efficient molecular weight and viscosity reduction

Conventional acrylic polyols for waterborne polyurethane topcoats are usually prepared via a solution polymerization process followed by solvent removal. After this step, the resins are dispersed in water. To produce low or zero-solvent waterborne dispersions, the APO resin should contain low or no solvents. It is not easy to make such APOs because at lower solvent contents, the resin viscosity makes it practically impossible to handle the resin. However, Cardura E10P glycidyl ester acts as a reactive diluent and can replace solvents during the polymerization. Because of its very high boiling point, when Cardura E10P is used to replace solvents in the initial reactor charge (IRC), it allows for higher polymerization temperatures under normal atmospheric pressure. This results in lower molecular weight (Mw) and viscosity of the resin (see Fig 1). The bulky ester group in Cardura E10P glycidyl ester reduces hydrogen bonding in the polymer chains which further reduces the viscosity of APO resins.

**Fig 1: Effect of Cardura E10P glycidyl ester on viscosity**  
 Viscosity of the APO resin at 80% Solids Content

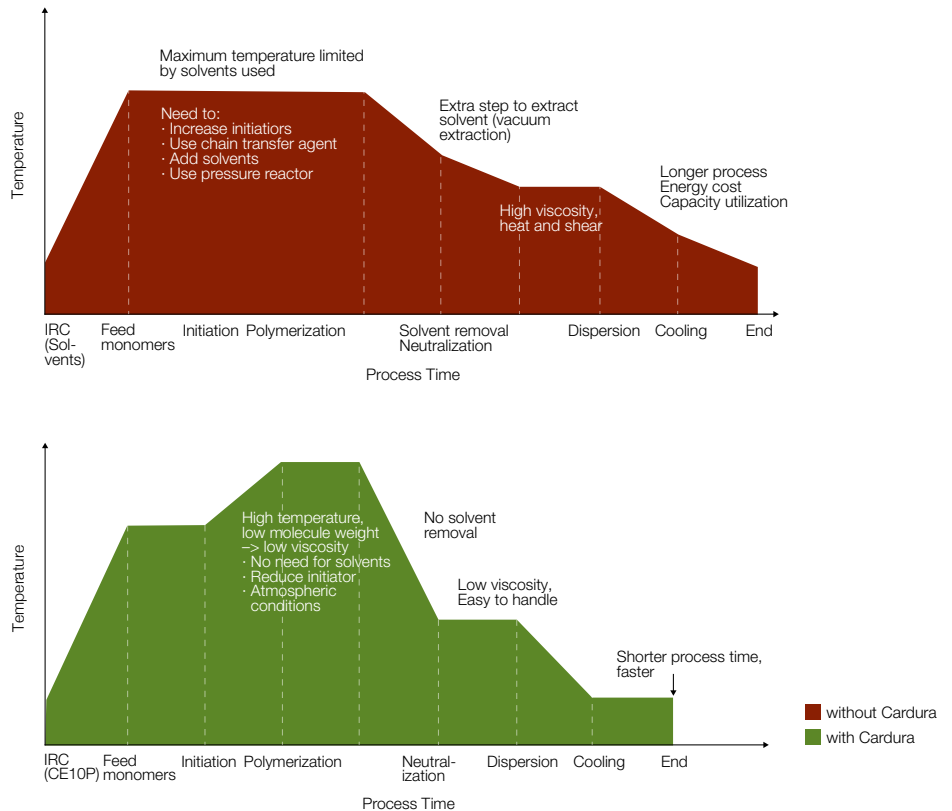


### Basic parameters of APO resin

OH theoretical, %	3.5
Solids content, %	80
Acid Value, mg KOH/g	30
Fox Tg, °C	55
Mw, kg/mol	8.2

Below is shown how Cardura E10P glycidyl ester (CE10P) enables the production of low-viscosity APO resins.

**Fig 2: Efficient and faster process with CE10P versus conventional method without**



Cardura E10P glycidyl ester provides an opportunity to

- Save time – avoid vacuum distillation
- Reduce cost – no solvent, less initiator, easy to handle
- Free-up capacity – e.g. avoid vacuum distillation

## Summary

### Low- or zero-solvent waterborne dispersions are easily produced with Cardura E10P glycidyl ester

- Applicable to 1K and 2K coatings
- Partial or total replacement of solvents in the APO resin intermediate, thus no solvent removal required
- Efficient viscosity reducing power, especially at higher solids
- No need for pressure reactors

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