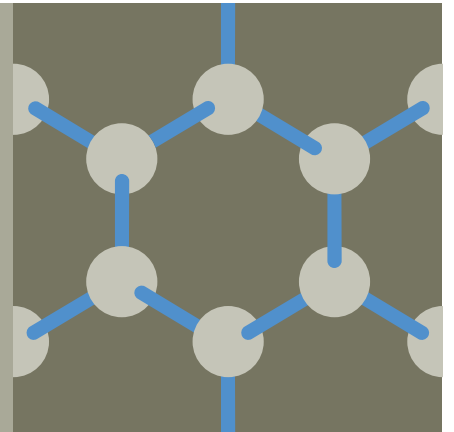




Cardura E10P
**A Building Block
and Acid Scavenger
for Polyesters**



Cardura™ Glycidyl Ester E10P

Cardura E10P monomer is the glycidyl ester of Versatic™ acid 10. Versatic™ acid 10 is a highly branched saturated carboxylic acid containing 10 carbon atoms.

Cardura is a bulky and hydrophobic intermediate which is easily incorporated into resins via its reactive epoxy group.

Cardura E10P is used in a wide range of applications such as automotive coatings (refinish and OEM topcoats), general metal coatings, coil coatings, and pigment pastes.

Characteristics:

Carbon Durable Glycidyl Ester with 10 carbon atoms backbone:

- Epoxy equivalent weight approximately: 240 g/mol
- Epoxy group content approximately: 4170 mmol/kg
- Boiling range: 251 – 278 °C (5 – 95 %)
- Low viscosity (23 °C): 7 mPa·s
- High flame / flash point
- Low colour
- Low vapour pressure
- EINECS and TSCA listed

Viscosity / co-solvent content:

The epoxy / acid reaction proceeds without liberation of water at a lower temperature than that of conventional esterification reactions. It is therefore more selective. Polyester resins with a narrower molecular weight distribution, and a lower viscosity can be produced. The solvent content of solvent-borne paints or the co-solvent content of water-based paints can therefore be reduced.

Polymer design:

Cardura E10P can be introduced into the polyester resin at different stages of the production, thereby influencing considerably the resulting resin and coating properties.

Structural Features:

- Epoxy group

Performance Characteristics:

- Highly reactive towards amines, acids, alcohols
- Enhanced metal adhesion

Structural Features:

- Sterically protected ester group
- Bulky structure

Performance Characteristics:

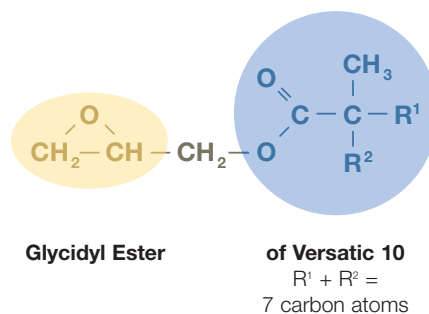
- Excellent compatibility with polar solvents
- Excellent acid and alkali resistance
- Superior outdoor durability
- Improved gloss
- Improved pigment utilization
- Low solution viscosity
- High solid resins
- Improved polar solvent resistance
- Excellent solubility in aliphatic solvents

Introduction of hydroxyl groups:

Cardura E10P introduces hydroxyl groups into the resin via reaction with carboxylic acid groups. This can be used either for further advancing the resin or as a functional group for the cross-linking reaction with melamine formaldehyde or polyisocyanate resins.

Chemical Resistance:

Cardura E10P improves the chemical resistance of coatings by reducing the permeability to polar and aggressive chemicals and by the steric protection of the own and adjacent ester bonds.

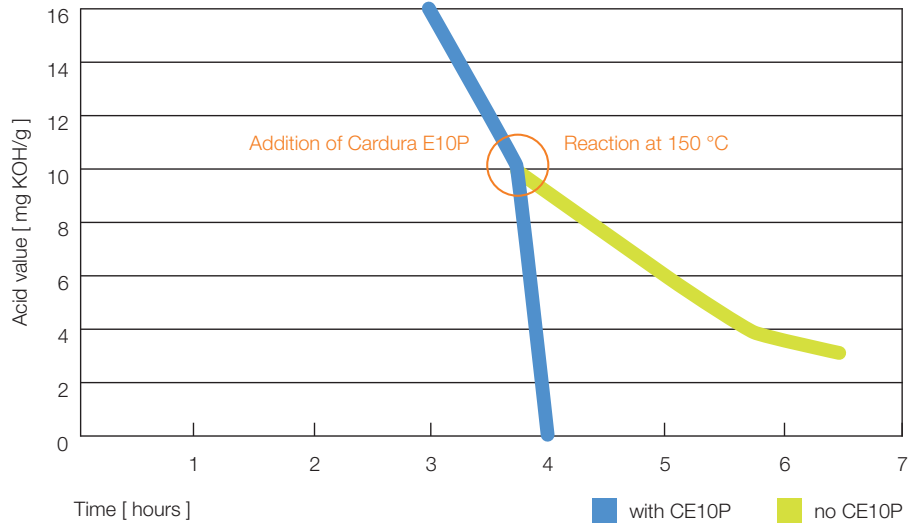


Cardura E10P as acid scavenger in Polyesters

The epoxy group of *Cardura E10P* readily reacts with carboxylic acids under mild conditions (150 °C – 180 °C). The addition of *Cardura E10P* at the end of the cooking process of polyester / alkyds enables significant reduction of the process time required to achieve a very low acid content.

Acid Scavenging – *Cardura E10P* can be used in the polyester manufacture to obtain lower acid value in shorter time.

4.3 kg of *Cardura E10P* is required to decrease the acid number by 1 unit per metric ton of resin.



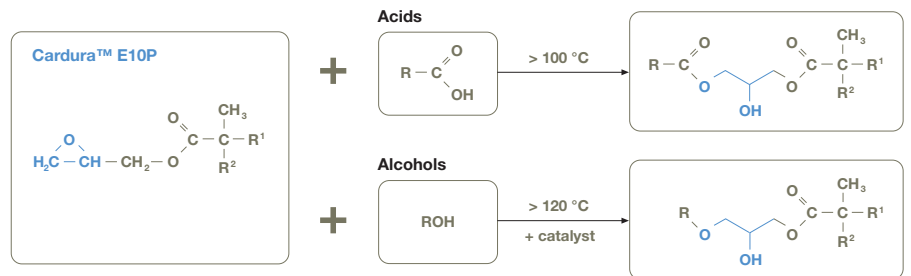
Cardura E10P as building block in Polyesters

The epoxy group of the *Cardura E10P* readily reacts with a carboxylic acid group at low temperature without liberating water. The opening of the epoxy group generates a hydroxyl group which can further react.

Cardura E10P can be seen as an “instant diol” with unique reactivity and structure.

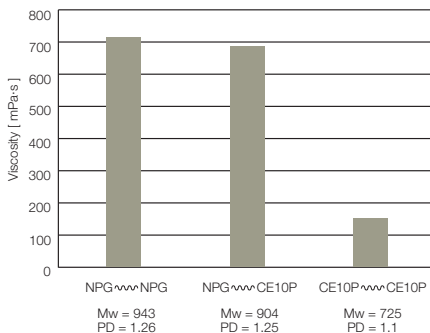
Reaction between acid / alcohol and epoxy leads to an OH group:

- further advancing in the resin production
- can be further utilized for cross linking purposes



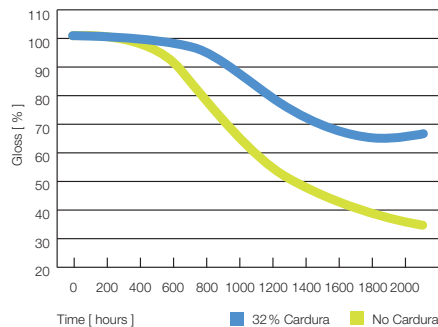
The incorporation of *Cardura E10P* in polyesters for general industry, coil coating and pigment paste reduces resin viscosity and improves the flow and pigment wetting. It provides superior chemical and weathering resistance of the derived coatings.

Reduction of resin viscosity



Cardura E10P reduces polyester resin viscosity. Higher reactivity and selectivity of the epoxy / acid reaction provide a resin with narrower Mw distribution and thus a lower resin viscosity. Lower VOC at similar Mw can be achieved.

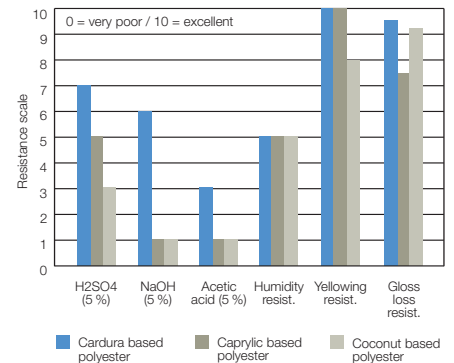
Superior ODD resistance



Cardura E10P improves outdoor durability:

- Protection of hydrolysable ester bonds by the bulky group
- Lower reaction temperature prevents formation of UV sensitive ether groups

Improvement of chemical resistance



Cardura E10P based polyesters have better chemical resistance than the benchmarks tested due to the protection of hydrolysable bonds by the bulky group.

The Global Leader in Thermoset Resins

As the world's largest producer of thermoset resins and the leader in adhesive and structural resins and coatings, Hexion Specialty Chemicals meets customers' specific application needs with a total solutions approach of products and services.

Hexion offers the broadest range of thermoset resin technologies and unmatched technical support – and provides them around the globe.

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