

resoltech 1400 **ECO**

Hardener 1407 **ECO** – Accelerator AC140
Hot curing epoxy system



- 28% biobased on the resin part*
- Pultrusion, filament winding, pressure moulding
- Excellent wetting properties on all reinforcements
- Adjustable pot life with accelerator content
- High mechanical and chemical resistance
- T_g up to 140°C after post-curing

*ratio of the number of biobased carbon atoms / the number of total carbon atoms

INTRODUCTION

RESOLTECH 1400 ECO / 1407 ECO / AC140 is a biobased epoxy-anhydride system with accelerator formulated for hot curing process as **pultrusion, filament winding or pressure moulding**.

The system is easy to process and has a **lower viscosity and reactivity** that RESOLTECH 1400.

It has **good fibre impregnation** properties and exhibits excellent **mechanical**, dynamic and thermal properties. It has an excellent **chemical** resistance especially to acids at temperatures up to 80 °C.

The reactivity of the system is adjustable by variation of the accelerator content. The reactivity is extremely long at ambient temperature (several days) and very short at high temperature with 2 part by weight of accelerator (6min at 120°C). A post-curing allows to obtain full thermomechanical properties.

The 1407 ECO hardener is dosed at 90 parts for 100 parts of resin 1400 ECO by weight. The accelerator is dosed between 0.5 and 2 parts for 100 parts of resin 1400 ECO by weight according to desired reactivity. Reaction speed and exothermie increase with the accelerator content.

Post-curing will influence the coloring of the hardened product, from 130°C the resin will tend towards brown but the properties will not be affected.

With 28% of biobased carbon atoms in the resin part, the use of 1400 ECO will reduce the carbon footprint of composites structures making no concessions on thermo-mechanical performances.

MIXING RATIO

The mixing ratio must be accurately followed. It is not possible to change the ratio, it would result in lower mechanical properties.
The mixture should be thoroughly stirred to ensure full homogeneity.

Systems	1400 ECO	1407 ECO	AC140
Mixing ratio by weight	100	90	0.5-2
Mixing ratio by volume	100	86	0.6-2.4

APPLICATION

- It is recommended to use products at a **temperature close to 30-40°C** in order to facilitate the mixing and the reinforcements impregnation.
- Lower temperatures will increase the viscosity of the mixture and the gel time, but the resin will not crystallize at low temperatures.
- On the contrary, a higher temperature will reduce the viscosity of the mixture as well as the pot life.
- Hardener **1407 ECO** and accelerator **AC140** can be premixed, thus allowing the use of two component mixing/metering equipment. The mix of hardener and accelerator has a shelf life of several days. The gelation temperature should not be higher than absolutely necessary. A high gelation temperature induces high shrinkage and generates internal stresses.

BIOBASED CARBON CONTENT

References or mix	1400 ECO	1400 ECO / 1407 ECO / AC140
Biobased carbon mass content*	28%	15%

*ratio of the number of biobased carbon atoms / the number of total carbon atoms

PHYSICAL CHARACTERISTICS

1 Visual aspect

1400 ECO :

Slight yellow transparent liquid

1407 ECO :

Slight yellow transparent liquid

AC140 :

Clear liquid

Mix :

Slight yellow transparent liquid

2 Density

References	1400 ECO	1407 ECO	AC140
Density at 23°C	1.16	1.20	1.04

ISO 1675, ± 0.05 tolerance

3 Viscosity

References	1400 ECO	1407 ECO	AC140
Viscosity at 23°C (mPa.s)	13000	75	2
Mix viscosity at 23°C (mPa.s)	690		
Mix viscosity at 40°C (mPa.s)	250		
Mix viscosity at 60°C (mPa.s)	<75		

ISO 12058.2, ± 15% tolerance

Systems	1400 ECO / 1407 ECO / AC140		
Mixing ratio by weight	100/90/0.5	100/90/1	100/90/2
Viscosity evolution at 25°C			
1500 mPa.s	11h	4h	1h45min
3000mPa.s	35h	17h	6h30min
Viscosity evolution at 40°C			
1500 mPa.s	20h	7h30min	3h30min
3000mPa.s	24h	9h30min	4h30min
Viscosity evolution at 80°C			
1500 mPa.s	1h40min	55min	33min
3000mPa.s	1h50min	63min	36min

Hoeppler, ISO 9371B, ± 10% tolerance

REACTIVITIES

Systems	1400 ECO / 1407 ECO / AC140		
Part by weight	100/90/0.5	100/90/1	100/90/2
Pot life on 100g at 23°C	170h	100h	50h
Pot life on 100g at 40°C	6h	4h30min	-

± 10% tolerance

Systems	1400 ECO / 1407 ECO / AC140		
Mixing ratio by weight	100/90/0.5	100/90/1	100/90/2
Gel time on film at 80°C	4h	2h30min	1h10min
Gel time on film at 100°C	1h10min	40min	20min
Gel time on film at 120°C	23min	11min	6min
Gel time on film at 140°C	8min	4min	2min

± 10% tolerance

The values shown are for small amounts of pure resin/hardener mix. In composite structures the gel time can differ significantly from the given values depending on the fibre content and the laminate thickness.

RETICULATION & POST-CURING

In order to obtain the maximum thermo-mechanical properties, it is necessary to respect the recommended curing cycle. The table below shows the glass transition temperatures (DSC) according to different curing cycles.

System	1400 ECO / 1407 ECO / AC140
Mixing ratio by weight	100/90/0.5-2
4h at 80°C + 4h at 120°C	125 - 128
4h at 80°C + 8h at 120°C	125 - 128
4h at 80°C + 4h at 140°C	130 - 135
4h at 80°C + 8h at 140°C	135 - 145
4h at 80°C + 4h at 160°C	140 - 145

T_g measured on Kinetech®

Post-curing cycles previously presented were chosen in order to reach the maximum potential of each systems. Depending on parts size, oven performance and hardener used, shorter post-curing cycles could lead to fully cured parts.

Please contact our laboratory service for any help on post-curing cycles.

MECHANICAL PROPERTIES

System		1400 ECO / 1407 ECO / AC140
4h at 80°C + 8h at 140°C	TRACTION	
	Modulus	3.20 GPa
	Maximum strength	88 MPa
	Elongation at max strength	4.9%
	Strength at break	85 MPa
	Elongation at break	6%
	FLEXION	
	Maximum strength	130 MPa
	Deflection at maximum load	10 - 18 mm
FLEXION		
After 10days in water at 23°C		
Maximum strength	115 MPa	
Deflection at maximum load	8 - 18 mm	

Traction properties on pure resin according to ISO 527, ± 10% tolerance
Flexion properties on pure resin according to ISO 178, ± 10% tolerance

WATER ABSORPTION

System		1400 ECO / 1407 ECO / AC140
1 days at 23°C		0.10 - 0.15 %
10 days at 23°C		0.30 - 0.40 %

ISO 62

PACKAGING

Kits 1400 ECO / 1407 ECO :

- Plastic jerrycan kit of 1kg + 0.9kg
- Plastic jerrycan kit of 5kg + 4.5kg
- Plastic drum kit of 25kg + 22.5kg
- Metal drum kit of 225kg + 202.5kg
- IBC kit of 1T + 900kg

AC140 is available in : 0.02kg, 0.2kg, 0.5kg, 25kg.

TRANSPORT & STORAGE

Keep containers sealed and away from heat and cold preferably between 10°C and 30°C in a well ventilated area. Our products are guaranteed in their original packaging (check expiry date on the label).

HEALTH & SAFETY

Skin contact must be avoided by wearing protective nitrile gloves & overalls or other protective clothing.

Eye protection should be worn to avoid risk of resin, hardener, solvent or dust entering the eyes. If this occurs flush the eye with water for 15 minutes, holding the eyelid open, and seek medical attention.

Ensure adequate ventilation in work areas. Respiratory protection should be worn with ABEKP coded filters.

Resoltech issues full Material Safety Data Sheet for all hazardous products. Please ensure that you have the correct MSDS to hand for the materials you are using before commencing work.

! The data provided in this document is the result of tests and is believed to be accurate. We do not accept any responsibility over the mishandling of these products and our liability is limited strictly to the value of the products we manufacture and supply.



249, Avenue Gaston Imbert
13790 ROUSSET
FRANCE

Tel. : +33 (0)4 42 95 01 95
Fax : +33 (0)4 42 95 01 98
export@resoltech.com