

resoltech 1050 **ECO**

Hardeners 1053S to 1059S

Biobased Structural Laminating Epoxy System



- **34% biobased on resin part***
- **Adjustable pot life from 13mn to 13h13mn**
- **Room temperature cure & mould release**
- **Excellent wetting properties on all reinforcements**
- **For small to XXL size parts productions**

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

INTRODUCTION

The **1050 ECO** epoxy laminating system is formulated to manufacture high performance lightweight structures with glass, carbon, aramid, basalt and natural reinforcements with or without post-curing.

This latest generation system, **without CMR substances (including salicylic acid)** according to GHS criteria is optimized with a low exotherm, low viscosity and excellent air release properties. This epoxy system is also suitable for the manufacture of small to very large structures and composite parts by **wet lay-up, infusion, injection moulding or filament winding** while guaranteeing low toxicity working conditions to the users.

All hardeners mix with a 100/35 ratio and can be pre-blended together to precisely adjust the desired pot life.

The 1050 ECO resin is **available in a thixotropic version 1050T ECO** for wet lay-up application in vertical or overhanging surfaces prone to resin dripping.

It is possible to **release the parts from the mould without post-curing**. To speed up demoulding a 40°C cure is possible and optimum thermo-mechanical properties of the laminate will be obtained after a 60°C post-curing cycle.

With 34% of biobased carbon atoms in the resin part, the use of 1050 ECO will reduce the carbon footprint of composites structures making no concessions on thermo-mechanical performances.

Laminates produced with the 1050 ECO system will offer very good mechanical properties combined with **excellent fatigue resistance thanks to its exceptional wetting properties**, improving the composite interlaminar properties even on aramid reinforcements. Its elongation at break in flexion up to 5% makes the 1050 ECO system as a prime choice epoxy system for large structural laminates submitted to dynamic working efforts.

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 | 1050 ECO 1053S | 1050 ECO 1054S | 1050 ECO 1055S | 1050 ECO 1056S | 1050 ECO 1058S | 1050 ECO 1059S |
|------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Mixing ratio by weight | 100 / 35 | | | | | |
| Mixing ratio by volume | 100 / 43 | 100 / 42 | 100/42 | 100/41 | 100/42 | 100/40 |

APPLICATION

- The 1050 system can be applied by brush, roller, infused or injected. In case of laminating over a cured surface without peel ply, it is required to deglaze, clean and degrease the support prior to laminating.
- It is recommended to use products at a **temperature close to 18-25°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.

BIOBASED CARBON CONTENT

| References or mix | 1050 ECO | 1050 ECO 1053S | 1050 ECO 1054S | 1050 ECO 1055S | 1050 ECO 1056S | 1050 ECO 1058S | 1050 ECO 1059S |
|--------------------------------------|----------|----------------|----------------|----------------|----------------|----------------|----------------|
| Biobased carbon mass content* | 34% | 26% | 26% | 26% | 25% | 25% | 26% |

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

PHYSICAL CHARACTERISTICS

1 Visual aspect

1050 ECO :

Opalescent neutral liquid

1053S to 1059S :

Transparent to yellow liquid

Mix :

Neutral to transparent yellow liquid

2 Density

| References | 1050 ECO | 1053S | 1054S | 1055S | 1056S | 1058S | 1059S |
|----------------------------|----------|-------|-------|-------|-------|-------|-------|
| Density at 23°C | 1.16 | 0.94 | 0.96 | 0.96 | 0.97 | 0.97 | 1.02 |
| Mix density at 23°C | - | 1.09 | 1.10 | 1.10 | 1.10 | 1.10 | 1.12 |

ISO 1675, ± 0.05 tolerance

3 Viscosity

| References | 1050 ECO | 1053S | 1054S | 1055S | 1056S | 1058S | 1059S |
|--------------------------------------|----------|-------|-------|-------|-------|-------|-------|
| Viscosity at 23°C (mPa.s) | 1300 | 14 | 20 | 24 | 47 | 117 | 216 |
| Mix viscosity at 23°C (mPa.s) | - | 239 | 259 | 270 | 365 | 494 | 537 |

ISO 12058.2, ± 15% tolerance

REACTIVITIES

| Systems | 1050 ECO 1053S | 1050 ECO 1054S | 1050 ECO 1055S | 1050 ECO 1056S | 1050 ECO 1058S | 1050 ECO 1059S |
|---|----------------|----------------|----------------|----------------|----------------|----------------|
| Gel time on 70mL at 23°C* (4cm high) | 13h13min | 3h09min | 2h26min | 51min | 25min | 13min |
| Time at exothermic peak on 70mL at 23°C | 8h15min | 3h23min | 2h39min | 54min | 28min | 13min |
| Temperature at exothermic peak on 70mL at 23°C | 30.3 °C | 90.0 °C | 98.5 °C | 200.9 °C | 229.1 °C | 251.7 °C |
| Gel time on 1mm film at 23°C** | 13h | 9h20min | 8h42min | 5h | 2h40min | 1h58min |

* Gel time measurements realized with Rheotech*

** Gel time on film measurement realized on rheometer

Indication on the choice of hardener according to ambient temperature conditions :

- For the whole year, the use of 1056S hardener is recommended ;
- For winter conditions, the use of 1058S is recommended ;
- For summer conditions, the use of 1055S hardener is recommended.

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.

| Systems | | 1050 ECO 1053S | 1050 ECO 1054S | 1050 ECO 1055S | 1050 ECO 1056S | 1050 ECO 1058S | 1050 ECO 1059S |
|--------------------|---------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 14 days at 23°C | T _g | 50 °C | 51 °C | 50 °C | 50 °C | 55 °C | 50 °C |
| | Shore D Hardness | 85 | 88 | 88 | 88 | 88 | 88 |
| 16h at 60°C | T _g | 67 °C | 73 °C | 71 °C | 75 °C | 86 °C | 71 °C |
| | Shore D Hardness | 86 | 88 | 88 | 88 | 89 | 88 |
| T _g max | | 70 °C | 77 °C | 75 °C | 83 °C | 94 °C | 74 °C |

T_g measured by DSC, 10°C/min, inflexion point
Shore D hardness measured at 23°C according to ISO 868

Post-curing cycles previously presented were chosen in order to reach the maximum potential of each systems. Depending on part 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

| Systèmes | | 1050 ECO 1053S | 1050 ECO 1054S | 1050 ECO 1055S | 1050 ECO 1056S | 1050 ECO 1058S | 1050 ECO 1059S |
|--------------------|----------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| 14 days at 23°C | FLEXION Modulus | 2.97 GPa | 3.27 GPa | 3.19 GPa | 3.11 GPa | 3.30 GPa | 3.20 GPa |
| | Maximum strength | 85.7 MPa | 91.0 MPa | 93.9 MPa | 93.9 MPa | 80.5 MPa | 105.9 MPa |
| | Elongation at max strength | 4.2 % | 3.4 % | 3.9 % | 4.5 % | 2.9 % | 4.6 % |
| | Elongation at break | >15 % | 3.6 % | 4.0 % | 5.0 % | 2.9 % | 11.7 % |
| 16h at 60°C | FLEXION Modulus | 2.85 GPa | 3.10 GPa | 3.04 GPa | 3.10 GPa | 3.19 GPa | 3.14 GPa |
| | Maximum strength | 96.2 MPa | 111.1 MPa | 107.3 MPa | 121 MPa | 128.2 MPa | 114.5 MPa |
| | Elongation at max strength | 5.3 % | 5.6 % | 5.5 % | 6.0 % | 5.9 % | 5.8 % |
| | Elongation at break | 13.4 % | 8.5 % | 9.6 % | 10.5 % | 6.7 % | 6.5 % |

Flexion properties on pure resin according to ISO 178

PACKAGING

- Pastic jerrycan kit of 1kg + 0.35kg
- Pastic jerrycan kit of 5kg + 1.75kg
- Pastic jerrycan kit of 28kg + 9.8kg
- Drum kit of 200kg + 3 x 23,33kg
- IBC kit of 1t + 2 drums of 175kg

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.



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