



About biobased resins

www.resoltech.com

Who are we?

Formulator & manufacturer
of **epoxy resin**

- Over 30 years of experience
- **250** available systems
- Distribution in **50** countries
- Production capacity:
1000 T/year



Biobased systems



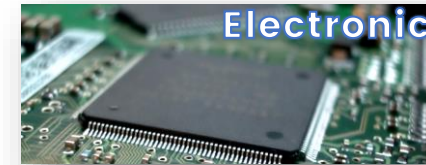
Customer focused



Low toxicity



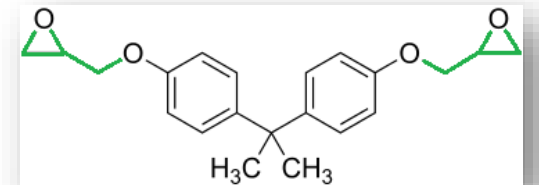
Integrated R&D
Technical support



What means Biobased Epoxy resins?

% of bio content definition:

- The Bio% corresponds to the number of carbon atoms that come from a renewable source vs. total number of carbon atoms in the system (resin + hardener).
- The other part of carbon atoms come from fossil source.
- Measuring is done with carbon 14 dating method:
 - Recent carbon atoms (few years) = plant origin.
 - Old carbon atoms (millions of years) = Petroleum origin



Biobased DGEBA
(Diglycidyl ether of bisphenol A)

What is the origin of the Biobased content?



Oily plants :
sunflowers,
colza, cashew,
nuts....



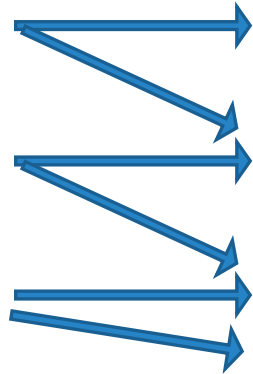
Wood (pine trees)



Glycerol

Fatty acid

Cardanol



- Epoxy resins
- Reactive diluents
- Hardeners
- Diluents
- Powders
- Fibers
- Other raw materials

Formulation

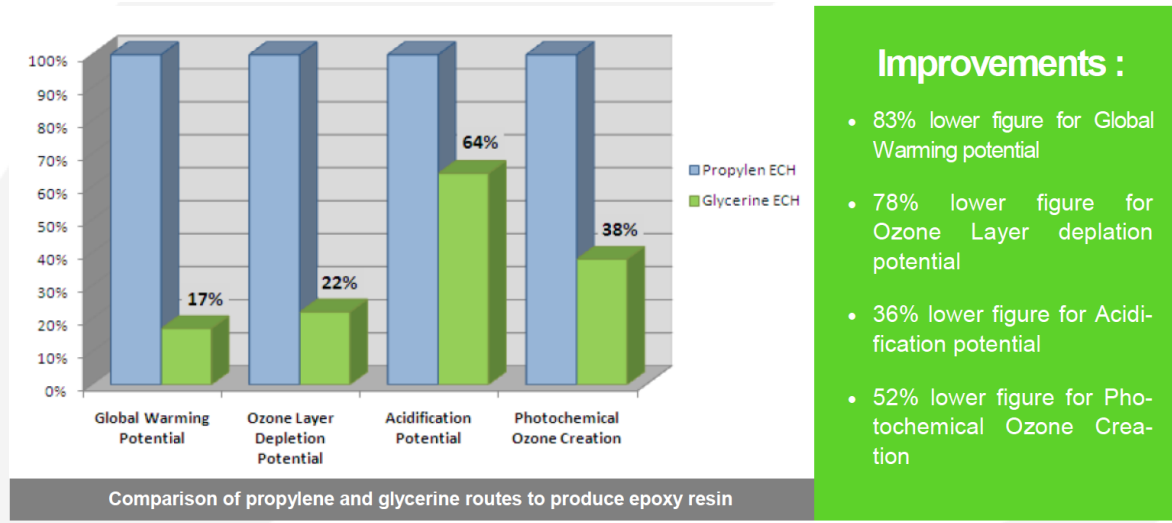


Ready to
use system



Ecological benefits?

Raw material synthesis: exemple of glycerine route to manufacture DGEBA resin



Improved carbon footprint

Finished goods:

- Epoxy resins are infusible = no way to revert the curing
- Cycling into other materials is studied but :
 - Cycling process is not clean
 - Some key properties are missing

Using plants to recycle CO₂



resoltech
ADVANCED TECHNOLOGY RESINS

What does it change for users?

Two cases :

- Simple replacement of molecules with their biobased versions :
 - Exactly the **same properties**
 - Usually low to moderate biocontent (5 to 25%)
- Totally **new formulation** using all raw materials available :
 - Possibility to create custom made formulas that fully meet customer's SPECS
 - Potential **higher biocontent** (up to 50% on the mix)

Biobased does not mean lower properties!

Biobased range

INFUSION

Resin	Hardener	Biocontent % ¹	Gel time ²	Viscosity at 23°C	T _g ³	Flexion modulus ³	Max strength ³	Elongation ⁴
1020 ECO	1023S	35 %	11h30	205 mPa.s	55 °C	2.50 GPa	83.6 MPa	10.7 %
-	1024S	-	3h23	263 mPa.s	64 °C	2.70 GPa	93.9 MPa	11.9 %
1050 ECO	1053S	34 %	13h13	239 mPa.s	67 °C	2.85 GPa	96.2 MPa	13.4 %
-	1054S	-	3h09	259 mPa.s	73 °C	3.10 GPa	111.1 MPa	8.5 %
1800 ECO	1804 ECO	43 %	4h53	258 mPa.s	95 °C	3.01 GPa	90.0 MPa	4.3 %
-	1805 ECO	-	4h11	290 mPa.s	102 °C	3.10 GPa	93.0 MPa	3.5 %
-	1807 ECO	-	42min	348 mPa.s	82 °C	2.89 GPa	82.0 MPa	3.5 %



Bio-composite bridge
70m long
Biobased 1800 ECO & flax
Netherland

LAMINATION

Resin	Hardener	Biocontent % ¹	Gel time ²	Viscosity at 23°C	T _g ³	Flexion modulus ³	Max strength ³	Elongation ⁴
1020 ECO	1025S to 1029S	35 %	2h19 to 13min	289 to 457 mPa.s	57 to 75 °C	2.60 to 2.90 GPa	91.6 to 113.7 MPa	7.7 to 15.3 %
1050 ECO	1055S to 1059S	34 %	2h26 to 13min	270 to 537 mPa.s	71 to 86 °C	3.04 to 3.19 GPa	107.3 to 128.2 MPa	6.5 to 10.5 %
1070 ECO	1074 ECO	46 %	28min	700 mPa.s	74 °C	3.24 GPa	110.6 MPa	7.4 %
1700 ECO	1706 ECO	58 %	1h12	428 mPa.s	98 °C	2.97 GPa	120.4 MPa	7.2%



Surf boards
Biobased 1070 ECO & flax
France

Biobased range

FILLET JOINT & FAIRING FILLER

Resin	Hardener	Biocontent % ¹	Gel time ²	T _g ³	Max thickness	Applications
2040G ECO	2045G ECO	62 %	1h51	57 °C	2-3 cm	Fillet joints on wood or composites
-	2049G ECO	-	24min	67 °C	2-3 cm	Fillet joints on wood or composites
8050 ECO	8058 ECO	15 %	18min	67 °C	25 mm	Fairing

WATER BASED IMPREGNATION

Resin	Hardener	Biocontent % ¹	Gel time ²	T _g ³	Dry to touch	Surface aspect
1010 ECO	1014	32%	1h50	77 °C	30 min	glossy
-	1016	-	1h50	77 °C	30 min	mat



Plywood & epoxy & glass fabric
 Marine construction
 1010 ECO (primer)
 1020 ECO (lamination)
 2040 ECO (fillet joint)
 France

Biobased range

Standard

Biobased

Improvements

1010	1010 ECO	Surface hydrophobicity Abrasion resistance
1020	1020 ECO	Thermomechanical and mechanical properties after curing
1050	1050 ECO	Elongation at break before and after curing
1070(S) CLEAR	1070 ECO	Thermomechanical and mechanical properties before and after curing UV stability
1800	1800 ECO	Thermomechanical properties before and after curing
2040G	2040G ECO	Elongation at maximal strength Biobased hardeners
8050	8050 ECO	Thermomechanical properties before and after curing
Innovative system : 1700 ECO		High biocontent Biobased hardener