resoltech
ADVANCED TECHNOLOGY RESINS

TYPE APPROVED PRODUCT
DNV·GL
MARITIME

resoltech 1200

Hardeners 1204 - 1206 - 1208

Structural epoxy laminating system




- Adjustable working time from 14min to 8h45min
- Excellent wetting out with all type of reinforcements
- Same mixing ratio for the 3 hardeners
- Manufacturing of small parts to very large composite structures
- T_G from up to 85°C after post cure
- 130°C T_G with 1205HT & 1206HT hardeners

INTRODUCTION

RESOLTECH 1200 / 1204 - 1206 - 1208 is a state of the art chemistry laminating epoxy system, formulated without reactive diluents (primary cause of allergies) thus improving the H&S working conditions. It allows to manufacture **small parts as well as large composite structures & tools** with all the existing fibers.

RESOLTECH 1200 / 1204 - 1206 - 1208 does not crystallize, these systems **do not contain any CMR** components and meet the latest requirements of European regulation & REACH.
With its adapted viscosity and its large range of reactivity, the system enables application by wet lay up, vacuum bagging and filament winding. **A thixotropic version 1200T** is available for applications such as vertical & overhanging laminates.

The hardeners 1204, 1206 and 1208 of this system have a mixing ratio of 35 parts for 100 parts of resin 1200 by weight. They are compatible and may be mixed together in order to adjust the reactivity needed.
After curing at room temperature the system 1200 / 1204 - 1206 - 1208 can be released directly from the mold. In order to accelerate the release after initial curing, a post cure at 40°C is possible. To obtain the optimum thermo mechanical properties a post cure at 60-80°C will be required.

Hardeners 1205HT and 1206HT will enable to obtain a T_G of 130°C after post cure making the 1200 a choice system for pre-preg tools.
The system RESOLTECH 1200 offers **great flexibility of use** with the available hardeners and will enable to reduce product's stock while allowing production of tools & parts of all sizes.

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	1200/1204	1200/1206	1200/1208
Mixing ratio by weight	100/35		
Mixing ratio by volume	100/44	100/43	100/41

APPLICATION

- It is recommended to use the products at a temperature close to 18-25°C in order to facilitate the mix and wetting out of reinforcements.
- A lower temperature will increase the viscosity of the mix and the gel time.
- On the opposite, a higher temperature will lower the viscosity of the mix and shorten the gel time.
- **It is highly recommended** to put a small amount of fast hardener 1208 with slow hardener 1204 (5%+95%) when laminating vertical areas, specially in winter.
- For high T_G applications hardeners 1205HT and 1206HT are recommended, a T_G of 130°C is obtained after a post cure (table on page 5).
- **Hardener 1205HT is sensitive to moisture, use quickly after opening.**

PHYSICAL CHARACTERISTICS

1 Visual aspect

1200 :
Opalescent colorless liquid

1204 / 1206 / 1208 :
Clear to yellow liquid

Mix :
Colorless to yellow opalescent liquid

2 Density

References	1200	1204	1206	1208
Density at 23°C	1.16	0.91	0.95	0.98
Liquid mix density at 23°C	-	1.10	1.11	1.12
Polymerized mix density at 23°C	-	1.18	-	1.20

ISO 1675, ± 0.05 tolerance
ISO 2811-1 ± 0.05 tolerance

3 Viscosity

References	1200	1204	80% 1204 20% 1208	1205 HT	1206 HT	1206	20% 1204 80% 1208	1208
Viscosity at 23°C (mPa.s)	6500	18	19	7	16	45	54	84
Mixed viscosity at 23°C (mPa.s)	-	235	458	882	815	610	774	1130

ISO 2555, ± 15% tolerance

REACTIVITIES

Hardeners are compatible and may be mixed together in order to adjust the reactivity needed.

Systems	1200 1204	1200 1204/1208	1200 1206	1200 1204/1208	1200 1208
Mixing ratio 1204/1208 (weight %)	100/0	80/20	40/60	20/80	0/100
Geltime on 70 mL at 23°C (thickness : 4cm)	8h45min	4h25min	43min	26min	14min
Time at exothermic peak 70mL at 23°C	NR*	3h40min	44min	28min	14min
Temperature of peak on 70mL at 23°C	NR*	43°C	205°C	214°C	225°C
Geltime on 2mm thickness at 23°C	9h45min	6h08min	3h12min	2h18min	1h30min

Reactivity measurements are made on Rheotech *
*NR : Non Representative

CURING & POST-CURING

To obtain a material with its maximum thermal and mechanical properties as T_G max, it is necessary to respect the recommended curing cycle. You will find in the spreadsheet below the temperature of T_G & HDT in relation to the curing cycle.

Systems	1200/1204	1200 1204/1208	1200/1206	1200 1204/1208	1200/1208
Mixing ratio 1204/1208 (weight %)	100/0	80/20	40/60	20/80	0/100
Curing cycle	24h at 23°C + 16h at 60°C				
T_{G*}	75°C	77°C	80°C	82°C	82°C
max T_G*	86°C	86°C	89°C	91°C	94°C
HDT	66°C	-	-	-	69°C

*T_G measured on DSC, 10°C/min, inflexion point
HDT according to ISO 75-2

HIGH TEMPERATURE HARDENERS

In order to produce tools or parts needing higher temperature resistance, it is possible to use **1205HT** and **1206HT** hardeners.

Systems	1200/1205HT	1200/1206HT
Mixing ratio by weight	100/18	100/25
Geltime on 70mL at 23°C (thickness 4cm)	5h	2h45min
Time at exothermic peak 70mL at 23°C	4h51min	2h54min
Temperature of peak on 70mL at 23°C	38°C	144°C
T_G after 4h at 40°C + 4h at 60°C + 8h at 120°C	124°C	128°C

Reactivity measurements are made on Rheotech®
TG realized on Kinetech®

MECHANICAL PROPERTIES

Systems	1200/1204	1200/1206	1200/1208	1200 / 1205HT
Curing cycle	24h at 23°C + 16h at 60°C			
FLEXION Modulus Max. strength Strength at break	 3.09 GPa 116 MPa 84 MPa	 3.34 GPa 124 MPa -	 3.37 GPa 133 MPa 99 MPa	 3.23 GPa 112.8 MPa -
TRACTION Modulus Max. strength Elongation max. strength	 3.42 GPa 67.6 MPa 3.3%	 - - -	 3.59 GPa 80.7 MPa 3.7%	 - - -
Shore D Hardness	87	88	87	89
Water absorption after 24h	0.09%	-	0.08%	-
Water absorption after 168h	0.19%	-	0.15%	-

Tests realized on pure resin samples according to : Flexion / ISO 178 - Traction / ISO 527-2 - Hardness / ISO 868 - Water absorption / ISO 175

PACKAGING

- Plastic jerrycan kit of 1kg + 0.35kg
- Plastic jerrycan kit of 5kg + 1.75kg
- Plastic 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 stated 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 or hardener 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.

! Nota : 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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