



HYBTONITE®

Epoxy Systems

HYBTONITE® Resin system is a low viscosity 100 % reactive CNT modified epoxy system tailor-made for windmill blade industry. It is suitable for infusion, RTM, filament

winding, laminating, pultrusion and many other applications. The system is made with patented HYBTONITE® technology, see <http://www.amroy.fi/pdf/amroyhybtoniteinfo.pdf>.

The systems can be tailor-made with different curing agents and accelerators to meet required cure rate, pot life and properties.



TABLE 1: Process data

| Before mixing | Mixing | Curing |
|--|--|---|
| Clear the surface from dust, grease and moisture. | Mix the resin with curing agent properly for minimum 1 – 2 min. | The product cures even at RT but higher temperature gives better cure and properties. |
| The higher the temperature of the object the better flow and wetting are achieved. | Let the air come out and settle for min 2 – 5 min. (Use vacuum if possible) | Recommended heat cure is 4 – 8 hours at 80 °C. |
| If possible preheat the resin component to 20 – 40 °C before use. | | |

Vertical surfaces in hand laminating :

The system can be thickened with 2 % HDK / Aerosil for laminating vertical surfaces. This helps especially against sagging/draining. Also available in all RAL colours.

The system does not crystallize and has a long storage stability of at least 3 years when is properly stored in closed containers.

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TABLE 2. Mix System Technical Data of different HYBTONITE systems

| | Hybtonite AFLV UN | G2+Ca35/Ca40 | G4LV |
|--------------------------------|---|--------------|-------------|
| Mix ratio (By weight) | 100:35 | 100:35 | 100:35 |
| Mix Viscosity 25 °C, mPa·s | 250 | 1500 | 2000 |
| Mix Viscosity 40 °C, mPa·s | 100 | 500 | 750 |
| Density, kg/l | 1.06 | 1.06 | 1.06 |
| Colour | Clear when cured / black, green in liquid | | |
| Gel Time 25 °C (150 g) | max 24 hours | max 10 hours | max 8 hours |
| Min Cure Temperature, °C | 30 | 15 | 15 |
| Recommended cure time at 80 °C | 2 – 8 hrs | 1 – 8 hrs | 1 – 8 hrs |
| Max Tg, °C | 90 | 70 – 170 | 80 – 200 |
| Elongation at break, % | 5 – 15 | 6 – 12 | 6 – 10 |
| Modulus, GPa | 2.5 – 3.2 | 3.0 – 3.6 | 3.2 – 3.6 |

TABLE 3. Concentrated pastes / masterbatches

| Masterbatch | EGC, mmol/kg | Replacement % | Suitability | Enhancement |
|----------------|--------------|---------------|-------------------|----------------------------------|
| HYBTONITE EP | 5000 | 10 – 25 | All Epoxy | Fatigue, toughness, impact, flex |
| HYBTONITE HMOD | 5500 | 10 – 25 | All Epoxy | Fatigue, toughness |
| HYBTONITE G4++ | 5500 | 10 – 50 | All Epoxy | Fatigue, Modulus, Compressive |
| HYBTONITE UN | 0 | 5 | Epoxy, VE, Phenol | Adhesion, fatigue |

Replace X % of epoxy resin part in the system. The EGC (Epoxy Group Content) of all pastes is about 5400 mmol/kg so there is normally no need to adjust mix ratio.

Storage Data

The products can be stored at temperatures between 0 – 60 °C in closed containers in dry place protected from direct sunlight. Storage time is at least 3 years.

TABLE 4: Sales Packages

| | | | |
|--------------|-------------|-------------|------------|
| Resin | 1100 kg IBC | 240 kg drum | 20 kg cans |
| Curing agent | 900 kg IBC | 180 kg drum | 18 kg cans |

References

| | | | |
|---------------------------|------------------|---------------------|----------------|
| Evergreen Ltd | 38 – 49 m blades | Infusion | China / USA |
| EASTON Sports | Arrows | Pultrusion | USA |
| Exel Composites Oy | Sports | Pultrusion | Finland |
| Peltonen Skis | Skis | Gluing | Finland |
| Montreal Sports - Warrior | Ice Hockey | RTM | Finland |
| CompoTech | Robot arms etc | Filament winding | Czech Republic |
| EAGLE Windpower Oy | 2–10 m blades | Pressure laminating | Finland |

Available from factories in Finland (EUROPE), China (ASIA) and USA from 2009 onwards.

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