

Cardolite® FormuLITE™ 2502A + 2401B

Liquid Epoxy System

Technical Datasheet

DESCRIPTION

Cardolite FormuLITE 2500A and FormuLITE 2401B are a two-component epoxy system recommended for the manufacturing of reinforced composites by wet lay-up, resin transfer molding (RTM), lamination and vacuum infusion. Both the epoxy resin and the amine hardener are based on components from renewable sources. The calculated bio-based content of the system is 27%.

PROPERTIES

| PROPERTY | TYPICAL VALUES ¹ | TEST METHOD |
|------------------------------------|-----------------------------|-------------|
| RESIN FormuLITE 2500A | | |
| Appearance | Clear liquid | Visual |
| Color (Gardner) | ≤ 1 | ASTM D1544 |
| Viscosity @ 25°C (cPs) | 930 | ASTM D2196 |
| Density @ 25°C (kg/L) (lbs/gal) | 1.13 9.47 | ASTM D1475 |
| Flash point | > 150°C / 302°F | ASTM D93 |
| Shelf Life (Months) | 12 | - |
| HARDENER FormuLITE 2401B | | |
| Appearance | Light Yellow Liquid | Visual |
| Color (Gardner) | ≤ 8 | ASTM D1544 |
| Viscosity @ 25°C (cPs) | 90 | ASTM D2196 |
| Density @ 25°C (kg/L) (lbs/gal) | 0.95 7.93 | ASTM D1475 |
| Flash point | > 110°C / 230°F | ASTM D93 |
| Shelf Life (Months) | 12 | - |

¹Typical properties are not to be construed as specifications

RECOMMENDED PROCESSES

Epoxy-based composites:

- Wet lay-up
- Resin transfer molding (RTM)
- Laminates
- Vacuum infusion

ADVANTAGES

- Good processability
- Good wetting of carbon, glass and natural fibers
- Good mechanical and thermal properties
- Improved water, acid and alkali resistance
- Based on renewable raw material feedstock

TYPICAL PROCESSING DATA

| PROPERTIES | TYPICAL VALUES | TEST METHOD |
|--------------------------------------|----------------|------------------------------|
| Mixing ratio by weight | 100:33 | - |
| Mixing ratio by volume | 100:40 | - |
| Mix viscosity @ 25°C (cPs) | 480 | ASTM D2196 |
| Mix viscosity @ 40°C (cPs) | 175 | ASTM D2196 |
| Pot life, 100 g mix @ 23°C (min) | 125 | Internal Method ² |
| Pot life, 100 g mix @ 40°C (min) | 63 | Internal Method ² |
| Peak exotherm, 100 g mix @ 23°C (°C) | 31 | ASTM 2471-99 |
| Peak exotherm, 100 g mix @ 23°C (°C) | 70 | ASTM 2471-99 |

²Pot life is measured when the formulation reaches a limit viscosity of 10,000 cPs starting from the reference temperature.

TYPICAL CURED SYSTEM PROPERTIES

| PROPERTIES | TYPICAL VALUES ³ | TEST METHOD |
|--|-----------------------------|--------------|
| Ultimate glass transition temperature ⁴ (°C) | 88 | ASTM 3418-99 |
| Water absorption at 25°C (7/14 days) | 0.43/0.59 | ASTM D543 |
| Alkali resistance - 10% sodium hydroxide at 25°C (7/14 days) | 0.36/0.53 | ASTM D543 |
| Acid resistance - 3% sulfuric acid at 25°C (7/14 days) | 1.03/1.38 | ASTM D543 |
| Tensile strength (MPa) | 66 | ASTM D638-10 |
| Tensile modulus (MPa) | 2,893 | ASTM D638-10 |
| Tensile elongation at Fmax (%) | 3.4 | ASTM D638-10 |
| Tensile elongation at break (%) | 3.4 | ASTM D638-10 |
| Flexural strength (MPa) | 96 | ISO 178 |
| Flexural modulus (MPa) | 2,484 | ISO 178 |
| Bio-based content (% wt.) | 27.0% | Calculated |

³Curing schedule: 4h@RT + 2h@100°C

⁴DSC scan from 0 to 200°C at 20°C/min, 2nd run

CURING AND POST CURING

Post-curing is advisable for ambient cured systems to reach their best mechanical and thermal properties. It is recommended that cure and post-cure conditions be evaluated based on the size and shape of the composite part. In the case of room temperature curing, some heat treatment at a minimum of 50°C (122°F) should be done before demolding.

MIXING INSTRUCTIONS

It is recommended that components be weighed carefully to prevent mixing inaccuracies, which can adversely affect the properties of the final product. Both components should be mixed thoroughly to ensure homogeneity. In case of air entrapment, appropriate quantities of air release additives can be used. Pot life decreases when large amounts of mixture are prepared due to the exothermic reaction. It is recommended to split large amounts of mixture into smaller containers.

REGULATORY STATUS

Please refer to the material safety data sheet (MSDS). Specific information regarding chemical inventory listing can be obtained from your local sales representative.

SAFETY PRECAUTIONS

Please refer to the material safety data sheet (MSDS). Copies of the MSDS can be requested on the Cardolite website or via your local sales representative.

STABILITY AND STORAGE

Cardolite epoxy resins and hardeners may absorb moisture and carbon dioxide when left in open containers, which could result in increased viscosity, discoloration, reduction of reactivity, and/or crystallization of the products. These products should be kept tightly sealed in their original containers when not in use, and stored in a cool, dry place. Some Cardolite epoxy resins might crystallize. This reversible, physical phenomena can be greatly avoided by storing the resin at temperatures not below 25°C.

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