

# PRO-SET®

## Technical Data **LAM-145-BK** **LAM-239**

### LAMINATING EPOXY

#### COMBINED FEATURES

**Black Pigmented Resin** for a deep black color.

**Medium Medium viscosity** for good wet out of all synthetic composite fabrics and core materials.

**Thixotroped** to prevent drain out in heavy fabrics and on vertical surfaces.

**High tack** to help hold heavy fabric and core in place on vertical surfaces.

**Extended open time** hardener provides 8 to 9 hours of working time at 85°F (29°C). A typical laminate will be gelled in 12 to 14 hours at 85°F (29°C).

**Optimized** for hand wet out and machine impregnation in contact molding, vacuum bagging and filament winding applications.

**Elevated temperature cure** is required; thermal and mechanical properties suitable for composite components and high-temperature tooling and molds.

**T<sub>g</sub> as high as 215°F (102°C)** with proper post cure providing excellent temperature stability and great part cosmetics.

**Cost effective, high performance** epoxy formulation for synthetic composite manufacturing.

**Quality-control tinting** is available at no extra charge; simply add "QC" after the product code on your order.

**Shelf life** is 3 years for resin and 2 years for hardener when properly stored<sup>3</sup>.

#### HANDLING PROPERTIES

| Property             | Standard   | Units   | 72°F (22°C) | 77°F (25°C) | 85°F (29°C) |
|----------------------|------------|---------|-------------|-------------|-------------|
| 150g Pot Life        | ASTM D2471 | minutes | 223-273     | 187-229     | 142-174     |
| 500g Pot Life        | ASTM D2471 | minutes | 162-198     | 123-151     | 94-116      |
| Viscosity Mixed      | ASTM D2196 | cP      | 2599        | 1974        | 1291        |
| Viscosity (resin)    | ASTM D2196 | cP      | 10,000      |             |             |
| Viscosity (hardener) | ASTM D2196 | cP      | 116         |             |             |
| Shear Thinning Index | ASTM D2196 | –       | 1.1         |             |             |

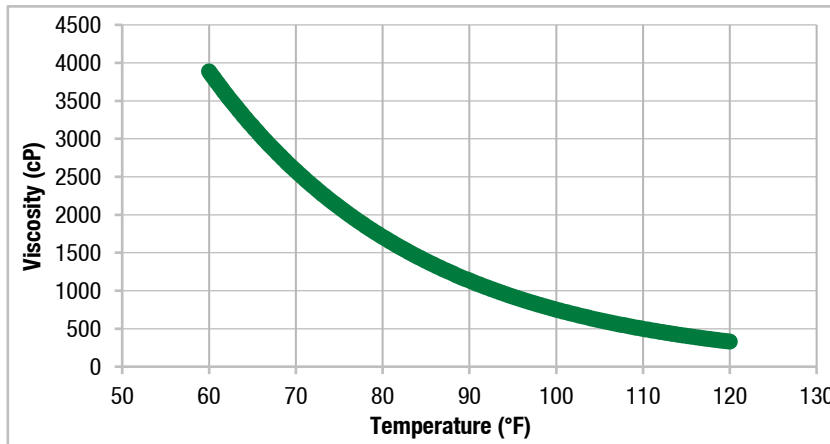
#### MIX RATIO

| Method       | Resin:Hardener | Resin:Hardener    |
|--------------|----------------|-------------------|
| Weight       | 3.5:1          | 100:27.8          |
| Weight Range | 4.28:1-3.10:1  | 100:23.4-100:32.3 |
| Volume       | 3.00:1         | 100:33.3          |
| Volume Range | 3.57:1-2.58:1  | 100:28.0-100:38.7 |

#### DENSITY

| State    | Units         | 72°F (22°C) |
|----------|---------------|-------------|
| Cured    | lb/gal (g/cc) | 9.68 (1.16) |
| Resin    | lb/gal (g/cc) | 9.65 (1.16) |
| Hardener | lb/gal (g/cc) | 8.14 (0.98) |

#### VISCOSITY VS TEMPERATURE



Test specimens were neat epoxy (without fiber reinforcement).  
Typical values, not to be construed as specification.

The New  
Standard

EPOXIES for  
Laminating  
Infusion  
Tooling  
Assembly

Gougeon Brothers, Inc.  
P.O. Box 908  
Bay City, MI 48707  
prosetepoxy.com  
888-377-6738

ISO9001:2015 Certified

Rev 2 / Oct 2020

# LAM-145-BK~LAM-239

## LAMINATING EPOXY

### MECHANICAL PROPERTIES

| Property           | Standard   | Units     | RT Gelation<br>+ 140°F (60°C)<br>x 8 hrs | RT Gelation<br>+ 140°F (60°C)<br>x 16 hrs | RT Gelation<br>+ 180°F (82°C)<br>x 8 hrs |
|--------------------|------------|-----------|--|---|--|
| Hardness           | ASTM D2240 | Type D    | 86                                       | 91  | 86                                       |
| Compression Yield  | ASTM D695  | psi (MPa) | 14,100 (97)                              | 14,100 (97)                               | 14,100 (97)                              |
| Tensile Strength   | ASTM D638  | psi (MPa) | 10,200 (70)                              | 10,200 (70)                               | 10,300 (71)                              |
| Tensile Modulus    | ASTM D638  | psi (GPa) | 4.83E+05 (3.33)                          | 4.58E+05 (3.16)                           | 4.05E+05 (2.79)                          |
| Tensile Elongation | ASTM D638  | %         | 4.8                                      | 6.2                                       | 6.3                                      |
| Flexural Strength  | ASTM D790  | psi (MPa) | 17,700 (122)                             | 17,700 (122)                              | 17,700 (122)                             |
| Flexural Modulus   | ASTM D790  | psi (GPa) | 4.84E+05 (3.34)                          | 4.84E+05 (3.34)                           | 4.21E+05 (2.9)                           |

### THERMAL PROPERTIES

| Property                     | Standard                | Units   | RT Gelation<br>+ 140°F (60°C)<br>x 8 hrs | RT Gelation<br>+ 140°F (60°C)<br>x 16 hrs | RT Gelation<br>+ 180°F (82°C)<br>x 8 hrs |
|------------------------------|-------------------------|---------|--|---|--|
| Tg DMA Peak Tan Delta        | ASTM E1640 <sup>1</sup> | °F (°C) | 210 (99)                                 | 219 (104)                                 | 241 (116)                                |
| Tg DMA Onset Storage Modulus | ASTM E1640 <sup>1</sup> | °F (°C) | 181 (83)                                 | 188 (87)                                  | 215 (102)                                |
| Tg DSC Onset– 1st Heat       | ASTM E1356              | °F (°C) | 167 (75)                                 | 169 (76)                                  | 215 (102)                                |
| Heat Deflection Temperature  | ASTM D648               | °F (°C) | 162 (72)                                 | 174 (79)                                  | 208 (98)                                 |
| Tg DSC Ultimate              | ASTM E1356              | °F (°C) | 224 (107) <sup>2</sup>                   |   |  |

<sup>1</sup> 1 Hz, 3°C per minute.

<sup>2</sup> Additional post cure may be required; contact Technical Department for details.

<sup>3</sup> Store PRO-SET® Epoxy resins and hardeners at room temperature in sealed containers until shortly before use. As with many high-performance epoxy resins, repeated exposure to low temperatures during storage may cause the resin to crystallize. If this occurs, warm the resin to 125° F and stir to dissolve crystals. Hardeners may form carbamation when exposed to CO<sub>2</sub> and moisture in the atmosphere for extended periods of time. Prevent carbamation by protecting hardeners from exposure until immediately prior to processing.

145-BK.01

239.01