

PRO-SET®

Technical Data

LAM-135 LAM-237

LAMINATING EPOXY

The New
Standard
2013

EPOXIES for
Laminating
Infusion
Tooling
Assembly

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

ISO9001:2008 Certified

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COMBINED FEATURES

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

Extra Slow cure speed hardener provides 7 to 8 hours of working time at 77°F (25°C). A typical laminate will be gelled in 12 to 14 hours.

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

Room temperature cure properties suitable for many composite components and structures.

Tg as high as 213° F (101°C) with proper post cure providing excellent temperature stability and great part cosmetics.

Cost Effective - High Performance Epoxy formulation for synthetic composite manufacturing.

HANDLING PROPERTIES

| Property | Standard | Units | 72°F (21°C) | 77°F (25°C) | 85°F (29°C) |
|----------------------|------------|---------|-------------|-------------|-------------|
| 150g Pot Life | ASTM D2471 | minutes | 197 | 128 | 100 |
| 500g Pot Life | ASTM D2471 | minutes | 135 | 107 | 75 |
| Viscosity Mixed | ASTM D2196 | cP | 1095 | 911 | 675 |
| Viscosity (resin) | ASTM D2196 | cP | 6890 | | |
| Viscosity (hardener) | ASTM D2196 | cP | 33 | | |

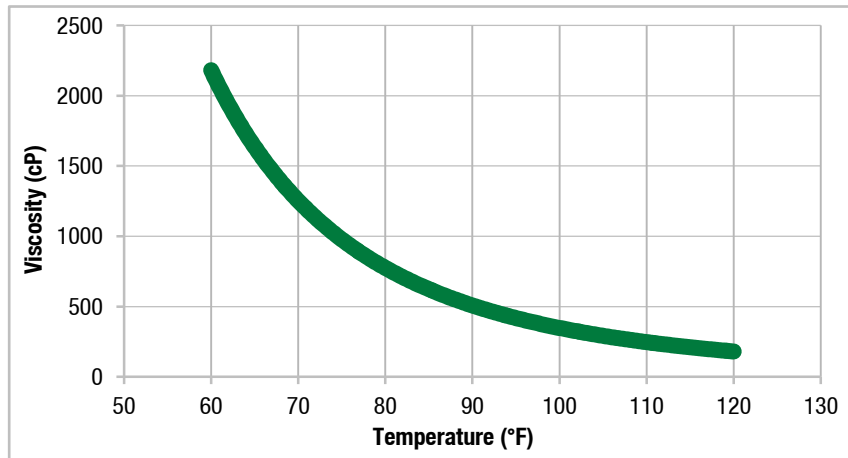
MIX RATIO

| Method | Resin:Hardener | Resin:Hardener |
|--------------|----------------|-------------------|
| Weight | 3.5:1 | 100:28.6 |
| Weight Range | 3.61:1–3.04:1 | 100:27.7–100:32.9 |
| Volume | 3.00:1 | 100:33.3 |
| Volume Range | 3.00:1–2.53:1 | 100:33.3–100:39.6 |

DENSITY

| State | Units | 72°F (21°C) |
|----------|---------------|-------------|
| Cured | lb/gal (g/cc) | 9.7 (1.16) |
| Resin | lb/gal (g/cc) | 9.71 (1.16) |
| Hardener | lb/gal (g/cc) | 8.07 (0.97) |

VISCOSITY VS TEMPERATURE



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

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LAMINATING EPOXY

MECHANICAL PROPERTIES

| Property | Standard | Units | 72°F (22°C) x 4 wk | 77°F (25°C) x 2 wk | RT Gelation + 120°F (49°C) x 8 hrs | RT Gelation + 140°F (60°C) x 8 hrs | RT Gelation + 180°F (82°C) x 8 hrs |
|--------------------|------------|-----------|-----------------------|-----------------------|--|--|--|
| Hardness | ASTM D2240 | Shore D | 84 | 85 | 86 | 86 | 86 |
| Compression Yield | ASTM D695 | psi (MPa) | 15,400 (106) | 15,500 (107) | 14,300 (99) | 14,300 (99) | 14,300 (99) |
| Tensile Strength | ASTM D638 | psi (MPa) | 8,960 (62) | 8,420 (58) | 9,750 (67) | 10,100 (70) | 10,400 (72) |
| Tensile Modulus | ASTM D638 | psi (GPa) | 5.54E+05 (3.82) | 5.49E+05 (3.79) | 5.06E+05 (3.49) | 5.00E+05 (3.45) | 4.22E+05 (2.91) |
| Tensile Elongation | ASTM D638 | % | 1.9 | 1.9 | 3.2 | 3.9 | 6.7 |
| Flexural Strength | ASTM D790 | psi (MPa) | 13,900 (96) | 15,400 (106) | 17,100 (118) | 17,400 (120) | 18,400 (127) |
| Flexural Modulus | ASTM D790 | psi (GPa) | 5.47E+05 (3.77) | 4.99E+05 (3.44) | 4.99E+05 (3.44) | 4.94E+05 (3.41) | 4.04E+05 (2.79) |

THERMAL PROPERTIES

| Property | Standard | Units | 72°F (22°C) x 4 wk | 77°F (25°C) x 2 wk | RT Gelation + 120°F (49°C) x 8 hrs | RT Gelation + 140°F (60°C) x 8 hrs | RT Gelation + 180°F (82°C) x 8 hrs |
|------------------------------|-------------------------|---------|-----------------------|-----------------------|--|--|--|
| Tg DMA Peak Tan Delta | ASTM E1640 ¹ | °F (°C) | 157 (69) | 157 (69) | 188 (86) | 199 (93) | 231 (111) |
| Tg DMA Onset Storage Modulus | ASTM E1640 ¹ | °F (°C) | 144 (62) | 144 (62) | 165 (74) | 177 (80) | 213 (101) |
| Tg DSC Onset– 1st Heat | ASTM E1356 | °F (°C) | 134 (57) | 136 (58) | 150 (65) | 166 (75) | 191 (88) |
| Heat Deflection Temperature | ASTM D648 | °F (°C) | 133 (56) | 132 (56) | 148 (64) | 161 (72) | 179 (82) |
| Tg DSC Ultimate | ASTM E1356 | °F (°C) | | | 215 (102) ² | | |

¹ 1 Hz, 3°C per minute.

² Additional post cure may be required; contact Technical Department for details.

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