

Advanced Materials**RenLam[®] 4017R Resin
Ren[®] 1510H Hardener****HEAT RESISTANT EPOXY LAMINATING SYSTEM**

- High Temperature Performance
- Good Work Life

DESCRIPTION :

RenLam[®] 4017R resin/Ren[®] 1510H hardener epoxy laminating system is a two-component, non-MDA, black material based on multifunctional resins to produce a good balance of cost and performance. The product is designed to perform at temperatures up to 350°F (177°C) after an elevated temperature postcure. The liquid laminating system offers good cloth wet-out and has a 90-minute work life. RenLam[®] 4017R resin/Ren[®] 1510H hardener epoxy laminating system is well suited for use in building large, high-temperature fiberglass or graphite lay-up molds.

TYPICAL MIXED PROPERTIES*

| <u>Property</u> | <u>4017R/1510H</u> | <u>Test Method</u> |
|---|--------------------|--------------------|
| Color, Resin | Black | Visual |
| Hardener | Amber | |
| Mixed | Black | |
| Viscosity, mixed, cP at 77°F (25°C) | 8,000 | ASTM-D-2393 |
| Gel time, 14 fl. oz. at 77°F (25°C), min. | 90 | ASTM-D-2471 |

* Tested at 77°F (25°C)

MIX RATIO :

RenLam[®] 4017R resin:Ren[®] 1510H hardener 100:15 by weight

Stir each component thoroughly before use. Weight each component accurately ($\pm 5\%$) into clean containers. Thoroughly mix resin and hardener together (minimum of three minutes), scraping container sidewalls, bottom and mixing stick several times to assure a uniform mix.

TYPICAL CURED PROPERTIES :

| | <u>Cure Value</u> | <u>Test Method</u> |
|------------------------|-------------------|--------------------|
| Hardness, Shore D | 93 | ASTM-D-2240 |
| Tg by DMA, E", °F (°C) | 350 (177) | ASTM D-4065 |

Laminate : 10 oz. glass cloth, 6K, 5 harness satin weave graphite fabric, 8 layers, lay-up 0° rotation, vacuum bagged. Resin content: 45%

| | <u>Cure Value</u> <u>Heat Cured²</u> | <u>Cure Value</u> <u>Aged 1000 hrs.</u> <u>@ 350°F (177°C)</u> | <u>Test Method</u> |
|---------------------------------|--|--|--------------------|
| Flexural Strength, psi (MPa) | | | ASTM-D-790 |
| at 77°F (25°C) | 77,000 (531) | 79,000 (545) | |
| at 300°F (149°C) | 41,000 (283) | 39,000 (269) | |
| at 350°F (177°C) | 20,000 (138) | 18,000 (124) | |
| Flexural Modulus, psi (MPa) | | | ASTM-D-790 |
| at 77°F (25°C) | 4.4x10 ⁶ (30,335) | 4.3x10 ⁶ (29,655) | |
| at 300°F (149°C) | 3.6x10 ⁶ (24,828) | 3.3x10 ⁶ (22,758) | |
| at 350°F (177°C) | 1.7x10 ⁶ (11,724) | 1.5x10 ⁶ (10,344) | |
| Tensile Strength, psi (MPa) | | | ASTM D-638 |
| at 77°F (25°C) | 80,000 (552) | 78,000 (538) | |
| at 300°F (149°C) | 72,000 (496) | 73,000 (503) | |
| at 350°F (177°C) | 65,000 (448) | 63,000 (434) | |
| Compressive Strength, psi (MPa) | | | ASTM D-695 |
| at 77°F (25°C) | 44,000 (303) | 43,000 (296) | |
| at 300°F (149°C) | 26,000 (179) | 27,000 (186) | |
| at 350°F (177°C) | 16,000 (110) | 15,000 (103) | |

Tested parallel to weave direction

Laminate : 7500 Volan A-treated glass fabric, 8 layers, vacuum bagged.

| | <u>Cure Value</u> <u>Heat Cured²</u> | <u>Cure Value</u> <u>Aged 1000 hrs.</u> <u>@ 350°F (177°C)</u> | <u>Test Method</u> |
|------------------------------|--|--|--------------------|
| Lay-up 45° rotation | | | |
| Flexural Strength, psi (MPa) | | | ASTM-D-790 |
| at 77°F (25°C) | 29,000 (200) | 31,000 (214) | |
| at 300°F (149°C) | 22,000 (152) | 22,000 (152) | |
| at 350°F (177°C) | 12,000 (83) | 10,500 (72) | |
| Flexural Modulus, psi (MPa) | | | ASTM-D-790 |
| at 77°F (25°C) | 1.6x10 ⁶ (11,034) | 1.6x10 ⁶ (11,034) | |
| at 300°F (149°C) | 1.2x10 ⁶ (8,276) | 1.2x10 ⁶ (8,276) | |
| at 350°F (177°C) | 0.8x10 ⁶ (5,517) | 0.7x10 ⁶ (4,828) | |
| Lay-up 90° rotation | | | |
| Flexural Strength, psi (MPa) | | | ASTM-D-790 |
| at 77°F (25°C) | 36,000 (248) | 37,000 (255) | |
| at 300°F (149°C) | 22,000 (152) | 22,000 (152) | |
| at 350°F (177°C) | 13,000 (89.6) | 10,500 (72) | |
| Flexural Modulus, psi (MPa) | | | ASTM-D-790 |
| at 77°F (25°C) | 2.0x10 ⁶ (13,793) | 1.8x10 ⁶ (12,414) | |
| at 300°F (149°C) | 1.6x10 ⁶ (11,034) | 1.4x10 ⁶ (9,655) | |
| at 350°F (177°C) | 1.1x10 ⁶ (7,586) | 0.6x10 ⁶ (4,138) | |

²Cure Schedule – postcured 24 hrs. at 77°F (25°C), + 2 hrs. at 200°F (93°C) + 2 hrs. at 250°F (121°C) + 2 hrs. at 300°F (149°C) + 3 hrs. at 350°F (177°C).

NOTE : Typical Properties – These physical properties are reported as typical test values obtained by our test laboratory. If assistance is needed in establishing product specifications, please consult with our Quality Control Department.

CURING INSTRUCTIONS :

With proper backup completed, allow to gel at room temperature followed by a postcure of two hours at 150°F (66°C), plus two hours at 200°F (93°C), plus two hours at 250°F (121°C), plus two hours at 300°F (149°C), plus three hours at 350°F (177°C). For best results, laminates should be supported during postcure cycles.

STORAGE/ SHELF LIFE :

Epoxy resins and hardeners should be stored in a dry place in their original, sealed containers at temperatures from 60-100°F (16-38°C). Material temperatures should be above 65°F (18°C) when mixing. After use, tightly reseal containers. Under these conditions, epoxy resins and hardeners will remain useable for 12 months from date of shipping from Huntsman.

CAUTION :

Huntsman Advanced Materials Americas Inc. maintains up-to-date Material Safety Data Sheets (MSDS) on all of its products. These sheets contain pertinent information that you may need to protect your employees and customers against any known health or safety hazards associated with our products. Users should review the latest MSDS to determine possible health hazards and appropriate precautions to implement prior to using this material. Copies of the latest MSDS may be requested by calling our customer service group at 800-367-8793 or emailing your request to adhesives_group@huntsman.com.

FIRST AID !

Eyes and skin : Flush eyes with water for 15 minutes. Contact a physician if irritation persists. Wash skin thoroughly with soap and water. Remove and wash contaminated clothing before reuse.

Inhalation : Remove subject to fresh air.

Swallowing : Dilute by giving water to drink and contact a physician promptly. Never give anything to drink to an unconscious person.

**KEEP OUT OF REACH OF CHILDREN
FOR PROFESSIONAL AND INDUSTRIAL USE ONLY**

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