

## EpoPro<sup>®</sup> 100A/B



### HIGH PERFORMANCE, LONG WORK-LIFE EPOXY ADHESIVE

EpoPro<sup>®</sup> 100 A/B is a versatile, long work-life epoxy adhesive that provides strong bonds to most materials including wood, ceramics, metals, any many plastics. It is easy to mix and apply due to its 1:1 by volume mix ratio and medium bodied, spreadable consistency. It can be cured at temperatures from 20°C to 180°C and releases no volatiles during or after curing. When fully cured EpoPro<sup>®</sup> 100A/B produces translucent, nearly invisible, bond lines that provide exceptional environmental and fatigue resistance, as well as good chemical and heat resistance. In addition, the cured polymer provides excellent electrical insulation properties and meets NASA outgassing requirements for space, optical, and high vacuum applications.

Many variations on the standard EpoPro<sup>®</sup> 100A/B system are available upon request, including custom colors, alternate worklives and curing speeds, modified viscosities, and many other variants. Please contact us to discuss your application if you think such a variant would be helpful for your application.

#### APPLICATIONS & BENEFITS

- Bonding large surfaces
- Exceptional fatigue & environmental resistance
- Bonds metals, ceramics, wood, cardboard, glass, plastics and many other materials.
- Low or no shrinkage during curing
- Excellent dielectric properties
- Odorless, free of solvents & volatiles – meets NASA outgassing requirements

#### HANDLING PROPERTIES

|                                       | <u>VALUE</u>       | <u>TEST METHOD</u>    |
|---------------------------------------|--------------------|-----------------------|
| Density Mixed, g/cm <sup>3</sup>      | 1.05               | ASTM E-201            |
| Viscosity Mixed @ 25°C, cps           | 40,000             | ASTM D-2393           |
| Mix Ratio By Weight (By Volume)       | 100A:80B (1A:1B)   | Calculated            |
| Gel Time @ 25°C, 4 fl oz mass (~500g) | 90-120 minutes     | ASTM D-2471           |
| Gel Time @ 25°C, 1/16" thick film     | 120-180 minutes    | ASTM D-2471           |
| Lap Shear Strength                    |                    | ASTM D-1002           |
| Development @ Various temperatures    |                    |                       |
| <u>Cure temperature</u>               | <u>Curing time</u> | <u>Shear Strength</u> |
| 20°C (68°F)                           | 12 hours           | 710 psi (5 mPa)       |
|                                       | 15 hours           | 1050 psi (7.4 mPa)    |
|                                       | 24 hours           | 1990 psi (14 mPa)     |
| 25°C (77°F)                           | 8 hours            | 710 psi (5 mPa)       |
|                                       | 12 hours           | 1200 psi (8.45 mPa)   |
|                                       | 15 hours           | 1990 psi (14 mPa)     |
|                                       | 24 hours           | 2130 psi (15 mPa)     |
|                                       | 5 days             | 2560 psi (18 mPa)     |
| 40°C (104°F)                          | 2 hour             | 900 psi (6.3 mPa)     |
|                                       | 3 hours            | 1420 psi (10 mPa)     |
|                                       | 6 hours            | 2560 psi (18 mPa)     |

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| <u>Cure temperature</u> | <u>Curing time</u> | <u>Shear Strength</u> |
|-------------------------|--------------------|-----------------------|
| 70°C (158°F)            | 1 hour             | 3130 psi (22 mPa)     |
|                         | 2 hours            | 3410 psi (24 mPa)     |
|                         | 3 hours            | 3700 psi (26 mPa)     |
| 100°C (158°F)           | 6 minutes          | 1420 psi (10 mPa)     |
|                         | 10 minutes         | 3700 psi (26 mPa)     |
|                         | 30 minutes         | 4120 psi (29 mPa)     |
| 150°C (302°F)           | 4 minutes          | 2130 psi (15 mPa)     |
|                         | 5 minutes          | 4270 psi (30 mPa)     |
|                         | 10 minutes         | 4410 psi (31 mPa)     |

## PHYSICAL PROPERTIES

|                             | <u>VALUE</u>                    | <u>TEST METHOD</u> |
|-----------------------------|---------------------------------|--------------------|
| Color                       | Translucent, very little yellow | Visual             |
| Shore D Hardness            | 80                              | ASTM D-2240        |
| Tensile Strength, psi       | 4,800 psi (33 mPa)              | ASTM D-638         |
| Tensile Elongation at break | 9%                              | ASTM D-638         |
| Lap Shear Strength          |                                 | ASTM D-1002        |

### Effect of Cure Temperature:

| <u>Test Temperature</u> | <u>(Cured 5 Days @ 25C)</u> | <u>Cured 20 min @ 100C</u> |
|-------------------------|-----------------------------|----------------------------|
| -60°C (-76°F)           | 2840 psi (20 mPa)           | 3560 psi (25 mPa)          |
| -20°C (-4°F)            | 2840 psi (20 mPa)           | 3410 psi (24 mPa)          |
| 20°C (68°F)             | 2560 psi (18 mPa)           | 3980 psi (28 mPa)          |
| 40°C (104°F)            | 1420 psi (10 mPa)           | 1990 psi (14 mPa)          |
| 60°C (140°F)            | 570 psi (4 mPa)             | 1000 psi (7 mPa)           |
| 70°C (158°F)            | 280 psi (2 mPa)             | 425 psi (3 mPa)            |

### Tropical Aging (40°C & 92% Relative Humidity):

| <u>Aging Period</u> | <u>(Cured 16 hrs @ 40C)</u> | <u>Cured 20 min @ 100C</u> |
|---------------------|-----------------------------|----------------------------|
| 0 Days              | 2560 psi (18 mPa)           | 3980 psi (28 mPa)          |
| 10 days             | 2560 psi (18 mPa)           | 2560 psi (18 mPa)          |
| 30 days             | 1710 psi (9 mPa)            | 1710 psi (9 mPa)           |
| 60 days             | 1560 psi (28 mPa)           | 1560 psi (28 mPa)          |
| 90 days             | 570 psi (28 mPa)            | 1280 psi (9 mPa)           |

### Heat Aging:

| <u>Aging Period</u> | <u>- Aged @ 20°C</u> | <u>- Aged @ 60°C</u> | <u>- Aged @ 80°C</u> | <u>- Aged @ 120°C</u> |
|---------------------|----------------------|----------------------|----------------------|-----------------------|
| 0 days              | 2560 psi (18 mPa)    | 2560 psi (18 mPa)    | 2560 psi (18 mPa)    | 2560 psi (18 mPa)     |
| 3 days              | 2560 psi (18 mPa)    | 2560 psi (18 mPa)    | 2130 psi (15 mPa)    | 2130 psi (15 mPa)     |
| 10 days             | 2560 psi (18 mPa)    | 2420 psi (17 mPa)    | 2130 psi (15 mPa)    | 2280 psi (16 mPa)     |
| 60 days             | 2560 psi (18 mPa)    | 2130 psi (15 mPa)    | 2130 psi (15 mPa)    | 2130 psi (15 mPa)     |
| 1 year              | 2280 psi (16 mPa)    | 1560 psi (11 mPa)    | 1280 psi (9 mPa)     |                       |
| 2 years             | 1990 psi (14 mPa)    | 1420 psi (10 mPa)    | 710 psi (5 mPa)      |                       |
| 4 years             | 1990 psi (14 mPa)    | 994 psi (7 mPa)      | 430 psi (3 mPa)      |                       |
| 5 years             | 1990 psi (14 mPa)    | 994 psi (7 mPa)      | 280 psi (2 mPa)      |                       |

### Various Substrates: (metals cured 20 min@100°C, plastics 16 hrs@23°C)

| <u>Material</u>  | <u>Shear Strength</u> | <u>Material</u> | <u>Shear Strength</u> |
|------------------|-----------------------|-----------------|-----------------------|
| Aluminum         | 3840 psi (27 mPa)     | SMC             | 1065 psi (7.5 mPa)    |
| Carbon Steel     | 3840 psi (27 mPa)     | ABS             | 852 psi (6 mPa)       |
| Stainless Steel  | 3270 psi (23 mPa)     | Polycarbonate   | 426 psi (3 mPa)       |
| Galvanized Steel | 1990 psi (14 mPa)     | PVC             | 288 psi (2 mPa)       |
| Copper           | 3270 psi (23 mPa)     | Nylon 6         | 430 psi (3 mPa)       |
| Brass            | 2990 psi (21 mPa)     |                 |                       |

Chemical Resistance (After Immersion for 90 days)

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|   |  |                               |  |
|---|--|-------------------------------|--|
| <u>Chemical</u><br><i>Control</i>                             | <u>Shear Strength</u><br>2560 psi (18 mPa) | <u>Chemical</u><br>Ammonia    | <u>Shear Strength</u><br>1420 psi (10 mPa) |
| Acetone (30 days)   | 570 psi (4 mPa)                            | Water @ 20°C                  | 1420 psi (10 mPa)                          |
| Acetylene   | 430 psi (3 mPa)                            | Water @ 90°C                  | 430 psi (3 mPa)                            |
| Ethyl Acetate (30 days)                                       | 570 psi (4 mPa)                            | Paint Thinner                 | 1200 psi (8.5 mPa)                         |
| Acetic Acid 10%   | <i>degraded</i>                            | Gasoline                      | 2410 psi (17 mPa)                          |
| Methanol  | <i>degraded</i>                            | Lubricating Oil(HD30)         | 2560 psi (18 mPa)                          |
| Mineral Oil   | 2560 psi (18 mPa)                          | Transmission Fluid            | 2560 psi (18 mPa)                          |
| Vegetable/Corn Oil  | 2560 psi (18 mPa)                          | Power Steering Fluid          | 2410 psi (17 mPa)                          |
| Kerosene  | <i>degraded</i>                            | Trichloroethylene             | <i>degraded</i>                            |
| Shear Modulus   |  |                               | DIN 53445                                  |
| <u>@ -50°C</u>  | <u>@ 0°C</u>                               | <u>@ 50°C</u>                 | <u>@ 100°C</u>                             |
| 217,500 psi (1500 mPa)  | 174,000 psi (1200 mPa)                     | 29,000 psi (200 mPa)          | 1015 psi (7 mPa)                           |
| Fatigue Strength (load frequency 90 Hz), cured 20 min @ 100°C |  |                               |  |
| Fatigue Limit Load  |  |                               |  |
|   | <u>(% of Shear Strength)</u>               | <u>Cycles to Failure</u>      |  |
|   | 50%  | 1,000 – 10,000                |  |
|   | 40%  | 10,000 – 100,000              |  |
|   | 30%  | 100,000 – 1 million           |  |
|   | 20%  | 1 million – 10 million        |  |
|   | 15%  | >10 million                   |  |
| Roller Peel Strength  |  | 28 pli                        | ISO 4578                                   |
| Water Absorption (% weight gain)                              |  |                               |  |
| 24 hour immersion @ 25°C                                      |  | 0.8%                          |  |
| 30 minute immersion @ 100°C                                   |  | 1.3%                          |  |
| Water vapor permeability (1mm thick film)                     |  | 16g/m <sup>2</sup> / 24 hours |  |
| Electrolytic Corrosion  |  | A-A/B1.2                      | DIN 53489                                  |
| Glass Transition Temp. (Tg)                                   |  | 113°F (45°C)                  | ASTM D-648                                 |
| Coefficient of Thermal Expansion (CTE)                        |  |                               | ASTM E-831                                 |
| Below Tg / Above Tg   |  | 45 ppm/°C / 85 ppm/°C         |  |
| Dielectric Strength @ 50 Hz & 25°C                            |  | 26 kV/mm                      |  |
| Dielectric Constant @ 25°C                                    |  |                               | ASTM D-150                                 |
| @ 50Hz / @1 KHz / @10 KHz                                     |  | 3.4 / 3.2 / 3.2               |  |
| Loss tangent @ 25C  |  |                               | ASTM D-150                                 |
| @ 50Hz / @1 KHz / @10 KHz                                     |  | .026 / .018 / .017            |  |
| Thermal Conductivity  |  | 0.22 W/mK                     |  |

**NOTE** : Most Typical Properties determined using EpoPro® 100A/B cured for for 16 hours @ 40°C and/or tested at 25°C unless otherwise stated. Values are based on laboratory or average production results – not for specification purposes.

## SUGGESTED PROCESSING GUIDELINES

EpoPro® 100A/B can be applied by stiff brush, roller, squeegee, knife, or spatula. It is also suitable for meter-mix dispensing and can be supplied in dual syringes cartridges for use with static mixing nozzles.

Weigh Part A and Part B in the recommended ratio as accurately as possible into a clean mixing container. Always use weighing equipment having accuracy in proportion to the amounts being weighted. Blend by using a spatula or stirring stick for 1-2 minutes using a kneading motion. Scrape the bottom and sides of the mixing container carefully and frequently to produce a uniform mixture.

Apply the adhesive to clean, dry surfaces. Allow to cure before handling. See chart above to determine the minimum time required at the ambient temperature to achieve enough strength for parts to be handled. Often 500 – 1000 psi is enough for simple handling, but do not subject parts to impact or large stress prior to full curing. For the highest strength bonds or for improved chemical or heat resistance use a heat cure or allow to cure at room temperature then post cure for 10 – 20 minutes at 100°C.

## STORAGE GUIDELINES

Store this material in a clean, cool and dry environment in its tightly closed original container. Products may settle during storage and should be thoroughly re-mixed prior to use. Avoid extended exposure to high humidity. Tightly re-seal after use. If the recommended storage conditions are observed the products will have a minimum shelf-life of 12 months from the date of shipment.

## HANDLING PRECAUTIONS

Mandatory and recommended industrial hygiene procedures should be followed whenever these products are being handled and processed. For additional information please consult the corresponding material safety data sheets.

## PERSONAL HYGIENE

### EpoPro® 100A

**CAUTION!** May cause eye irritation. Prolonged or repeated skin contact may cause irritation, may cause allergic skin reaction. Harmful if inhaled or swallowed. Avoid contact with eyes, skin, or clothing. Wear eye protection and impervious gloves when handling. Wash thoroughly after handling. Avoid breathing vapor or mist. Keep containers closed when not in use. Use only with adequate ventilation. Do not take internally.

### EpoPro® 100B

**WARNING!** Causes skin and eye irritation. May cause allergic skin and respiratory reactions. Harmful if inhaled or swallowed. Do NOT get in eyes, on skin, or clothing. Wear chemical splash goggles and impervious gloves when handling. Wash skin and clothing thoroughly after handling. Avoid breathing vapor or mist. Use only with adequate ventilation. Keep containers closed when not in use. Do NOT take internally.

## FIRST AID

In case of contact:

**Skin** – Immediately wash skin thoroughly with mild soap and water. Remove contaminated clothing and wash before reuse. Destroy contaminated shoes and other articles made of leather.

**Eyes** – Immediately flush eyes with plenty of water for 15 minutes and get prompt medical attention.

**Inhalation** – Remove person to fresh air. Administer oxygen or artificial respiration if necessary. Call a physician.

**Ingestion** – Do not induce vomiting. Dilute with plenty of water and contact physician immediately. Never give anything by mouth to an unconscious person.

# Product Datasheet



## **DISCLAIMER**

**IMPORTANT:** The following supercedes Buyer's documents. **SELLER / MANUFACTURER MAKES NO REPRESENTATION OR WARRANTY, EXPRESS OR IMPLIED, INCLUDING OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** No statements herein are to be construed as inducements to infringe any relevant patent. Under no circumstances shall Seller / Manufacturer be liable for incidental, consequential or indirect damages for alleged negligence, breach of warranty, strict liability, tort or contract arising in connection with the product(s). Buyer's sole remedy and Seller's sole liability for any claims shall be Buyer's purchase price. Data and results presented are based on controlled or laboratory work and must be confirmed by Buyer by testing for its intended conditions of use. The product(s) has not been tested for, and is therefore not recommended for, uses for which prolonged contact with mucous membranes, abraded skin, or blood is intended; or for uses for which implantation within the human body is intended.

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