

EpoPro[®] 202-A/B

LOW OUTGASSING URETHANE CONFORMAL COATING

Ultrane 785A/B is a variant of the popular Arathane 5750A/B(LV) produced by Huntsman Advanced Materials. The Ultrane 785A/B is produced from the Arathane 5750A/B(LV) and is designed to yield the cured properties as the Arathane 5750A/B(LV) with the added benefit of a longer open time and significantly improved resistance to crystallization of the A-side.

Ultrane 785A/B when cured produces a soft elastomeric, repairable, urethane coating designed specifically for insulating printed circuit boards and electronic components. Ultrane 785A/B exhibits excellent reversion resistance under heat and high humidity conditions and displays very low outgassing properties critical for applications in outer space and high vacuum environments.

Many variations on the standard Ultrane 785A/B(LV) system are available upon request, including custom colors, alternate worklives & curing speeds, modified viscosities, and many other special properties. Please contact us to discuss your application if you think such a variant would be helpful for your application.

APPLICATIONS & BENEFITS:

- Conformal Coating of military, aerospace, and other high performance PWBs
- Excellent Mechanical & Dielectric Properties
- Can be applied by spray, dip, & brush
- Low Modulus for low stress on embedded components
- Base system for producing low outgassing, filled adhesives and coatings.
- Meets NASA outgassing requirements
- Repairable
- Meets Mil spec MIL-I-46058C type UR & IPC CC 830 Type UR class 3 requirements

HANDLING PROPERTIES		<u>VALUE</u>	<u>TEST METHOD</u>
Visual Appearance, Part A		Clear yellow to orange liquid	
Density, Part A		1.20 g/cm ³	ASTM E-201
Viscosity, Part A, @ 25°C		50 cps	ASTM D-2393
Percent Solids (non-volatile %)		90% ± 3%	
Visual Appearance, Part B		Clear to translucent liquid	
Density, Part B		0.92 g/cm ³	ASTM E-201
Viscosity, Part B, @ 25°C		600 cps	ASTM D-2393
Percent Solids (non-volatile %)		82% ± 3%	
Density Mixed, g/cm ³		1.00 g/cm ³	ASTM E-201
Viscosity Mixed @ 25°C		550 cps	ASTM D-2393
Mix Ratio By Weight (By Volume)		18A:100B (15.6A:1000B)	Calculated
<u>Processing Temp.</u>	<u>Gel time</u>	<u>Tack Free time</u>	<u>Full Cure time</u>
25°C	4 hours	24 hours	7 days
65°C	60-90 minutes	3 - 4 hours	10 - 12 hours
100°C	30-45 minutes	2 – 2.5 hours	6 hours
125°C	20–30 minutes	1 – 1.5 hours	2 hours

PHYSICAL PROPERTIES		
	VALUE	TEST METHOD
Color	Translucent, light yellow to amber	Visual
Shore A Hardness	50	ASTM D-2240
Tensile Strength, psi	350 psi	ASTM D-638
Tensile Elongation at break	>150%	ASTM D-638
Glass Transition Temp. (Tg)	<-70°C	ASTM D-648
Coefficient of Thermal Expansion (CTE):		ASTM E-831
Below Tg / Above Tg	100 ppm/°C / 180 ppm/°C	
Maximum Suggested Continuous Use Temperature:	130°C	
Fungus Resistance	Non-Nutrient	Mil-I-46058C
Outgassing:		ASTM E-595
Total Mass Loss (TML) %	0.41%	
CVCM %	0.03%	
WVR %	0.01%	
Dielectric Strength @ 3 mil	>1500 V/mil	Mil-I-46058C
Insulation Resistance, ohms	>1.0 x 10 ¹⁵ ohms	Mil-I-46058C
Dielectric Constant @ 25C		ASTM D-150
@ 1 k Hz / 100 KHz	2.5 / 3.0	
Dielectric Constant @ 100C		ASTM D-150
@ 1 k Hz / 100 KHz	3.6 / 3.2	
Loss tangent @ 25C		ASTM D-150
@ 1 k Hz / 100 KHz	0.022 / 0.025	
Loss tangent @ 100C		ASTM D-150
@ 1 k Hz / 100 KHz	0.024 / 0.027	
Thermal Conductivity	0.22 W/mK	

NOTE : Values are based on laboratory or average production results – not for specification purposes.

SUGGESTED PROCESSING GUIDELINES:

To use, weigh Part A and Part B in the recommended ratio as accurately as possible into a clean mixing container. Mixing containers should preferably be made of polypropylene, polyethylene, glass, or non-corroding metal. (Stainless steel, aluminum, etc.). Always use weighing equipment having accuracy that is ±1% or less of the smallest quantity that you will be weighing. Blend Part A & B thoroughly by using a spatula or stirring stick for at least 2-3 minutes using a kneading motion. Scrape the bottom and sides of the mixing container carefully and frequently to produce a uniform mixture. Vacuum de-gassing after mixing may be helpful, but is often not necessary when working with the Ultralane 785 system.

Apply the coating to clean, dry surfaces. Two or more coats must be applied for optimum protection of parts. Allow enough time for each application to gel prior to applying the next layer. Allow solvent to escape at ambient temperatures for 15-30 minutes prior to elevated temperature curing. This will minimize bubble entrapment. An alternative to air drying or curing between layers is to place board in a 15-30mm Hg Vacuum for 5-10 minutes for a dense, bubble-free coating. Suitable application methods include brushing, dip coating, curtain coating and spraying.

Spraying Guidelines:

Some high pressure spray systems are able to apply the high-solids Ultralane 785A/B as supplied and in layers of as much as 8 mils thickness per pass. For conventional sprayer, for use in air brushes or to obtain a lower build per pass, Ultralane thinner can be added to reduce the viscosity of the coating. Start by adding 20 part by weight (pbw) of Ultralane thinner to 100 pbw of the mixed Ultralane 785A/B and incrementally add additional thinner as needed. For ease of handling, the thinner can be pre-mixed with the 785B prior to mixing with the 785A and the thinner-785B mixture can be stored for extended periods if tightly capped and kept in a flammable cabinet. Levels of up to 150 pbw Ultralane thinner to 100 pbw mixed 785A/B can be used, but at levels higher than 50 pbw thinner per 100 pbw of the system the coating should be allowed to air dry for at least 1-2 hours prior to heat curing or should be dried at 30°C - 40°C for a minimum of 30 minutes prior to higher temperature curing.

Dip Coating Guidelines:

Thoroughly mixed Ultralane 785A/B can be used as-is for dip coating or can be thinned with Ultralane thinner to control coating thickness. Coating thickness depends upon amount of thinner added. With no thinner coating thickness of about 2-3 mils per dip are typically achieved. With 20 parts by weight (pbw) of Ultralane thinner to 100 pbw mixed 785A/B the each dip coating layer will typically be 1 – 1.5 mils in thickness. For best results, allow mixed 785A/B or 785A/B + thinner to stand for 15-30 minutes prior to using. This time period will allow for bubbles to dissipate rather than being deposited on your circuit board. Vacuum degassing can eliminate the need for this step and higher levels of thinner will shorten the time required for all the bubbles to rise and break. If using high levels of thinner (≥ 50 pbw thinner per 100 pbw 785A/B), the coating should be allowed to air dry for at least 1-2 hours prior to heat curing or should be dried at 30°C - 40°C for a minimum of 30 minutes prior to higher temperature curing.

Stripping / Removal:

Uncured or partially cured Ultralane 785A/B can be removed with acetone, MEK, Ultralane Thinner, or other solvents. Fully cured Ultralane 785A/B may be removed using the following mechanical or chemical methods.

Mechanical removal: Due to the soft, flexible nature of cured Ultralane 785A/B, it may be easily cut with a sharp knife and then scraped or peeled from component leads, solder pads, and devices. Desolder and remove components, lightly sand down rough edges of intact coating, and wipe repair area clean with fresh isopropyl alcohol. Allow to dry 15 minutes then replace component and solder in place. Wipe clean all solder flux with cloth dipped in isopropyl alcohol and allow to dry at least 15 minutes at 80°C. Mix fresh Ultralane 785A/B per instructions and apply to repair area with a clean, dry, acid brush or equivalent, making sure that fresh coating overlaps the intact coating. The repaired board may be put back into service after a 6 hour cure at 100°C (or alternative cure schedule).

Note: This procedure is not advised for other than field or temporary repair. Using a sharp knife to scrape the coating may also cause damage to the printed circuit board, circuitry, or other components.

Chemical removal Use Ultralane Stripper A/B for selective or total removal of cured compound. **Important:** Laboratory tests indicate that if suggested procedures are followed, there will be little or no adverse effects to the printed circuit board or components. However,

since each application is different, users should test a representative board that has been coated and fully cured to determine deleterious effects of stripper.

Localized chemical removal: Prepare printed circuit board by masking off area to remain intact. If possible, dam off repair area beyond component level to prevent the stripper from spreading to unwanted areas. Using an acid brush, apply generous amounts of Ultralane Stripper A/B over components in repair area. Do not allow to dry. Keep applying stripper until coating starts to swell and flake off (approximately 5–10 minutes). While keeping repair area saturated, periodically brush away loosened coating. If necessary, a blunt tool may be used to remove thick sections of coating. After 20 minutes exposure to stripper, drain board and allow to dry. Scrape away any loose coating close to or under components. If further cleaning is necessary, apply fresh stripper and repeat process for an additional 15 minutes. Follow same procedure for underside of board. Remove masking/damning materials and replace defective parts. When removing part, scrape away any coating remaining beneath it prior to replacing. Remove flux and wash area with deionized water. Dry with isopropyl alcohol and dry board 2 hours at 80°C. Apply fresh Ultralane 785A/B and follow recommended cure schedules.

Total coating removal: Place board into a container of Ultralane Stripper A/B . Agitation will increase stripper efficiency. For safety reasons, using Ultralane Stripper A/B at room temperature is preferable, but with proper ventilation and fire/explosion proof equipment heating the stripper up to as much as 50°C is possible and will reduce the time required to remove the coating. At room temperature, leave the circuit board in the Ultralane Stripper for 15 minutes. The coating will swell and start to fall off the board. Brush board with stiff brush periodically while in bath. Remove PCB from stripper and inspect board after 15 minutes. Brush or scrape away any remaining coating. For thick or very old/oxidized coating sections, an additional immersion soak/brushing in fresh Ultralane Stripper may be necessary.

When coating is removed, replace defective components. Clean board with deionized water and isopropyl alcohol washes. Dry board for 2 hours at 80°C. Remove as much remaining coating as possible, although any unremoved coating will not adversely affect board performance. New Ultralane 785A/B coating will encapsulate the old coating to seal and protect the board and components. Follow directions for applying and curing the Ultralane 785A/B. (LV).

Note: Effectiveness of Ultralane Stripper A/B will decrease with use. See separate Ultralane Stripper technical datasheet & MSDS for additional usage and handling instructions. Do not use if amber color or other contaminants become visible. Use only explosion-proof equipment. Keep away from flame and sparks.

STORAGE GUIDELINES:

Store this material in a clean, cool and dry environment in its tightly closed original container. Store away from Fire, sparks, and heat. Protect the Ultralane 785A from extended exposure to temperature below 15°C (59°F). Crystallization may occur if the 785A is exposed to clod for extend periods. If this occurs, heat the entire container of 785A for 4 horus at 50°C to re-liquefy the crystals. Allow to cool to ambient temperature prior to using. Also protect the 785 & B from exposure to moisture or high humidity. Tightly re-seal containers after use and blanket with dry nitrogen or another dry inert gas if available. 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:

Ultralane 785A

WARNING! Flammable, contains organic isocyanate May cause severe eye & skin irritation. Prolonged or repeated skin contact or inhalation of vapors may cause allergic skin or respiratory reactions. 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. Keep away from fire, sparks, or heat. Use only with adequate ventilation. Do not take internally.

Ultralane 785B

WARNING! Flammable. May cause severe eye & skin irritation. Prolonged or repeated skin contact or inhalation of vapors may cause allergic skin or respiratory reactions. 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. Keep away from fire, sparks, or heat. Use only with adequate ventilation. 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.

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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