Advanced Materials
Electrical Insulation Materials

DATA SHEET

Arathane â 5750-A/B (LV)

Urethane Conformal Coating

General

Arathane 5750-A/B (LV) is a translucent, soft, repairable, two-component urethane system designed specifically for insulating printed circuit boards and electronic components.

Arathane 5750-A/B (LV) exhibits excellent reversion resistance under heat and high humidity conditions. As a cured coating, this material displays very low outgassing properties critical for applications in outer space and high vacuum environments.

Applications

Protective coating for printed wiring boards
Dip, spray, and spread applications

Advantages

Low outgassing
Repairable
Low modulus
Mil spec MIL-I-46058C approved
IPC CC 830 Amendment 1 Type UR class 3 approved

Typical Properties*

Arathane 5750 A	
Viscosity, cPs	50
Specific gravity, g/cm^3	1.21
Flash point, open cup, °C	7
Percent solids	90 ± 3
As supplied form	Amber Liquid

Arathane 5750 B (LV)	
Viscosity, cPs	600
Specific gravity, g/cm^3	0.92
Flash point, open cup, °C	17
Percent solids	82 ± 3
As supplied form	Translucent Liquid

* Typical properties are based on Huntsman's test methods. Copies are available upon request.

Packaging & Storage

Arathane 5750-A/B (LV) are flammable liquids. These materials are moisture sensitive and should be stored in a dry place and, whenever possible, in the tightly closed original containers at 25°-40°C. Under these conditions, shelf life will be 6 months from the day of shipping. Partial containers should be resealed using dry nitrogen or argon. Contact Customer Service for packaging information.

System Preparation

The printed circuit board or electronic circuitry should be clean and free of grease, dirt, or other contaminants. Although solvent cleaning is generally sufficient, if excess flux is evident, techniques such as vapor degreasing may produce better cleaning. Arathane 5750 A/B (LV) may be sprayed or applied by dipping.

For Teflon™ coated wires and other Teflon™ surfaces, abrade with non-chlorinated steel wool and etch with sodium before applying customized adhesion agents or primers. Allow all coated surfaces to dry completely prior to applying Arathane 5750 A/B (LV).

Exposure of Part A to low temperatures for prolonged periods may cause crystallization. Part A must be reliquified by heating to 50°C (120°F) maximum. **DANGER! Do Not heat above 50°C! Extreme Explosion and Fire Hazard.**

Heat Part A until clear amber solution is achieved. Remove container from oven. Do not disturb contents. Allow to cool to 25-40°C in a controlled environment; do not force cool.

Measure height of the precipitate from outside of bottle. Do not use if level of precipitate is above 3/8 inches (0.6 cm), or if liquid remains cloudy or contains gelled particles. Contact our Customer Service Department with lot number, date received and condition of bottle.

Material is ready for use if level of precipitate is below 3/8 inches. Do not agitate. Slowly decant clear resin out of the bottle without disturbing the precipitate. Enough material has been packaged to allow for any precipitate and to assure sufficient Part A. For best results, filter Part A through nylon tricot, 10-25 micron size.

Use entire bottle so remaining material will not be contaminated with moisture. If this is not possible, any remaining material must be well blanketed with dry nitrogen or argon and the cap tightened securely. Store at 25-40°C for best long-term stability.

Mixing

Container should be plastic, glass, or metal. Paper and wooden containers or utensils are not recommended because of high moisture content.

Weigh Part B into container first. Add Part A to container. (Do not use Part A if precipitate level is greater than 3/8 inches.)

Slow machine mixing or hand stirring will minimize air entrapment. Complete and thorough mixing of Parts A and B is essential for optimum end properties.

A brief vacuum may be applied to remove bubbles; however, some solvent will also be removed. Vacuum should be equipped with solvent trap to prevent damage to pump.

Mix ratios

	Parts by weight
Arathane 5750 A	18
Arathane 5750 B (L V)	100

Processing

Initial viscosity, cPs 550

Pot life at 25ºC (100g), hours 2

Recommended cure times*

Temp., °C	Gelation (min)	Tack free (hours)	Full cure (hours)
25	120	24	7 days
65	45	2	9
100	25	1.5	4
125	15	1	2

* Above data was generated on two coatings of 1.5 mil (3.8 x 10^{-2}mm) each, dip-applied on epoxy laminate printed circuit boards. High component density boards may require slightly longer cure schedules. Maximum insulating resistance, interfacial adhesion, and protection from corrosion are obtained with heat curing.

Spraying

Some spray systems are able to apply the high-solids Arathane 5750 A/B (LV) as received to provide up to 8 mils thickness per pass.

For most conventional spray systems, a viscosity of 100-250 cP is desired. To dilute Arathane 5750 A/B (LV) for optimum spraying viscosity, use 5750 Thinner.

Suggested procedure for reducing viscosity of Arathane 5750 A/B (LV):

- To 100 pbw of Arathane 5750 B (LV) add 20 pbw of 5750 Thinner, mix well.
- To above mixture add 18 pbw of Arathane 5750 A, mix well.

Spray equipment manufacturers:

- Zicon, Mount Vernon, NY – airless inert carrier system
- Binks, Franklin Park, IL – conventional air system
- DeVilbiss, Toledo, OH – conventional air system

Dipping

Arathane 5750 A/B (LV) must be thinned with 5750 Thinner to control coating thickness. Coating thickness depends upon amount of solvent added to reduce viscosity and dipping rate. To achieve a one to one and one-half (1 – 1.5) mil thickness (2.5-3.8 x 10-2mm) coat per dip, reduce mixed viscosity to approximately 100 cPs. (Refer to previous recommendations for reducing viscosity).

Allow mixture to stand 15-30 minutes for bubbles to dissipate. A suggested solvent blend is recommended above. Adjust dipping rate to achieve desired thickness. This allows for complete wetting of all surfaces and minimizes run-off during cure.

Multiple applications

Two or more coats must be applied for optimum protection of parts. Allow enough time at curing temperature for each application to gel. 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 15-15mm Hg Vacuum for 5-10 minutes for a dense, bubble-free coating.

Removal

Note: Cured Arathane 5750 A/B (LV) conformal coating may be removed from the printed circuit board using the following mechanical or chemical methods.

Mechanical removal

Due to the soft, flexible nature of cured Arathane 5750 A/B (LV), 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. 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 80ºC before recoating.

Mix fresh Arathane 5750 A/B (LV) 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 4 hour cure at 100ºC (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.

The cured coating may be burned through directly with a soldering iron if only the solder joints are involved. Any coating on the leads may be easily sliced with a razor knife to facilitate part removal. Remove the burned residue and sand smooth rough burned edges of intact coating. Wipe away debris and solder new part in place. Remove dirt/resin flux with clean cloth dipped in isopropyl alcohol. Dry for 30 minutes at 65–80ºC before recoating. Mix fresh Arathane 5750 A/B (LV) and apply a thin coat over repair area. Make sure to overlap original coating. Cure 4 hours at 100ºC (or see alternative cure schedules).
Note: Toxic gases from burning cured urethane systems may be evolved. Perform this procedure only in well-ventilated areas.

Chemical removal

Use our Arathane 5750 Stripper 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 up repair area beyond component level to prevent 5750 Stripper from spreading to unwanted areas.

Using an acid brush, apply generous amounts of 5750 Stripper 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 80ºC. Apply fresh Arathane 5750 A/B (LV) and follow recommended cure schedules.

Total coating removal

Place board into a container of 5750 Stripper. Agitation will increase stripper efficiency. For safety reasons, use 5750 Stripper at room temperature. (Heating up to 50ºC in a laboratory hood environment will reduce time to remove coating.) Leave board in 5750 Stripper bath for 15 minutes. The coating will swell and start to fall off the board. Brush board with stiff brush periodically while in bath. Remove and inspect board and brush or scrape away any remaining coating. For excessively thick areas, an additional

soak/brushing in fresh 5750 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 80ºC. Remove as much remaining coating as possible, although any unremoved coating will not adversely affect board performance. New Arathane 5750 A/B (LV) coating will encapsulate the old coating to seal and protect the board and components. Follow directions for applying and curing Arathane 5750 A/B (LV).
Note: Effectiveness of 5750 Stripper will decrease with use. Do not use if amber color or other contaminants become visible. Use only explosion-proof equipment. Keep away from flame and sparks.

Physical Properties (typical values)

Hardness, Shore A*	50
Tensile strength, psi (N/mm^2)	350 (2.4)
Elongation, %	150
Tg, °C	< -70
Fungus resistance	Non-nutrient
Maximum continuous use temperature, °C	130
Flame resistance	Self-extinguishing
Flexibility	No cracking/crazing
Outgassing at 10^{-6} Torr	
Total Mass loss, %	0.41
Collectible volatile condensable materials, %	0.03

* Data obtained from cast specimens of 100% solids version of Arathane 5750 A/B (LV)

Electrical Properties (typical values)

Insulation resistance, Ω	> 1.0×10^{15}
Volume resistivity, ohms-cm	
@ 25°C	9.3×10^{15}
@ 95°C	2.0×10^{13}
Dielectric strength,	
3mil thickness, V/mil	> 1,500
7.5×10^{-2}mm thickness, V/mil	> 59,000
Dielectric constant	
@ 25°C, 1 KHz (100 KHz)	2.5 (3.0)
@ 100°C, 1 KHz (100 KHz)	3.6 (3.2)
Dissipation factor	
@ 25°C, 1 KHz (100 KHz)	0.022 (0.025)
@100°C, 1 KHz (100 KHz)	0.024 (0.027)
Percent change in Q resonance, %	
1 KHz (50 KHz)	4.5 (3.1)
Moisture resistance, Ω	8.2×10^{11}

Handling/Safety Precautions

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

Arathane 5750 A/B (LV)
Warning! Flammable. Contains organic isocyanate. Causes severe eye and skin irritation and possible eye burns. Vapor or mist harmful if inhaled. Harmful if swallowed. May cause allergic respiratory reaction.

Work in a well ventilated area and use clean, dry tools for mixing and applying. For two component systems, combine the resin and hardener according to mix ratio. Mix together thoroughly and use immediately after mixing. Material temperature should not be below 65°F (18°C) when mixing.

First Aid

In case of contact:

Eyes: Immediately flush with water for at least 15 minutes. Call a physician.

Skin: Immediately wash with mild soap and water.

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

Ingestion: If conscious, give plenty of water to drink. Call a physician.

Other: Referral to physician is recommended if there is any question about the seriousness of an injury

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Note

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Huntsman Advanced Materials Americas Inc.
281 Fields Lane
Brewster, New York 10509
Tel.: (914) 785-3000
Fax: (914) 785-3472

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