

Viscosity (RT = 25C or 72F)	Main component SPSR-950 C-20 is 280 poise at 25C. Additive SH-250B C-20 is 60 poise at 25C. After mixed, viscosity is 220 +/- 20 poise at 25C. Viscosity as a function of temperature is tabulated below.
Thixotropic index	1.20 to 1.40 (after it is mixed)
Hold time	The hold time is tabulated as a function of viscosity below.
Machinability	Acceptable
Hardness (pencil)-JIS-D-0202	> 6H
Adhesion-JIS-D-0202	100/100. Passed crosscut hatch test.
Heat resistance (solder bath)	Passed three times floating at 260C for 10 seconds.
Insulation resistance	1 x 10 ¹³ Ohms as received
Moisture and insulation resistance (pattern B-25A)	Class T: 1 x 10 ¹² Ohms: 65C / 90%RH for 24 hours Class H: 1 x 10 ¹¹ Ohms: 40C / 85%RH for 7 days
Electrochemical migration (pattern B-25B)	Class T: < 1 decade drop: 85C / 85%RH for 500 hours Class H: 2 x 10 ⁸ Ohms: 85C / 85%RH for 168 hours
Dielectric constant (at 1 MHz)	2.8 as received 3.5 at 55C and 95% RH for 96 hours.
Dielectric loss/Tan (at 1 MHz)	0.025 as received 0.032 at 55C / 95% RH for 96 hours.
Dielectric strength	2.0 KV/mil
Solvent resistance	IPA passed for 60 minutes at room temperature. 75% IPA + 25% water passed for 24 minutes at 46C
Chemical resistance 10% HCl, 10% H ₂ SO ₄ , 3% NaOH	Passed for 30 minutes at room temperature
Immersion in boiling water	Passed for 2 hours
Gold plating	Electro-gold plating at 40C at 1.0 Amps/dm ² for 5 min. Nickel/Gold plating, Ni 3 microns, Au 0.05 microns
Pressure cooker test-JIS-D-0202	Passed at 121C at 2 atmosphere for 4 hours.
Flammability (UL approved)	UL 94V-0
Thermal shock (Item 3.9.3)	Passed at 65C for 15 min. at 125C and 15 min. for 100 cycles.
Shelf life Unmixed state Mixed state	9 months after delivered when stored at 20C (65F). 24 hours.

Viscosity as a function of temperature **Viscosity as a function of hold time**

Temp (C)	Viscosity (Poise)	Hold Time (hours)	Viscosity (Poise)
15	400		
20	300	0	220
25	220	24	250
30	160		
35	120		

V. Process Procedures

1. Preparation of the Solder Mask

- Add 200 grams of specified additive (SH-250B C-20) to 800 grams of specified base (950 C-20).
- Thoroughly mix up both components. This will result in the mask having a viscosity of 220 poise. A lower viscosity can be realized by adding a small quantity of PMA solvent. The viscosity can be reduced 20 – 30 poise by adding 1% PMA.
- Shelf life is 24 hours after initial mixing.

2. Application of the Solder Mask

- In screen-printing, the viscosity of the mask should be 200 - 240 poise at 25C. A polyester or stainless steel screen of 100-180 mesh is recommended.
- The bare board should be polished and dried thoroughly by either pumice or Aluminum oxide scrubbing.
- The solder mask should be applied to give a dried thickness of 15-20 microns. A coating greater than 25 microns may give rise to tackiness and under cut problems. A thickness less than 10 microns will make the mask more sensitive to heat and chemicals and overall increase general exposure sensitivity.
- If hole plugging is done, then the LPI should be pushed through the holes, so that it can be seen coming out of the back side. If the holes are not filled, then air will be trapped, causing the LPI “caps” to explode during heat curing later. We recommend holding the boards for 30 min to 3 hours before tack dry, if the holes are filled. This will allow some of the solvents to escape out of the holes.

3. Pre-cure (tack dry)

- This procedure condition is very critical to the development process and finished surface.
- Optimum drying conditions are to be used to evaporate the solvent out of the mask. In a conventional oven, a tack time of 20 -30 minutes at 176F (80C) is recommended for thermal ovens for a thickness of 15 to 20 microns. Please confirm temperature with temperature dots. For double sided boards, the first side is to be dried for 10-15 minutes (176F). The other side is to be dried for 20-25 minutes (176F).

Note: Poor ventilation or poor drying will cause the surface to become matted.

4. Exposure

- The solder mask is to be exposed by a super high-pressure mercury vapor lamp.
- The light energy setting is 200 – 300 mJ / cm² for the C-20 version.
- The object is to get in the 10-12 range on the Stouffer 21 step tablet, on copper.

5. Development

- The exact development time will depend on the actual developer and this varies from machine to machine. However, in screen applications, a breakpoint of around 30-40% (lower for high ink volume) is recommended.
- Typically, a 1% carbonate (Potassium carbonate based developer) is used at 30C under a pump pressure of 1.5 to 2.5 Kg/cm² (20-40 psi). A 20-micron thick mask should develop in 60-90 seconds for screen applications and 30 seconds for coating and spray applications.
- The breakdown of developing solution is about 100 grams of mask per liter of working solution.
- Water rinsing after development is needed with a recommended pressure of 1-1.5 Kg/cm² (15-20 psi) for 45-60 seconds.
- Florida CirTech has a variety of potassium carbonate based developers with and without cleaners to minimize down time and scale build up (DV200, DV205 and ACT2070). In addition, Florida CirTech also sells very compact and precise feed and bleed control units based on pH.

Note: The solder mask surface is vulnerable to scratching before final cure.

6. Final cure

The final cure should be as follows:

IR baking - 10 minutes at 338F (170C)
Thermal oven bake - 1 hour at 300F (150C)

VI. Analysis

Not applicable.

VII. Safety and Storage

Do not store in direct sunlight, high temperature or below freezing. **Store in original uncontaminated container.**

VIII. Waste Treatment

Not applicable.

IX. Miscellaneous

Packaging. The main component comes in a small metal container that holds 800 grams of material. The additive comes in a plastic jar that contains 200 grams of material. Consult MSDS sheet for additional information.

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