

Avian-B Coating

**Instruction and Information Packet
Preparation and Application Notes:**



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Avian-B coating pre-mix is a concentrate for the production of Avian-B coating. The pre-mix consists of analytically pure barium sulfate, binder, distilled water, and coating dispersant agents. Instructions for mixing and application should be followed closely to assure the best final product.

Preparation and Application Notes for Avian-B Coating

Avian-B coating pre-mix is a paste-like concentrate for the production of Avian-B coating. The pre-mix consists of analytically pure barium sulfate, binder, distilled water, and coating dispersant agents. Instructions for mixing and application should be followed closely to assure the best final product.

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USE ONLY GLASS OR STAINLESS-STEEL VESSELS FOR MIXING. DO NOT USE ALUMINUM VESSELS FOR MIXING – THEY WILL DEGRADE THE PERFORMANCE OF THE COATING.

IMPORTANT - DO NOT USE ANY ALCOHOL THAT CONTAINS EITHER AROMATICS (SUCH AS BENZENE, TOLUENE, OR XYLENES) OR 2-BUTANONE (METHYL ETHYL KETONE OR MEK).

MIXING MATERIALS

- Avian B Pre-Mix
- Distilled Water (Distilled or Distilled/Deionized)
- Alcohol:
 - Alcohols acceptable for dilution: (in order of acceptability)**
 - Preferred – SDA-3A (95% ethanol, 5% methanol)
 - USP Grade 95% ethanol (95% ethanol, 5% water)
 - 100% ethanol (non-denatured)
- Mixer (not a blender) or extra polypropylene bottle – rinse/wipe out with alcohol prior to use. (See Appendix)
- Viscosity Cup (see Appendix)
- pH testing materials (strips or tester)

MIXING INSTRUCTIONS

All mixing should be performed in either stainless steel or glass vessels. Instructions are for a 1-liter bottle of pre-mix. If pre-mix is supplied as a ½ liter bottle, adjust liquid amounts proportionally. The coating should be at room temperature or, desirably, about 100-110°F for mixing.

Method A – Mixer Method (Not a blender)

At room temperature (20-30°C), shake the room-temperature bottle of pre-mix for several seconds to coarsely mix the slurry, then pour the contents into the mixer bowl. The bottle may be rinsed with a small amount of distilled water ($\leq 50\text{mL}$) to remove the remnants, and the water added to the bowl. Start the mixer at a slow speed and slowly add about 500mL of alcohol (adjust amount if using size other than 1 Liter). Slowly increase speed (but not as high as “whip” setting) and allow to mix until uniform (approximately ≤ 1 minute). Add a mixture of 50% ethanol/50% distilled water to complete the dilution. The mixture should be similar in consistency to that of heavy cream. Proceed to viscosity testing section below.

Note: Do not use a blender* – it may create an emulsion of the coating and air that will not only have a very high viscosity but will also lower the performance of the coating.

Note: Once coating is heated Do Not reheat it a second time.

Method B- Propeller Stirrer Method

Place the desired amount of pre-mix in a stainless steel, glass or plastic container at room temperature (or up to 110°F/43°C). With the stirrer at medium speed, slowly add alcohol in the amount of half the original volume of the coating. The coating should resemble heavy cream at this point and the solids should not separate quickly when the stirring is stopped. Add a mixture of 50% ethanol/50% distilled water to adjust the viscosity to that required by your spraying equipment.

(This is the method used at Avian Technologies to prepare Avian-B for spraying)

Viscosity Testing

Test for viscosity using either a Wagner (See Appendix) or a Zahn #3 viscosity cup (See Appendix).

- Wagner viscosity should be 13-14 seconds;
- Zahn #3 cup 7-8 seconds.

If the viscosity is too high, add alcohol in small increments and re-test until the viscosity is correct. Proceed to pH testing.

pH Testing

The pH of the coating should be checked at this point. The pH should be no lower than 5.5 nor higher than 8.5. Coating with a pH of below 5 or above 9 will slowly attack aluminum parts and cause a reduction in reflectance over time.

Storage/Handling

Once the coating is mixed, it has a shelf life of 3-4 weeks if stored in clean, brown glass bottles. If the coating is allowed to sit more than a few hours, it should be re-blended and the viscosity adjusted If necessary.

SURFACE PREPARATION OF PARTS FOR SPRAYING

The substrate must be clean and oil free. It is advisable to wash the substrate in water and detergent, followed by an alcohol rinse to remove any traces of coating release agents that will degrade the adhesion and reflectance of the coating. If possible, the surface should be roughened by sand- or bead-blasting before cleaning. If blasting is impractical, the product BIN (see Appendix) may be used to improve adherence of coating to substrate.

Masking Techniques

Mask sections of parts not to be coated using masking tape or die-cut masking tapes. Larger areas, like the exterior of spheres, may be protected by taping paper towels over the exterior.

MATERIALS / EQUIPMENT

Standard and Large Parts (See Appendix for Examples)

- High-volume / low-pressure (HVLP) spray gun
- Air compressor capable of delivering 35 PSI to the spray gun (90psi at compressor)
- Air hose
- Line filter (to remove moisture and oils from compressed air)
- Very Small Parts Airbrush assembly
For all parts
- Paint filter for removing particles if seen when testing the spray pattern

If the above equipment for standard and large parts is not available, a spray gun for application of house paint such as a Wagner Power Painter™ may be used, but this is not the preferred equipment.

SPRAYING TECHNIQUES

- Visual presentation of this section coming soon to <http://www.aviantechologies.com>
- Test the spray pattern before spraying parts. The pattern should be ≤18cm high.

- If particles appear while spraying the test pattern, strain the coating through a mesh paint filter and re-test.
- Apply the coating approximately 20 coats, applying the first 3-4 coats fairly heavily, then more lightly after that. Hold the spray gun nozzle 35-45cm from the substrate. A coat consists of one pass with the spray gun in each direction. (Hemisphere's will only be sprayed in one direction) After each coat, the article being sprayed should be rotated approximately 90°.
- Allow the coating to dry somewhat before application of the next coat – prior coating should be neither fully dry nor wet – see drying section below. The last few coats should be applied from a slightly greater distance so that a very matte finish is obtained.
- The final coating thickness should be 20 ± 4 mils (0.5 ± 0.1 mm).

Drying

- Coating on parts too dry between coats may crack or peel.
- Coating on parts too wet between coats may blister (see repair note below).

Parts can be dried at room temperature (for this purpose is 15-30°C or 60-85 °F) for 8-10 minutes or more quickly under heat lamps. If using heat lamps, place them so that the temperature at the level of the parts is approximately 32°C. Drying time in this arrangement will be about 4-5 minutes. Parts should be cool enough to handle before re-coating.

If blisters form, they may be repaired by dampening cotton 'Q-tip' with distilled water (as defined in mixing materials above) and touching the surface of the blister until it collapses. Allow the area to dry before applying additional coating.

De-Masking

Carefully remove tape adhesive residue with alcohol. If chipping occurs at a masking/coating interface, it can be patched with the coating and a fine bristle brush.

CLEANUP OF COATING AND EQUIPMENT

After use or at the end of a shift, the spray equipment should be broken down and cleaned. A mild detergent wash, with a soft brush, followed by

several rinses with clean water is usually sufficient. All equipment should be blown dry with clean compressed air, and then re-assembled.

Wastewater should be collected and either allowed to settle or filtered. The white solid remaining is non-toxic and non-hazardous and is allowed (in the US) to be buried in landfills with no regulation. Excess coating should be allowed to settle, the liquid poured off and the solid dried and disposed of as above. Care should be taken to inspect parts of the spray equipment that contact the coating for wear.

SAFETY CONCERNS IN APPLICATION OF COATING

While Avian-B coating is non-toxic, usual safety and cleanliness procedures should be followed. The coating should be sprayed in a booth expressly designed for the purpose. The made-up coating is slightly flammable and the evaporating vapors contain ethanol and methanol, which are flammable.

While respirators are not required if ventilation is sufficient, a good quality dust mask (3M particle mask #07048 or equivalent) should be worn by those applying the coating. Full coverage safety glasses and latex or vinyl gloves should also be worn. Those working in touch-up should work in a well-ventilated space, and also wear masks and eye protection.

SPRAY EQUIPMENT NOTES

Spraying equipment is a matter of preference. Both gravity-feed and siphon-feed spraying equipment will give good results. The important factors in the selection of the spraying guns are that the parts in contact the coating (fluid needle, fluid nozzles, and fluid passages) - be stainless steel rather than aluminum, as barium sulfate is rather abrasive.

If a siphon feed or pressure pot is used to feed the spraying equipment, we recommend the following guidelines for the pot:

- Should have a polyethylene liner.
- Capacity \leq 7.5 liters.
- -Should have stirring capability to prevent separation of coating.

The action of spraying parts will keep the coating mixed in a gravity feed system.

IMPORTANT: Spray gun parts should be checked frequently for wear, as abrasion from the barium sulfate will cause a degradation in the spray pattern. If the spray pattern is no longer optimum, disassemble

the gun, clean, and check for wear. It is wise to have extra fluid needles available.

Compressors

Compressors should be able to maintain 90 psi pressure, even though the pressure at the spray gun is at 35-45 psi. An oil/ water filter should be installed in the line between the compressor and the spraying equipment to prevent contamination of the coating. Something on the order of 20 cubic feet capacity/ 10-15 HP is sufficient for spraying at the proper pressure.

Appendix – Materials and Sources

Sources are provided to give a clearer idea of what equipment we use; they may not be available internationally. Other suppliers and equipment may work equally well.

<p style="text-align: center;">Liquid Mask</p> 	<p style="text-align: center;">BIN Primer</p> 	<p style="text-align: center;">Luer Lock Syringes</p> 
<p style="text-align: center;">Infusion cannulas</p> 	<p style="text-align: center;">Wagner Viscosity Cup</p> 	<p style="text-align: center;">Zahn Viscosity cup</p> <p>Zahn Cups</p> 
<p style="text-align: center;">Spraying equipment (HVLP) Spray Gun</p> 	<p style="text-align: center;">Airbrush</p> 	<p style="text-align: center;">Line Filter</p> 
<p style="text-align: center;">Stand Mixer</p> 		