



# Vacuum Bagging Instructions

for Foam Wings

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# Vacuum Bagging Instructions *for* Sheeting Wings with Balsa or Obeechi

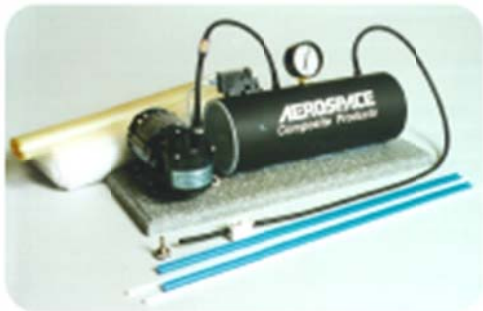
## What you need to start:

- Set of foam cores, lightly sanded, with beds
- EZ-VAC Kit or AUTO-VAC Kit
- EZ-LAM epoxy resin
- Peel ply, vinyl gloves, squeegee, mixing cups, epoxy brushes
- Sheeting material
- Balsa strip for sub leading edge
- Optional items: carbon fiber laminates (.007" or .014" thick); 2oz. or 3oz. fiberglass; .5oz carbon tissue.



The EZ-VAC Kit includes:

- EZ-VAC Pump (preset to deliver 6" HG)
- 9' of 18" wide nylon bagging tube
- 2' neoprene hose
- 20" Quick Lock seals
- EZ-VAC bag connector
- 9' of 15" wide breather cloth
- "T" Fitting



The AUTO-VAC kit includes:

- AUTO-VAC electric pump, rated up to 20" Hg
- Vacuum switch adjustable from 3" - 20" Hg
- Vacuum gauge
- Large capacity reservoir
- Check valve
- 3ft neoprene tubing
- EZ-VAC connector
- 1/4" Hose clamp
- 9ft bag tube
- Quick-Lock seals
- 9ft breather cloth
- "T" fitting

## Procedure

1. Cut foam cores
2. Bond 1/8" thick balsa to the leading edges of the foam core to prevent crushing of the core when vacuum is applied. If desired, before installing the balsa, bond a .007" thick carbon fiber laminate to the back side of the balsa. Then bond this assemble to the foam. Install any ribs, joiner tubes; mounting blocks, end caps, carbon fiber reinforced spars, etc. onto the wing. (See Figure I)

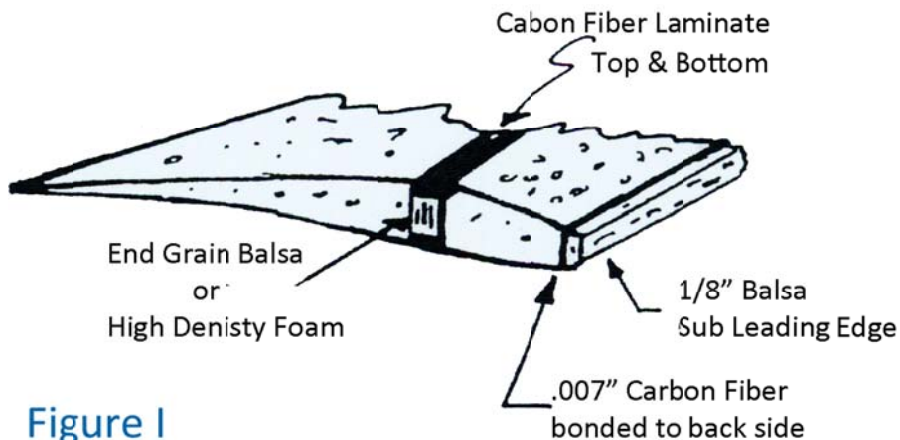


Figure I

3. Fill all dings, dents and discontinuities in the core surfaces with light weight spackle, such as Dap Fast and Final or Red Devil One Time.
4. After the spackle has dried, use 220 grit sandpaper, bonded to a block, to fair the wing surfaces completely smooth. Vacuum the core clean.
5. Prepare the balsa or obeechi planks by trimming the edges with a fresh razor blade and a straight edge. Match up pulling the join tight as you go.
6. Turn the sheets over and glue them together with thin CA. Note: use the thin CA very sparingly. Try to prevent the glue from soaking through to the other side as it will be difficult to sand later.
7. Mark the glued side of the sheet as a reminder that it is the side that will be bonded to the foam.
8. Trim the sheets approximately 1/2" longer and 3/4" wider than the core.
9. Prepare the trailing edges, top and bottom skin, by beveling them with a sanding block so they fit together. Tape the top of the bottom sheet together along the trailing edge with masking tape. Leave a 1/8"-1/4" gap between them. Use a straight edge to keep the edges parallel while applying the tape. (See Figure II)

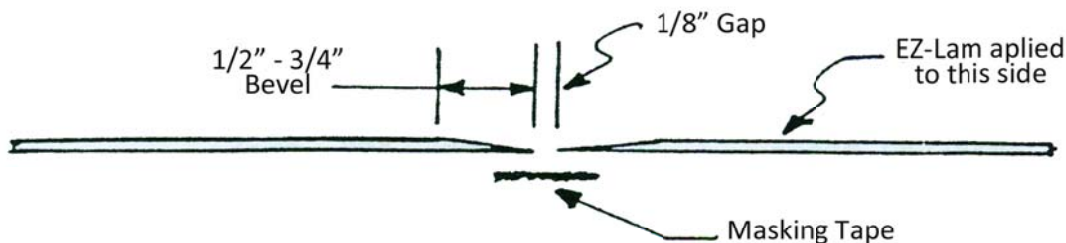


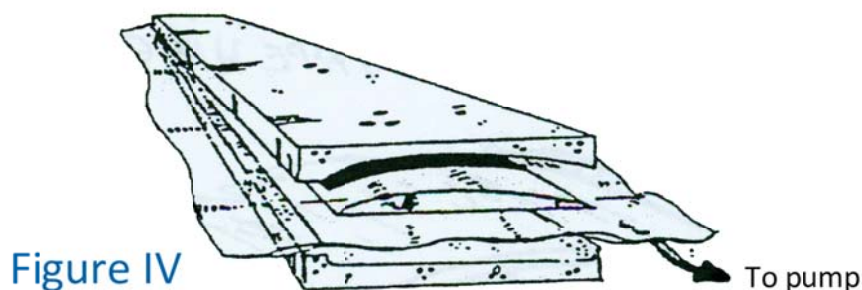
Figure II

10. Cut bagging tube approximately 18" longer than the core.
11. Cut breather cloth 12" longer than the core.
12. Cut the peel ply approximately 2" longer and wider than the core.
13. Slide two 1" x 2" wood planks, or something similar, into each side of the bag to hold the bag open, allowing easier insertion of the wing into the bag.
14. Install EZ-VAC connector by cutting an approximate 3/8" hole in the bag on the upper surface, 4" from the end and 9" from the side of the bag. Note: The EZ-VAC connector can be installed anywhere in the bag, as long as the bottom surface comes in contact with the breather cloth. Disassemble the EZ-VAC connector. Slip the barbed end of the connector with the black washer through the hole from inside the bag. Place white washer, with grooves down, over connector and then thread nut on to connector with flat surface facing down. Secure the nut with a wrench while holding connector nipple.
15. Assemble the vacuum pump system (see last page for EZ-VAC Assembly instructions.)
16. Put on vinyl gloves. Mix EZ-LAM resin according to the mix ratio. Usually 3oz total mixed resin is sufficient for most wings.
17. Position the sheeting on newspaper with the beveled side up. Pour the EZ-LAM on the sheeting to form then lines up and down the sheet. Use an old credit card or squeegee to spread the epoxy around, covering the entire sheet. After the entire sheet is wet, sue the spreader to scrape off the excess epoxy until a slight sheen is left on the surface. If the sheet looks wet, there is too much epoxy on the surface.
18. If additional reinforcement of the trailing edge is require, strips of 2oz. or 3 oz. fiberglass cloth and .5oz tissue can be added. Cut two pieces of glass cloth and one piece of carbon mat, about three inches wide, for a 10"-12" cord wing. Lay down the fiberglass strips on the inner side of both the top and bottom sheeting along the trailing edge. Apply extra EZ-LAM resin to the cloth to thoroughly impregnate the glass with epoxy. Apply the .5oz carbon tissue strip over the fiberglass cloth on the trailing edge of the upper sheeting only. Work EZ-LAM resin carefully into the tissue.
19. Place foam wing on bottom sheeting. Position it approximately 1/2" from the trailing edge hinge. Fold upper sheet over core, sandwiching the core between the two epoxy covered sheets. Secure with tape at various points along the leading edge. (See Figure III)



Place pre-cut breather cloth on work bench surface. Position peel ply on top of breather. The peel ply will prevent the breather cloth from bonding to the sheeting or to the leading edge should any resin ooze out. Once the resin has cured, the peel ply can be easily removed.

20. Slide entire assembly (breather, peel ply and wing) into the bag. Position the assembly so that the EZ-VAC Connector is resting on the excess breather cloth and not on the wing. Remove wood planks from bag and check that the assembly has not shifted.
21. Seal both ends of bag with Quick Lock seals. These seals are used by simply laying the bag over the white rod and then clipping the red portion over the white rod sealing the bag in between. Make sure that the breather cloth or peel ply is not caught in the Quick Lock seal when it is closed. The Quick Lock seals can be removed after the vacuum process has been completed and can be used again.
22. Set the core bag assembly on its foam bed and make sure the wing is flat and true. Cut top foam bed to make allowance for EZ-VAC connector and hose. Weight lightly as required. Hook up vacuum hose to connector and apply vacuum. (see Figure IV)  
Note: The EZ-VAC system is pre-set to deliver 6" HG and will not crust the foam core. When using the AUTO-VAC pump, the vacuum can be adjusted with the bleeder valve (6-8" HG for white foam, 15-18" HG for blue foam)



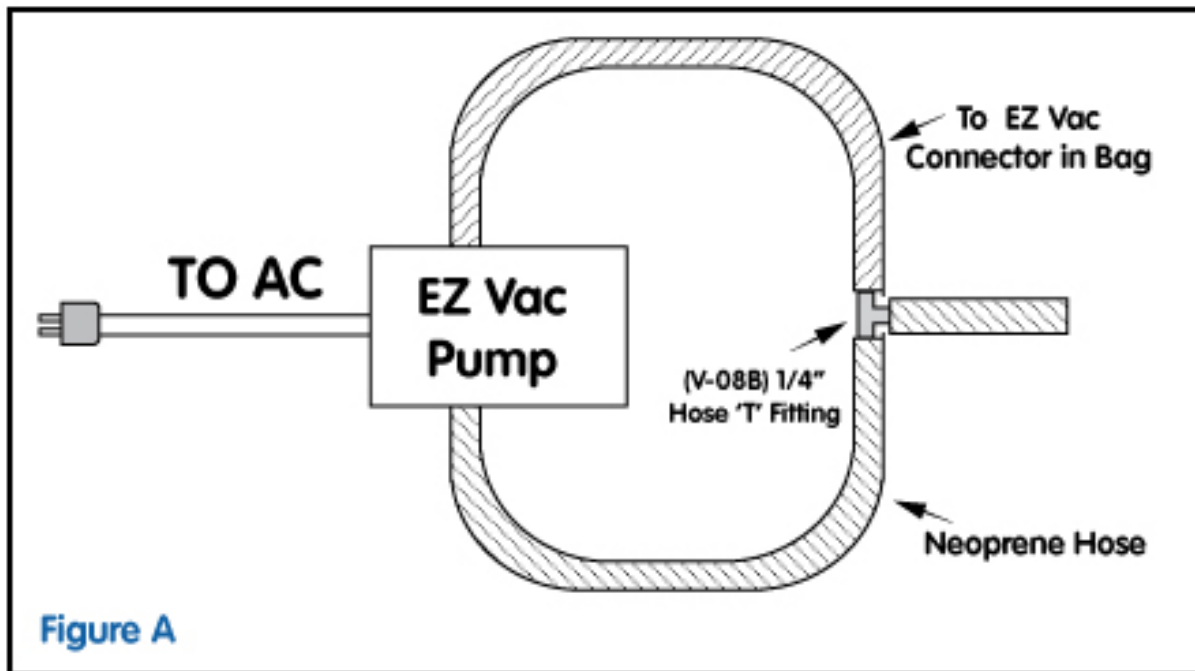
23. Allow the EZ-LAM to cure vacuum, usually 24 hours at 75-80 degrees F. If room temperature is below 75°F, cure cycle will be extended.
24. After resin has cured, remove wing from bag. Sand excess sheeting flush with sub leading edge. Bond on final leading edge.
25. If the trailing edge was reinforced with glass and carbon mat, it can now be sanded to form a thin smooth taper. Use the carbon mat as a guide to gauge your progress, sanding until a thin black line can be seen from either side of the wing.
26. The wing can be finished using .58oz fiberglass cloth, EZ-LAM resin and paint. See detailed glassing instructions supplied with EZ-LAM resin or fiberglass. Sheeting can also be covered with any of the heat shrink plastic films available.

# Vacuum Pump Set-up's for EZ-Vac and Auto Vacuuming Bagging Systems

## The EZ-Vac System

An ideal start kit for vacuum bagging sheeted or glassed white foam structures.

The EZ-VAC pump is pre-set to deliver 6" HG and will not crush the foam core. Connect neoprene hoses as shown in Figure A. Note: The EZ-VAC pump must run continuously until the EZ-LAM resin is cured.



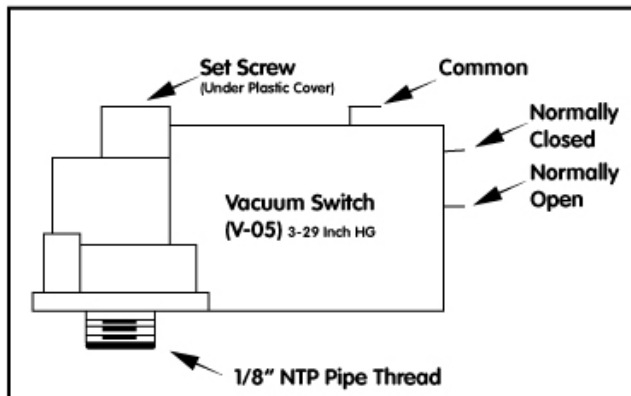
## The Auto-Vac System

The Auto-Vac System is fully automatic vacuum bagging systems that is completely self-monitoring, thereby eliminating the need for the pump to run continuously. It has a fully adjustable vacuum switch and a large capacity reservoir which prevents frequent cycling of the vacuum pump. It comes completely assembled, mounted on a wood base and ready to use.

The Auto-Vac System is supplied with the vacuum switch set to shut the pump off at 8" Hg and to start the pump when the vacuum drops to 5" Hg. The 5" setting is

recommending for bagging low density white foam wings, 12"-14" Hg for gray and pink foam and when bagging higher density foam such as blue foam or Spyder Foam 15-"8" is recommended. High vacuum, up to 26" Hg can be used when bagging solid laminate into a mold.

### Adjusting the Vacuum Switch



Vacuum Switch Instructions: Do not use near organic solvent cleaners (Acetone, Freon 22) and commercial products such as Loctite & Eastman 910. The thread in the switch is 1/827SAE-Short Series and is fully compatible with 1/8-27 NPT fittings. Do not tighten fitting more than one turn beyond finger tight.

The switch can be adjusted to 15-18" Hg setting as follows:

- Unplug the pump and clip off hose from the reservoir outlet.
- Turn the vacuum switch set screw counterclockwise two full turns.
- Plug the pump in and check the reading on the vacuum gauge when the pump shuts off. If the reading is not at 18"Hg, unplug the pump; dump the vacuum to 0" Hg by release the clamp on the reservoir outlet hose and adjust the switch accordingly,
- Continue this procedure until the pump shuts off at 18" Hg. TO verify that the pump will turn on at 15"Hg, wait approximately five minutes after the pump has shut off at 18" Hg before slowly dumping the vacuum. The pump should shut off at 15" Hg. The reason for waiting the five minutes before dumping the vacuum (simulating a leak in the bag) is to allow the vacuum (18"Hg) to dissipate from the top of the pump diaphragm. If any attempt is made to start the pump before the vacuum has dissipated across the diaphragm, the motor will stall and the pump will not start at the correct set-point.

Note: The vacuum switch is rated for 5 Amps maximum. For pumps larger than 1/16hp, a relay at 10 Amp (V-05C) should be used

All diaphragm type vacuum pumps are designed to leak past the diaphragm. On the AUTO-Vac system, the check valve prevents the vacuum in the reservoir from leaking past the diaphragm. The reason for the built-in leak is to equalize the vacuum and atmospheric pressure on either side of the diaphragm. If the pressure is not allowed to equalize, the motor will be unable to start the pump, since the vacuum on one side of the diaphragm will stop the motor from turning. In normal operation, it will take at least thirty minutes for the vacuum in the reservoir to drop to 15" Hg. In that time period, the



pump diaphragm has had sufficient time to equalize and the pump will start immediately when the vacuum switch senses that the vacuum has dropped to 15" Hg.

for system with diaphragm type pumps.

