

HOW TO SOLDER COPPER TUBING

A "How To" Workshop from AAA Solar

FIVE STEPS TO SUCCESSFUL SOLDER JOINTS

It is an absolute must, this cannot be overstated, that you follow the 5 steps given below in order to have good solid soldered joints that don't leak. If you are careful with each step and take your time, you will have 100% success with soldered joints on new work. Repairing joints is a little harder in that you need to really clean a joint thoroughly with a wire brush or sand cloth to make sure you have a good joint.

- 1. CLEAN THE TUBE AND FITTING WITH WIRE BRUSH**
- 2. USE A GOOD FLUX TO CHEMICALLY CLEAN THE FITTING AND TUBE**
- 3. APPLY HEAT TO THE FITTING**
- 4. APPLY SOLDER TO THE TUBE OPPOSITE TO THE HEAT**
- 5. DON'T TOUCH OR JIGGLE THE JOINT WHILE COOLING**

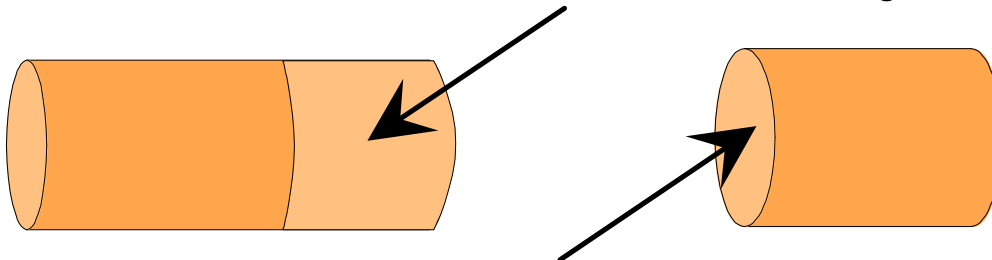
Materials needed

1. A torch, if possible use acetylene or Mapp Gas as they are hotter fuels than propane, propane will work fine, it just takes a little longer.
2. Solder, use 95/5 solder in a roll - don't use a paste solder or a paste of flux and solder together
3. Flux, use a good paste flux that is applied with a small brush
4. Wire brush or sand cloth to clean the copper fittings
5. A wet rag
6. Gloves

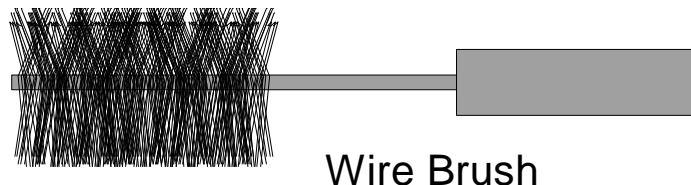
Step 1 - Cleaning

Use the wire brush or sand cloth to get rid of the oxidation on the tube and fitting surface. If you have a lot of fittings to clean, think about getting a wire brush that chucks into an electric drill. Cleaning the tubing and fittings takes the longest time of any of the steps and is usually the job of a helper. Do not skimp on this step. Tubing and fittings that are not adequately cleaned is probably the largest reason for failed solder joints.

Clean the outside of the tubing



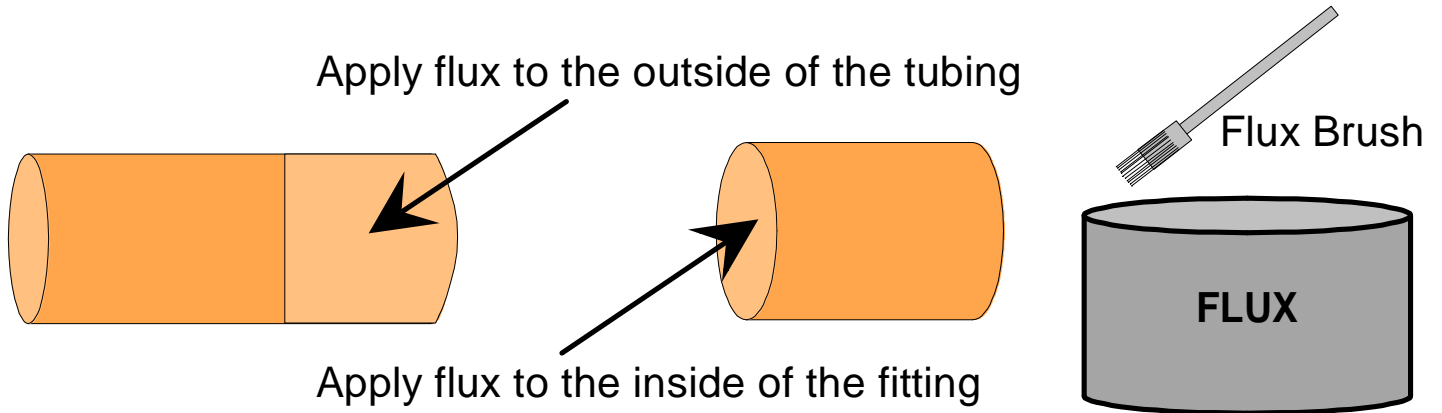
Clean the inside of the fitting



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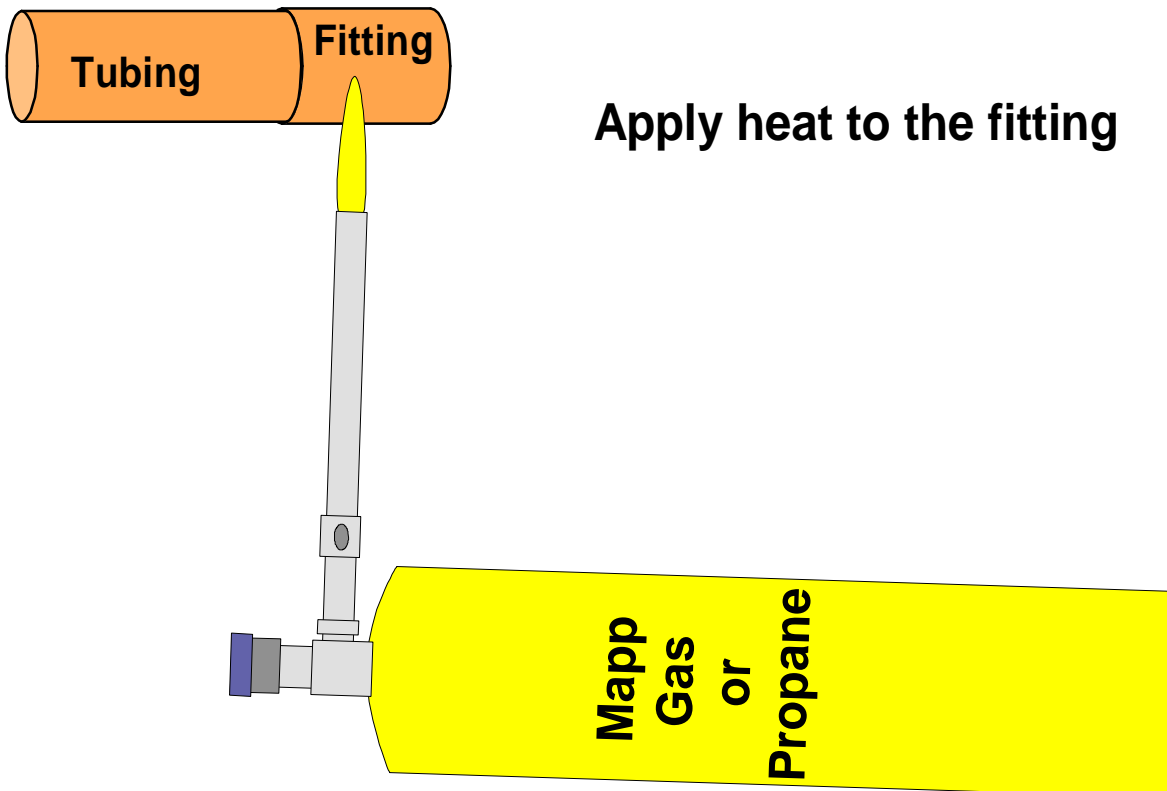
Step 2 - Fluxing

Use a flux brush and apply flux to the outside surface of the tubing and the inside surface of the fitting. Don't use a combination flux and solder paste. After you are sure the flux has been applied to both surfaces, you can slip the tubing into the fitting. The second most reason for bad solder joints is forgetting to flux a fitting or tubing. If you've cleaned it - flux it!



Step 3 - Heating the fitting

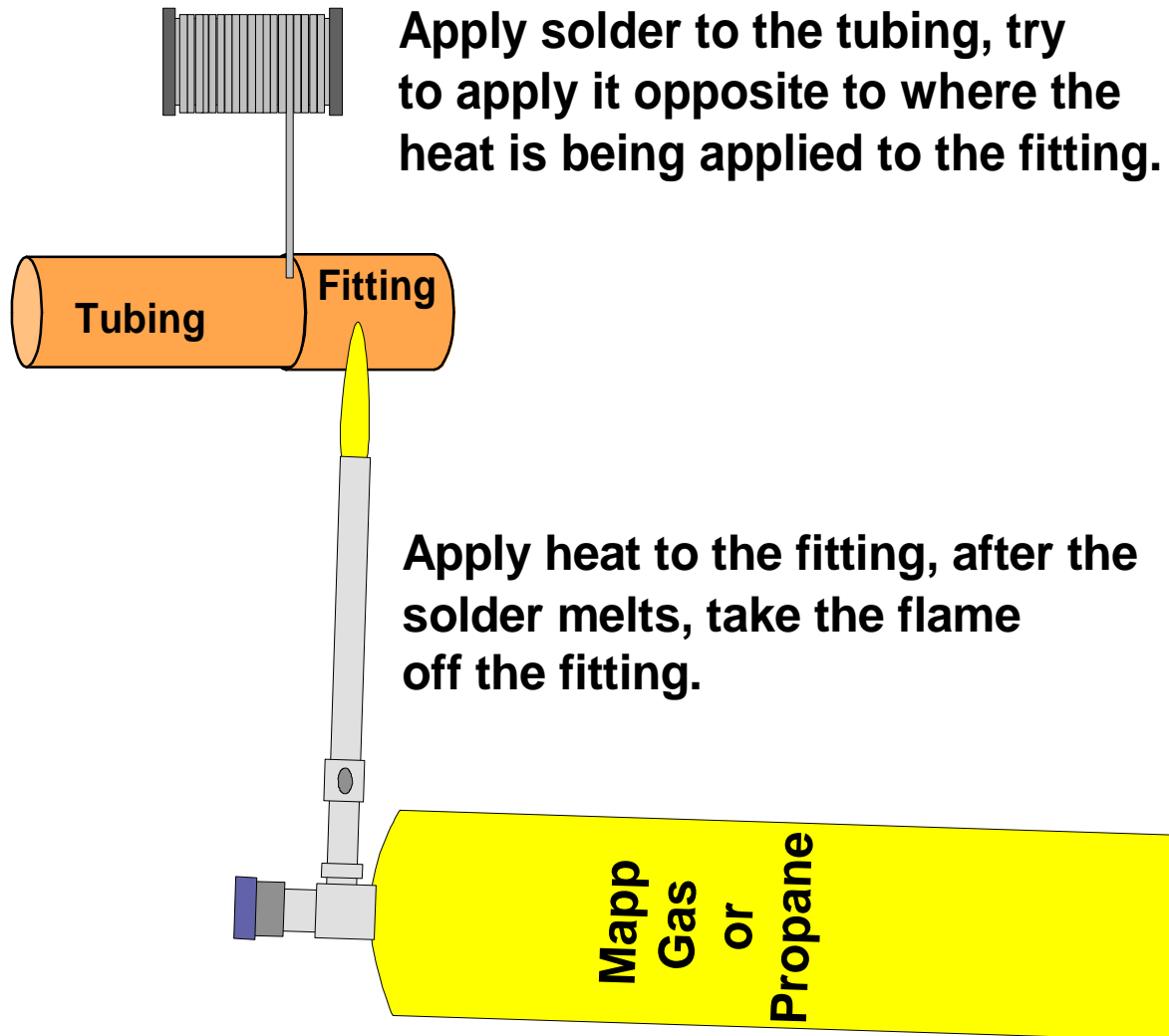
Use your torch to apply heat to the fitting. Since you will apply the solder to the tubing, you will know that the fitting is hot enough to take the solder if it melts on the tubing. Heating 1/2" and 3/4" fittings just takes under a minute unless it is very cold and windy. Heating larger fittings takes more time proportionally to the size.



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Step 4 - Soldering

Use 95/5 solder that comes in a roll. Apply the solder to the tubing after heating the fitting. You may wish to test the heat of the joint from time to time by touching the solder to the tube. The solder should be applied to the tube very close to the fitting. When the joint is hot enough, you will see the solder melt and flow into the joint. The solder will flow into a vertical joint and the capillary action will actually draw the solder uphill into the joint, seemingly defying gravity.



Step 5 - Don't touch the joint while it is hot

Hitting the joint while it is hot will cause the solder to not cool evenly and can cause leaks. If you wish, you can apply a wet rag to the joint to make it cleaner while it is cooling to make the joint a bit neater but this isn't necessary. Professional plumbers will "wipe the solder joint" in some situations but it really isn't necessary to do it while the joint is cooling. Wiping the joint after it has cooled will clean off the excess flux and the joint will not turn green over time. If you should accidentally hit a joint while it is hot - don't be surprised if it leaks. Usually this happens with end of the torch when taking the flame off the fitting - be careful and it won't happen to you.

5 steps, follow them and always have strong, professional solder joints.