

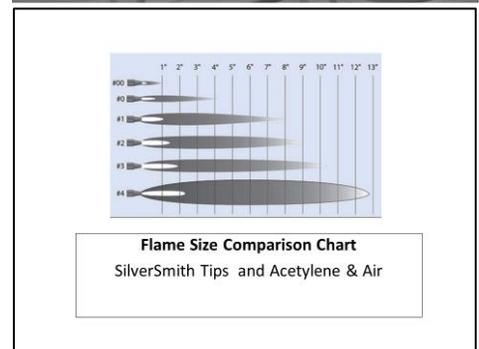
Soldering Guide Apollo Cast Bronze & Lead Free Bronze Ball Valves

Nearly all reports of body joint, stem packing or seat leaks involve solder valves rather than NPT, so heat definitely plays a role. Limiting the amount of heat applied beyond the solder cup will prevent most problems.

1. Always identify the alloy to be soldered. Apollo **EZ-Solder**[®] bronze valves do NOT contain *silicon* alloy, meaning heat transfer rates are identical to standard bronze. Therefore extra heat is NOT required in order to ensure a sound solder joint.
2. Always review the applicable Apollo Installation, Operation & Maintenance Instructions to ensure factory recommendations are being followed:
http://cdn.conbraco.com/apollovalves/products/documents/IOM_I908600Rev_G.pdf
3. We also recommend viewing our **Apollo** soldering video and the **Copper Development Association**-produced video entitled **Soldering of No Lead...Valves**. Both cover Industry Best Practices relative to soldering valves. We particularly endorse heating of the tube prior to heating the solder cup of the valve to reduce the total amount of heat applied to the valve body.
Apollo video: <https://www.youtube.com/watch?v=91P3WouFLnY>
CDA video: https://www.youtube.com/watch?v=nyGZI48_vuc&t=6s
4. The installer should be mindful of the type of soldering gas being used. Acetylene is the hottest industrial gas, meaning it requires the most care and caution when soldering vs MAPP gas or propane. Always move the flame to *evenly* distribute the heat to all surfaces of the solder cup during heating.
5. Do NOT oversize the torch tip! The torch tip selection should be appropriate for the pipe size, based on the torch manufacturers' recommendation (see example below). In fact **TurboTorch**[®] technicians advise their tip sizing chart is based on wrought copper fittings, and they recommend *reducing* the tip selection by 1 – 2 sizes when soldering (ball) valves due to the PTFE components.



Tip No.	Tip Size		Gas Flow		Soft Solder		Silver Braze		Replacement Orifice Model
	IN.	MM	@14 PSI SCFH	(0.9 BAR) M3/HR	IN.	MM	IN.	MM	
A-2	1/8	4.8	2.0	.17	1/8-1/2	3-15	1/8-1/4	3-10	OR-A2
A-3	3/16	6.4	3.6	.31	1/4-1	10-25	1/8-1/2	3-12	OR-A3
A-5	1/4	7.9	5.7	.48	3/4-1 1/2	20-40	1/4-3/4	10-20	OR-A5
A-8	5/16	9.5	8.3	.71	1-2	25-50	1/2-1	15-25	OR-A8
A-11	7/16	11.1	11.0	.94	1 1/2-3	40-75	7/8-1 5/8	20-40	OR-A11
A-14	1/2	12.7	14.5	1.23	2-3 1/2	50-90	1-2	30-50	OR-A14
A-32	3/4	19.0	33.2	2.82	4-6	100-150	1 1/2-4	40-100	OR-A32
MSA-8	3/8	9.5	5.8	.50	3/4-3	20-75	1/4-3/4	10-20	OR-A5



TurboTorch[®] Tip Selection Chart

Note TurboTorch technicians advise these recommendations are based on soldering *wrought copper fittings*. When soldering (*ball*) valves they recommend reducing the tip selection 1 to 2 sizes to reduce the area being heated and prevent damage to seats and seals.

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6. Solder selection is another variable. Soft solders with melting temperatures below 500°F must be used. Many high strength lead free solders are now available with melting temperatures in the range of 410° – 420°F. (Example **Sterling** Premium Lead Free, 410°F melting temperature and 7,130 psi tensile strength). Selecting lower temperature solders can help to further reduce the amount of heat required to be applied to the valve.

7. Apollo Valves may be soldered with the ball either in the fully open or fully closed position, however fully open is preferable to maximize the heat sink effect while protecting the seats.

8. It is possible that the heat from soldering can affect the packing material resulting in a stem packing leak. Follow the steps above to limit the amount heat applied to the center section of the valve. If a packing leak is encountered, use a packing wrench (**Apollo P/N H371400** or equal) to tighten the stem packing hex nut (clockwise) one-half (1/2) flat at a time to restore packing integrity. Many contractors make it a standard practice to tighten the packing gland of every solder valve after soldering to preclude the possibility of leaks / callbacks.

9. Installers today are faced with a number of new challenges when soldering: a.) a variety of lead free alloys that can have very different soldering properties; b.) the use of new lead-free solders and fluxes; c.) a trend away from propane and MAPP gas to the much hotter acetylene soldering gas, and d.) the use of **Turbo Torch**® and similar “air-swirl” technologies to solder even hotter and faster. For these reasons, Apollo cast bronze ball valves have been specifically engineered to resist heating damage while providing the installer with a simple, quick and consistent soldering experience. EZ-Solder® lead-free alloys require less heating time than comparable silicon bronze alloys meaning lower costs, less gas and less trouble.

10. Our customers experience very few problems with solder valves. If problems are encountered, always review the points above to minimize the effects that heat can play during the soldering process. In some cases it may be necessary to wrap the valve body/retainer joint with a wet rag to protect against heat migration beyond the solder cup.

11. If problems are still encountered, a small representative sample of valves should be returned to the factory via RGA for evaluation. Valves should be cut from the line with an inch or more of tube intact on each side so we can properly test and evaluate. **Note that valves that have been de-soldered cannot be properly evaluated** since we can't tell if the heat of installation or removal affected the body joint, seats or packing. Providing details of the solder, flux, gas, torch tip size, test pressures/media and duration will help us prepare a detailed evaluation.

Thank You for choosing **Apollo Valves**.

Additional Resources:

1.) Copper Development Association Recommended Practice for Soldering of No-Lead Copper Alloys:

https://www.copper.org/publications/pub_list/pdf/A4108-NoLeadSoldering.pdf

2.) Apollo website:

<http://www.apolloflowcontrols.com/>