

TECHNICAL BULLETIN

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NIBCO[®] Lead-Free* Silicon Bronze Alloys Soldering & Brazing Recommendations

The following recommendations are offered to aid installers who are soldering lead-free (LF) silicon bronze alloys. NIBCO selected lead-free silicon bronze alloys primarily due to superior heat tolerance, strength and corrosion resistance, although attention-to-detail is required when soldering.

When soldering any lead-free products for the first time, always practice and review solder coverage via peel test joints. Practicing on small and large diameter joints is highly recommended, to ensure the installer is comfortable in achieving consistent quality coverage.

For soldering and peel test recommendations, review video at www.nibcoleadfree.com



SOLDERING RECOMMENDATIONS:

1. Ensure proper joint preparation for solder cup and mating tube:

Proper joint preparation is critical in order to achieve a satisfactory solder joint - follow all best practices for prepping tube by using a coarse emery cloth or a clean wire brush, including square cutting, de-burring (inside and outside), cleaning, etc.

2. Select appropriate solder, flux and heat:

The selection of a compatible solder / flux combination is a critical first step to achieving a quality joint.

All solder / flux combinations should be tested and confirmed for adequate coverage.

Solder: NIBCO recommends plumbing solders with a melting point above 400°F. Solders with a melting point above 400°F include traditional 95/5 tin / antimony and those containing silver or other filler elements.

Flux: The purpose of flux is to clean, prep, and protect the surfaces of the joint to accept solder. It is important that the flux utilized has an active temperature range compatible with the intended solder. Many plumbing flux and solder combinations have been confirmed for use with silicon bronze alloys. There are generally many flux types beyond plumbing – best practice calls for installers to utilize plumbing paste fluxes containing chlorides. Contact the flux manufacturer regarding the suitability of their flux for use with any intended solder. Confirming flux suitability per local plumbing code is the responsibility of the installer.

* Lead Free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25% per the Safe Drinking Water Act (Sec. 1417) amended 1-4-2011 and other equivalent state regulations.

Heat: Silicon bronze alloys will transfer heat away from the heat affected area more slowly than copper or leaded bronze; therefore, more attention may be required to achieve uniform heating of the alloy. Select torch tip and gas mix to adequately distribute the heat. The hotter the flame, the more skill and technique are required.

3. Ensure sufficient joint heating:

Ball valves should be in the CLOSED position and gate valves OPEN when soldering.

Ensuring sufficient heat is critical to achieving a satisfactory solder joint.

Standard soldering techniques can be used with proper selection of a solder and flux combination**. Even, uniform heat should be accomplished by directing the inner-most flame tip (neutral flame) to the joint, remembering these critical points:

- Begin by mildly preheating the socket and tube.
- Do not direct the flame into the gap.
- Heat the entire joint, always keep the flame moving – **do not linger in any one position.**
- Watch for the flux to activate, per flux manufacturer's recommendation. Flux will generally bubble as it reaches activation temperature, taking care not to burn out the flux.
- Apply the flame to the base of the solder cup – the farthest point you want to draw the solder to.
- With uniform heating around the base of the cup, touch the solder to the joint. If the solder doesn't melt remove the solder and continue heating the entire joint.
- When the solder begins to melt, **return the flame to the base of the cup**, rotating the flame 360 degrees around the cup.

Due to expansion and contraction of materials after heating, the ball valve or gate valve pack nut may need to be tightened.

Lead-free solder training kits are available and highly encouraged – consult your local NIBCO representative.

BRAZING RECOMMENDATIONS:

1. Although soldering of large diameter joints is possible, NIBCO recognizes that LF bronze alloy joints larger than 2" in diameter become increasingly difficult to achieve adequate solder coverage.
2. LF silicon bronze alloy brazing, including filler material selection and installation, is identical to that used in good industry practice for traditional plumbing products.

Failure to follow installation instructions can result in improper installation and damage to property.

For answers to additional questions regarding soldering, brazing or any other technical issue involving NIBCO products, please call toll-free:

** ASTM B828 Standard Practice for Making Capillary Joints by Soldering of Copper and Copper Alloy Tube and Fittings.

Proper soldering is the responsibility of the installer. Installers should follow best industry practices when soldering any LF bronze alloy and should confirm the most up-to-date manufacturer's instructions from all solder and flux material manufacturers prior to prepping solder joints in plumbing installations.