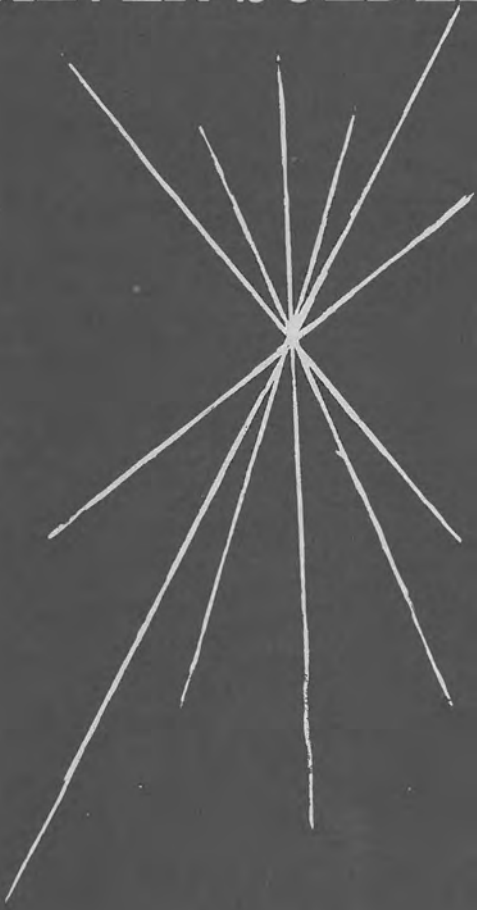
Working with SILVER SOLDER



U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
CENTER FOR DISEASE CONTROL
National Institute for Occupational
Safety and Health

Working with Silver

Silver brazing alloy, frequently called "silver solder," is an extremely valuable industrial material used for joining metals and alloys such as silver, copper, brass, bronze, stainless steel, carbon steel and dissimilar metal combinations where it is necessary to perform the joining of these metals at low temperatures. Its wide variety of applications include use in home jewelry making, dental laboratories, refrigeration and electronic equipment, and in the aerospace and missile industries.

Brazing is a safe operation when proper practices are followed. As in all operations, there are certain hazards to be avoided. In brazing the major hazards are heat, chemicals and fumes.

Hazards

Since brazing is a process requiring heat, precautions should be taken for handling hot objects to prevent workers from being burned. Proper outer clothing, preferably woolen, and eye protection should be worn. Chemicals such as acids and alkalies are sometimes used to clean parts before brazing and can produce chemical burns if allowed to come in contact with the skin. Protective gloves should be worn when handling these chemicals. Brazing fluxes are mixtures of chemicals and the caution notice on the package should be followed.

Solder

Fumes generated during brazing can be a serious hazard. Brazing fluxes generate fluoride fumes when heated. Cadmium in silver brazing alloys vaporizes when overheated and produces cadmium oxide, a highly toxic substance. If cadmium oxide fumes are inhaled into the respiratory tract, they can cause pulmonary distress, shortness of breath, and in cases of severe exposure, may cause death.

How to Use Safely

The American Welding Society and the American Society for Testing and Materials designations for silver brazing filler metals containing cadmium are: BAg–1, BAg–1a and BAg–2 and BAg–3. These silver brazing alloys can be safely used, however, if precautions are followed.

The BAg–1 and BAg–1a classes of silver brazing filler metal can be successfully and properly used at temperatures below 1400°F. Since the boiling point of cadmium is 1412°F, brazing can be carried on safely using these two classes of filler metal. The remaining two classes of silver brazing filler metal, BAg–2 and BAg–3, have recommended brazing temperature ranges of 1295 – 1550°F and 1270 to 1500°F respectively. Brazing can be carried on safely using

temperatures below 1400°F with these latter classes of filler metal. Since temperatures in the upper portion of these ranges can be reached, it is important to provide adequate local exhaust ventilation or, where this is not possible, individual air-supplied respirators. The American Welding Society states that: "Local exhaust or general ventilation systems shall be provided and arranged to keep the amount of toxic fumes, gases or dusts below the maximum allowable concentration as defined by the *Acceptable Concentrations of Toxic Dusts and Gases*, American Standard Z37, or the latest threshold limit value of the American Conference of Governmental Industrial Hygienists." The 1972 threshold limit value for cadmium is 0.1 mg per cubic meter of air.

It should be noted that the most serious cause of cadmium oxide fume generation occurs when all of these silver brazing filler metals are

overheated. Care must be taken to control the temperature of the silver brazing operation. *Under no circumstances should a torch flame be applied directly to the silver brazing alloy.* The heat of the base metal should be used to melt and flow the brazing filler metal.

Another source of cadmium fumes is from brazing on cadmium plated parts. Since the torch flame is applied directly to the base metal, cadmium plated parts are potentially more hazardous than cadmium-bearing silver brazing alloys. When in doubt about a base metal, check with the supplier of the part. Cadmium plating should be removed before heating for brazing.

By following safety procedures, cadmium-bearing silver brazing alloys can be handled without hazard to health.

Do's and Don'ts in Working with Silver Solder

1. Know what materials you are working with. Be sure you are not brazing on cadmium plated parts.
2. Read warning labels on filler metals and fluxes and follow label instructions.
3. Wear eye and face protection and protective clothing as required by the job.
4. Work in well ventilated areas, or use air-supplied respirators as required by the job.
5. Apply heat to base metal—not directly to the brazing filler metal.
6. Do not overheat either the base metal or the brazing filler metal.
7. Wash hands thoroughly after handling brazing fluxes and filler metals.

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