APPENDIX F - Brazing

Brazing is frequently necessary to join metals at low temperatures. Since brazing is a process requiring heat, precautions shall be taken for handling hot objects to prevent workers from being burned.

Brazing Compound Safety

- The caution notices on the packages shall be followed when using brazing fluxes. 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.

- When using silver solder, the guidance listed below shall be followed.
  - Know the materials with which you are working. Be sure you are not brazing on cadmium plated parts.
  - Read warning labels on filler metals and fluxes and label instructions.
  - Wear eye and face protection and protective clothing as required by the job.
  - Work in well ventilated areas, or use respirators as required by the job.
  - Apply heat to base metal, not directly to the brazing filler metal.
  - Do not overheat either the base metal or the brazing filler metal.
  - Wash hands thoroughly after handling brazing fluxes and filler metals.

- To use silver solder safely, the following information should be kept in mind.
  - 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 degrees F; brazing can be carried on safely using these two classes of filler metal. The remaining two classes of silver brazing temperature ranges are 1295-1550 degrees F. Brazing can be carried on safely using temperatures below 1400 degrees 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 respirators. "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".
  - 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 shall a torch flame be applied directly to the silver brazing alloy. The heat of the base metal shall 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 shall be removed before heating for brazing.