STANDARD OVERHAUL PRACTICES MANUAL

MACHINING OF COPPER BERYLLIUM ALLOYS

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STANDARD OVERHAUL PRACTICES MANUAL

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To: All holders of MACHINING OF COPPER BERYLLIUM ALLOYS 20-10-09.

Attached is the current revision to this STANDARD OVERHAUL PRACTICES MANUAL

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Location of Change	Description of Change
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A = Added, R = Revised, D = Deleted, O = Overflow

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Revision		Filed		Revision		Filed	
Number	Date	Date	Initials	Number	Date	Date	Initials

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INTRODUCTION

1. General

A. The instructions in this manual tell how to do standard shop procedures during maintenance functions from simple checks and replacement to complete shop-type repair.

B. This manual is divided into separate sections:

(1) Title Page

(2) Transmittal Letter

(3) Highlights

(4) Effective Pages

(5) Contents

(6) Revision Record

(7) Record of Temporary Revisions

(8) Introduction

(9) Procedures

C. Refer to SOPM 20-00-00 for a definition of standard industry practices, vendor names and addresses, and an explanation of the True Position Dimensioning symbols used.

D. The data is general. It is not about all situations or specific installations. Use it as a guide to help you write minimum standards.

E. If the component overhaul instructions are different from the data in this subject, use the component overhaul instructions.

MACHINING OF COPPER BERYLLIUM ALLOYS

1. INTRODUCTION

A. The data in this subject comes from Boeing Process Specification BAC5648. The airline has a copy of the Boeing Process Specification manual.

B. This subject contains health and safety requirements necessary to use copper beryllium alloys which contain less than 2% beryllium. Emergency procedures are also included.

C. Refer to SOPM 20-00-00 for a list of all the vendor names and addresses.

2. DESCRIPTION

A. Copper beryllium alloy is a good one for parts that can wear, such as bushings, safety tools, and certain airplane parts.

B. These copper beryllium alloys are almost all copper, with 2% or less beryllium, and smaller amounts of other metals such as cobalt, nickel, iron or aluminum.

3. COPPER BERYLLIUM RISKS

A. Refer to BAC5648 for WARNING and CAUTION notes.

B. Health Risks

(1) Copper beryllium is not dangerous in the solid condition. Special precautions are not necessary. Use the same precautions you use with other metals, such as copper and steel. Components or devices that include finished parts of copper beryllium alloys are also not dangerous.

(2) Copper beryllium becomes a risk only when a person sensitive to beryllium breathes in a sufficiently large concentration of dusts, mists, or fumes of beryllium. Then serious lung disease can occur. Although only a small percentage of persons become sensitive to beryllium, those persons cannot be identified before that time. Thus all persons must have protection. (Permitted levels are given below in Paragraph 3.D.)

(a) Particles smaller than 10 microns (0.0004 inch) are dangerous because they can stay in the air and be breathed in. The diameter of a human hair is approximately 40 microns (0.0016 inch).

(b) Dusts can come into the air when you grind, sand, hone, abrasive saw, abrasive blast, or electrical discharge machine copper beryllium. If you do these operations wet (with a coolant or lubricant) the risk is decreased because the liquid keeps the dust out of the air. But the risk will come back when the liquid-dust mixture dries.

(c) Mists can come into the air when a coolant or lubricant is used. These mists could contain particles of copper beryllium.

(d) Fumes can come into the air from all of the metals in copper beryllium if you weld, melt, or electrical discharge machine the material, or let it become too hot because you did not use a coolant or lubricant. These fumes have the same effect as the particles. The fumes can also cause metal fume fever.

C. Fire Risks

(1) Copper beryllium alloy is not a fire hazard. It will not burn in the solid condition. A layer or a cloud of dust particles of this alloy will not burn.

(2) Fumes or particles can get into the air if copper beryllium is in a fire. Then the fumes or particles become a risk to health if they are breathed in.

D. Permitted Levels

(1) The U.S. Occupational Safety and Health Organization (OSHA) standards, given below, were set to keep airborne concentrations much lower than the levels known to cause health problems.

(a) Daily time-weighted average exposure over an 8-hour day must not be more than 2 micrograms of beryllium per cubic meter of air.

(b) Short-term exposures to 5-25 micrograms of beryllium per cubic meter of air must not total more than 30 minutes during an 8-hour work period.

(c) Exposures to more than 25 micrograms of beryllium per cubic meter of air are not permitted.

(2) To give protection to the general public, the U.S. Environmental Protection Agency does not permit more than 10 grams of beryllium per day to go into the air around a plant that works with beryllium.

4. PRECAUTIONS

A. Do not breathe air that could contain dusts, mists, fumes, or vapors of beryllium.

B. Control the details of operations that make dusts, fumes, or mists of copper beryllium, to confine the particles and keep them out of the air. This includes details of procedures, tools, and ventilation equipment. Operations that make dust include shop procedures (grinding, sanding, honing, abrasive sawing or blasting, electrical discharge machining) and housekeeping (removal of beryllium copper chips and dusts from shop tools). Refer to Paragraph 5. for details.

C. When the controls are not sufficient to keep the copper beryllium out of the air, make the operators use respirators and special clothing, such as shop coats and gloves. But gloves must not be used at or near machines with parts that move. The respirators must be approved for protection from beryllium as recommended by industrial health and safety authorities. Boeing Industrial Hygiene specifies that OSH Class 114 respirators be used during operations that make dust.

D. Machine shop procedures and housekeeping operations are not the only ones that could put copper beryllium particles into the air. The risk is there also when work is done on the ventilation equipment and vacuum cleaners. Persons who change filters and do related work on such equipment must use respirators and special clothing for protection from the copper beryllium dust in the equipment. Also, if there is a fire and copper beryllium items are in it, the firefighters must breathe through pressure-demand self-contained equipment. A respirator is not sufficient protection during a fire.

E. Waste Disposal

(1) Copper beryllium chips or dust are not a hazardous waste. If the chips are not mixed with other metals such as steel or aluminum, they can be recycled. Many recycling centers and some vendors of the raw material will accept copper beryllium scrap.

(2) Put dusts, such as from baghouses or the vacuum cleaner, into a plastic bag. Seal the bag and put it into a good, strong container. Identify the contents as copper beryllium dust.

(3) Send other copper beryllium waste, such as filters, rags, dirty disposable clothes and respirator cartridges, to approved waste facilities. These items are not hazardous waste.

5. CONTROLS FOR SHOP PROCEDURES THAT MAKE DUST

A. These operations usually make dust during the procedure: grinding, sanding, honing, abrasive sawing, abrasive blasting, and electrical discharge machining. This dust must be controlled to make sure it does not get into the air where it could be breathed in.

B. To control the dust, confine it with enclosures, baffles, guards or shrouds on the machining equipment. Use a ventilated enclosure at the point where the tool touches the copper beryllium material and in the direct line of travel of the dust particles. Use high-velocity exhaust ducts or vacuum hoses.

C. If possible, use wet procedures, because the coolant or lubricant will hold the dust particles and keep them out of the air. But you must be careful, because the mix of dust and lubricant could become dry or become a vapor and let the copper beryllium get into the air.

D. Supply local exhaust ventilation for all operations which make beryllium dusts, fumes, or mists. In the ventilation system, include devices to clean the air, such as cyclones, baghouses, or high-efficiency filters, to prevent beryllium contamination of the air the persons must breathe.

E. For the operations that make dust, if hoods and local exhaust systems cannot be installed to collect the dusts, fumes, and chips from the machine tools, use portable vacuum cleaners or dust collectors (with absolute filters). A dropout can is recommended ahead of the vacuum if the operation makes a large amount of chips. This equipment can also be used to clean floors and other areas with dust contamination. Identify such equipment "For Copper Beryllium Use Only" as a caution and to make it possible to recycle the collected copper beryllium. Here are some examples of approved equipment:

(1) M.S.A. Contamovac, V55799

(2) All American X-100, V01072

(3) UOP Integral Dust Collector, V48512

F. If the ventilation systems malfunction, stop all work on the copper beryllium until the ventilation system is put back into operation.

G. Keep chips and scrap of copper beryllium apart from those of other metals, to let you recycle the different metals.

H. You can sweep up copper beryllium chips and turnings, but not the dust. Use a vacuum cleaner and wet procedures on copper beryllium dust, to keep the dust out of the air.

I. Ventilation and local exhaust equipment is necessary only for operations that make dust. Be sure to regularly do maintenance on such equipment.

6. EMERGENCY PROCEDURES

NOTE: Unless specified differently, these procedures are the same as for other metals, such as copper, steel or aluminum

A. Eyes

(1) Do not rub.

(2) Flush out the dusts or powder with clean water.

(3) Lift the upper and lower eyelids frequently to be sure all of the unwanted matter is removed.

(4) If irritation continues, get medical help.

B. Skin

(1) For skin cuts and abrasions, use standard first aid procedures.

(2) Remove contamination from the skin with soap and water.

(3) If irritation continues, get medical help.

C. Nose

(1) If dusts or fumes are breathed in and the person then cannot breathe easily, remove the person immediately to fresh air.

(2) If breathing stops, give the person artificial respiration and get medical help.

D. Mouth

(1) If dust or powder is eaten and the person is conscious, let the person drink large quantities of water, then try to cause the person to vomit.

(2) Get medical help.

E. Spills

(1) Spills of solid copper beryllium, such as raw material or pieces or chips, are not a problem.

(2) If copper beryllium dust or powder is spilled, isolate the area. Persons that go into the area must have the protection of respirators and special clothing.

(3) Clean up the spilled dust or powder with the special vacuum cleaner (with high efficiency particulate air filtration system). Then use wet procedures. Be careful to keep airborne dust or powder to a minimum.

(4) Be careful to prevent contamination of water and air environments. If contamination of the environment occurs, reports could be necessary to national, state and local authorities.

7. MACHINING HINTS

A. Refer to BAC5648 for WARNING and CAUTION notes.

B. BAC5648 gives recommended values and tool data to let you saw, drill, mill, turn, bore, ream, deburr, grind, sand, hone, blast and machine copper beryllium alloys. The data in BAC5648 is only a guide to let you get started. Some adjustment could be necessary as tools and other conditions change.

C. For cutting fluids, use a water-soluble or mineral oil as listed in BAC5008 under Manufacturing Aid Lubricants and Coolants.