

MATERIAL AND TOOL CAUTIONS - DESCRIPTION AND OPERATION**1. Titanium**

CAUTION: Cadmium plated tools must not be used on titanium parts, particularly if parts are mounted where they may be subjected to temperatures above 250°F. Small cadmium deposits, which may be left on such parts, will react with titanium when heated, resulting in brittleness and possibly cracks.

CAUTION: Cadmium plated fasteners must not be used in contact with titanium parts.

2. Mercury

CAUTION: Mercury-containing thermometers and other test equipment must not be used on the airplane.

- A. Mercury, by the amalgamation process, can penetrate any break in the finish, paint or sealing coating of a metal structural element. An oxide coating on a dry metallic surface will tend to inhibit an immediate action while a bright, polished, shining or scratched surface will hasten the process. Moisture will also promote the amalgamation process. Soils, greases or other inert contaminants, present on the metal surfaces, will prevent the start of the action. The corrosion and embrittlement which results from an initial penetration, can be extremely rapid in structural members under load. Once it has begun, there is no known method of stopping it. Complete destruction of the load carrying capacity of the metal will result.

3. Asbestos

WARNING: Asbestos fibers are harmful when ingested into the body. The following steps must be adhered to when working with parts containing asbestos.

- A. Avoid inhalation of dust with either the following methods.
- (1) Use engineering controls, such as working with properly filtered exhaust chamber, or use wet methods to maintain exposure below OSHA personnel exposure limits.
 - (2) If methods in step (1) above cannot be used, use respiratory protection, including high efficiency filters. Other protection must include coveralls, gloves and eye protection.
- B. Dispose of all asbestos containing material in accordance with local, state and federal regulations.

4. Cadmium Plated Fasteners

CAUTION: Cadmium plated fasteners, utilized in areas where contact with jet fuel exists, must be completely covered with fuel tank sealant to prevent contact with fuel. All avenues that fuel can travel to reach head or shank or fastener must be sealed. Cadmium fasteners when continuously in contact with jet fuel may disperse cadmium from the fastener into the fuel system, which will be detrimental to the engines.

5. Maintenance Precautions

WARNING: During maintenance, repair and servicing of the airplane, many substances and environments encountered may be injurious if proper precautions are not observed.

- A. Carefully read and follow all instructions, and especially adhere to all cautions and warnings provided by the manufacturer of the product being used. Use appropriate safety equipment as required including goggles, face shields, breathing apparatus, respirators, protective clothing and gloves. Fuel, engine oil, solvents, volatile chemicals, adhesives, paints and strong cleaning agents may be injurious when contacting the skin or eyes, or when vapors are breathed. When sanding composites or metals or otherwise working in an area where dust particles may be produced, the area should be ventilated and the appropriate respirator must be used.
- B. In case of a spill of hazardous material, consult the latest version of the [Emergency Response Guidebook DOT P 5800.5](#) for guidance in dealing with the hazard. As soon as possible, notify CHEMTREC at 1-800-424-9300 (in the United States, including Alaska and Hawaii; and in Canada) for more detailed information in dealing with the hazard.

6. General Usage Solvents

- A. During the course of daily work routines, many will have the occasion to work with solvents. Webster's dictionary defines a solvent as, a substance, usually liquid, that dissolves or can dissolve another substance. An example would be the reaction that is obtained when salt is added to water. The salt is dissolved by the water. General usage solvents include the following:
- Methyl n-Propyl Ketone
 - Isopropyl Alcohol
 - Naptha
- B. These chemicals/solvents are generally colorless, evaporate quicker than water, and tend to give off vapors in higher quantities as their temperature increases. The vapors are generally heavier than air, which causes them to collect in low

lying areas or push normal oxygen and air out of a confined area. This situation can lead to oxygen deficient atmospheres. Many general usage solvents are also flammable.

- C. Solvents are hazardous to work with because of their flammability, rate of evaporation and reaction to oxidizers. Solvents can also be an irritant to the skin and eyes.
- D. Solvent flammability can be induced by a single spark, a smoldering cigarette, or even atmospheric conditions can ignite gasoline vapors. The vapors may also flash back to the original source which can explode. The same reaction can take place with Methyl n-Propyl Ketone (MPK) or Isopropyl Alcohol. The lower the flash point of the chemical, the more likely it is to become flammable. Generally, flash points of less than 100°F (37.8°C) are considered flammables. Examples of solvent flash points are shown below:

SOLVENT	FLASH POINT
Methyl n-Propyl Ketone	45°F (7.2°C)
Isopropyl Alcohol	53.6°F (12°C)

- E. The rate of evaporation is closely tied to flammability because normally the vapors must be present to ignite the liquid. Vaporization also allows the solvents, even those that are not flammable, to get into the air and into the body's blood stream through the lungs.
- F. Solvents can also react explosively with oxidizers (chemicals which release oxygen). A very violent and uncontrollable reaction takes place which generates heat rapidly. For this reason, it is very important for each person to be aware of specific chemicals in use in the work area, and to comprehend the labeling of containers. Chemical manufacturers are required to label each container with a diamond shaped symbol: red for flammable and yellow for oxidizers.
- G. Solvents can also damage the hands and skin. Solvents dry out skin and dissolve the natural oils. The condition can develop into an irritation or, if left untreated with continuous exposure it may progress to a dermatitis. Damaged skin allows other contaminants to worsen the condition, because the contaminants have easier access to the deeper levels of the skin. In serious cases, blood poisoning is also possible.
- H. The best defense against skin irritation is not to be exposed, but many times exposure to solvents/chemicals is unavoidable. Fortunately, the body is capable of filtering small amounts of solvents out of the body. This filtration function takes place in the liver. The liver receives blood which may be contaminated with solvents from both the lungs and the skin. If the quantities are low enough and infrequent enough, the liver can filter out the contaminants. This is one of the scientific facts on which OSHA based its Permissible Exposure Limits. However, when exposures are constantly above these levels over an extended period of many years, the filter (liver) becomes clogged and the solvents can then affect other parts/portions of the body.

7. National Emissions Standards for Hazardous Air Pollutants

- A. National Emissions Standards for Hazardous Air Pollutants (NESHAP).
- (1) The NESHAP standards have restricted the use of certain chemicals and solvents.
 - (2) For complete details of the regulatory standards, see Federal Register, 40 CFR Part 63, [Ad-FRL-5636-1], RIN 2060-AG65.
 - (3) The currently acceptable replacements for chemicals that have been restricted or prohibited by the standards are listed in Exterior Finish - Cleaning/Painting, and these supersede materials which may be specified elsewhere in this manual.
- B. NESHAP Requirements.
- (1) Hand-Wipe Cleaning.
 - (a) All hazardous air pollutants or volatile organic compounds that are used as hand wipe cleaning solvents must meet a composition requirement and have a vapor pressure less than or equal to 1.75Hg at 69°F (45 mm Hg at 20°C.)
 - (b) The requirements specified may be met by an alternative compliance plan administered by the permitting authority and approved under Section 112(1) of the Clean Air Act.
 - (2) Primer Application.
 - (a) The organic hazardous air pollutant content is limited to 350 g/l (2.9 pounds per gallon), less water, as applied.
 - (b) The volatile organic compound limit is 350 g/l (2.9 pounds per gallon), less water, as applied.
 - (c) Achieve the content limits by using coatings below the content limit or use monthly volume-weighted averaging to

meet content limits.

- (3) Topcoat Application.
 - (a) The base coat organic hazardous air pollutant content must be less than 420 g/l (3.5 pounds per gallon), less water, as applied.
 - (b) The volatile organic compound limit is 420 g/l (3.5 pounds per gallon), less water, as applied.
 - (c) The topcoats must meet the requirements of MIL-C-85285.
 - (d) Stripe paint requirements are the same as the base coat requirements. If the recommended supplier cannot be used, then use base coat materials. to paint stripes.

NOTE: All paints and primers must have specific application techniques. If alternative is sought, use only the materials that are less than or equal in emissions, to less than HVLV or electrostatic spray application techniques.

NOTE: Operate all application equipment according to the manufacturer's specifications, company procedures or locally specified operating procedures.

- (4) Depainting
 - (a) Depainting operations apply to the outer surface of the airplane and do not apply to parts or units normally removed. Fuselage, wings and stabilizers are covered. Radomes and parts normally removed are exempt from the following requirements:
 - 1 No organic hazardous air pollutants are to be emitted from chemical strippers or softeners.
 - 2 Inorganic hazardous air pollutant emissions must be kept to a minimum during periods of nonchemical based equipment malfunctions.
 - 3 The use of organic hazardous air pollutant material for spot stripping and decal removal is limited to 190 pounds per airplane per year.
 - (b) Operating requirements for depainting operations generating airborne inorganic hazardous air pollutants include control with particulate filters or water wash systems.
 - (c) Mechanical and hand sanding are exempt from these requirements.

8. Facilities and Equipment

A. Facilities

- (1) A system must be provided to collect processing waters to treat for chromium and pH or to be hauled away.
- (2) Facilities must have proper safety equipment.

B. Equipment

- (1) Spray application of cleaning solvents, paint removers or color chemical film treatment solutions is prohibited unless all requirements of NESHAP are met.
- (2) Spraying equipment to wash the airplane with alkaline cleaner may be used. This equipment should be adequate to spray deoxidizer, chemical film solutions and rinse water.
- (3) A high pressure washer is recommended, with or without hot water.
- (4) Respirators and/or dust masks should be used.