

OCCUPATIONAL HEALTH AND SAFETY INSTRUCTIONS

APPLICATION AND REMOVAL OF POLYURETHANE PAINTS AND SOLVENTS

GENERAL INSTRUCTION

This instruction is authorised for use by command of the Chief of Army. It provides direction, mandatory controls and procedures for the operation, maintenance and support of equipment. Personnel are to carry out any action required by this instruction in accordance with EMEI General A 001.

INTRODUCTION

General

1. This instruction details the Occupational Health and Safety (OHS) requirements for the application and removal of polyurethane paint (PUP) and solvents.

Associated Publications

2. Reference may be necessary to the latest issue of the following documents:
- a. [AS 1319-1994](#) – Safety Signs for the Occupational Environment;
 - b. [AS/NZS 1337:1992](#) – Eye Protectors for Industrial Applications;
 - c. [AS/NZS 1715:1994](#) – Selection, Use and Maintenance of Respiratory Protective Devices;
 - d. [AS/NZS ISO 6529:2006](#) – Protective Clothing - Protection against Chemicals - Determination of Resistance of Protective Clothing Materials to Permeation by Liquids and Gases;
 - e. APAC Paint standards;
 - f. [Defence Safety Manual \(SAFETYMAN\)](#) – Volume 1, Part 7, Chapter 11, Personal Protective Equipment;
 - g. [DI\(A\)TECH 15-1](#) – Australian Army Equipment Painting Policy;
 - h. EMEI Workshop D 700 – Painting of Army Equipment;
 - i. EMEI Workshop D 701 – Repair Policy for Equipment Painted in Polyurethane Paint;
 - j. EMEI Workshop E 651 – Spray Painting and Spray Booths;
 - k. Material Safety Data Sheets (MSDS) for view or print now available via the Chem Alert 2 database (<http://dsmachem.defence.gov.au/index.jsp>); and
 - l. [MEMA, Vol 2, Part 2, Chapter 17 – Manual of Equipment Management Accounting](#) – Direct Unit Funding (DUF).

Scope

3. OHS requirements for the application of alkyd or other paint systems are detailed in EMEI Workshop D 700.
4. This instruction does not detail the procedures for the preparation of surfaces for the application of PUP, nor does it discuss painting techniques. This information is contained in EMEI Workshop D 700, EMEI Workshop D 701 and associated instructions.

POLYURETHANE PAINT

5. PUP is a two component paint system. One part is commonly a polyester resin containing aromatic hydrocarbon, ester, ketone solvents and pigments. The other part contains aliphatic polyisocyanate resins (as the hardener), which are produced from unmodified isocyanate materials.
6. Polyisocyanate is the substance that may cause the majority of serious health problems; however the solvents, pigments and other paint additives are also categorised as potentially harmful.

7. Although the amount of aliphatic polyisocyanate in PUP formulations is relatively small, high airborne concentrations, up to 50 times the allowable exposure standard, may be generated during spray painting operations.

Equipment to be Painted with PUP

8. PUP systems are only to be applied to specific equipment as detailed in DI(A)TECH 15-1 – Australian Army Equipment Painting Policy.

SAFETY AND ENVIRONMENTAL CONSIDERATIONS

WARNING

The handling, storage and use of chemical substances are to be in accordance with MOHS, MSDS and EMEI Workshop series requirements.

Procedures

9. Each of the hazardous substances referred to in this EMEI are to be used, handled, stored and disposed of in accordance with the safety requirements given in their Material Safety Data Sheets (MSDS). MSDS for view or print are now available via the Chem Alert 2 database <http://dsmachem.defence.gov.au/index.jsp>.

First Aid

10. All personnel are to understand the first aid procedures relevant to the equipment and all hazardous substances used. This information is provided in the MSDS and is to be read and understood.

Adverse Health Effects of Isocyanates

11. Isocyanates are irritant substances. Splashes on the skin or in the eyes can cause immediate local inflammation. A brief exposure to high concentrations of isocyanate aerosol or vapour produces irritation of the eyes, nose and throat. Respiratory symptoms include coughing, chest tightness and breathlessness, occasionally resembling an asthma-like illness. These symptoms may often be associated with nausea, vomiting and gastric pain.

12. Sensitisation may occur with long term exposure at low levels, resulting in asthma. Respiratory sensitisation is referred to as isocyanate asthma, which is an obstructive lung condition. Although it normally occurs within the first few months of exposure, the onset of sensitisation may be delayed for several years. The asthma symptoms such as coughing, chest tightness and wheezing may begin immediately following exposure or may be delayed for several hours.

Medical Surveillance

13. Spray painters who regularly use PUP are to be medically examined every 12 months. The examination is to include a test of lung function. The Unit Safety Coordinator is to liaise with local medical staff to ensure this medical examination occurs and is documented.

14. New personnel who have not undergone recent testing (such as an apprentice or new spray painter) are to have a medical examination before commencing spray painting. New personnel are to be examined again after four weeks, at six months and at the end of the first year.

Training and Education

15. All personnel who work in or near spray painting areas are to be informed of the hazards associated with using PUP and the precautions necessary to prevent damage to their health. Personnel are to be aware of the following:

- a. the toxic effects of isocyanates;
- b. safe working practices;
- c. the characteristics of facilities for the spraying of PUP paints both in an enclosed spray booth and when sprayed outside;
- d. the procedures for reporting hazards or problems;
- e. emergency procedures (including evacuation, fire and spills);

- f. first aid provisions; and
 - g. the methods of avoiding exposure, including the selection, use, maintenance and storage of personal protective equipment (PPE).
16. Special attention is to be given to ensuring all personnel are aware of and understand these instructions.

PPE

WARNING

The application of polyurethane paint without the correct PPE or without the correct facilities is not permitted under any circumstances.

17. All personnel are to ensure they wear the correct PPE. Spray painters must know how to correctly use and maintain respiratory protective equipment.
18. MEMA, Vol 2, Chap 17, details what PPE may be purchased under DUF arrangements. This is restricted to safety eyewear, footwear and clothing (including gloves). PPE that is purchased under DUF is to comply with the relevant International, Australian and New Zealand Standards (ISO, AS, AS/NZS) as referred in paragraph 2.

NOTE

Respiratory protection equipment **is not** to be purchased by units (under DUF or other forms of self-funding). Respirators and other breathing apparatus are to be obtained through the logistic system, via DMO.

19. The following PPE is to be worn by operators or personnel assisting the operator:

WARNING

Combination air-purifying (particle/vapour filter) respirators are not suitable for the spraying of isocyanates.

- a. **Respiratory Protection.** A respirator that provides a filtered, separate air flow to the operator is mandatory when spray painting inside the spray booth. An example of this type of respirator is:
 - (1) NSN 4240-66-130-5095, Respirator, air filtering half-face, twin cartridge type filter, small, rubber mask, for chromic mist, paint mist, nuisance dust, adjustable quick release head; and
 - (2) Breathing apparatus, as per SCES 17807.
- b. **Eye Protection.** Full-face eye protection is to be worn.
- c. **Body Protection.** Coveralls, Safety, Industrial, 'Tyvek' (NSN 8415-66-100-0823, NSN 8415-66-100-0824, NSN 8415-66-102-9592 or NSN 8415-66-102-9593) are to be worn.
- d. **Hand Protection.** Glove Set, Butyl, (NSN 8415-66-116-2312 or NSN 8415-66-116-2313) are to be worn.
- e. **Skin Protection.** A suitable protective cream, such as Barrier cream NSN 6850-66-038-4510, is to be applied to exposed skin.

WARNING

Unprotected personnel are not to enter the spray painting area whilst painting is in progress.

20. A waiting period of at least 15 minutes, with the mechanical ventilation system operating, is required before unprotected personnel may enter the spray painting area. It is recommended that unprotected personnel do not enter the spraying area until the PUP has cured.

21. Care and Use of PPE. The PPE listed in this EMEI is required to provide protection from hazardous substances. To ensure that maximum protection is provided, the equipment must be maintained and used correctly. Procedures for use and care of PPE are detailed below:

- a. Respirators must be kept clean and hygienic; cleaning involves removing the cartridge and washing the respirator in warm soapy water.
- b. Organic vapour chemical cartridges continue to pick up vapours when not in use and are to be stored in sealed containers away from solvent vapours. Cartridges must be replaced immediately when personnel first notice a solvent smell in the respirator, (cartridges must not be used if the expiry date has been exceeded).
- c. Butyl gloves are not completely impervious to solvents and will become thicker and softer as a result of exposure to solvents. When this occurs they become more easily damaged and are to be replaced.



Figure 1 Personal Protective Equipment Suitable for Spraying PUP Indoors

Mixing and Handling PUP

22. PPE must be worn when opening, stirring, pouring or mixing PUP.
23. Containers are to be tightly closed when not in use. Containers must not be allowed to come in contact with water (isocyanates react with water which leads to the formation of carbon dioxide).
24. The pressure generated from carbon dioxide can cause a container to distort or burst. If a container shows signs of distortion or if water is suspected of entering, the container is to be covered with cloth whilst the lid is opened slowly to prevent violent expulsion or splashing of the paint.

Spray Application of PUP Indoors

25. Where PUP is to be applied indoors, painting is to be conducted in a specifically designed PUP spray booth facility that has been approved vide DI(A)TECH 15-1.

Spray Application of PUP Outdoors

26. If the equipment to be sprayed cannot fit into a spray booth, it may be painted outdoors (in the case of aircraft, spraying may occur in an aircraft hanger).
27. The PPE described in this EMEI is to be worn when spraying outdoors. No unprotected person is to be within 20 metres of the spray painting activity. In the case of an aircraft hanger, all personnel within the hanger are to wear PPE.
28. The spray painting area is to be sign-posted to prevent other personnel inadvertently entering the hazardous area. The signs are to comply with AS 1319 – Safety Signs for the Occupational Environment, and are to be of the Danger/Hazard type shown in Figure 2.



Figure 2 Danger Sign When Spraying Outdoors

Brush/Roller Application of PUP

29. When PUP is applied by brush or roller and where more than one litre is used during a period of eight hours, full PPE for polyurethane paint is to be worn.
30. Where less than one litre is applied in eight hours, the air line respirator can be replaced with the following equipment:
- NSN 4240-66-135-5799; Respirator, Air-filtering, Full Face-piece, Cartridge Type; fitted with
 - NSN 4240-66-031-2344, Canister Gas Mask Cylindrical.

Spills

31. Personnel are to be familiar with the emergency procedure for the clean up of a PUP spill as follows:
- The area is to be immediately evacuated.
 - Personnel wearing the correct PPE are to carry out the clean up process.
 - The area of the spill must be neutralised by spreading solid decontaminate over the spill.
 - The solid decontaminate is to be left for 10 minutes and then collected for disposal.
 - The spill site is to be washed with liquid decontaminant and hosed with water.
 - The waste solid decontaminate is to be disposed of in accordance with the waste disposal policy of the state authority. The state authorities are detailed in Table 1.

Table 1 State Environmental Protection Authorities

Queensland:

Environmental Protection Agency (EPA)
160 Ann Street
BRISBANE QLD 4000
Telephone: (07) 3227 7111

EPA Pollution Hotline Emergency Incidents Only (24 Hour)
Telephone: 1300 130 372

Internet: www.epa.qld.gov.au

Victoria:

EPA Victoria
Herald & Weekly Times Tower
40 City Road
SOUTHBANK VIC 3006
Telephone: (03) 9695 2722

Pollution Watch Line (All Hours)
Telephone: (03) 9695 2777

Country Callers
Telephone: 1800 444 004

EPA Information Centre
Telephone: (03) 9695 2722

Internet: www.epa.vic.gov.au

Western Australia:

Environmental Protection Authority (EPA)
168 St George Terrace
PERTH WA 6000
Telephone: (08) 6364 6500

Mines Department, Dangerous Goods Branch
Storage Issues
Telephone: (08) 9222 3413 and
Transport Issues
Telephone: (08) 9222 3595

Internet: www.epa.wa.gov.au

Northern Territory

Department of Natural Resources, Environment
and the Arts

Pollution Response Hotline, (24 Hour)
Telephone: 1800 064 567;

Internet www.nt.gov.au/nreta/environment/index.html

New South Wales:

Environmental Protection Authority (EPA)
59-61 Goulburn Street
SYDNEY NSW 2000
Telephone: (02) 9995 5000

Pollution Information Line (Business Hours)
Telephone: 13 1555

Pollution Incidents (24 Hour)
Telephone: 13 1555

Internet: www.epa.nsw.gov.au

South Australia:

Environmental Protection Authority (EPA)
77 Grenfell Street
ADELAIDE SA 5000
Telephone: (08) 8204 2000

Incident Reporting & Complaints
Telephone: (08) 8204 2004

Freecall (Outside Metropolitan Adelaide)
Telephone: 1800 623 445

Internet www.epa.sa.gov.au

Tasmania:

Environment Division
Department of Primary Industries & Water (DPIW)
134 Macquarie Street
HOBART TAS 7000
Telephone: (03) 6233 6518

Pollution Incidents & Complaints
Telephone: 1800 005 171

Internet: www.dpiw.tas.gov.au

32. The components and volume of the solid and liquid decontaminate are detailed in Table 2.

Table 2 Decontaminates for Cleaning PUP Spills

| Type of Decontaminant | Amount to Use |
|---|---------------|
| Solid Decontaminant (by weight) | |
| Sawdust | 20% |
| Kieselguhr, Technical or China Clay or Fuller's Earth | 40% |
| Liquid Decontaminant | 40% |
| Liquid Decontaminant (by volume) | |
| Water | 90% |
| Non-ionic Detergent (100%) | 2% |
| Concentrated Ammonia (Specific Gravity 0.880) | 8% |

WARNING

Removal of PUP by burning is not permitted.

Welding or Flame Cutting of Equipment Coated with PUP

- 33. At temperatures of approximately 300°C, isocyanates are liberated from PUP and become a health hazard.
- 34. Welding or flame cutting of equipment coated with PUP is not to occur until the area to be cut or welded is mechanically or chemically cleaned to bare metal.
- 35. PUP must be removed from all surfaces likely to be heated in the repair process, including from the rear surface of the component to which heat is applied.

Hazards of Mechanical Removal of PUP

WARNING

The application or removal of PUP by sanding without correct PPE and facilities is not permitted.

- 36. **Dry Sanding of Freshly Painted PUP.** The complete curing of a PUP coat may take hours or days depending on the temperature or the humidity. Sanding freshly applied PUP that has hardened, but is not fully cured, can release isocyanates. Therefore, wet sanding should be carried out in preference to dry sanding. Where this is not practicable, the PPE described in paragraph 19 is to be worn.

WARNING

If reusable cloth overalls are used and significant sanding of PUP has occurred, the launderers are to be informed of the possible presence of harmful dust.

- 37. **Dry Sanding of PUP.** Dry sanding of PUP creates a dust hazard. PUP dust is to be collected, sealed in plastic bags and disposed of as industrial waste in accordance with state environmental requirements. Sanding should be conducted in a separate area to confine the spread of dust.

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WARNING

Compressed air is not to be used after sanding to blow surface PUP dust from equipment or clothing.

38. Wet Sanding of PUP. Wet sanding is the preferred method of sanding PUP, but it is recognised that it is likely to be impractical for other than the final preparation for the application of the primers and topcoats. Wet sanding does not require the use of special PPE. Wet sanding residue must be collected and placed in plastic bags before it dries. The waste residue is to be disposed of in accordance with the state environmental requirements.

NOTE

If wet sanding residue becomes dry, it is to be collected wearing PPE and disposed of in accordance with the state environmental requirements.

39. Abrasion Blasting. PUP can be completely removed by abrasion blasting; however, it may only be carried out by those workshops authorised to apply PUP. Full PPE must be worn when using abrasion blasting to remove PUP.

WARNING

Chemical paint removers contain a highly toxic substance called methylene chloride. Appropriate PPE is to be worn when using chemical paint removers. Only those workshops authorised to apply PUP are to use chemical removers.

40. Chemical Removal. PUP can be completely removed by chemical stripping, however, it may only be carried out by those workshops authorised to apply PUP. Full PPE must be worn when using chemical removal techniques to remove PUP.

END

Distribution List: **WKSP E 02.0 – Code 1** (Maint Level)
(Sponsor: LV SPO, VMSE)
(Authority: TRAMM)