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## Personal Protective Equipment (PPE)

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## Personal Protective Equipment (PPE)

### 1. Introduction

The need to reduce risk and to provide a safe working environment are fundamental principles of mine action management, risk reduction involves a combination of safe working practices and operating procedures, effective supervision and control, appropriate education and training, equipment of inherently safe design, and the provision of effective Personal Protective Equipment (PPE) and protective clothing.

As a minimum, all employees involved in demining should be provided with comfortable and serviceable protective clothing and footwear appropriate to the task and local conditions.

PPE should not be considered as the primary protective measure against the effects of mine and UXO hazards. Rather it should be regarded as the final protective measure after all planning; training and procedural efforts to reduce risk have been taken.

PPE protects only the wearer, whereas measures controlling the risk at the source can potentially protect everyone at the demining workplace. Theoretical maximum levels of protection are seldom achieved with PPE in practice and the actual level of protection afforded is difficult to assess. Effective protection is only achieved by suitable correctly fitted PPE that is properly maintained and used.

Whilst PPE often offers a good level of protection to the wearer there are some drawbacks to wearing it as well. PPE can be uncomfortable to wear as it raises body temperatures in warmer climates, impedes the view of the wearer by visors fogging in colder climates, restricts the wearer to some extent by limiting mobility, and can create fatigue as a result of its weight.

The threat to deminers comes principally from Anti Personnel (AP) blast mines, AP fragmentation (AP Frag) mines, Anti Tank (AT) mines and Unexploded Ordnance (UXO).

AP blast mines are the most abundant mines encountered in humanitarian demining and cause the greatest number of injuries. The affects of AP Fragmentation mines and AT mines defeat PPE that is currently available. AP Frag and AT mines create heavy fragmentation and blast effects out to tens of metres radius. Therefore they have the potential to cause casualties within that range.

In general when items of UXO are encountered they have already malfunctioned. They are usually high in metal content, located on or near the surface and normally if not incorrectly handled constitute less of a hazard than mines. When dealing with items of UXO PPE should again be considered as a last line of defence, as many varieties of UXO will defeat PPE. As with mine clearance, operating and safety procedures shall be appropriately adhered to as the first line of protection.

### 2. Scope

The scope of this chapter is to provide the specifications and guidance to organisations on the minimum requirements for PPE including protective clothing and other items of protective apparel for use in mine action in Afghanistan.

### 3. PPE Standards

The levels of PPE provided for use in hazardous areas shall be based on a number of factors including the threat, operational procedures and practices, and local environmental conditions. The following minimum standards shall be achieved:

- a) PPE intended to be employed by organizations for use on clearance operations in Afghanistan shall be approved and accredited by MACCA.
- b) Appropriate training shall be conducted on the correct use, maintenance and storage of PPE that is employed within an organisation prior to commencement of clearance operations.
- c) Facilities should be provided for proper storage and carriage of PPE.
- d) PPE shall be inspected on a regular basis to ensure that it is suitable for continued use.

#### 4. Blast Protection

To meet accreditation requirements for Afghanistan PPE shall achieve the following requirements:

- a) Minimum capability of protecting against the blast effects of 240 gm of TNT at stand-off distances for each item of PPE appropriate to the activity performed in accordance with SOPs.
- b) Frontal protection appropriate to the activity, capable of protecting against the blast effects of 240 gm of TNT at 30 cm from the closest part of the body.
- c) Eye protection capable of retaining integrity against the blast effects of 240 gm of TNT at 60 cm whilst providing full frontal coverage of face and throat as part of the specified frontal protection ensemble

Note 1 Although the above standards lay down distances at which the PPE must be effective it must be emphasised that this does NOT imply that the PPE will provide total protection such distances.

Note 2 The frontal protection ensemble used, regardless to whether the wearer is required to kneel, sit or squat shall be designed to cover the eyes, throat (frontal neck), chest, abdomen and genitals. Where SOPs permit employees to work in the kneeling or squatting position, then the frontal protection ensemble may cover the front of the thighs.

Note 3 Hand tools should be constructed in such a way that their separation or fragmentation resulting from the detonation of an AP blast-mine incident is reduced to a minimum. They should be used with appropriate hand protection such as a hand-shield or gloves. Hand tools should be designed to be used at a low angle to the ground and should provide adequate stand-off from an anticipated point of detonation.

Note 4 Only those hand tools that are accredited for use in Afghanistan by the MACCA shall be employed.

#### 5. Fragmentation Protection

The effects of detonating fragmentation mines defeat PPE that is currently available which emphasises the initial need to minimise risk of injury through procedures. Protection should nevertheless be provided against non-designed fragmentation from other mines, (such as that from plastic-bodied blast mines), and to potential secondary victims where such a threat cannot be removed procedurally. To reduce the risk from such hazards, PPE shall include, as a minimum:

- a) Ballistic body armour with a STANAG 2920 v50 rating (dry) of 450m/s for 1.102g fragments.

- b) A full face visor capable of retaining integrity against the blast effects of 240 gm of TNT at 60 cm whilst providing full frontal coverage of face and throat as part of the specified frontal protection ensemble. However, if an analysis of the threat indicates that a full face visor would provide inadequate protection across a full 360<sup>o</sup> threat spectrum, then a helmet should be worn. The helmet should have a ballistic rating similar to the ballistic body armour accredited for use in Afghanistan.
- c) Eye protection should be no less than that offered by 5mm of untreated polycarbonate. It should provide full frontal coverage of the face and throat as part of the specified frontal protection ensemble. The bottom edge of the full-face visor should be of sufficient length to fit behind the protective flap on the body armour.
- d) Ballistic eye protection in the form of glasses may be worn in some occasions as detailed later in this chapter however it shall meet the provisions as detailed above.

Note: Commonly available industrial safety spectacles do not meet the minimum requirement of this standard and shall not be used as demining PPE.

## 6. Minimum Requirements of PPE for Operations

The minimum requirements of PPE for demining, disposal of UXO and stockpile destruction operations are described below:

- a) Manual clearance: The PPE to be used shall be full face visor, body armour and protective gloves. The visor may be part of a combined helmet and visor assembly if necessary.
- b) BAC operations: The minimum requirements shall be as follows:
  - i. Surface visual search – body armour.
  - ii. Surface instrument-aided search - ballistic eye protection and body armour. (NOT in areas known to contain sub munitions strikes).
  - iii. Sub-surface search and excavation - Protective visor and body armour.
  - iv. Surface and sub-surface for sub-munitions – Protective visor and body armour.
- c) MDD operations: As for manual clearance, except that MDD handlers are permitted to use reduced face protection to avoid voice distortion. Reduced face protection may be half-face visors or the use of ballistic eye protection only.
- d) Mechanical operations: As for manual clearance, except that mechanical operators are not required to wear protective visor and body armour when working inside a protective cab, unless there are limitations applied as part of the operational accreditation of the machine that dictate that PPE shall be worn by machine operators. When machine operators are not required to wear PPE in a protective cabin, then protective visor and body armour may be carried in the cabin for use in an emergency.
- e) EOD operations: EOD personnel shall wear PPE whenever they are required to handle items of UXO or when working around items of UXO that are known to be sensitized and potentially may detonate without warning. An exception may be when the EOD personnel are required to operate in confined spaces, when the wearing of PPE could impede the operator potentially creating a higher risk and when dealing with large items such as large aerial dropped weapons as current PPE offers no protection against such weapons.

## 7. Command Group and Visitors

The PPE worn by command groups and visitors while moving inside a hazardous area may be as follows;

- a) Command group: The minimum PPE for command groups including, supervisors while moving inside a hazardous area may be ballistic eye protection and body armour, so long as they do not approach within minimum safety distances of any clearance activities, when full visors and body armour shall be worn.
- b) Visitors: Protective visors and body armour shall be worn by visitors whenever they move within the minimum safety distances for personnel working in a hazardous area. Outside these areas they may wear ballistic eye protection and body armour.

## 8. PPE For Specialist Operations

Organizations carrying out demining or EOD operations, including disposal of UXO and stockpile destruction operations shall have available and use PPE that meets or exceeds internationally recognized standards of protection for the activity to be carried out. However, this is only applicable provided that such PPE is available, it is effective against the hazard(s) present and that the use of such PPE does not impede the safe conduct of the activity being carried out.

Organizations shall obtain the express agreement of the MACCA to undertake operations involving items containing Depleted Uranium, Liquid Propellant, Chemical Agents or Fuel Air Explosive. If such operations are necessary and authorized, the following details the minimum PPE to be provided to personnel involved in these operations.

## 9. Operations Involving Depleted Uranium (DU)

The PPE to be provided for operations involving items suspected to contain DU is to provide complete overall protection from inhaled or skin-contact DU dust and cuts from sharp fragments. The minimum PPE to be provided is:

- a) Inner cotton gloves.
- b) Outer heavy PVC gloves of industrial quality.
- c) Respirator.
- d) Protective trousers and over boots.

Note 1 Organizations required to conduct operations involving items suspected of containing DU shall read and familiarize themselves with the latest version of Technical Notes for Mine Action (TNMA) 09.30/02, 'Clearance of Depleted Uranium (DU) hazards'. The TNMA is available from the MACCA or can be downloaded from the IMAS website at <http://www.mineactionstandards.org/>.

## 10. Operations Involving Liquid Propellant

The PPE to be provided for operations involving items suspected to contain liquid propellant is to provide complete overall protection from inhaled or skin-contact vapour and cuts from sharp fragments. The minimum PPE to be provided for personnel involved in the marking or close reconnaissance, without physical contact, of items suspected of containing liquid propellant is:

- a) Inner cotton gloves.
- b) Outer heavy PVC gloves of industrial quality.

- c) Respirator.
- d) Gas and liquid resistant over suit and over boots.

Note 1 If the presence of liquid fuel propellant is known from the start, or physical operations on the munitions or storage tank of an item suspected of containing liquid propellant are taking place, personnel dealing with the item shall also be provided with:

- e) Self-Contained Breathing Apparatus (SCBA).
- f) A Gas Tight Suit (GTS).

Note 2 Organizations required to conduct operations involving items suspected of containing liquid propellant shall read and familiarize themselves with the latest version of Technical Notes for Mine Action (TNMA) 09.30/03, 'Guidance on liquid propellant fuelled systems'. The TNMA is available from the MACCA or can be downloaded from the IMAS website at <http://www.mineactionstandards.org/>.

## 11. Operations Involving Chemical Agents

The PPE to be provided for operations involving items suspected to contain chemical agents is to provide complete overall protection from inhaled or skin-contact vapour and cuts from sharp fragments. The minimum PPE to be provided is:

- a) Inner cotton gloves.
- b) Outer heavy PVC gloves of industrial quality.
- c) Respirator.
- d) Gas and liquid resistant over suit and over boots.

Note 1 The PPE shall be of a standard equal to that of NBC ensembles worn by NATO armies.

## 12. Operations Involving Fuel Air Explosive (FAE)

The PPE to be provided for operations involving items suspected to contain FAE is to provide complete overall protection from inhaled or skin-contact vapour and cuts from sharp fragments. The minimum PPE to be provided is:

- a) Inner cotton gloves.
- b) Outer heavy PVC gloves of industrial quality.
- c) Respirator.

Note 1 Organizations required to conduct operations involving items suspected of containing FAE shall read and familiarize themselves with the latest version of Technical Notes for Mine Action (TNMA) 09.30/04, 'Fuel Air Explosive (FAE) systems'. The TNMA is available from the MACCA or can be downloaded from the IMAS website at <http://www.mineactionstandards.org/>.

## 13. Protective Clothing

Demining organizations shall provide to their personnel at no cost to the individual, suitable attire that affords appropriate protection for tasking under low threat operating conditions at their worksites and from the elements.

## 14. Hearing Protection

Mine action organizations shall provide hearing protection to personnel exposed to intense or protracted levels of noise. The exception is when wearing hearing protection may impede safety. Under such circumstances work practices shall be addressed to reduce exposure.

## 15. Management of PPE and Protective Clothing

PPE shall be subject to routine inspections and the following requirements shall be achieved to allow continued use of the equipment:

- a) Organizations shall conduct routine inspections of PPE and protective clothing to ensure that the items of equipment continue to meet the accredited standards. The requirements for such inspections shall be included in organizations' SOPs.
- b) Routine inspections shall cover both the serviceability of PPE and protective clothing and the correct wearing of it. During these inspections, special attention shall be made to the condition of protective visors, the fit of body armour and the serviceability of clothing including footwear. When damaged or defective PPE or protective clothing is identified demining organizations shall ensure that these items are replaced prior to the individual user being permitted to continue working.

Note 1 TNMA 10.10/02, Safety Notes – General, issue 1 dated 1 July 2004 contains information on the effects of sunlight on visors, use of visors attached to helmets, visor maintenance and the wearing of visors down or closed. Information contained in this TNMA, should be reviewed by demining organizations operating in Afghanistan. A copy of the TNMA can be obtained from the MACCA or downloaded from the IMAS website at <http://www.mineactionstandards.org/> .