



NMAS 10.30

Safety & Occupational Health (S&OH) – Personal Protective Equipment (PPE)

March 2020

Edition 2.1

Lebanon Mine Action Center-LMAC

Chekri Ghanem Casern–Fayadieh

Tel: +961 5 956143, Fax: +961 5 956192

Email: info@lebmac.org

Website: <http://www.lebmac.org/>

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Tel: +961 5 956143,

Fax: +961 5 956192

Email: info@lebmac.org

The LMAC gratefully acknowledges UNDP support during the preparation of this NMAS.

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Foreword

The National Mine Action Standards (NMAS) of Lebanon were first developed in the form of Technical Standards and Guidelines (TSG). After the Lebanon Mine Action Policy was released in 2007, these TSG were edited into the first edition of the NMAS in 2010 and were written to concurrently comply with the first edition of the International Mine Action Standards (IMAS). Since then, the scope of the IMAS has been expanded to include more components of mine action and amended to mirror the most recent changes to standards as required in today's operations. These changes, as well as changes in the local context of Lebanon, have necessitated a review and update of the NMAS.

As detailed in the National Mine Action Policy of 2007, the Lebanon Mine Action Center (LMAC) has the responsibility to execute and coordinate the Lebanon Mine Action Program (LMAP) on behalf of the Lebanon Mine Action Authority (LMAA), including the development and amendment of standards. Such standards shall be developed in a participatory approach that shall involve international, governmental, and nongovernmental organizations.

The NMAS shall be reviewed as needed to reflect amendments in the IMAS as well as incorporate changes to international obligations and local requirements. Such revisions shall be regularly made available on the LMAC's website www.lebmac.org or can be obtained through contacting the LMAC via the email info@lebmac.org.

Acronyms

AP	Anti Personnel
AT	Anti Tank
EO	Explosive Ordnance
ERW	Explosive Remnants of War
GoL	Government of Lebanon
HMA	Humanitarian Mine Action
IA	Implementing Agency
LMAA	Lebanon Mine Action Authority
LMAC	Lebanon Mine Action Center
LMAP	Lebanon Mine Action Program
MDD	Mine Detection Dog
PPE	Personal Protective Equipment
S&OH	Safety and Occupational Health
SOPs	Standard Operating Procedures
STANAG	Standardization Agreement (NATO)
UXO	Unexploded Ordnance

Introduction

The provision of appropriate Personal Protective Equipment (PPE) during HMA work in areas that are, or may be, contaminated with EO hazards is a basic health and safety requirement that shall always be complied with by IAs operating in Lebanon. However, the nature of EO hazards is such that no PPE can guarantee protection against injury in the event of a detonation close by. The best protection is the avoidance of any unintended detonations and this is achieved procedurally by ensuring that staff are appropriately trained, equipped and supervised to conduct demining procedures that are designed to avoid any unintended detonations. After everything reasonable has been done to avoid an accident/incident, PPE is added as the last measure of protection for staff.

Available and practical PPE cannot provide guaranteed protection against a high explosive event occurring close by. However, it can provide some protection and so avoid some injuries and reduce the severity of injuries of many others. The use of PPE is a risk mitigation strategy. The only way to eliminate the risk of explosive injury is to avoid the explosive event entirely. Accordingly, managing procedures to avoid risk events occurring is the most effective way to protect staff from explosive injury.

Appropriate PPE shall be provided to reduce the risk of severe injury in the event of an unintended detonation occurring after everything reasonable has been done to avoid the event. Appropriate PPE should not be so heavy or uncomfortable in use that it is impractical to conduct demining while wearing it. Appropriate PPE should impose minimal constraints on the wearers, all of whom should be provided with training about its safe use, its maintenance and its limitations. This NMAS provides specifications and guidance to IAs on the minimum requirements for PPE for use in all HMA field operations in Lebanon, including survey, demining, BAC and EOD activities.

Personal Protective Equipment (PPE)

1. Scope

This NMAS provides the IAs in Lebanon with standards and guidelines for the appropriate use and application of Personal Protective Equipment (PPE) during HMA interventions in hazardous areas. It should be read in conjunction with the other NMAS in the 10 series and with NMAS 07.14 *Risk Management*.

Implementing Agencies (IAs) intending to engage in mine action interventions (specifically survey, demining, EOD, and EO transportation, storage and handling) shall abide by the standards provided in all relevant NMAS.

2. References

A list of normative and informative references is provided in Annex A.

Normative references provide cross-referencing to other standards referred to in this standard and which form an integral part of the provisions of this standard.

Informative references provide a list of documents that may be consulted for a clearer understanding of this standard.

3. Key Terms and Definitions

The following key terms and definitions are used in this standard:

- *Hazardous areas, (dangerous areas)*: all areas within Lebanon that are known to contain an EO hazard are marked and recorded as Dangerous Areas (DAs) in the Information Management System for Mine Action (IMSMA) that is used by the LMAC. DAs are frequently referred to as *Hazardous areas* or *Contaminated Areas*.
- *Personal Protective Equipment (PPE)*: all equipment and clothing designed to provide protection, which is intended to be worn or held by an employee at work and which protects him/her against one or more risks to his/her safety or health (IMAS Glossary, 2014).
- *Safety distance*: the acceptable and minimum distances between staff and equipment and a deliberate demolition/detonation. Safety distances need not be the same as Working distances.
- *Tolerable risk*: for the purposes of the Lebanon NMAS, tolerable risk is defined as the risk remaining after all reasonable effort has been applied to managing and mitigating risk. The 'tolerable risk' remaining after an area has been searched, cleared and released is

the risk of explosive hazards being beneath the required search depth in that task area. The 'tolerable risk' to demining staff is the risk remaining after all reasonable efforts have been made to train, equip and supervise staff in the conduct of inherently safe demining procedures. All reasonable effort includes the production of a formal task risk assessment designed to ensure that appropriate measures to mitigate risk are taken. All formal risk assessments must be updated as work progresses and new information becomes known. The LMAC shall determine the level of risk that is tolerable at any task. In the event of disagreement, the final arbiters of what is 'all reasonable effort' shall be the Government and Courts of Justice in Lebanon.

- *Working distances*: the acceptable and minimum distances between people and between people and equipment at a demining worksite. Because no deliberate detonations will occur, working distances may be less than safety distances.

In addition to the above terms, NMAS 04.10 provides a glossary of terms and definitions used across all standards.

As in the IMAS, the terms 'shall', 'should' and 'may' are used across all standards to indicate the required degree of compliance. For any organization working in Lebanon, the use of 'shall' indicates a compulsory requirement. The term 'should' indicates the national preference which may be varied with LMAC approval. The term 'may' indicates a suggestion that is not obligatory.

4. Personal Protective Equipment (PPE) Requirements

4.1 General

The appropriate level of PPE required shall be determined by IAs after conducting a formal risk assessment for each specific task. The risk assessment will consider the type and size of EO anticipated in each area, the available tools and procedures and the environmental conditions at the worksite. Guidelines on the process of risk assessment and risk management at demining worksites are provided in NMAS 10.20 and NMAS 07.14.

When assessing risk, the probability of the specific demining procedure initiating a specific type of EO hazard in the context of the worksite shall be calculated. When there is no risk of the procedure initiating the hazard, the minimum PPE shall still be used. It may be appropriate to use different types of PPE in the varied parts of a single worksite when the hazards that are present vary considerably.

Although the available PPE cannot be guaranteed to provide complete protection against the effects of a detonation, it can reduce the number and/or the severity of injuries and so shall always be worn when required.

4.2 Measures to Ensure Suitability and Appropriateness

In their LMAC approved SOPs and during all of their work in Lebanon, IAs shall:

- ensure that PPE fits the wearer and arrangements shall be made by IAs to accommodate all demining staff (male or female) with suitably fitting equipment;
- ensure that weather-appropriate clothing in addition to PPE, including suitable, sturdy, and slip-resistant footwear is made available and used appropriately;
- provide regular training for staff covering all aspects of PPE, including its correct storage, transportation, maintenance, and its limitations; and
- not allow the use of faulty, deteriorated, or malfunctioning PPE (employees shall immediately report any faulty, deteriorated, or malfunctioning PPE to their supervisor and should cease work until provided with replacement equipment).

Protection other than PPE shall be used by IAs when the risk at a task is assessed as exceeding 'tolerable risk' levels. This may involve the use of alternative procedures, machines, long-reach equipment, portable hard-armor panels, or protective works.

4.3 Minimum PPE Requirements

4.3.1 For Blast Protection

As a minimum and as required in IMAS 10.30, the PPE worn inside the safety distance of a suspected hazardous area or when engaged in any activity that involves being close to EO shall be:

- frontal body armor capable of satisfying the ballistic test outlined in STANAG 2920, achieving a V50 rating (dry) of 450m/s for 1.102g fragments. It shall also be capable of protecting the chest, abdomen and groin area against the blast effects of 240g of TNT at 60 cm from the closest part of the body; and
- eye protection that is held over the eyes in a frame that prevents blast ingress from beneath. The eye protection shall be capable of retaining integrity against the blast effects of 240 g of TNT at 60 cm and shall provide protection equivalent to not less than 5mm of untreated polycarbonate (IMAS 10.30, 2013).

While the minimum permitted in the IMAS is 5mm thick polycarbonate goggles, the LMAC recommends that eye protection should be a part of a visor capable of protecting against the blast effects of 240g of TNT at 60 cm and providing full frontal coverage of face and throat.

4.3.2 For Fragmentation Protection

Most PPE cannot protect against the dangers of fragmentation from metal cased EO detonating close by. This reinforces the point that risk should be minimized by avoidance

which is achieved by using appropriate procedures and equipment. However, fragmentation from EO is varied in size and speed and so PPE can sometimes be effective, and if often partially effective. A minimum level of protection shall be offered against the fragmentation of EO through maintaining the following standards:

- frontal body armor capable of satisfying the ballistic test outlined in STANAG 2920, achieving a V50 rating (dry) of 450m/s for 1.102g fragments; and
- eye protection that is held over the eyes in a frame that prevents blast ingress from beneath; this may be achieved using goggles, a full face visor or a helmet with a long visor. In all cases the eye protection shall be equivalent to that provided by 5mm thick untreated polycarbonate.

4.4 Helmets

The use of helmets to support a blast visor shall be permitted as long as the visor face is long enough to provide frontal neck protection. Helmet visors manufactured for use in combat are generally too short and allow blast ingress from beneath.

Helmets may be made of materials designed to provide additional protection or may simply be lightweight carriers for the visor.

4.5 Hand Tools

This section provides standards that shall be applied for all demining hand tools that are used to expose or move any EO hazards.

- The IA shall ensure that hand tools used during signal investigation or for EO handling in Lebanon are constructed in a way that minimizes the risk of their separation or fragmentation in a detonation to a minimum. The IA shall ensure that the hand tools are designed to be used at a low angle to the ground and that they provide adequate stand-off from any anticipated point of detonation.
- IAs shall not allow the use of faulty, deteriorated or malfunctioning hand tools. IAs shall regularly check the condition of hand tools used in demining, and ensure the maintenance or replacement of unsuitable items immediately.
- Employees shall immediately report any faulty, deteriorated, or malfunctioning hand-tools to their supervisors and shall discontinue use of the tool until provided with a suitable replacement.
- IAs should provide employees with hand tools that incorporate an effective hand-shield, when appropriate.
- IAs should provide demining employees with practical gloves to protect against small cuts and grazes as they work. Practical gloves are gloves that do not prevent the wearer receiving tactile feedback as they do their job. No practical gloves known to

the LMAC can provide reliable protection against a detonation in, or close to, the wearer's hand.

Note: Excavation tools and trowels constructed with inverted 'V' shoulders have been refused accreditation for use in EO excavation activities in South Lebanon. Contact the LMAC for more information if required.

4.6 Blast Resistant Footwear

The use of blast resistant footwear is optional for two reasons. First, deminers conducting appropriate search and clearance procedures should never be in a position where they might step onto a pressure-sensitive hazard. Second, no currently available blast boots can reliably prevent severe injury when stepping on even the smallest anti-personnel blast mine, so their provision may give the wearer false confidence.

The most effective designs of blast resistant footwear use a stand-off distance to try to deflect and/or absorb the shock effects of small explosive hazards. The footwear raises the wearer above the ground surface in a manner that prevents both foot flexion and wearer feedback about the ground surface. As a result, the wearer can be unstable when walking over uneven ground and find it difficult/painful when moving between a standing and a kneeling position. These problems may make it more hazardous to wear the boots than not.

IAs may wish to evaluate the available provide blast resistant footwear for use during NTS or for specific activities in a hazardous area. The issue of blast resistant footwear shall never be used to justify any reduction in the LMAC approved search and clearance procedures that are the deminers' main protection.

4.7 Blast trauma

Research into blast induced neurotrauma has shown that persons who experience the pressure wave from a large explosion can suffer internal injury, especially brain injury, without any obvious physical damage. This occurs with or without the protection of PPE. Brain injury can result even when the head is not struck by the pressure wave because it passes through body fluids, including spinal fluid.

The consequences of blast induced brain injury can take time to manifest but can be severely disabling, so should be avoided. It is not clear how best to protect against this. Until otherwise informed, the safety distance when destroying EO should be augmented by being protected behind solid walls or lying flat on the ground whenever large scale demolitions are conducted or a large device is being destroyed. NMAS 09.32 provides guidance about large scale demolitions.

4.8 Protecting Hearing

IAs should offer deminers protective hearing devices for use during demolitions. The use of ear protection shall be balanced against the need for open communication channels.

Repeated unprotected exposure to large blast waves at a safe distance may cause cumulative hearing loss that leads to a deafness disability. IA's shall ensure that their demolition procedures effectively protect all staff from exposure to large blast waves that may damage their ears.

4.9 PPE during Explosive Ordnance Disposal (EOD)

Greater levels of protection may be necessary during some EOD activities. Whenever approaching large EO that is believed to be fuzed and sensitive, full body protection should be available to the EOD operator.

The PPE provision available for unusual circumstances encountered during EOD activities shall be detailed in the SOPs that the IA submits to the LMAC for assessment before conducting dedicated EOD tasks in Lebanon.

4.8.1 Sub-munition EOD

Whenever working with sub-munition hazards, all staff shall be made aware that no PPE can protect against an armor-penetrating shaped-charge. However, body armor and blast visors or goggles can provide some protection against the fragmentation associated with sub-munitions so shall always be worn.

4.8.2 IED EOD

Whenever working with IED hazards the minimum body armor requirements for demining shall apply and enhanced PPE should be available whenever the task risk assessment determines that the risk is higher than 'normal'.

5. Roles and Responsibilities

Both the LMAC and employers/IAs shall comply with the standards and guidelines for PPE as laid out in this NMAS. The requirements are the *minimum* requirements and should be exceeded whenever practicable.

5.1 Responsibilities of the LMAC

The LMAC shall:

- ensure that all IAs are appropriately accredited to work in Lebanon and that their relevant SOPs covering PPE have been assessed and approved for use before any IA is permitted to conduct mine action activities in Lebanon;
- ensure that the minimum requirements set in this NMAS for PPE are met or exceeded in the IA's SOPs;
- ensure that the IA has a formal procedure for conducting task risk assessments and calculating appropriate PPE requirements and that the risk assessment is recorded appropriately;

- monitor the availability of other procedures and equipment which may be able to further reduce risk to demining staff;
- ensure that the IAs provide regular training concerning the selection, use and care of appropriate PPE for HMA in Lebanon; and
- conduct QA/QC checks to ensure the IA's compliance with this standard and the condition of the PPE in use.

5.2 Responsibilities of IAs

In their capacity as demining organizations, IAs shall:


- submit detailed SOPs covering PPE that comply with the provisions of this NMAS and receive the LMAC's approval of those SOPs before conducting any demining operations;
- conduct effective task risk assessments and use the results to provide employees with PPE that is appropriate to the risk and working conditions;
- provide regular training and supervision for employees covering the correct use, maintenance and storage of PPE;
- attend any training offered by LMAC on the correct choice and use of PPE;
- ensure the provision of suitable facilities for the storage, movement, cleaning, and maintenance of PPE;
- regularly check that the PPE in use is in a good condition and remains fit for purpose; and
- adequately investigate employees' reports of PPE malfunction or degradation of quality and provide employees with replacements in a timely manner.

5.3 Responsibilities of Employees

Employees shall wear and use PPE as directed by their employer and ensure that the PPE provision complies with the requirements laid out in this NMAS.

Employees shall also:

- report faulty, deteriorated, or malfunctioning PPE immediately to their supervisor and discontinue hazardous operations until provided with replacement equipment;
- immediately report any faulty, deteriorated, or malfunctioning hand-tools to their supervisor and discontinue any procedure relying on the availability of that tool until provided with suitable replacements; and
- comply with the IA's SOPs related to the storage, movement, cleaning, and maintenance of PPE.

	LEBANON NATIONAL MINE ACTION STANDARDS		Edition 2.1	NMAS 10.30
	ANNEX A: Normative and Informative References			
				March 2020

The documents listed below constitute normative references which form an integral part of the provisions of this standard.

- Current LMAC and IMSMA reporting formats (request copies from the LMAC);
- NMAS 07.14 Risk Management;
- NMAS 10.10 General Guidelines for the Development of S&OH Systems
- NMAS 10.20 Demining Worksite Safety;
- NMAS 09.30 EOD;
- NMAS 09.32 Guide for the Large Scale Demolition of EO; and
- NMAS 04.10 Glossary of Mine Action Terms, Definitions, & Abbreviations used in the Second Edition of the NMAS.

In addition to the normative references listed above, the following informative reference may be consulted:

- IMAS 10.30 S&OH - PPE.

NMAS 10.30, Edition 2.1: Amendment Record

The NMAS are subject to a comprehensive or partial review by the Review Board periodically. Changes in the context as well as safety requirements and efficiency considerations may necessitate amendments to individual NMAS standards more frequently. If this occurs, such amendments shall be given a number, dated, and detailed in the table below. The amendment should also be indicated on the header under the NMAS edition number.

Whenever the formal review of the NMAS is completed, a new edition shall be issued. Amendments that have taken place before the review date shall be incorporated in the new edition and the amendment record table cleared. Consequently, the recording of amendments shall start again until the next review.

The most recent revisions of the NMAS shall be posted on the Lebanon Mine Action Center (LMAC) website on www.lebmac.org.

Number	Date	Amendment Details
1	March 2020	Minor revisions throughout.