



## **NMAS 10.50**

### **Storage, Transportation, and Handling of Explosives**

**March 2020**

**Edition 2.1**

**Lebanon Mine Action Center-LMAC**

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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). These TSG were edited into the first edition of the NMAS in 2010 and were written to 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 made available on the LMAC's website [www.lebmac.org](http://www.lebmac.org) or can be obtained through contacting the LMAC via the email [info@lebmac.org](mailto:info@lebmac.org).

## Acronyms

EO	Explosive Ordnance
EOD	Explosive Ordnance Disposal
HMA	Humanitarian Mine Action
IA	Implementing Agency
IMAS	International Mine Action Standards
LAF	Lebanon Armed Forces
LMAA	Lebanon Mine Action Authority
LMAC	Lebanon Mine Action Center
LMAP	Lebanon Mine Action Program
NMAS	National Mine Action Standards
PPE	Personal Protective Equipment
TSG	Technical Standards and Guidelines

## **Introduction**

Humanitarian Mine Action (HMA) operations entail varying degrees of risk. One of the main aims of standard setting is to minimize such risks and render mine action interventions as safe as possible. The term 'safe' does not necessarily imply the complete removal of risk. Rather, it assumes that the risk has been reduced to an acceptable or 'tolerable' level.

In HMA, risk management involves establishing, maintaining and refining a combination of safe working practices and operating procedures, effective supervision and control, appropriate education and training, selection of well designed equipment, and the provision of effective Personal Protective Equipment (PPE) and clothing.

The provision of a safe working environment includes the safe storage, transportation, and handling of all demolition explosives and ancillary items as provided for in this NMAS.

## Storage, Transportation, and Handling of Explosives

### 1. Scope

This NMAS provides standards and guidelines designed to ensure that all demolition explosives and ancillary items used by civil IAs engaged in HMA activities are stored, transported, and handled in a manner that reliably minimizes associated risks.

Some or all of the provisions of this NMAS may be adopted by the LAF or other government bodies at their discretion.

The transportation and handling of EO for demolition at LMAC approved demolition sites should be conducted in compliance with the requirements for transporting demolition explosives and ancillary items described below.

### 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 NMAS, 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 terms and definitions are used in this NMAS:

- *Demolition ancillaries*: ancillary items used by IAs during demolitions such as wires and exploders and parts which may be hazardous, such as detonators and primers.
- *Demolition consumables*: all items used in EO demolitions including high explosive, detonators or blasting caps, detonating cord, safety fuse, flares, disrupters, chemical deflagration systems and any other consumables used in an EO demolition system that is approved for use by the LMAC.
- *Explosive materials*: components or ancillary items used by IAs, which contain some explosives, or behave in an explosive manner, such as detonators and primers. May also be known as *Explosive ancillaries*.
- *Explosives*: a substance or mixture of substances, which, under external influences, is capable of rapidly releasing energy in the form of gases and heat in a detonation.
- *Explosive Ordnance (EO)*: all munitions or parts of munitions containing explosives, nuclear fission or fusion materials and biological and chemical agents. This includes

bombs and warheads; guided and ballistic missiles; artillery, mortar, rocket and small arms ammunition; all mines, torpedoes and depth charges; pyrotechnics; cluster munitions and dispensers; cartridge and propellant actuated devices; electro-explosive devices; clandestine and improvised explosive devices; and all similar or related items or components that are explosive in nature (adapted from IMAS, 2<sup>nd</sup> ed., 2014).

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. Guidelines and Principles**

### **4.1 General Guidelines**

This NMAS provides standards for the storage and movement of high explosive, demolition ancillaries, consumables and EO for transit by road and for the storing of explosives and demolition ancillaries and consumables. It covers the handling, loading, and unloading of explosives, demolition ancillaries and consumables and EO during HMA related activities.

Demolition consumables and ancillaries include detonators, blasting caps, detonating cord, flares, disrupters, chemical deflagration systems and all equipment approved by the LMAC for use in the demolition of EO. High explosive and demolition ancillaries/consumables are collectively referred to in this standard as 'demolition materials'.

## **5. Transporting explosive hazards**

Explosive hazards include demolition materials and Explosive Ordnance (EO).

Unstable demolition materials and/or EO shall not be transported by road in Lebanon.

Vehicles used for transporting demolition materials or EO shall not be used as overnight storage for their load. Vehicles carrying demolition materials or EO shall be under continuous guard.

### **5.1 Transportation of Demolition Materials**

IAs preparing demolition materials for transport shall be responsible for loading, unloading, and all aspects of transportation between storage locations.

Drivers and other persons involved in the transport of demolition materials shall be suitably trained and experienced in the handling of the materials being transported. The following



criteria should apply to all IA staff involved in the transit or the handling of demolition materials in transit.

Loading/unloading and transport staff should be:

- at least 21 years of age.
- in good health and physically able to conduct the required tasks; and
- trained on the handling, storage, and transportation of the materials in transit.

Packaging of high explosives and explosive ancillaries/consumables shall be in accordance with international standards and technical requirements specific to the materials in transit. Transit boxes should be water-resistant and securely closed to prevent any loss or spillage of the contents during transport. When the vehicle is not a covered vehicle, the load should be covered with a waterproof cover.

Demolition materials such as detonators, blasting caps, and the initiation means for explosives should not be transported in the same vehicle as explosives (or any EO with an explosive content) except when the materials will be used on the same day.

When necessary, an IA's EO demolition team's daily needs for demolition materials may be carried in the same vehicle. Up to 50 kg of explosives may be carried in the same vehicle with up to 100 detonators or blasting caps. When this occurs, the detonators or blasting caps shall be securely packed in a box and carried in a separate compartment of the vehicle. High explosive and explosive ancillaries/consumables shall be transported in closed boxes. Under no circumstances shall detonators or blasting caps be carried in the same box as high explosive.

The IA's loading, transportation and unloading of explosives and explosive ancillaries/consumables shall only be conducted under the supervision of appropriately trained and experienced EOD staff member who holds a current LMAC accreditation.

When large loads of more than 50kg of high explosive or more than 100 detonators are to be moved, the IA shall request approval for the transit from the LMAC before loading the hazardous materials. The LMAC will require the IA to show that the transit can be conducted safely and may require the IA to arrange a suitable security escort. Large loads should not be unloaded in populated areas. The destination site should be away from radio communications and provided with appropriate fire extinguishers.

The following should be prohibited within 25 meters of locations where demolition materials are stored, loaded, or unloaded:

- matches, cigarette lighters, material or devices which can cause fire;
- open flames or work with open flames, e.g. welding;
- smoking;
- work with tools that may cause sparks; and

- running of vehicle engines.

Persons who are not involved in the loading and unloading of hazardous materials should remain at a safe distance while the work is conducted.

Unloading of hazardous materials should normally be carried out during daylight hours. If loading or unloading is carried out at night, the loading or unloading area shall be appropriately lit to ensure safety and security.

## **5.2 Transportation of EO**

IA's may request authorization from the LMAC for the transportation of EO for demolition at a large scale demolition area. The LMAC shall not authorize transportation unless the transportation of EO is covered in detail in the IA's LMAC approved SOPs. The LMAC may require the IA to arrange transit with a security escort.

The constraints applied to vehicles transporting demolition materials below shall be applied to the transport of unfuzed EO.

The transit of fuzed EO shall only be authorized under conditions in which the LMAC is satisfied that the transit can be safely conducted.

## **5.3 Vehicles for Transporting Explosive Hazards**

Vehicles used for the authorized transportation of demolition materials or EO shall be roadworthy, well maintained, and in good working order. The driver and driver's assistant shall be briefed about the type of materials to be transported and trained appropriately in readiness to manage any emergency that may arise.

Transport vehicles shall be correctly fitted, equipped, and loaded according to the requirements of this NMAS. Demining IAs should not draw attention to the load by marking the outside of their vehicles to indicate that what they are carrying except if instructed by the LMAC to do so.

The load should be evenly distributed over the load area. Containers shall be packed in a way that prevents the movement of contents inside the containers. The load shall be firmly fixed to prevent movement during transit.

Towing any vehicle loaded with hazardous materials shall not be permitted except in a breakdown situation. In a breakdown situation, the vehicle may be towed with a rigid link to the closest suitable location for repairs or for transferring the load into another vehicle. The tow speed should never exceed 40 kph whatever the road condition.

## **5.4 Procedures in Case of a Traffic Accident/Incident**

In the event of any accident/incident that prevents the transportation from continuing, the transit team shall immediately inform their IA's headquarters and the LMAC.

The duties of the driver and assistant shall be to:

- take necessary measures to prevent any danger to other vehicles or traffic;
- place two warning triangles behind the vehicle on the road;
- in daytime, the driver shall send the assistant to a distance of 100 m to warn other traffic; and
- by night, lights should be used to warn other vehicles of the presence of the stopped vehicle.

After taking measures to prevent any danger to other traffic, the transit team should:

- remove all documentation related to the transportation of hazardous materials from the vehicle;
- extinguish any fires on or in the vehicle;
- do anything necessary to secure the load;
- prevent the approach of bystanders; and
- inform the closest local police station or military unit, and suggest how they may assist.

If there is a danger of explosion or fire, the LAs, the police and the LMAC shall be informed immediately and the transit team should withdraw to a safe distance, preventing all vehicles or members of the public from approaching.

## **5.5 Additional Safety Measures**

In addition to the requirements above, the IA should ensure that:

- no passengers are carried in vehicles transporting demolition consumables or EO;
- transit teams should comprise as few people as possible, usually a driver and a driver's assistant;
- no material that may cause a fire is carried in vehicles transporting demolition consumables or EO;
- the vehicle is fitted with a device to 'earth' static electricity from the vehicle;
- no repairs that may cause fire by sparking impact or violent contact are carried out;
- no smoking is allowed in any part of the vehicle;
- the driver never leaves the vehicle unless the assistant remains present; and
- the vehicle is driven with care at speeds that comply with the law and ensure the safety of the load.

If any demolition materials or EO are stolen during transit, the transit team and the IA shall immediately inform the LMAC, the LAs and the police and then take all reasonable measures to recover the missing items without incurring risk to themselves.

## 6. Storage of demolition consumables

IAs needing to store high explosives and explosive ancillaries in Lebanon shall ensure that they are stored correctly, safely and securely.

There are three types of storage facility:

1. *Permanent Storage Facility:* a separate building in which quantities of high explosive in excess of 2724 kg may be stored. No civil IA in Lebanon shall have a permanent storage facility. IA's may have access to an LMAC authorized permanent storage facility from which to withdraw small quantities of demolition consumables at agreed times. Any IA staff engaged in the collection of demolition consumables from a permanent storage facility shall obey the safety and security regimes in place at that facility.
2. *Temporary Storage Facility:* a storage building that meets the requirements for the temporary storage of high explosives that may be a secure sea-transit container that has been appropriately modified. The weight of high explosives stored in a temporary storage facility by any IA shall be determined by the LMAC on a case by case basis depending on the security situation and the IA's immediate needs. For security reasons, the IA should not seek to store more demolition consumables than necessary.

Only suitably trained, experienced and LMAC EOD accredited persons may control a temporary storage facility. These persons shall be trained to understand the characteristics of the materials they handle and be experienced in their loading, unloading, and storage.

3. *Daily storage:* refers to the worksite storage of demolition consumables that will be used that day. The maximum quantity of high explosives stored at any worksite shall not exceed 25 kg without prior authorization from the LMAC. No demolition consumables shall be left overnight at a worksite.

The movement and/or use of demolition consumables at a worksite shall always be supervised by suitably trained, experienced and LMAC accredited EOD staff.

### 6.1 Temporary storage of demolition consumables

At the discretion of the LMAC, steel sea-transit containers may be modified for use as a temporary storage facility for the storage of demolition consumables by IAs. The containers should be ventilated and have secure barriers inside to separate high explosive from the varied explosive ancillaries/consumables. They should be positioned in a manner that minimizes the consequences of any accident in terms of surrounding buildings or the public, using protective works as necessary.

Temporary storage containers/buildings shall always have:

- a floor covering that prevents sparking;
- robust interior wooden or plastic furniture to raise the contents at least 100mm off the floor and away from the walls;
- robust separation barriers (which may be sandbags) to separate high explosive from all ancillaries/consumables;
- an external firebreak perimeter that is clear of obstructions and vegetation;
- a lightning conductor and earth wire;
- appropriate fire extinguishing equipment;
- adequate insulation and ventilation including, when necessary, a sun-shade;
- clear signs to prohibit smoking or the presence of smoking ancillaries within 25 meters of the storage facility;
- a log book and detailed inventory that is duplicated off site;
- an external fence at least 2 meters high and 10 meters away from the walls with signs restricting access and a locked gate;
- a suitably trained and experienced storage site manager with LMAC EOD accreditation who is responsible for all movements of hazardous materials at the facility; and
- secure locks and a 24/7 security presence whenever the facility contains hazardous materials.

High explosives shall be stored separately from detonators or blasting capsules and in the manufacturer's original packaging whenever possible. The total height of stacked boxes should not exceed 1.4 meters.

When battery powered lighting is used, it should be switched on before entering the facility. The person holding the light source should not handle detonators, or blasting caps.

Temporary storage areas may be fitted with electric lights and air conditioners as long as the entire circuits are appropriately sheathed, fused and protected to ensure that failure cannot impact on the contents of the store. No electric outlets/sockets should be installed inside the storage area. Plans for the IA to electrify temporary storage areas shall be submitted to the LMAC for approval before being carried out.

## **6.2 Worksite Storage of Demolition Consumables**

Demolition consumables required for daily use by IAs may be stored in wooden boxes or other appropriate containers that are sited at least 50 meters away from any other worksite feature. Up to 25 kg of high explosives along with the appropriate quantity of explosive ancillaries/consumables may be stored at a worksite when it is needed for use that day. High explosives and explosive ancillaries shall be kept in separate boxes and separated by

distance or a suitable barrier. The materials shall be stored in a manner that guarantees their security, with a guard posted if necessary.

The IA shall provide detailed SOPs covering its worksite storage and use of demolition explosives and ancillaries in the EOD SOPs that it submits for the LMAC's approval before conducting any EOD tasks in Lebanon.

### **6.3 Managing the use of demolition consumables**

IAs shall have a comprehensive explosives management system that is detailed in the EOD SOPs that they submit for the LMAC's approval before conducting any EOD tasks in Lebanon.

All IAs using demolition consumables shall keep detailed records of the materials received, used and/or destroyed. Such records should show the following:

- the storage facility source;
- the date of receipt, and the type and quantity received;
- the detailed use to which the materials were put; and
- full information about any missing or destroyed materials.

IAs using demolition consumable shall ensure that a complete record of quantities used during operations and training is maintained and made available to the LMAC during QA/QC or as required.

The IA shall ensure that demolition consumables are only issued to LMAC accredited EOD staff who take responsibility for ensuring their safe transit to the worksite and safe use at the worksite. The recipient shall sign for the weight of high explosive and the quantity of ancillaries and be required to maintain a detailed record the use of all materials issued.

Unless otherwise approved by the LMAC, demolition consumables that are not used during a working day should be destroyed at the worksite to avoid carrying them on the roads more than is strictly necessary.

## **7. Roles and Responsibilities**

### **7.1 Role of the LMAC**

The LMAC shall:


- accredit IAs before assigning any EOD tasks to them, in accordance with NMAS 07.12 Guide for the Accreditation of Mine Action Organizations and Operations;
- assess the IA's EOD SOPs, including their detailed regimes for the storage, transportation and handling of demolition consumables and, when appropriate, approve their use;
- oversee and provide certification and quality assurance of EOD qualifications, issuing individual accreditation when appropriate;

- assist the IAs to gain access to demolition consumables, when appropriate;
- conduct QA/QC checks of the IA's transportation of demolition consumables and EO;  
and
- appropriately regulate and monitor IA's storage facilities.

## **7.2 Role of IAs**

In their capacity as demining organizations with an EOD role, IAs shall:

- acquire LMAC accreditation to conduct EOD operations;
- comply with the national standards related to the storage, transportation and handling of explosives, and of all demolition consumables;
- only allow LMAC accredited EOD staff to handle demolition consumables;
- avoid using vehicles as overnight storage for any demolition consumables;
- request authorization from the LMAC before the transportation of any large loads of demolition consumables;
- notify the LMAC in cases of traffic accidents during the transportation of demolition consumable;
- immediately inform the LMAC in the event of stolen demolition consumables (or EO);
- ensure that entry to explosives storage facilities is appropriately restricted;
- keep accurate and detailed records of demolition consumables that are received, used, or destroyed, and immediately report any that are missing to the LMAC; and
- establish, maintain and protect LMAC authorized temporary explosive storage facilities for demolition consumables as required in this NMAS.

	LEBANON NATIONAL MINE ACTION STANDARDS		Edition 2.1	NMAS 10.50
	<b>ANNEX A: Normative and Informative References</b>			
				<b>March 2020</b>

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 09.30 Explosive Ordnance Disposal;
- NMAS 09.31 Guide for the Demolition of Mines and EO;
- NMAS 09.32 Guide for Large Scale demolitions and burning;
- 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 references may be consulted:

- Lebanon National Mine Action Policy; and
- IMAS 01.10 Guide for the Application of International Mine Action Standards (IMAS).



## NMA 10.50, Edition 2.1: Amendment Record

The NMA 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 NMA 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 NMA edition number.

Whenever the formal review of the NMA 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 NMA shall be posted on the Lebanon Mine Action Center (LMAC) website on [www.lebmac.org](http://www.lebmac.org).

<b>Number</b>	<b>Date</b>	<b>Amendment Details</b>
1	March 2020	Minor revisions throughout.