

# **DEMINING NATIONAL STANDARD 10.20**

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## **Safety and occupational health Demining worksite safety - Mozambique**

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## Introduction

The need to reduce risk and to provide a safe working environment are fundamental principles of mine action management (see IMAS 07.10). 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 and clothing.

The provision of a safe working environment includes the design and layout of a demining worksite by fencing and marking hazardous areas, controlling the movement of deminers, visitors and the public, enforcing safety distances, and providing effective medical cover and insurance. This requires IND and demining agencies to develop and maintain appropriate policy and procedures.

It is necessary to clarify the meaning of the term 'safe' in respect of mine action. To say that a situation is safe does not necessarily imply that all risk has been removed. It merely assumes that the risk has been reduced to a 'tolerable' level, i.e. '.... to a level which is accepted in a given context based on the current values of society'. (See ISO Guide 51.)

Given the wide range of operational settings and mine action activities, it is not possible to provide a precise and complete set of specifications or provisions that apply to all demining worksites. Thus, demining agencies should develop and maintain management procedures and processes that will enable safety and occupational health (S&OH) risks in the worksite to be identified, evaluated and reduced in a systematic and timely manner.

This NS aims to provide demining agencies with guidance on the development and implementation of policy and documented procedures for establishing and managing a safe worksite. The document is in three parts: Clauses 1 to 3 define the scope, references and terms used in the standard; Clauses 4 to 7 define the requirements, specifications and responsibilities; and the annexes provide additional detailed information and guidance on how to apply the standard.

## **Safety and occupational health - Demining worksite safety**

### **1. Scope**

This National Standard (NS) provides specifications and guidance on the development and implementation of policy and documented procedures and practices that aim to establish and maintain a safe demining worksites in Mozambique.

### **2. References**

A list of normative references is given in Annex A. Normative references are important documents to which reference is made in this standard and which form part of the provisions of this standard.

### **3. Terms and definitions**

A list of terms and definitions used in this standard is given in Annex B. The terms and definitions in this NS are in compliance with IMAS 04.10 (Glossary of mine action terms and abbreviations) and all terms that have been developed locally have been captured in NS 04.10 (Glossary of mine action terms and abbreviations in Mozambique).

The term 'worksite' refers to the location where demining activities take place, and which is under the direct control of the demining agency.

The term 'national mine action authority or authorities' which usually refers to the government department(s), agency(s) or institution(s) in each mine-affected country charged with the regulation, management and co-ordination of mine action is used, in Mozambique under the directive of the Government IND has been designated to fulfill these responsibilities with regard to the supervision and implementation of demining operations.

The term 'demining agency' refers to any agency (military, government, NGO or commercial entity) responsible for implementing demining projects or tasks. Demining agencies include headquarters, support elements, and comprise one or more sub-units. Demining agencies in the NS refer to those agencies that are contracted and accredited by IND to carry out demining activities in Mozambique.

### **4. General requirements**

The provision of a safe working environment includes the design and layout of a demining worksite by fencing and marking hazardous areas, controlling the movement of deminers, visitors and the local population, enforcing safety distances, and providing effective medical cover and casualty evacuation procedures. The following are the minimum requirements that demining agencies shall use to establish policies and develop and maintain procedures for worksite safety

### **5. Demining worksite layout and procedures**

#### **5.1. General requirements**

The demining worksite shall be designed to:

- a) provide a clearly visible separation of hazardous areas including fragmentation zones, cleared areas, useable areas and unknown areas of and around the worksite;
- b) control the movement of deminers and visitors (including members of the public) at the worksite;

- c) limit the number of deminers and visitors allowed into the blast and fragmentation hazard zones;
- d) during the controlled destruction of mines and UXO, take all reasonable precautions to exclude deminers, visitors and members of the local population from the blast and fragmentation hazard zones, or provide suitable protection inside buildings, bunkers or mobile structures; and
- e) include measures to prevent structural and environmental damage.

## **5.2. Marking of hazardous areas**

Safe and hazardous areas within the worksite shall be separated by providing clear and consistent marking. (See NS 08.50)

## **5.3. Control of entry into blast hazard or fragmentation hazard zones**

Demining agencies shall develop and implement procedures for controlling the entry of unauthorized persons into mined areas, onto the demining worksite and into blast and fragmentation hazard zones. This should be achieved by:

- a) informing the local population, demining workers and demining worksite visitors of the extent of the worksite, and the blast and fragmentation hazard zones; and
- b) physically controlling entry into the hazard zones during the mine or UXO hazard destruction processes by warning signs and positioning sentries (See Annex B for specifications and recommendations on the development of standards and SOP for blast and fragmentation hazard zone safety distances).

Note 1: Warning systems should include the following.

- Warning signs on approach routes (roads, tracks or paths) informing people that they are entering a fragmentation zone. Signs should include information on the nature and extent of the fragmentation zone.
- Awareness education through briefings or signs or information sheets to people living or working near a demining worksite, and to the local authorities in the area. The briefings and/or information sheets should include information on the audible warning methods used to advise workers and the local public of the demolition of mine or UXO hazards and hazardous material.
- Awareness education, including site dangers, and the implications of ignoring the directions of demining workers appointed to control access into fragmentation zones.

Note 2: SOP should include the use of sentries to control entry into fragmentation zones, warning signs and audible signals to be used during the destruction process.

Note 3: Planning and execution of demining operations should minimize disruption to the local population, which may need to move through blast and fragmentation hazard zones if they are to subsist or survive. It is unrealistic to expect that the public can be prevented from entering associated blast and fragmentation hazard zones of whole demining worksites for the duration of the clearance task. On the other hand it is important to reduce to tolerable levels the risk of harm to the public. The following example may provide guidance on the development of a reasonable and workable compromise.

- The extent of the fragmentation zone should be equivalent to the fragmentation hazard of the likely mine/UXO contamination in the worksite.
- The public, having been given appropriate warnings as set out above, should be allowed to pass on marked routes through the fragmentation zone, EXCEPT when demolitions are taking place. When a demolition is taking place the demining organization shall establish a cordon with sentries on routes at the entry points of the fragmentation hazard zone to prevent entry into the hazard zone. It may also be necessary to restrict entry when particular munitions with a large fragmentation radius, such as bounding mines, are being cleared.

An inner safety distance should also be identified. For example, a radius equivalent to the blast zone from the likely mine/UXO contamination, demining lane separation, or RF detonator hazard (whichever is greater). The minimum radius of such a distance should be 25m. The public should not be allowed to enter this safety zone at any time when demining is being undertaken on the worksite.

Where the location of the worksite means that this inner safety distance cuts a frequently used road or path, an alternative solution should be considered. If the worksite is small enough, the demining unit should phase operations in such a way to minimize disruption to the public. If the worksite is large, the demining organization should seek the assistance of the local administration, police or other appropriate emergency services or the military to identify, mark and possibly supervise the creation of a suitable diversion route. If no such diversion route is feasible, the demining unit should consider using protective works.

#### **5.4. Control areas**

Demining agencies have to establish effective control of the worksite. Establishing and clearly marking a number of areas for safety and administration can achieve this. Such areas shall be outside the relevant safety distances from all contaminated areas, clearance activity and explosive storage.

##### **5.4.1. Vehicle parking area**

The vehicle parking area shall be a used area or cleared area large enough to provide safe parking for demining unit and visitor's vehicles.

The boundary of the parking area shall be clearly marked and sign posted. The parking area sign posting shall indicate directions to the demining worksite and visitor reporting area. Where appropriate these directions should include a map that indicates any mine or UXO hazards in close proximity to the parking area or along the route from the vehicle parking area to the visitor reporting area of the demining worksite.

Safety vehicles and or ambulances shall be parked in such a manner that they can easily exit the parking area in case of casevac.

##### **5.4.2. Visitor reporting and briefing area**

The visitor reporting area and briefing area shall be a clearly marked and identifiable area that is outside the fragmentation zone of the demining worksite.

##### **5.4.3. Safety lanes**

The demining agency shall establish cleared safety lanes to provide access to and around the demining worksite. Cleared safety lanes shall be marked and documented as specified in NS. Cleared safety lanes shall be wide enough to provide safe access for personnel and equipment to the worksite. Safety lanes cleared for casevac shall be wide enough for the safe execution of documented casevac procedures. Safety lanes should be not less than 2.0m wide

##### **5.4.4. First aid**

Each demining worksite shall include a first aid post, organized and equipped as recommended in NS 10.40. The first aid post shall:

- a) be identifiable and clearly marked;
- b) be equipped with appropriate first aid and medical supplies and equipment;
- c) where appropriate, be attended by suitably qualified and experienced medical or paramedical staff; and
- d) provide easy access to the clearance area of the worksite and easy access from the worksite to the safety vehicle or ambulance.

#### **5.4.5. Rest areas**

The worksite shall include clearly identifiable and marked rest areas for deminers. Rest areas shall be located outside the fragmentation zone and should be equipped to provide staff with protection from adverse or extreme weather conditions. Drinking water should be provided in the rest area.

#### **5.4.6. Explosive storage area(s)**

Explosives or mine and/or UXO hazardous material may be stored on a demining worksite. Explosives used in the demining process should be stored in a container approved for the type and quantity of explosive being stored, which will be located outside the fragmentation zone of the demining worksite (See NS 10.50 for standards for the construction of storage boxes and magazines for explosive materials used in the demining process). Where provision of this standard of container storage is impracticable, the demining agency shall be responsible for providing adequate safety measures (protective works, safety distances, physical security etc.) and should include protection against environmental factors in accordance with explosive manufacturers' instructions. Such storage should be considered as a temporary measure only.

### **6. Demining incident**

Procedures for the response to a demining incident shall be established and formally documented as SOP. The SOP should include:

- a) the agency and capabilities needed to respond to a demining incident, including the procedures, training, equipment and material (see NS 10.40); and
- b) procedures for the investigation, analysis and corrective action to be taken following a demining incident (see NS 10.60).

### **7. Deminers**

Demining agencies shall develop SOP to make provision for all the above. Deminers also have a responsibility to ensure safety on the worksite. These responsibilities include that demining personnel shall:

- a) take all reasonable care for their own safety and that of other persons on the worksite;
- b) comply with instructions given for their own conduct and safety, especially those contained in SOP;
- c) comply with IND and national instructions and regulations on conduct and safety on worksites; and
- d) report immediately to their superior any situation, which they have reason to believe could present a worksite hazard, which they cannot themselves correct.

## **Annex A (Normative) References**

The following documents when referred to in the text of this standard, form part of the provisions of this standard.

- a) NS 10.10 S&OH – General requirements
- b) NS 10.30 S&OH – Personal protective equipment.
- c) NS 10.50 S&OH – Storage, transportation and handling of explosives.

The latest version/edition of these references should be used. IND, Maputo holds copies of all references used in this NS. A register of the latest version/edition of the NS and references is maintained by IND, Maputo, and can be found at the Operations Department. Demining agencies should obtain copies before commencing demining activities in Mozambique.

## **Annex B** (Informative) **Terms and definitions**

**1.1. briefing area**

in mine clearance operations; a clearly identifiable control point intended to be the first point of entry to a demining worksite. The briefing area contains a plan of the minefield and its current level of clearance, at a scale large enough for briefing purposes, showing the location of control points (car park, first aid point, explosive storage areas, the areas where mine clearance work is progressing and distances), and where safety equipment is issued to visitors.

**1.2. control point**

control area

all points or areas used to control the movements of visitors and staff in a demining worksite.

**1.3. demolition**

(dml)

destruction of structures, facilities or material by use of fire, water, explosives, mechanical or other means

**1.4. deminer**

an employed person, including a public servant, qualified and employed to undertake demining activities or work on a demining worksite.

**1.5. demining worksite**

all workplaces where demining activities are being undertaken

Note 1: Demining worksites include workplaces where survey, clearance, inspection, sampling and EOD activities are undertaken including centralized disposal sites used for the destruction of mines and UXO identified and removed during clearance operations.

Note 2: Survey, in relation to a demining worksite includes general survey undertaken to identify mine and UXO hazards and hazardous areas,

**1.6. destroy (destruction) in situ**

blow in situ.

the destruction of any item of ordnance by explosives without moving the item from where it was found, normally by placing an explosive charge alongside.

**1.7. mine clearance**

the clearance of mines and UXO from a specified area to a predefined standard.

**1.8. risk**

combination of the probability of occurrence of **harm** and the severity of that **harm**.

**1.9. risk analysis**

systematic use of available information to identify **hazards** and to estimate the **risk** [ISO Guide 51:1999(E)]

**1.10. risk assessment**

overall process comprising a **risk analysis** and a **risk evaluation** [ISO Guide 51:1999(E)]

## Annex C (Normative)

### Safety distances for blast and fragmentation hazard zones

#### 1. General

Hazard distance calculations can be extremely complex requiring consideration of a range of factors including:

- a) the hazard division and compatibility classification of the mine or UXO hazards that may be on the demining worksite;
- b) the protective measures included in the documented SOP;
- c) protection offered by vegetation, topography or structures surrounding the worksite and available to the demining workers, visitors and the public; and
- d) climatic conditions.

#### 2. Calculating safety distances

IND and demining agencies should seek the advice of a suitably qualified EOD expert to calculate safety distances appropriate for the mine and UXO hazard risk.

In Mozambique the following default safety distances apply. Upon application to IND a demining agency may request for exemption to the default safety distances in exceptional circumstances.

#### 3. Default safety distances

In the absence of a detailed risk assessment and calculations based on the above the safety distances provided in the following table shall apply.

##### 3.1. Default safety distances on demining worksites”.

Activity	Metres apart
More than one working section	25
Deminers working in the same lane	25
Access route and safety areas	25
Vehicle park, medical teams and active mine clearance sites	100
Note 4: Distances in this table should be applied to worksites assessed as having an AP blast mine hazard. Safety distances for fragmentation hazards should be considerably greater, depending on the nature of the risk.	
Note 5: See NS 07.50 for distances to applied to storage of explosives on site	
Note 6: Safety distances while using mechanical machines are included in NS 09.50	

**Figure 1. Demining worksite AP blast mine safety distances**

**3.2. Safety distances for the destruction of mines and UXO**

Demolition minimum safety distances	
Type of munition	(Open area – metres)
AP mine – Blast	100
AP mine – Fragmentation/bounding/directional	300/500
AT mine – Blast	500/1,000
AT mine - Shaped charge (A shaped charge jet can travel up to 1800m in free air.)	1,800
Off route mine	1,000
Mortar up to 82 mm	500
Shell up to 80 mm	500
Shell up to 160 mm	800
Shell above 160 mm	1,000
Rocket up to 88 mm	500
Hand and rifle grenade	300
<p>Note 1: Buried boosted charges estimated at 10 kilograms have a safety distance of 500 metres. 100 metres should be added for each additional 10-kilogram charge.</p> <p>Note 2: Agencies shall seek the advice of qualified EOD specialists to determine safety distances for all munitions other than those detailed above. All safety distances shall be specified in documented SOP.</p> <p>Note 3: Protective measures should be used to allow distances to be reduced.</p>	

**Figure 2. Demolition minimum safety distances**

## **Annex D (Informative) Managing visitors to demining worksites**

### **1. General**

Demining activities attract a range of visitors from the donor community, government and other officials and the media. These visitors should not be discouraged from visiting demining sites as they can assist in much needed advocacy and resource mobilization for the mine action sector.

### **2. SOP**

The demining agency shall develop and maintain documented procedures for dealing with visitors to demining worksites. These SOP should include:

- a) procedures for establishing and maintaining signs that:
  - provide warning that the visitor or public are approaching or entering a demining worksite blast hazard or fragmentation hazard zone;
  - direct visitors to a safe vehicle parking area; and
  - direct visitors to a reporting area.
- b) safety briefing including information on:
  - the site layout, safety marking system and any restrictions, this may include restriction on movement, the use of equipment that may be an RF hazard (mobile telephones, radios etc) and the use of other electronic equipment or cameras;
  - the requirements to wear PPE; and
  - action to be taken in the event of a demining incident or accident.
- c) liabilities in case of accident

### **3. Insurance**

The demining agency shall have third party liability insurance to cover risk of harm to visitors to demining worksites. This should cover liability not only of the demining agency, but also of its employees. Insurance for employees of the demining agency is covered in NS 10.10 (S&OH general requirements).