

# IMAS 09.30

First Edition  
01 October 2001  
Incorporating amendment number(s) 1 & 2

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## Explosive ordnance disposal

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## Foreword

International standards for humanitarian mine clearance programmes were first proposed by working groups at an international technical conference in Denmark, in July 1996. Criteria were prescribed for all aspects of mine clearance, standards were recommended and a new universal definition of 'clearance' was agreed. In late 1996, the principles proposed in Denmark were developed by a UN-led working group and the International Standards for Humanitarian Mine Clearance Operations were developed. A first edition was issued by the UN Mine Action Service (UNMAS) in March 1997.

The scope of these original standards has since been expanded to include the other components of mine action and to reflect changes to operational procedures, practices and norms. The standards were re-developed and renamed as International Mine Action Standards (IMAS).

The United Nations has a general responsibility for enabling and encouraging the effective management of mine action programmes, including the development and maintenance of standards. UNMAS, therefore, is the office within the United Nations responsible for the development and maintenance of IMAS. IMAS are produced with the assistance of the Geneva International Centre for Humanitarian Demining.

The work of preparing, reviewing and revising IMAS is conducted by technical committees, with the support of international, governmental and non-governmental organisations. The latest version of each standard, together with information on the work of the technical committees, can be found at <http://www.mineactionstandards.org/>. Individual IMAS are reviewed at least every three years to reflect developing mine action norms and practices and to incorporate changes to international regulations and requirements.

## Introduction

Unexploded Ordnance (UXO) has many definitions, but for the purposes of IMAS the term applies to all munitions other than landmines which form part of a mine action programme, and which present a significant risk to human life. UXO may be cleared as part of a demining contract, or a contractor specialising in Explosive Ordnance Disposal (EOD) may clear them under separate arrangements. For the purposes of this standard both activities are included as EOD operations.

The majority of UXO found during demining are small items of ordnance such as sub-munitions, grenades and mortar ammunition. Nevertheless, UXO also includes larger items such as artillery ammunition, guided missiles, air-dropped bombs and cluster munitions. The wide variety of size and complexity of UXO requires special attention to be given to the management of EOD.

The aim of this standard is to provide specifications and guidance for the management of EOD as part of mine action. It covers general principles and management responsibilities for EOD. It does not provide specific technical guidance for the disposal of particular explosive ordnance.

## **Explosive ordnance disposal**

### **1. Scope**

This standard provides specifications and guidelines for the safe conduct of Explosive Ordnance Disposal (EOD) operations as part of a mine action programme. It applies to the disposal of conventional Unexploded Ordnance (UXO), other than mines. Mines are addressed in other IMAS.

This standard does not apply to nuclear, biological or chemical weapons, or ammunition containing depleted Uranium. National Mine Action Authorities (NMAA) will need to obtain, and to disseminate, specialist advice on such weapons and ammunition. The standard also does not specifically cover munitions with highly toxic or carcinogenic components, although some mines (such as PFM1) fall into this category.

### **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, definitions and abbreviations**

A list of terms, definitions and abbreviations used in this standard is given in Annex B. A complete glossary of all the terms, definitions and abbreviations used in the IMAS series of standards is given in IMAS 04.10.

In the IMAS series of standards, the words 'shall', 'should' and 'may' are used to indicate the intended degree of compliance. This use is consistent with the language used in ISO standards and guidelines:

- a) 'shall' is used to indicate requirements, methods or specifications that are to be applied in order to conform to the standard.
- b) 'should' is used to indicate the preferred requirements, methods or specifications.
- c) 'may' is used to indicate a possible method or course of action.

The term 'National Mine Action Authority (NMAA)' refers to the government department(s), organisation(s) or institution(s) in each mine-affected country charged with the regulation, management and coordination of mine action. In most cases the national Mine Action Centre (MAC) or its equivalent will act as, or on behalf of, the 'NMAA'. In certain situations and at certain times it may be necessary and appropriate for the UN, or some other recognised international body, to assume some or all of the responsibilities, and fulfil some or all of the functions, of a NMAA.

The term 'demining organisation' refers to any organisation (government, NGO or commercial entity) responsible for implementing demining projects or tasks. Demining organisations include headquarters and support elements, and comprise one or more sub-units.

The term 'Unexploded Ordnance (UXO)' refers to a munition (or munitions) containing explosive that has been used, or has been primed, fused, armed or otherwise prepared for use. It may have been dropped, launched or projected yet remains unexploded either through malfunction or design or for any other cause.

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## **4. Explosive Ordnance Disposal (EOD) procedures and operations**

### **4.1. General principles**

EOD operations involve the detection, identification, field evaluation, render safe, recovery and disposal of UXO. EOD may be undertaken as a routine part of mine clearance operations following the discovery of UXO in or near mined areas. EOD operations may also be undertaken to dispose of UXO discovered outside mined areas. Such operations may involve a single UXO, or a number of UXO at a specified location such as a mortar or artillery gun position. It may also involve a stockpile of ammunition left in a bunker or an ammunition point. The standard does not however address the destruction of stockpiles of anti-personnel landmines in accordance with the Mine Ban Treaty (MBT).

The effective management of mine action programmes includes where necessary the establishment and maintenance of a capability to conduct EOD in a safe and effective manner. This involves a formal risk assessment of the UXO threat and the development of a safe and effective EOD capability. Such a capability shall include the preparation of appropriate procedures for neutralisation and disarming, the use of well trained and qualified deminers and EOD specialists, and the use of effective and safe equipment, stores and supplies. It is recognised that some programmes have a limited need for an integral EOD capability; in such cases the NMAA shall establish and provide an appropriate EOD response.

The development of a safe and effective EOD capability may require the establishment of levels of expertise to cope with a range of operational requirements. As a general principle, operators should deal only with those items and situations for which they have been trained and authorised. All other cases should be referred to the next higher level of expertise.

### **4.2. Qualifications**

EOD can be carried out at many levels from the neutralisation of large bombs and missiles to the destruction of grenades and sub-munitions. EOD qualifications should be appropriate to the UXO threat, and the munitions most likely to be found. The qualifications of all staff shall satisfy the requirements and regulations of the NMAA. As a guide:

- a) a Level 1 (EOD) qualification enables a deminer to locate, expose and destroy under supervision in situ mines that the deminer has been specifically trained on;
- b) a Level 2 (EOD) qualification enables a deminer to undertake the destruction in-situ of single small UXO such as sub-munitions, grenades and mortar ammunition up to 84mm this includes High Explosive Anti Tank (HEAT) charges. These categories of munition normally represent the majority of UXO found in and around mined areas;
- c) a Level 3 (EOD) qualification is for a deminer who has had specific EOD training in the disposal by detonation of larger UXO, such as rocket and tank gun ammunition, and artillery ammunition up to 240 mm; this includes HEAT charges. Under the supervision and direction of a qualified supervisor, a Level 3 (EOD) deminer should be qualified to render safe UXO for safe removal from the demining worksite, and to undertake their final destruction; and
- d) a Level 4 (EOD) qualification is for those small number of specialist EOD staff who have been trained, and are qualified, to destroy the remaining EOD hazards with specialist EOD techniques, including the bulk disposal of rendered safe UXO and other recovered ammunition. Such specialist skills would include the render safe of liquid propellant systems, disposal of Depleted Uranium or the clearance of conventional munitions with improvised firing systems. The Level 4 (EOD) qualification shall clearly indicate the specialist areas of operation for each individual.

Note: Some UXO fall within the guidelines for the above categories of operators, but present a specific or additional threat. Examples are items containing White Phosphorous (WP), missiles, or the requirement for bulk demolitions. Special consideration is needed regarding the need for additional training, or specific exclusion from the category of competence.

Note: Where particular items are frequently encountered, specific training in the disposal of these items may be given to enable the operator subsequently to deal with them rather than continually refer the problem to the next higher level of expertise.

Note: It should be noted that submunitions are particularly hazardous to deal with and should only be dealt with by appropriately trained and qualified personnel.

#### **4.3. Neutralisation and disarming procedures**

UXO should normally be destroyed in-situ by detonation. If it is not possible or suitable to destroy UXO in-situ for reasons of safety or for local environmental considerations such as the proximity of buildings or facilities, demining organisations shall render the munition safe by neutralisation and/or disarming, prior to moving it to a suitable location for disposal.

Demining organisations, with an integral EOD capability, shall prepare Standard Operating Procedures (SOPs) for neutralisation and disarming procedures which are appropriate to the UXO threat and are consistent with accepted international EOD practice.

Should a demining organisation not have a suitable integral EOD capability, then they shall mark, identify and report the UXO to the NMAA. It shall then be the responsibility of the NMAA to provide an appropriate EOD response.

#### **4.4. Destruction procedures**

Demining organisations shall prepare SOPs for the effective and safe destruction of UXO. This includes UXO destroyed in-situ, and UXO or recovered ammunition items destroyed individually or in bulk. Special attention shall be given to ensuring the containment of blast and fragmentation effects resulting from the destruction of UXO. Sites chosen for bulk destruction shall be located sufficiently far away from populated areas so as to represent no risk.

#### **4.5. Transportation, handling and storage of mines and UXO**

When UXO or other ammunition (which has been rendered safe) is moved, either for storage or to a site for bulk destruction, demining organisations shall apply national standards for the transportation, handling and storage of explosives. If national standards do not exist or are inappropriate, demining organisations shall apply the general principles given in IMAS 10.50.

### **5. Responsibilities and obligations**

#### **5.1. National Mine Action Authority (NMAA)**

The NMAA shall:

- a) establish and maintain national standards for EOD procedures;
- b) establish and maintain national standards for the qualification of EOD staff;
- c) establish and maintain the capability to accredit demining organisations involved in EOD operations;
- d) establish and maintain the capability to monitor the effectiveness and safety of demining organisations involved in EOD operations;
- e) establish national systems for EOD incident reporting; and



- f) where necessary, seek assistance from other national governments in accordance with bilateral and international arrangements to obtain the specialist expertise and information necessary to establish safe and effective national standards for EOD procedures and EOD operations.

## **5.2. Demining organisations**

Demining organisations shall:

- a) establish and maintain SOPs for EOD operations which comply with IMAS, national standards and other relevant standards and regulations, and which reflect local conditions and circumstances;
- b) recruit, train and maintain the appropriate staff to carry out EOD; and
- c) apply SOPs for EOD operations in a consistent, effective and safe manner.

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

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of the standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of the standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid ISO or EN:

- a) IMAS 10.10 S&OH - General requirements;
- b) IMAS 10.20 S&OH - Demining worksite safety;
- c) IMAS 10.50 S&OH - Storage, transportation and handling of explosives; and
- d) Ammunition and explosives regulations – For use by the United Nations field missions.

The latest version/edition of these references should be used. GICHD hold copies of all references used in this standard. A register of the latest version/edition of the IMAS standards, guides and references is maintained by GICHD, and can be read on the IMAS website (<http://www.mineactionstandards.org/>). NMAA, employers and other interested bodies and organisations should obtain copies before commencing mine action programmes.

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

### **B.1.**

#### **deminer**

a person qualified and employed to undertake demining activities on a demining worksite.

### **B.2.**

#### **demining worksite**

any workplace where demining activities are being undertaken.

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

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

### **B.3.**

#### **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.

### **B.4.**

#### **Explosive Ordnance (EO)**

all 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; clusters and dispensers; cartridge and propellant actuated devices; electro-explosive devices; clandestine and improvised explosive devices; and all similar or related items or components explosive in nature. [AAP-6]

### **B.5.**

#### **Explosive Ordnance Disposal (EOD)**

the detection, identification, field evaluation, render safe, recovery and disposal of EO. EOD may be undertaken:

- a) as a routine part of mine clearance operations, upon the discovery of UXO.
- b) to dispose of UXO discovered outside mined areas, (this may be a single UXO, or a larger number inside a specific area).
- c) to dispose of EO which has become hazardous by deterioration, damage or attempted destruction.

### **B.6.**

#### **fragmentation hazard zone**

for a given explosive item, explosive storage or mine/UXO contaminated area, the area that could be reached by fragmentation in the case of detonation.

Note: Several factors should be considered when determining this zone; the amount of explosive, body construction, type of material, ground conditions etc. See also [secondary fragmentation].

### **B.7.**

#### **secondary fragmentation**

in an explosive event, fragmentation that was not originally part of the mine/UXO.

**B.8.**

**Unexploded Ordnance (UXO)**

explosive ordnance that has been primed, fused, armed or otherwise prepared for use or used. It may have been fired, dropped, launched or projected yet remains unexploded either through malfunction or design or for any other reason.

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## Amendment record

### Management of IMAS amendments

The IMAS series of standards are subject to formal review on a three-yearly basis, however this does not preclude amendments being made within these three-year periods for reasons of operational safety and efficiency or for editorial purposes.

As amendments are made to this IMAS they will be given a number, and the date and general details of the amendment shown in the table below. The amendment will also be shown on the cover page of the IMAS by the inclusion under the edition date of the phrase *'incorporating amendment number(s) 1 etc.'*

As the formal reviews of each IMAS are completed new editions may be issued. Amendments up to the date of the new edition will be incorporated into the new edition and the amendment record table cleared. Recording of amendments will then start again until a further review is carried out.

The most recently amended IMAS will be the versions that are posted on the IMAS website at [www.mineactionstandards.org](http://www.mineactionstandards.org).

Number	Date	Amendment Details
1	1 Dec 2004	1. Formatting changes. 2. Minor text editing changes. 3. Changes to terms, definitions and abbreviations where necessary to ensure that this IMAS is consistent with IMAS 04.10.
2	23 Jul 2005	1. Annex B, change to the definition of 'Explosive Ordnance Disposal (EOD)' to be consistent with IMAS 04.10.