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Explosive Ordnance Disposal

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Foreword

International standards for humanitarian demining programmes were first proposed by working groups at an international technical conference in Denmark, in July 1996. Criteria were prescribed for all aspects of demining, 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) with the first edition produced in October 2001.

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

Explosive Ordnance Disposal (EOD) involves the disposal of Explosive Ordnance (EO), including mines and Explosive Remnants of War (ERW).

While, in practice, EOD operations include disposal of all EO, the main focus is on the disposal of ERW. The majority of ERW found during demining operations are small items of Unexploded Ordnance (UXO), such as sub-munitions, grenades and mortar ammunition. However, ERW can also include larger items such as artillery ammunition, guided missiles, air-dropped bombs, caches of Abandoned Explosive Ordnance (AXO), post-explosion clearance of ammunition storage areas as well as Improvised Explosive Devices (IEDs). The wide variety of size and complexity of ERW requires special attention to be afforded to the management of EOD and the qualifications required to deal with the varying devices.

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 EO.

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 and applies to the disposal of mines and ERW, including unexploded sub-munitions. Demining worksite safety and quality requirements for clearance are addressed in other IMAS.

This standard does not apply to the disposal of nuclear or biological weapons. National Mine Action Authorities (NMAA) will need to obtain, and to disseminate, specialist advice on such weapons and ammunition and their destruction, if required. This standard also seeks to cover munitions with highly toxic or carcinogenic components, including some mines (such as PFM1) that fall into this category.

2. References

A list of normative and informative 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.

Previous versions of this document have referred to CWA 15464:2005 – *Humanitarian Mine Action – EOD Competency Standards (5 parts)*. These standards that referred to Level 1, 2 and 3 have now been subsumed within Test and Evaluation Protocol (T&EP 09.30/01/2014) and integrated with Level 3+ competency standards, which cover specialist capabilities.

For clearance requirements see IMAS 09.10, for battle area clearance (BAC) see IMAS 09.11, for clearance of ammunition storage area explosion see IMAS 09.12 and for demining worksite safety see IMAS 10.20.

A number of Technical Notes for Mine Action (TNMA) provide specific guidelines about specific EO hazards. See informative references in Annex A for related TNMA.

3. Terms, definitions and abbreviations

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 mandatory 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; and
- c. 'may' is used to indicate a possible method or course of action.

The term 'National Mine Action Authority (NMAA)' refers to the government entity, often an inter-ministerial committee, in a mine-affected country charged with the responsibility for the regulation, management and coordination of mine action.

Note: In the absence of a NMAA, 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 the functions, of a MAC or, less frequently, an 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 'Explosive Ordnance (EO) refers to '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; cluster bombs 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'¹.

The term 'Explosive Remnants of War (ERW)' refers to Unexploded Ordnance (UXO) and Abandoned Explosive Ordnance (AXO), excluding landmines.

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 EO. EOD may be undertaken as a routine part of mine clearance operations following the discovery of ERW. EOD operations may also be undertaken to dispose of ERW discovered outside hazardous areas. Such operations may involve a single item of ERW, or a number of items at a specified location such as a mortar or artillery position. It may also involve stockpiles of ammunition, AXO left in bunkers or ammunition points. The standard does not however address the destruction of stockpiles of anti-personnel landmines in accordance with the Anti-Personnel Mine Ban Convention (APMBC)². See IMAS 11.10 *Guide for destruction of stockpiles of anti-personnel landmines*.

The effective management of clearance 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 ERW hazards 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 operators, 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 rule, 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 hazard and the munitions most likely to be found. The qualifications of all EOD operators shall satisfy the requirements and regulations of the NMAA, or the authority acting on their behalf or in place of, who may request proof of capability in addition to the qualification. Detailed competencies and operating categories are listed at T&EP 09.30/01/2014. As a guide:

a) a Level 1 (EOD) qualification enables the trained holder of the qualification to locate, expose and to destroy in situ, when possible, single items of mines and specific ERW on which the individual has been trained; thus Level One operators may be licensed to destroy only specific items of ordnance.

¹ Allied Administrative Publication (AAP) 6, edition 2013.

² Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction.

b) in addition to the skills of a Level 1 (EOD) qualification, a Level 2 (EOD) qualification enables the holder to determine when it is safe to move and transport munitions and to conduct the simultaneous disposal of multiple items of ordnance using line mains or ring mains. This qualification extends only to those mines and specific ERW on which the individual has been trained;

c) in addition to the skills of a Level 1 and 2 (EOD) qualification a Level 3 (EOD) qualification enables the holder to conduct render-safe procedures and final disposal of a wide range of specific types of explosive ordnance on which the individual has been trained; and

d) in addition to the skills of a Level 1, 2 and 3 (EOD) qualification, which cover the skills that are routinely required in Mine Action, there may be a requirement for additional specialist skills. The Level 3+ (EOD) qualification is for specialist EOD operators who have been trained in areas that needed to address specific hazards. Level 3+ competencies are listed in the T&EP 09.30/01/2014 and include the following:

- (1) Clearance of AFV.
- (2) Depleted Uranium (DU) related EO and DU hazards.
- (3) Guided Weapon System AXO where the missile is fitted in the launcher.
- (4) Guided Missiles containing liquid propellants.
- (5) Intact cluster munitions.
- (6) IED Disposal.
- (7) Underwater EOD.
- (8) Chemical EOD

The Level 3+ (EOD) qualification shall clearly indicate the specialist training received by each individual, whether within core or specialist competencies.

Whenever there is a requirement for specialist skills not covered in the Level 3 qualification then it is the duty of the contracting authorities to specify the additional skills required for a particular task, and for the mine action organizations concerned to demonstrate that their Level 3+ operators have the higher-level training and experience appropriate for the task.

Some ERW fall within the guidelines for the above qualification levels but present a specific or additional hazard. Examples are items containing White Phosphorous (WP), missiles, or the requirement for bulk demolitions or the logistic destruction of ammunition. Special consideration should be given to the need for additional training, or for specific exclusion from the category of competence.

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

It should be noted that sub-munitions may be particularly hazardous to deal with and should only be dealt with by level 2 or above qualified personnel.

4.3. Certification

At every level of EOD competency the training organisation or authority that certifies an individual should, within the certification, explicitly list the disciplines on which the individual has been trained. At the most basic level this may include the specific munitions on which the individual has been trained to destroy or neutralise, and for more advanced levels should cover the generic competency subjects covered by the training.

To complement the certification individuals are encouraged to maintain logs of their application of the training such that demonstrate their operational experience.

4.4. Quality and audit of the qualifications

NMAA and mine action organisations should develop performance criteria, appropriate assessment tools and procedures in order to assess the level and quality of competence of EOD operators. This could include written tests, practical exercises, demonstrating a task, or procedures for assessment of performance during EOD operations.

EOD Competencies Standards T&EP 09.30/01/2014 provides guidance on the competencies needed for EOD levels 1, 2 3 and 3+ and is designed to enhance the process of planning and evaluating EOD operators development and capacity building. Its use can also help improve the assessment of training and competency of operators involved in EOD work.

4.5. Neutralisation and disarming procedures

Individual mines and ERW should be destroyed or neutralised in situ whenever it is not safe to move them and whenever practical. Prior to destruction of ERW in situ however, the effects of subsequent contamination and damage should be assessed in order to determine the most effective method of neutralisation/destruction. The decision whether or not to move a particular type of mine or ERW should be based on an assessment by an appropriately qualified EOD operator. EO should be rendered safe or disarmed, if possible, prior to moving to a suitable location for disposal. Any EOD activity should be closely coordinated with relevant authorities to ensure organisational and community awareness.

Demining organisations, with an integral EOD capability, shall prepare Standard Operating Procedures (SOPs) for neutralisation and disarming procedures which are appropriate for the mine and ERW hazards likely to be encountered and which are consistent with accepted international EOD practice.

Should a demining organization not have a suitable integral EOD capability, or be able to sub-contract that capability with an accredited individual or organisation, then they shall mark, identify and report any mine and ERW located to the NMAA. It shall then be the responsibility of the NMAA to provide an appropriate EOD response.

Neutralisation and disarming procedures should not be necessary for bulk or individual items of AXO as they will not, by definition, have been primed or have failed to explode. It should be noted however, that AXO could have been exposed to extreme temperature and climate changes for a prolonged period of time, resulting in degraded stability of the ordnance.

4.6. Destruction procedures

Demining organisations shall prepare SOPs for the effective and safe destruction of ERW relevant to the operating environment. These should include the destruction of mines and ERW in-situ, or recovered and destroyed individually. EOD operations should be carried out in a manner that minimises any impact on the environment. Planning for and destruction of bulk AXO should be conducted by suitably trained EOD operators. Special attention shall be given to ensuring the containment of blast, ground shock and fragmentation effects resulting from the destruction of mines and ERW. Sites chosen for bulk destruction shall be located sufficiently far away from populated areas so as to represent no risk. IMAS 10.20 provides guidelines on demining worksite safety distances. IMAS 09.12 provides guidance on EOD clearance of ammunition storage explosions. IMAS 10.70 provides guidelines as to the minimum environmental protection measures in demining operations.

4.7. Disposal site

A disposal site is an area authorised for the destruction of mines and ERW found during demining operations. Where both demolition grounds and burning grounds are required, they may be co-located on a disposal site. Disposal sites shall be sited to ensure that hazards associated with destruction operations are reduced to an acceptable level remaining cognisant of the requirement to protect the environment wherever possible. NMAA should allocate appropriate disposal sites for demining organizations as required and approve guidelines and

procedures for their safe and efficient use. See IMAS 11.20 *Principles and procedures for OBOD operations*.

4.8. Transportation, handling and storage of mines and ERW

When mines or ERW are moved, either for storage or to a site for bulk destruction, demining organisations shall apply national standards which should include reference to relevant national laws and by-laws 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- *Storage, transportation and handling of explosives*. Consideration should be given to providing suitable hazard classification to recovered Home Made Explosives (HME) in order to comply with the principles of safe movement, handling and storage.

5. Responsibilities

5.1. National Mine Action Authority (NMAA)

The NMAA should:

- a) establish and maintain national standards for EOD;
- b) establish and maintain performance criteria and tools for quality and audit of the EOD operators;
- c) establish and maintain the capability to accredit EOD training organisations and monitor the training and certification process.
- d) establish and maintain the capability to accredit demining organisations involved in EOD operations;
- e) where possible, allocate appropriate disposal sites for demining organizations as required and approve guidelines and procedures for their safe and efficient use;
- f) establish and maintain the capability to monitor the effectiveness, safety and measures to protect the environment of demining organisations involved in EOD operations;
- g) establish national systems for EOD incident reporting; and,
- h) 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 operations.

5.2. Demining organisations

Demining organisations shall:

- a) gain from the NMAA or organisation acting in place or on its behalf, accreditation for EOD operations;
- b) establish and maintain SOPs for EOD operations which comply with national or IMAS standards, and other relevant standards and regulations, that reflect local conditions and circumstances;
- c) ensure that the EOD operators are competent and suitably trained and qualified;
- d) instruct EOD operators to maintain logs of their operational experience;
- e) apply SOPs for EOD operations in a consistent, effective and safe manner which include procedures to protect the environment; and
- f) ensure that the affected community is fully cognisant of all EOD activities (including training) and clearance regulations and implications, particularly related to the depth of clearance.

5.3. EOD training organisations

EOD training organisations shall:

- a) gain from the NMAA or organisation acting in place of or on its behalf, accreditation for EOD training;
- b) establish and maintain SOPs for EOD training which comply with national or IMAS standards, and other relevant standards and regulations, that reflect local conditions and circumstances; and
- c) establish and maintain certification procedures so that training completion certificates explicitly list the disciplines on which the individual has been trained and has qualified as competent.

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 04.10 - Glossary of mine action terms, definitions and abbreviations;
- b) IMAS 09.10 - Clearance requirements;
- c) IMAS 09.11 - BAC;
- d) IMAS 09.12 – clearance of ASA explosion;
- e) IMAS 10.70 - S&OH protection of the environment;
- f) IMAS 10.20 - S&OH demining worksite safety;
- g) IMAS 10.50 - S&OH storage, transportation and handling of explosives;
- h) IMAS 11.20 - Principles and procedures for OBOD operations; and
- i) T&EP 09.30/01/2014 EOD Competency Standards.

Informative references:

- a) TNMA 09.30/01 - EOD Clearance of Armoured Fighting Vehicles (AFV)
- b) TNMA 09.30/02 - Clearance of Depleted Uranium (DU) hazards;
- c) TNMA 09.30/03 - Guidance on liquid propellant fuelled systems;
- d) TNMA 09.30/04 - Fuel Air explosive (FAE) systems;
- e) TNMA 09.30/05 - YM-1(B) anti-personnel mine – Technical Description
- f) TNMA 09.30/06 - Clearance of cluster munitions based on experience in Lebanon;
- g) TNMA 10.20/01 - Estimation of explosion danger areas:
- h) TNMA 10.20-02/09 - Field Risk Assessment:

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.

Amendment record

Management of IMAS amendments

The IMAS series of standards are subject to formal review on a triennial basis however this does not preclude amendments being made within this period 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.

Number	Date	Amendment Details
1	01 Mar 2010	<ol style="list-style-type: none"> 1. UNMAS address updated. 2. Update NMAA definition 3. Inclusion of a normative reference to the UNDP/SEESAC RMDS/G 05.55 4. Removal of Annex B and its reference in Clause 3.
2	12 Oct 2010	<ol style="list-style-type: none"> 1. Inclusion of Clause 4.6 "disposal site" 2. Inclusion of a bullet point "d" in Clause 5.1 responsibility of NMAA. 3. Inclusion of normative reference to IMAS 11.20 OBOD.
3	01 Aug 2012	<ol style="list-style-type: none"> 1. Replacement of UNDP/SEESAC RMDS.G 05.55 with IATG 11.30 ASA Explosions – EOD Clearance in Clause 4.5. 2. Replacement of UNDP/SEESAC RMDS.G 05.55 with IATG 11.30 ASA Explosions – EOD Clearance in Annex A Normative References. 3. Reviewed for impact of IATG development. 4. Minor typographical amendments.
4	01 Jun 2013	<ol style="list-style-type: none"> 1. Reviewed for impact of amended land release IMAS 2013 2. Amendment no included in the title and header.
5	30 October 2014	<ol style="list-style-type: none"> 1. Minor amendment to "Introduction" page V. 2. Amendments to Clause 1 Scope. 3. Amendment to Clause 2, References – replacing CWA with T&EP. 4. Amendments to Clause 4.2 d to reflect EOD qualification level 3+ 5. Inclusion of a new Clause 4.3 certification 6. Inclusion of a new Clause 5.3 responsibility of EOD training organisations 7. Inclusion of requirement for protection of environmental, Clause 4.6, 5.1 & 5.2. 8. Annex A, list of normative references is updated - CWA replaced by T&EP and IATG 11.30 replaced by IMAS 09.12.

