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Safety & occupational health - Personal protective equipment

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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

Fundamental responsibilities of mine action management include the need to reduce risk and to provide a safe working environment for men and women deminers and mine action staff. IMAS 10.10 provides guidance for the development and implementation of Safety and Occupational Health systems for use in mine action. 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 (PPE) and clothing.

PPE should be regarded as a 'last resort' to protect against the effects of mine and ERW hazards. It should be the final protective measure after all planning, training and procedural efforts to reduce risk have been taken. There are a number of reasons for this approach. First, PPE protects only the person wearing it, whereas measures controlling the risk at source can protect everyone at the demining workplace. Second, theoretical maximum levels of protection are seldom achieved with PPE in practice, and the actual level of protection provided is difficult to assess. To obtain the maximum protection from any PPE it must be correctly fitted and properly maintained and used. And third, PPE may restrict the wearer to some extent by limiting mobility, visibility and comfort, or by requiring additional weight to be carried. The requirements for protection must be balanced against the possibility that wearing too much PPE may impair movement or concentration.

While the risk to deminers comes from all types of explosive ordnance including Anti Personnel (AP) blast mines, AP fragmentation mines, Anti Tank (AT) mines and ERW, including unexploded sub-munitions, the AP blast mine occurs in the greatest numbers and features in the most accidents. PPE, therefore, is principally designed to defeat the injuries caused by AP blast mines. At close quarters, AP fragmentation mines and AT mines overmatch PPE currently available, however, due to the area effect of such mines, they also have the potential to cause 'secondary victims' and PPE is intended to provide some protection to these.

In general, when unexploded munitions are encountered in humanitarian demining, they have already malfunctioned, they are usually high in metal content, on or near the surface, and constitute less of a hazard than mines. The varied nature of UXO, however, means that the hazard is best dealt with procedurally rather than by relying on PPE designed primarily for humanitarian demining.

Safety & occupational health - personal protective equipment

1. Scope

This IMAS provides specifications and guidance to National Mine Action Authorities and demining organisations on the minimum requirements of Personal Protective Equipment (PPE) for use in mine action.

It does not provide guidance on the design characteristics of PPE garments, or on test and evaluation procedures. The European Committee for Standardisation (CEN) Workshop Agreement 15756 – 2007 provides guidance on the test and evaluation of PPE in humanitarian mine action. General requirements for PPE are included in ISO/DIS14876-1: 1999(E).

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.

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 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 'employer' refers to any organisation (government, NGO or commercial entity) responsible for implementing demining projects or tasks. The employer may be a prime contractor, subcontractor, consultant or agent.

The term 'employee' refers to men and women who work for an employer. Employees may be involved in management, operational or support activities.

The term 'Personal Protective Equipment (PPE)' refers to all equipment and clothing designed to provide a reasonable degree of protection, which is intended to be worn or held by an employee when conducting specific activities, and which protects him/her against one or more risks to his/her safety or health.

4. Personal Protective Equipment (PPE) requirements

4.1. General

The primary means of preventing explosive injury in the workplace is by the supervised use of demining tools and processes that reduce the likelihood of an unintended detonation. This is generally effective and unintended detonations are rare events. PPE is provided as a secondary safeguard to protect against the small risk remaining. It is important that the PPE provided should not restrict the application of demining tools and processes in any manner that increases the risk that an unplanned detonation will occur.

The levels of PPE provided for use in suspected hazardous areas must be decided after considering the local risk(s), operational procedures and tools, and local environmental conditions, and after making a written risk assessment. It is possible that different levels of PPE may be appropriate for use during different activities at different parts of a workplace. (Guidelines on the process of risk assessment and risk reduction are given in ISO Guide 51. Guidelines for assessing risk to determine the appropriate working distances for a demining worksite are given in IMAS 10.20.) Guidelines on conducting Field Risk Assessment are given in TNMA 01.20-02/2009.

Training shall be provided on the proper use, maintenance and storage of all PPE provided and in use within the demining organisation. Facilities should be provided for its proper storage, carriage, cleaning and maintenance. Equipment shall be examined on a regular basis to ensure that it is suitable for use.

4.2. Suitability and appropriateness

PPE provided shall fit the employee, male or female, and be designed to provide reasonable comfort and protection against the predictable risks present at a demining worksite. Other clothing provided shall be suitable for the prevailing weather conditions and include footwear with suitably slip-resistant soles. Cultural practices should also be taken into consideration. If the predictable risk is from AP blast mines, and ERW containing greater than 240 gm of TNT, and there is a high risk that the mine(s) or ERW may be initiated during the procedures that will be used, the use of other procedures or enhanced protection shall be considered.

While staff are inside the safety distance for the hazards anticipated at a suspected hazardous area, the minimum requirements under Clause 4.3 below apply. The minimum PPE requirement given below shall be increased if the worksite risk assessment determines that the risk warrants greater protection.

Note: Although this standard gives distances at which the PPE must be effective, this does NOT imply that the wearer will be safe at such distances. Distance reduces the severity of blast effects, so the further away the wearer is, the safer the wearer will be.

4.3. Minimum PPE requirement

PPE shall be capable of protecting the parts of the body that are covered against the blast effects of 240 gm of TNT at distances appropriate to the wearer's activity.

The amount of PPE provided shall be determined as a result of a field risk assessment and management decision. The minimum PPE inside the safety distance of a suspected hazardous area or when engaged in any activity that involves being close to mines and ERW, shall be:

a) Body armour 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 240 gm of TNT at 60 cm from the closest part of the body; and

b) 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 gm of TNT at 60 cm and shall provide protection equivalent to not less than 5 mm of untreated polycarbonate. However, it is recommended that eye protection should be a part of frontal head protection capable of protecting against the blast effects of 240 gm of TNT at 60 cm and providing full frontal coverage of face and throat.

Note: Commonly available industrial safety spectacles do not meet the minimum requirement of this standard and shall not be used as demining PPE.

4.4. Fragmentation protection

The fragmentation danger from most fragmentation mines and unexploded sub-munitions cannot be protected against with lightweight and practical PPE. This emphasises the need to minimise risk through the use of inherently safe procedures. Although the level of protection may not be sufficient, PPE provided to reduce the risk from fragmentation mines shall be at least that used as protection against blast hazards described under Clause 4.3 above.

4.5. Hand tools

Hand tools should be constructed in such a way that their separation or fragmentation resulting from the detonation of an AP blast-mine incident is reduced to a minimum. Hand tools should be designed to be used at a low angle to the ground and should provide adequate stand-off from an anticipated point of detonation. The use of gloves can provide protection against non explosive injury and should be considered.

4.6. Blast resistant footwear

During the risk reduction process, demining organisations may consider providing blast resistant boots for the protection of feet and lower limbs, where there is a significant risk that cannot be reduced by SOPs alone. However, the blast resistant boots being considered should be proven to be effective in reducing the risk presented by the anticipated hazards.

Note: The effectiveness and operational benefits of mine boots is still a contentious issue within the mine clearance community, and there are wide ranging views and opinions on their use. Nevertheless mine boots do exist, and therefore demining organizations may wish to evaluate their suitability for their particular operational scenario during the planning phase of a clearance operation. The cost of provision and replacement is high, whilst the benefits are unproven. There is, therefore, a danger that they offer 'false security'.

4.7. Protecting hearing

When conducting demolitions at minimum safety distances, the use of protection for the ear-drums is recommended.

4.8. Explosive Ordnance Disposal (EOD) clearance sites

When engaged in the clearance of EOD clearance sites, an enhanced level of protection may be necessary. This should be defined in Standard Operating Procedures (SOPs), and may include conventional body armour or other specialist PPE ensembles.

5. Responsibilities

5.1. General requirements

NMAA and employers (governments, NGOs and commercial entities) shall establish and maintain policy, standards and guidelines on the minimum requirements of PPE for use in different situations in national mine action programmes. These should distinguish between the obligations and responsibilities at the national level, and those of the employer and employee as set out below.

5.2. National responsibilities

The NMAA shall:

a) establish and maintain national standards to be applied for PPE;

a) monitor the application of standards; and

b) undertake periodic reviews of the national standards for PPE and the technologies available to reduce risks.

5.3. Employers' responsibilities

Demining organisations shall:

a) apply the documented NMAA standards for PPE;

b) provide PPE for each activity undertaken that meets, or exceeds, the minimum requirements and is appropriate for the wearer, male or female. In this regard, PPE should be provided to employees which is serviceable and appropriate to the risk, local operational procedures, culture and environmental conditions;

c) provide training and supervision in the selection of appropriate PPE and the correct use and maintenance of PPE;

d) establish and maintain SOPs that specify care and maintenance requirements;

e) provide suitable facilities for the storage, carriage, cleaning and maintenance of PPE; and

f) establish and maintain documented SOPs to undertake periodic reviews of PPE.

In the absence of a NMAA or authorities, the demining organisation should assume additional responsibilities. These include, but are not restricted to:

a) issue, maintain and update their own standards to be applied for PPE;

b) cooperate with other employers in the same country to ensure consistency of standards of use and maintenance of PPE; and

c) assist the host nation, during the establishment of a NMAA, in framing national standards for PPE.

5.4. Employees' obligations

Employees of demining organisations shall:

a) use PPE in accordance with the requirements specified by their employers and the manufacturer's specification for the PPE, including the use of facilities provided for storage and carriage of PPE;

b) clean and maintain the PPE in accordance with the demining organisation's SOPs and/or the manufacturer's specifications or guidelines; and

c) report to the employer, problems with the equipment or suggested improvements to SOPs, which may reduce the requirement for PPE, or improvements in the design or application of PPE.

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) ISO Guide 51 Safety aspects – Guidelines for their inclusion in standards;

b) ISO/DIS 14876-1:1999 (E) Protective clothing - Body armour – Part 1: General requirements;

c) IMAS 10.10 S&OH - General requirements;

d) IMAS 10.20 S&OH - Demining worksite safety;

e) STANAG 2920;

f) CWA 15756-2007 Test and evaluation of PPE in humanitarian mine action.

g) Database of Demining Accidents, www.ddasonline.com (Informative).

h) TNMA 10.20-02/2009 on Field Risk Assessment (informative).

The latest version/edition of these references should be used. GICHD hold copies of all normative 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: (See 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 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.

Number	Date	Amendment Details
1	1 Mar 2010	Definition of NMAA updated UNMAS Address updated Minor changes throughout to ensure gender and cluster munitions issues. Inclusion of a normative reference to TNMA –FRA in the body and Annex A. Removal of Annex B (definitions) from the IMAS series and its reference in clause 3.