CEN WORKSHOP DRAFT BUSINESS PLAN

Humanitarian Mine Action (HMA) – Test and Evaluation (T&E) - Personal Protective Equipment (PPE)

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The Background to Humanitarian Mine Action Standards

1.1 Context

The presence of landmines and other Explosive Remnants of War (ERW) represent a serious safety hazard and a major obstacle to reconstruction and development in former disputed areas around the world. Current estimates record at least 83 countries in the world\(^1\) contaminated with mines and unexploded ordnance (UXO). Recent conflicts have added a new generation of UXO threats which those engaged in Humanitarian Mine Action have to deal with alongside the more familiar mines and booby traps.

The current methodologies for clearance are varied and include such methodologies as mechanical ground preparation, scent detection by animals and the processing of ground by human deminers. This latter activity is the most common, forming part of the fundamental core of every demining programme.

All currently recognised methods of ground clearance involve people being inside the threat area at some time. Globally, the most common approach to ground clearance is still the use of manual deminers covering the ground with the aid of a variety of tools and assets that may include Explosive Detecting Animals and machines. When animals are used, human assets control the animals and check their indications. When machines are used, they can assist the process and may sometimes be effective in reducing the area that must be cleared, but human assets are still used to check their effectiveness and deal with discovered devices. Protective equipment issued to these individuals varies widely, and its proven effectiveness against humanitarian mine action (HMA) threats is often uncertain. The standards currently used to determine appropriate protective equipment are based on the NATO STANAG 2920 which is designed for ballistic protection against projectiles and are generally recognised as being

\(^1\) Landmine Monitor, 2004
inappropriate for the HMA activity and the range of threats that can be anticipated.²

Some accidental initiation of devices is recognised as being inevitable during demining. Processes, procedures and good management form the core basis for protection, but PPE provides the final line of defence against human errors and malfunctions. In many cases, effective Personal Protective Equipment (PPE) can prevent seriously disabling injury. Humanitarian principles and the legal aspects of an employer’s “duty of care” make it essential to limit the injuries that result by the provision of effective PPE. To achieve this reliably, it is necessary to provide a baseline and clearly defined set of T&E standards.

The Commission Communication for the proposed European Parliament and Council Regulation concerning action against anti-personnel landmines³ calls for the establishment of international Specifications and Methodology and their implementation, in close co-operation with CEN, ISO, and the UN. The European Commission has granted a mandate to the European Standardisation Bodies to proceed with this standardisation⁴. Such standardisation would include the test and evaluation of any PPE or component thereof in support to humanitarian demining.

The CEN BT/WG 126 “Humanitarian Mine Action” delivered in March 2002, as an action plan, the CEN response to the EC "Mandate to the European Standardisation Bodies on Technologies for Humanitarian Demining" (M/306),

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² IMAS 10.30 Personal Protective equipment, in which it is stated that: “Such tests for ballistic protection do not realistically replicate mine effects, but will continue to be used until an accepted alternative is developed as an international standard”.


⁴ Mandate to the European Standardisation Bodies on Technologies for Humanitarian Demining, EC Joint Research Centre and Research Directorate-General, M306 EN, Brussels, 25 August 2000.
interpreted to cover humanitarian mine action. In this response, a particular action to identify PPE T&E standards for HMA was identified and subsequently confirmed in October 2005. This Workshop is granted funding under a contract between CEN and the European Commission.

The main objective is to develop widely accepted and applied specifications for the testing and evaluation of PPE for HMA so increasing confidence that the PPE used is safe, reliable and fit for purpose.

It should be noted that “Humanitarian” demining in this context is intended to cover all demining actions not carried out within the framework of combat actions.

1.2 The Role of Standards

Standardisation will support the development of new protective equipment and will facilitate the development of a minimum operating standard for performance and effectiveness of PPE products in a manner appropriate for the HMA end-use and define the requirements. This will increase the use of effective PPE and thus reduce the incidence of severely disabling injury and fatal injuries. The benefit of agreed specifications and verifiable performance indicators is widely acknowledged.

An incremental and systematic approach has been recommended. The first task is to define what the threat that needs to be protected against is. This will include agreeing realistic representative threats in HMA and lead into agreeing standardised means of simulating those threats under controlled test conditions. The existence of agreed Standards/Specifications is crucial for the development of new and more effective PPE, and it is recognised that they would contribute to increasing the credibility of new products introduced on the market. It should also lead to the increased use of effective PPE at the appropriate times.
Agreed Standards/Specifications will help end-users to select the optimum PPE to use in the varied tasks they must perform in high threat areas during mine-clearance operations and related HMA activities.

The EC and donors will use Standards/Specifications to ensure that HMA programmes they support use appropriate PPE, protecting personnel against avoidable injury resulting in protection against ultimate liability.

The agreement of Standards/Specifications shall be by a collaborative effort between PPE developers, HMA authorities, Standards bodies and end users. It is considered essential that both PPE manufacturers and PPE users are represented and participate actively in the discussion workshops.

A basis for agreement will be sought by analysing the following areas in depth:

- the HMA accident record and derived definitions of the threat that can be anticipated;
- understanding what are the most pertinent injuries in this context, taking due account of the current limitations of accident record data;
- determining PPE needs that cover an appropriate range of common injury in HMA;
- defining the risk parameters within which any PPE could be effective, and excluding efforts to protect against some threats;
- considering the physical limitations on PPE design (ergonomics and durability) presented by the context in which it will be used and the actions that must be performed whilst using it in HMA;
- defining standard tests (and related recording methods and devices) that will allow confident appraisal of PPE performance against agreed threats;
- provide a preliminary set of definitions, parameters to be controlled and standard test conditions for the characterisation and assessment of PPE for HMA;
- specify a measurement and reporting system to ensure standard test conditions; and
- provide an uncertainty estimate for the measurement process.
1.3 Process Stakeholders

1.3.1 International Test and Evaluation Program

A Memorandum of Understanding has been signed by Belgium, Canada, Germany, the Netherlands, Sweden, the United Kingdom, the United States of America, and the European Commission in order to establish a global network for test and evaluation of equipment and technologies for humanitarian demining - International Test and Evaluation Program for Humanitarian Demining (ITEP). ITEP’s aim is to establish standards for test and evaluation and to carry out testing and evaluation of all kinds of equipment and methodologies, making the results available for the demining community. The co-ordination of work and the sharing of resources together with the combined knowledge and experience of the ITEP participants will increase their effectiveness to produce valuable test and evaluation data to the demining community.

1.3.2 The United Nations Mine Action Service

The United Nations Mine Action Service (UNMAS) issued a revision of the International Mine Action Standards for humanitarian mine clearance operations (IMAS) in 2005. The Geneva International Centre for Humanitarian Demining (GICHD) implemented the project on behalf of UNMAS, with financial assistance from the Government of the United Kingdom. Each of the IMAS is subject to review every three years, or sooner if required, so acknowledging the emergent nature of processes and technologies affecting HMA.

The IMAS review process anticipates improved co-operation, co-ordination and unity of effort between actors in HMA. The UN has recommended that a framework be established to provide structure and coherence to the growing number of Specifications and Methodology and guidelines.

The IMAS provide a suitable medium for informing the mine action community of existing international regulations, conventions, treaties and Standards which
impact on mine action, particularly those referring to basic human rights, clearance requirements, hazard marking and general safety issues.

1.3.3 CEN Workshop Approach in Mine Action Standardisation

The creation of a series of CEN Workshops in this field, and subsequent publication of CEN Workshop Agreements have been agreed by a Working Group of CEN’s Technical Board and endorsed by the European Commission, which is providing financial support.

The general concept and rules for a CEN Workshop can be found at CEN’s website: http://www.cenorm.be/boss/prodpro/pp013.htm

This particular CEN Workshop will deal with Specifications and Methodology for Testing and Evaluation (T&E) of Personal Protective Equipment (PPE) for use specifically in Humanitarian Mine Action (HMA) activities involving threats from Unexploded Ordnance (UXO), with the Workshop deciding the limitations of its coverage of such UXO.

2 Origin of the CEN Workshop on PPE for HMA

Test and Evaluation Specifications and Methodology for Personal Protective Equipment need to be developed for the following reasons:

1. The testing and evaluation of PPE used in HMA is currently conducted by some PPE manufacturers to meet standards that are required in other activities (such as combat and police roles where the threat is largely presumed to be from discrete ballistic articles). These tests may assess PPE performance against threats which do not apply in HMA, but sometimes do not assess its performance against the most common HMA threat, which is the blast effect of small amounts of High Explosive combined with fragmentation from the environment and mine casing. Some effort has been made in Canada to develop more appropriate tests, but the results have not achieved wide acceptance.
2. Some field testing and evaluation of PPE has been performed in the demining world, but this has usually been done to give confidence to purchasers and has been conducted in a manner that lacks the scientific and technical rigour required to give general relevance. In order to improve the situation it is necessary to provide standards whereby the materials used and each piece of finished equipment can be tested to the same levels, under the same conditions, and using criteria that can withstand technical scrutiny.

3. The test and evaluation CWA shall provide users and donors with useful and reliable data. This will permit users, donors and others to assess the effectiveness and efficiency of particular equipment and so improve operational effectiveness and safety in HMA operations.

4. Important benefits are expected from well-executed, standardised test and evaluation. Manufacturers will be aware that standards must be met and will design and develop the equipment in a way that meets the agreed criteria. Persons tasked with test and evaluation will be able to plan and execute the work much more efficiently using clearly defined protocols/Standards. Their results will gain greater acceptance and credibility when the protocols/Standards are carefully followed.
The proposers of this CEN Workshop are as follows:

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<tr>
<th>Proposing organization</th>
<th>Contact</th>
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Swedish Standards Institute (SIS) is committed to take the responsibility for the technical secretariat of this CEN WS and will provide the professional standardisation expertise and a formal link to the CEN System.
3 Market Overview

3.1 PPE for HMA

The stakeholders that will be affected by the outcome of this CEN Workshop are the manufacturers of PPE, the purchasers of PPE for HMA and ultimately, the deminer. The PPE market is both mature and growing, with PPE products used in civil and military contexts and designed to protect against a range of threat from fire to biological and chemical agents. Most manufacturers supplying PPE for HMA also make PPE for civil and military markets.

The PPE originally used in Humanitarian Demining was designed for combat purposes. Since 1995, some physical/mechanical design elements have been altered to meet the needs of Humanitarian Demining, but the materials used have remained substantially unchanged. The methods of determining the level of protection provided is defined in the IMAS in terms of blast and fragmentation effects as follows:

IMAS 10.30 Personal Protective Equipment

4.2 ……PPE should be capable of protecting against the blast effects of 240 gm of TNT at stand-off distances, for each item of PPE, appropriate to the activity performed in accordance with SOPs.

4.3 ……ballistic body armour with a STANAG 2920 v50 rating (dry) of 450m/s for 1.102g fragments. (Such tests for ballistic protection do not realistically replicate mine effects, but will continue to be used until an accepted alternative is developed as an international standard)"

No recognised standard test replicating the blast effects of 240g TNT exists, and it is recognised that the NATO STANAG 2920 fragmentation test does “not realistically replicate mine effects”. For these reasons, it is not possible for an
equipment purchaser to be confident that the equipment they buy will perform appropriately against the threat(s) they anticipate.

The Workshop is needed to establish standard ways of testing the performance of PPE. The results of such tests will enable users to select products that provide appropriate protection against the varying degrees of threats in their working areas. This will save money and lives, and reduce the number of severe injuries resulting from HMA accidents.

The EU is committed to substantial expenditure on demining-related activities. PPE is a basic requirement in mine-clearance operations and the existence of standards will help select the right PPE for the task.

3.2 Workshop contributors
Considering the market described above, the following groups of people are in particular invited to contribute to this CEN Workshop:

- users of PPE in HMA;
- manufacturers of PPE for HMA;
- institutions/agencies which perform tests on related equipment or who plan to do so;
- specialists in IMAS;
- experts in standardization
- donors.

4 Objectives of the CEN Workshop on testing and evaluation of PPE for HMA
The purpose of this CEN Workshop is to agree well-defined specifications for:

- vital criteria to be tested;
- appropriate testing methodology(ies);

This will be achieved by establishing:
• specifications for reliably replicable simulated threats;
• specifications for determining the physical suitability of finished PPE products;
• specifications for carrying out, and recording the results of, tests in a uniform manner; and
• specifications for determining ergonomic criteria and constraints required by the HMA end-users.

The following shall be presented to the WS for consideration, as a minimum:
• defining a limited range of threat types that can be protected against;
• agreeing a means of simulating each threat type in a reliably replicable manner;
• agreeing sample sizes and their presentation to the threat during tests of materials;
• determining how to test for the effects of use-context on equipment performance (temperature, humidity and moisture content);
• determining the reliability of physical aspects of the equipment (fastenings, etc) that may impact on safety;
• determining the minimum equipment required to conduct tests;
• agreeing specifications for the conduct of tests and the recording of results;
• determining appropriate scales to facilitate the comparison of results;
• agreeing the range of ergonomic requirements of PPE for the varied purposes for which it is used in HMA.

The beneficiaries of this process will be field operators, manufacturers, researchers and developers within the global HMA community. The results of this work should ensure that, for the first time, there is a baseline standard against which to judge the performance of PPE for HMA. This will reduce the incidence of severe injury and death during HMA activity, which in turn will reduce the stresses placed on medical and social systems by those with severe disabilities. A further advantage is that more of the trained individuals who suffer accidents will remain active, meaning that their training and experience are not lost to the HMA community.
The main objective therefore is to develop widely accepted and applied specifications for the testing and evaluation of PPE for HMA so increasing confidence that the PPE used is safe, reliable and fit for purpose.

Following the kick-off meeting, there will be other meetings as determined by the group (but not exceeding three workshops in all). Reflecting the global relevance of the output and the requirement for members from outside the EU to contribute, the venue for these meetings will be determined by agreement between participants. A first meeting will be held within four months of the kick-off meeting, and a final meeting within twelve months of that date. A suggested structure for a draft agreement will be presented for consideration at the first meeting, with revisions circulated as frequently as is appropriate to advance consensus between meetings.

The CEN Workshop process is relatively fast and it is open to participation from non-CEN member states. This is clearly an advantage in this case where the aim is to produce a document that can be accepted internationally. It has been decided therefore, to start with a CEN Workshop Agreement (CWA). This could then form the basis for TNMA, IMAS, European Standards (EN) and possibly ISO Standards.

The deliverable is a CEN Workshop Agreement (CWA) defining specifications for the testing and evaluation of PPE for HMA. It is intended that the CWA, resulting from the CEN WS, will conform to IMAS on equipment test and evaluation\(^5\), and anticipated that the eventual agreement will be referenced in the IMAS on PPE\(^6\).


5 Programme of the CEN Workshop

5.1 Action plan

This CEN Workshop will agree appropriate Specifications and Methodology for the Testing and Evaluation (T&E) of Personal Protective Equipment (PPE) for Humanitarian Mine Action (HMA).

Milestones

- Kick-off meeting (8th of June 2006)
- First Technical Workshop meeting (planned for September 2006)
- Second Technical Workshop meeting (planned for December 2006)
- Third Technical Workshop meeting (if required, in 2007)
- CEN Workshop Agreement finalised by the end of August 2007.

The first Technical CEN WS meeting will be held on 5-6 September 2006, where progress towards agreement will be presented and areas requiring further work discussed.

The second CEN Workshop meeting is scheduled to take place on 5-6 December 2006. The Chairman will seek consensus in each meeting (consensus meaning “no major opposition” as opposed to “unanimity”).

Following each of the CEN WS meetings, the minutes will be distributed for comment by the participants. The minutes with comments, if any, from the participants will be the basis for the draft CWA to be prepared by the co-chair/the Technical secretariat.

The draft CWA will be put to public comment, including on the CEN web site, for a minimum of 60 days and the Workshop will give due consideration to, and respond to, any comments made.

A third CEN WS meeting will be arranged, if necessary, to discuss and adopt the final CWA if this is not possible through electronic exchanges. The objective is to
have a draft CEN Workshop Agreement for adoption in August 2007. When the CWA has been agreed and adopted it will be circulated to CEN national members and others, to make it available at national level.

On completion of the work programme as described in the CEN WS Business Plan and adoption of the CWA, the CEN Management Centre (CMC), in co-operation with Chairman and Secretariat, will consider the Business Plan to be fulfilled. On approval of the CWA it will be sent by CMC to GICHD for presentation to the IMAS Review Board and consideration for inclusion into IMAS.

6 Relationship with PPE Directive (Dir. 89/686/EEC) and other relevant legislation

Compliance with the CEN Workshop Agreement cannot be assumed to grant presumption of conformity with the PPE Directive (Directive 89/686/EEC), nor to meet the obligations on employers under Directive 89/656/EEC. However, this may be achieved through compliance of the same equipment with existing harmonized European Standards (EN) from CEN that have been listed in the Official Journal of the European Union as meeting the essential requirements of the Directive. Following adoption of this CWA, it may be considered as the basis for a possible future harmonized European Standard according to the usual procedures.

7 Structure and resource requirements for this CEN Workshop

The proposers will support this CEN Workshop on PPE for HMA - T&E with a Secretariat with a local organisation team.

Secretariat: SIS has agreed to take responsibility for the technical secretariat and local organisation of the CEN WS with support from GICHD.
The Workshop working language and documentation will be English.

The European Commission, DG AIDCO, is supporting the Workshop financially.

8 External Liaisons

The Workshop will maintain appropriate liaison with the NATO standardization Agency (NSA) and its relevant WGs in this field.

9 Contact Points

Co-Chairs of the CEN Workshop:

The Workshop has two Co-Chairs, specialists in HMA PPE issues:

- Kaj Hörberg, SIS, kaj.horberg@telia.com, responsible for administration and organisation.
- Tim Lardner, GICHD, t.lardner@gichd.ch, +41 22 906 1658, responsible for technical coordination.

Secretariat to the CEN Workshop:

The Secretariat will be provided by Swedish Standard Institute (SIS)

Rolf Thesslin, rolf.thesslin@sis.se

CEN Programme Manager:

CMC: Ms Gaïd Le Gall +32 2 550 0939, e-mail gaid.legall@cenorm.be
Annex A - Performance testing parameters to be considered by the Workshop

The aim of performance testing definition is to develop specifications for repeatable performance tests of both PPE materials and finished products that will produce results that enable informed selection of PPE. The WS seeking agreement on how to conduct these performance tests shall consider the following topics:

- defining and specifying simulated threats;
- execution of tests;
- documentation of tests; and
- presentation/evaluation of test results.

When simulating the threats in HMA, the following topics will be considered (as a minimum):

- ensuring replicable blast forces from High Explosive;
- measuring blast forces;
- simulating environmental and mine-casing fragmentation;
- measuring fragment spread and speed;
- simulating fragmentation from fragmentation mines;
- possibilities for introducing appropriate modelling software to facilitate measurements;
- the question of the practicability of testing, in relation to the circumstances of the testing environment.

When assessing the effectiveness of PPE, the following criteria will be considered for inclusion in the agreement (as a minimum):

- number of repetitions required for confidence (desirable and essential statistical parameters needed);
- presenting the test item and its permitted/desirable movement;
• blast-induced impact;
• penetration by fragment(s);
• behind-armour blunt trauma as a result of fragment impact (depth and probable consequence);
• performance under varied environmental conditions (temperature, humidity, etc).
• deflection of blast;
• deflection of fragment(s);
• measurement of residual velocity from metal fragments;
• integrity of product maintained (significance of component separation);
• areas of the body protected by the product;
• depth of item under the ground, and the ground conditions; and
• distance between threat and test items.
Annex B - Definitions

Confidence Test
Test of a PPE product using real threat devices in a simulated accident event. The test is intended solely to give the end user confidence in the materials and performance tests conducted beforehand.

UXO 7
Unexploded ordnance means explosive ordnance that has been primed, fused, armed, or otherwise prepared for use and used in an armed conflict. It may have been fired, dropped, launched or projected and should have exploded but failed to do so.

ERW
Explosive remnants of war means unexploded ordnance and abandoned explosive ordnance.

Material test
Test of the performance of a material used in PPE in simulated threat events.

Performance test
Test of the performance of a PPE product in simulated threat events.

PPE
Personal Protective Equipment (PPE) used in Humanitarian Mine Action (HMA) is defined as "any equipment designed to reduce or prevent injury in an explosive event".

Simulated threats
A simulated threat is a means of reliably reproducing common features of a threat, such as the blast and fragmentation effects. A simulated threat does not

7 After further research, it is advised to use the descriptor ERW rather than UXO for reasons to be clarified during the first meeting of the CEN Workshop
reproduce the effects of any single mine or other article of ERW but simulates the main characteristics of the threat from a range of devices.
Annex C - References

1 IMAS 10.30 Personal Protective Equipment, in which it is stated that: “Such tests for ballistic protection do not realistically replicate mine effects, but will continue to be used until an accepted alternative is developed as an international standard”.

http://www.mineactionstandards.org/links.htm

2 Database of Demining Accidents, GICHD 2004: more than 21% of recorded accidents are classed as “unavoidable”.


4 Mandate to the European Standardisation Bodies on Technologies for Humanitarian Demining, EC Joint Research Centre and Research Directorate-General, M306 EN, Brussels, 25 August 2000.

5 Test and evaluation of mine action equipment”, IMAS 03.40, Edition 3 (2005), UNMAS, New York.


7 “Personal Protective Equipment for Demining” NATO/STANAG 2286

8 “Test Methodology for Personal Protective Equipment against Anti-Personnel Mine Blast” NATO HFM-089-TG-024