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Operational testing of mine detection dogs and handlers

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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

Although a dog's ability to detect mines varies as a function of several factors, including the training method and inherent qualities of the dog, independent operational testing of the detection ability of Mine Detection Dogs (MDD) did not start until 1999 in Bosnia. Experience from independent and national tests suggests that the overall quality of mine detection by dogs increases when MDD operators are subject to testing.

The greatest challenge to independent operational testing of MDD is to create a test that is as representative of the operational situation as possible. A test will always be slightly artificial. For example, mines laid for testing may differ from those available operationally because removal of detonators from test mines allows explosive odour to leak more freely. Test minefields are often laid more recently than operational minefields, leading to differences in odour availability and evidence of recent burial, especially in hard packed soils. Test minefields tend to be used repeatedly, which could allow MDD and handlers to learn the position of mines rather than using odour for detection.

Human factors are also relevant. The stress of testing may cause the handler to misread the MDD signals, or to work the dog improperly. The test therefore needs to be fair, unambiguous, and easily conducted and managed.

This standard provides National Mine Action Authorities (NMAA) and demining organisations with specifications and guidelines on:

- a) MDD operational test site selection, preparation and maintenance.
- b) Management and control of the MDD operational test process.
- c) MDD operational test procedures.
- d) Management of MDD operational testing records.

The standard is designed primarily for operational testing of MDD required to work in areas that have not been processed in any other way.

Operational testing of Mine Detection Dogs (MDD) and handlers

1. Scope

This standard provides specifications and guidelines for the external operational testing of Mine Detection Dogs (MDD) and their handlers required to work in areas where no earlier attempts have been made to clear the mines, either manually or by machine. Additional guidelines for the testing of MDD following mechanical ground processing are included in Annex C.

This standard does not apply to internal daily testing of MDD, which is part of the internal Quality Assurance (QA) undertaken by MDD organisations at the operational site. Many of the same procedures, however, should be considered by MDD organisations for internal testing.

The standard excludes testing of MDD for the detection of tripwires. This issue was addressed in Edition 1 of this standard, but the use of MDD in detecting tripwires has not become a part of industry practice and it has been removed.

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 which 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 co-ordination of mine action. In some cases the national Mine Action Centre (MAC) or its equivalent will act as, or on behalf of, the NMAA.

The term accreditation refers to the process by which a demining organisation is formally recognised as competent and able to plan, manage and operationally conduct mine action activities safely, effectively and efficiently.

The term 'MDD organisation' in this IMAS refers to any organisation (government, NGO or commercial entity) responsible for implementing demining projects or tasks with the use of MDD. The MDD organisation may be a prime contractor, subcontractor, consultant or agent.

The term 'demining' refers to activities which lead to the removal of mines and ERW hazards.

The term 'Mine Detection Dog' (MDD) refers to a dog specifically trained to detect the vapour from mines and ERW, which may be not only explosive vapours but vapour from the case material and other substances. MDD training and deployment are often significantly different from those given to other search dogs.

The term 'target object' is used to describe the object which the MDD is supposed to detect during live mine/ERW detection. The target object may be a mine or ERW, or part thereof, of a type typically found during live operations in the area.

The term 'target odour' is used to describe the scent from the target object.

The term 'test item' is used for mines/ERW that are laid in the test site for detection by the MDD.

4. Aim of MDD operational testing

4.1. Aim of operational testing

The aim of the operational test is to provide confidence in the ability of an individual MDD with its handler, to detect target objects with a minimum of false indications.

The aim is to test all MDD and their handlers individually. Although operational testing of teams may be desirable under some circumstances, a more comprehensive test effort is required which is beyond the scope of this standard.

The test does not address the capability of MDD as a complete clearance system. MDD are one of a number of demining tools that should be integrated to achieve the required clearance standard.

Although the test should replicate realistic scenarios, it must be manageable and unambiguous. As a result, test conditions are likely to be more favourable than the demining organisation would experience during live operations.

4.2. Focus of operational testing

The MDD and the handler, working together, form the mine detection tool. Operational testing focuses more on the MDD and less the handler. Consequently, if a MDD fails to perform, irrespective of whether it is the fault of the MDD or the handler, the MDD does not pass the test.

Although the handler is not being tested, his/her performance should be assessed during the test. The MDD may work well while the handler fails to perform, and this can result in the dog failing the test. This can happen if the handler fails to obey the MDD organisation's SOPs. However, as demining organisations use vastly differing methods of handling their MDD, this standard includes no guidelines in regard to potential handler errors and sanctions on them.

The handler may be tested again and obtain an operational licence with another MDD. However, a failed MDD should not be immediately tested again with a different handler. Failure sanctions should be applied to the MDD, and not the handler. If a MDD and its handler have passed the operational test, another handler cannot handle the MDD under the same operational test certification.

5. Test site

5.1 Layout

The standard procedure is to lay out the test site in 10m x 10m boxes with safe lanes in between. Sometimes these boxes are grouped into panels. Boxes in this format are:

- a) The most commonly used operationally.
- b) Easy to establish, monitor and control, especially when several MDD are to be tested concurrently at the same site.

- c) Able to allow searches from four different directions, making the test less reliant on a favourable wind direction. Panels can be searched in a similar way.

5.2 Size of test site

The overall size of the test site is determined by the number of test boxes required, the spacing required between test boxes (see clause 7.2) and any areas needed for administration purposes. The minimum area to be searched by each dog during a test is 400 square metres.

The number of test boxes needed to meet all the test requirements within a programme depends on a number of factors, which include:

- a) The number of MDD to be tested, including any retest requirements.
- b) The required frequency of testing, which may be laid down by the NMAA in national standards.
- c) The wait time between separate tests carried out in a single test box. See clause 10.1.
- d) The requirement to establish additional boxes for training prior to testing. See clauses 9.1 and 9.4

5.3 Other factors

Other factors to be considered when selecting a test site include:

- a) The time(s) of the year the MDD will be tested.
- b) The duration of the demining season, and consequently the test season.

5.4 Initial survey

An initial survey should be carried out to identify suitable test sites. The survey should consider:

- a) The size of test site needed.
- b) Current use of possible areas, including use by animals.
- c) Security issues and the need for fencing and guarding.
- d) Ownership of land. Rights for the use of land for test sites should be for a minimum of five years.
- e) Landscape and vegetation requirements needed to match field conditions.
- f) Soil conditions to determine whether the soil type is representative and if changes in weather will significantly affect the consistency of the soil.
- g) Drainage. The area could be subject to flooding, pounding or high ground water levels.
- h) Any existing mine or ERW contamination or contamination by petroleum products, fertiliser, chemicals, garbage, and metal including bullets and shrapnel.
- i) Pollution of the atmosphere by emissions from traffic, factories or domestic burning.
- j) Whether the area is sufficiently secluded or whether it can be shielded from disturbance.

- k) Costs associated with establishing and maintaining the site.

5.5. Environmental considerations

The following environmental considerations should be taken into account when identifying test sites:

- a) Landscape. Although MDD may be used in steep terrain, the test site should not be located in steep areas, as test items or contaminated soil may move during rain.
- b) Vegetation. Dense vegetation will prevent free movement of the MDD during the search and could affect the accuracy of indications and the monitoring of the tests.
- c) Soil type. The soil type should be representative of that in the operational theatre.
- d) Undesired explosive contamination. The test site should be as free as possible from undesired explosive contamination. Areas that have been cleared within the previous two years should be avoided if mines or UXO were found as the probability of residual explosive contamination in the soil is high. Areas where mines or ERW were destroyed in situ should also be avoided due to the spread of explosive residue and fragments.
- e) Metal contamination. The test site should be as free as possible from metal contamination. All foreign metal objects should be removed after visual inspection and a search with a metal detector.
- f) Other undesired contamination. The test site should be as free as possible from any contamination by compounds that may affect the results of the tests such as petroleum products, fertiliser or chemicals. If the area is contaminated by such products, or polluted by domestic burning, traffic or factory exhaust gases, the area shall not be used as a test site. If there is any doubt as to the level of undesired contamination, the area should not be used as a test site.
- g) Wind. If the proposed test site is regularly exposed to strong winds it should be disqualified as a test site as strong winds affect the indication accuracy of MDD.
- h) Noise and other disturbance. The test site should be secluded or shielded from loud noises, traffic, and other activity that may distract the MDD or the handler during search.

6. Selection of test items

6.1. General

Representative examples of the most common target objects (mines or ERW or parts thereof) shall be used as test items. Pure explosive substances or artificially prepared scents shall not be used unless officially approved.

Ideally, test items that have been recovered from the field should be used. If such items are not available, then items from stockpiles or stores may be used.

6.2. Number of test items

As a guide for planning purposes, a maximum of three test items (preferably not more than two) will be required per box for a test site laid out with 10 m x 10 m boxes.

6.3. Storage of test items prior to use

There is a difference in the odour that emanates from test items that have been recovered from the field to those that have been stored in a bunker. Test items recovered from the field should be stored separately from new mines or explosives.

Test items should not be stored in close proximity to paints, petroleum products, fertilisers and chemicals prior to use as they may absorb the odours emanating from these products and fail to give out a true target object odour.

As a general point, plastic gloves should be worn when handling test items. Thin plastic bags can be used instead of gloves, provided that they are water-tight.

6.4. Decontamination of test items and accessories

Decontamination is vital because even tiny amounts of contamination transferred to test items or accessories may compromise a test. All test items, tools, accessories, and recognition pieces shall be decontaminated prior to use. The following decontamination procedures are recommended:

- a) Wash and scrub tools, accessories, recognition pieces and test items in clean, pre-boiled water.
- b) Boil all washed items, except test items containing explosives, in clean water for a minimum of 2 x 10 minutes with one water change between.
- c) Wash and scrub all items with clean pre-boiled water twice more.
- d) Dry all items in the sun/open air thoroughly after each washing or boiling.
- e) When items have been washed, or boiled, they must be handled in plastic gloves. Thin plastic bags can be used instead of gloves, provided that they are water-tight.

7. Site preparation

7.1 Measuring and marking test boxes

The layout of the test site may vary depending on the operational search system used by local organisations. The typical length of a search line is 7 to 10 m, but there may be systems that use other search lengths, or where search lines are not worked. However, such systems are usually flexible enough to work in test areas laid out in boxes. The following measuring rules shall apply when preparing a site with test boxes:

- a) Each test box shall be recorded on a map with exact location references.
- b) All corners shall be marked with a metal recognition pole, which is driven into the soil until the top of the pole is at surface level. At least one corner marker shall be accurately recorded on the test box map.
- c) The test site should have one or more clearly identifiable benchmarks. Distance and compass bearings should be taken from at least one corner marker of each test box to a benchmark.
- d) All sides of a test box should be marked temporarily with tape or a similar material prior to the emplacement of test items. This marking may be removed during the soak time.

- e) The location of all test items and recognition pieces in the box or panel shall be to an accuracy of 20mm over a 10 metre length, and shall be recorded on the test box map.

7.2 Minimum distances between test boxes

Spacing between test boxes should be 3 m or more, except when boxes are grouped into panels.

The lanes between test boxes should allow the handler and the MDD to move freely around the circumferences of the box, and reduce the risk of MDD running into neighbouring boxes during rewarding, or the handler stepping into an adjacent box by mistake.

7.3 Number of test items in a test box

The number of test items in a test area not less than 400 square metres should be five to seven.

7.4 Location of test items in a test box

The location of each test item within a box shall be random and unpredictable. The minimum distance between each test item in a test box or between items in neighbouring test boxes shall be 3 meters unless discrimination between targets in close proximity is being tested.

7.5 Test item depth

The test items shall be buried at different depths. Depths should be representative of typical depths encountered under operational conditions.

7.6 Recognition pieces

Recognition pieces are small pieces of metal that are put in the ground with test items, so that their location can be verified using metal detectors. They should be used with test items that have no, or low, metal content so that the exact location of test items can be verified without disturbing the ground. When using recognition pieces the following procedures should apply:

- a) All recognition pieces in a test box shall be made of the same materials. Cut reinforcing rod or similar material is recommended.
- b) Each recognition piece should not exceed 15 g weight.
- c) Each recognition piece shall be decontaminated according to the procedures described in clause 6.3.
- d) The recognition pieces should be placed centrally under the test items in the ground.
- e) Care must be taken not to contaminate the test item or recognition piece during positioning.

It is necessary to ensure that the MDD are detecting the test items and not the recognition pieces. If recognition pieces are used with any test items in a test box a minimum of two additional recognition pieces should be buried at other locations inside the box as control items. The positions of these recognition pieces shall also be recorded.

7.7 Burying test items

When burying test items, the following procedures should be applied:

- a) Plastic gloves or double plastic bags should cover the hands during any contact with the soil. Gloves or plastic bags made from oil products should not be used as they have a very distinctive odour. If the hand protection splits during excavation, it should be immediately replaced.
- b) Soil disturbance should be minimised. The top plug of soil should be kept in one piece if possible.
- c) Surplus soil due to the added volume of the test item should be removed to outside the test site, and not spread inside the box or neighbouring boxes.
- d) The original soil should be used to fill around the test item. The top plug should be replaced on top of the test item.
- e) Only decontaminated equipment should be used during the test site preparation and during handling of the test items.

7.8 Initial soak time requirements

The required soak time depends on the moisture in the soil and ground/air temperatures, which facilitates natural transportation of the target odour from the test item to the surface. An MDD test site should have a minimum soak time of three months before use to permit:

- a) The target odour to migrate to the soil surface, contaminate the topsoil, and start to vaporise into the air.
- b) Any ground disturbance resulting from the burial of the target items to diminish.

A longer soak time of six months or more is desirable. In areas with little or no rain, the test site should be watered several times during the soak period. In areas with cold winters, the test items should be allowed to rest in the ground over the winter.

The same soak time is required for all target items, whether buried, partially buried, or surface-laid, so no target item should be moved or disturbed.

7.9 Security and protection of the test site

It may be necessary to fence the test site or post guards to prevent unauthorised entry into the area. These requirements will depend on the situation and shall be determined by the organisation responsible for the test site.

7.10 Test site records

The test site shall be thoroughly recorded and mapped. The records shall include the following:

- a) A map of the test site showing prominent topographical features, the boundaries of the test site, test box numbers, boundaries of the test boxes, bench marks, administration areas and relevant supplementary information such as the prevailing wind direction.
- b) A map of each test box showing the test box number; the exact location of the test box markers; reference to bench marks; the location of the test items; the depth, type, and state of each test item; any recognition pieces located under the test items and elsewhere in the boxes; details of the people responsible for the preparation of the box; and the date when the box was prepared.
- c) After each test in a test box a record of the locations of any false indications and the environmental data should be recorded to assist in managing any further tests within the particular test box.

7.10.1 Security of test site records

The credibility of MDD operational testing depends on restricted access to the records, including the location and number of test items in the test boxes. Only a few people should be involved in the preparation of the test boxes, with none of them affiliated to any of the demining organisations to be tested.

Two copies of records and maps should be prepared, preferably by the test manager alone. Both copies should be stored separately at secure locations by the testing authority. The test manager should be the only person with access to the records. The records should be stored in such a way that no one can access them without permission from the test manager, or without written approval from the testing authority.

7.11 Operational testing of MDD for search after mechanical ground processing has some different aspects to normal MDD search, and details are given at Annex C to this IMAS.

8. Maintenance of a test site

8.1 Verifying the location and state of the test items

MDD test sites should be regularly inspected by staff from the organisation responsible for the site to ensure that they are adequately secure and have not been interfered with.

All test items and recognition pieces should be located at least once a year using a metal detector, preferably after the period with the heaviest rain or snowfall. The locations should then be compared with records to ensure that no migration has occurred, or that no foreign items have been introduced to the test box.

If the test site has been subject to intruders, the site shall be thoroughly checked to ensure that it is still suitable for MDD testing.

8.2 Vegetation cutting

Vegetation cutting on MDD test sites should be carried out using the same vegetation cutting equipment and methods used on operations. Vegetation shall not be cut immediately before a test. The same time delay between vegetation cutting and clearance used on operations shall be applied between vegetation cutting and testing on a test site.

In certain environments it may be acceptable to allow grazing animals onto the test site to reduce the need for vegetation cutting. Grazing animals may spread some contamination, but that need not be regarded as a problem, especially if grazing occurs frequently in areas in which MDD normally work.

9. Management and control of operational tests

9.1 Management of the test

All MDD operational tests shall be overseen by a qualified test manager whose responsibilities are to prepare the test site, manage the tests and evaluate the MDD during the test.

The test manager must possess the knowledge, skill and experience to be able to professionally evaluate the MDD teams and it is essential to be seen as be impartial by demining organisations. The test manager is responsible for issuing recommendations to the testing authority based on results from the tests and the established pass/fail criteria.

Demining organisations shall not use the operational test site for training or internal testing without the supervision of the test manager. If a portion of the test site previously used for testing but separate from the main test box area is to be set aside for training or internal testing, this portion will never again be used for testing, but only for training.

9.2 Initial preparation

The test manager should inspect the test site at least one day before the test to ensure that the test site is properly prepared and ready for use.

The test manager shall review all aspects of the SOPs of the organisation being tested that are relevant to the test.

9.3 Test briefing

The test manager shall brief the demining organisation on the test. The brief should include the following information:

- a) The standard working procedures of the test site.
- b) The detailed test procedures.
- c) Marking of the test boxes.
- d) Administration areas.
- e) Observation points for visitors.
- f) Rest areas for MDD and handlers.
- g) Movement restrictions inside the test site.
- h) Any other information that may be relevant.

During the brief the test manager and each demining organisation should jointly agree on the suitability of the weather and site conditions for the test.

Where possible, use should be made of a weather station, which provides a continually updated record of the weather conditions before and during the test. This ensures that objective weather information is available if the results of the test are challenged on environmental grounds. The test results can only be contested if the weather conditions are outside the parameters laid down in the demining organisation's SOP.

9.4 Training requirements

The demining organisation may wish to train their MDD in a similar environment to the test site. In this case, the test manager shall ensure that the demining organisation is provided with a training area outside the immediate operational test box area, established and prepared in the same way as the test boxes, and containing test items of the same type, prior to the test. Training shall not occur at any time on boxes reserved for testing.

9.5 Assignment of test boxes

The test manager shall assign test boxes to the MDD handler prior to the operational test. The MDD handler shall have the right to inspect the test boxes prior to the test, provided that the test boxes are not physically entered or disturbed during the inspection.

9.6 Observers

Representatives of the demining organisation, and other observers acceptable to the tested organisation, may observe the test provided they obey the rules laid down in the standard working procedures for the site, are permitted to observe by the test manager and do not disturb or influence the test.

If the test manager feels that any of the observers are disturbing the test, he/she may ask the observers to move to another observation point or to leave the site entirely.

9.7 Photos and video

Photos and video may be taken during the tests for monitoring and learning purposes, provided that they do not interfere with the conduct of the test.

9.8 Test monitoring

The test shall be monitored by the test manager, or a qualified evaluator appointed by the test manager, to check whether the MDD is searching in accordance with the demining organisation's SOPs.

The monitoring shall be undertaken in such a way that it does not distract the handler or MDD during the search. If necessary, the monitor/evaluator should make records of indications given by MDD that have previously been tested in the same box, to aid in the verification of any false or unknown positive responses by the MDD.

9.9 Debriefing

The test manager shall debrief the MDD handler(s) and other members of the demining organisation on site upon completion of the test. The debrief shall cover the results of the test, a review of the box records and it should address aspects related to the nature of the search. The MDD handler should be encouraged to express his/her view on the test.

The test manager should be honest and open expressing his/her views objectively. Where deficiencies are identified, corrective action should be suggested. Debriefing should be followed up with a written report on the test to the demining organisation and to the testing authority.

9.10 Acknowledgement of test results

The test results record shall include a space for comments by the MDD handler. If the MDD handler has any comments about any aspects of the test, the details may be recorded in the test results record. The MDD handler shall sign the test results record as acknowledgement that s/he has seen the test results and has had an opportunity to comment.

10. Operational test procedures

10.1 Number of MDD searching a box

For testing purposes all MDD should work in separate boxes. Under normal circumstances a minimum soak time of one month should pass between uses of individual search boxes. This minimum may be reduced to two weeks if there is a period of heavy rain combined with sunshine between tests.

Although not recommended, in extreme circumstances two MDD may be tested in the same boxes provided that the following conditions are applied:

- a) Each of the MDD should be tested as the first search MDD over half of the area searched by the two MDD.
- b) The first search MDD should be ordered to sit randomly three to four times in the box after completion of the search and before the second MDD is allowed to search the box.

10.2 Compliance with demining organisation's SOPs

The MDD and handler shall undertake the search according to procedures described in the demining organisation's SOPs. However, some deviation from the SOPs may be required to facilitate testing. For example, the MDD will continue searching in a test box after giving an indication, when in accordance with SOPs it may be withdrawn.

Variations to the SOPs to meet the requirements of testing should be communicated by the testing authority to the demining organisation well in advance of the test to allow any necessary re-training.

10.3 Wind direction

The MDD handler shall evaluate the wind direction and other environmental factors prior to the test in accordance with SOPs, and use their own judgement when deciding the search direction. The handler may change the search direction at any time.

10.4 Search break

The MDD handler may take a break to rest the dog and give it water at any time during a search. If two MDD are being tested with the same handler, the handler may let the first MDD rest and start a search with the second MDD in another test box.

10.5 Minimum test requirements

The minimum search area to be covered by each MDD should be at least 400 square metres. This figure is based on the typical minimum productivity of MDD in typical mine action programmes. Individual MDD should be actively working for a minimum of one hour (excluding rest times) during the test. Each MDD should encounter a minimum of five target items during the test.

Under exceptional circumstances, a MDD may only be capable of covering a reduced test area in the time required. In this case, that MDD shall be permitted to operate for reduced areas only.

10.6 Termination of the test

The MDD handler may terminate the test if at any time they believe that the MDD is suffering from a lapse in concentration or for some reason is not working properly. The MDD handler can ask for a termination of the test for one MDD, and complete the test with a different MDD, provided that the second MDD can perform the complete test.

A termination of the test is not considered a failure to pass the test and the demining organisation may ask for a new test for that MDD at any time.

10.7 Pass/fail criteria

The following pass/fail criteria should be applied:

- a) The MDD must indicate all the test items in a test box with two or fewer false indications.
- b) All positive indications are to be within a 1 m radius of the exact location of the test item.
- c) Any MDD and handler that does not apply the search pattern and procedures as described in the demining organisation's SOPs is deemed to have failed the test.

When a MDD handler insists that a false indication was in fact correct, the handler shall have the right to have an inspection of the indication site. This can only be done when the test has been completed. If after inspecting the site, the test manager agrees that the false indication may have been caused by the presence of a target odour, the false indication shall be disregarded.

11. Responsibilities

11.1 National Mine Action Authority (NMAA)

The NMAA, or an organisation acting on its behalf, shall:

- a) Establish systems, procedures and facilities for the operational testing of MDD operating within the demining programme in accordance with the specifications and guidelines included in this standard.
- b) Accredite and appoint a MDD operational testing authority, to include a suitably qualified and experienced test manager, to manage MDD operational testing on behalf of the NMAA in accordance with the procedures established by the NMAA and relevant national standards.
- c) Produce standard working procedures for the operational test site.
- d) Monitor the work of the MDD operational test authority, ensure that the operational testing system is being applied in a fair and equitable manner, and that planning has taken place to ensure that the requirements for operational tests do not interrupt or delay demining operations.

The NMAA, or an organisation acting on its behalf, should conduct periodic external QA audits on the MDD operational testing authority.

11.2 Demining organisation

The demining organisation carrying out MDD operations shall:

- a) Establish SOPs for the use of MDD on demining operations. These SOPs are to be consistent with relevant national standards, or in the absence of national standards, with the IMAS 09.4 series of standards. A copy of these SOPs are to be made available to the operational test manager.
- b) Assist any appointed MDD operational testing authority with the establishment of systems, procedures and facilities for the management of MDD operational testing.
- c) Cooperate with the appointed MDD operational testing authority in the management and maintenance of national MDD test sites.

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

- d) Assisting the host nation, during the establishment of a NMAA, in the development of systems, procedures and facilities for the operational testing of MDD.
- e) In cooperation with other demining organisations employing MDD, carry out their own testing of MDD in accordance with the requirements laid down in this standard.

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 07.30 Accreditation of demining organizations and operations
- c) IMAS 09.40 Guide for the use of Mine Detection Dogs
- d) IMAS 09.42 Operational testing of Mine Detection Dogs and Handlers.
- e) IMAS 09.43 Remote Explosive Scent Tracing (REST).
- f) IMAS 09.44 Guide to occupational health and general dog care.

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 (www.mineactionstandards.org). National employers, mine action authorities, and other interested bodies and organisations should obtain copies before commencing mine action programmes.

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

B.1. **box**

a squared area that is developed for the purpose of being searched by MDD.

Note: A box normally measures 10m x 10m, but other sizes may be preferred.

decontamination

a process of removing undesired contamination from test items, tools, and accessories used when preparing a test site.

DNT (Dinitrotolulene)

a residual product of TNT manufacture, and a breakdown product of TNT decay. Is normally present in varying amounts in any explosive device containing TNT. The vapour pressure of DNT is much higher than that of TNT, and under some conditions it may be easier to detect DNT than TNT.

environmental factors

factors relating to the environment and that influence the transportation of odour from the mine, the detection of the target odour or the ability of people and dogs to work safely and effectively. (i.e. Wind, rain, temperature, humidity, altitude, sun and vegetation). (Definition for MDD use only).

RDX (1, 3, 5-triazacyclohexane)

RDX is another military explosive which is used extensively as an explosive in many munitions formulations. RDX is relatively insensitive; it has a high chemical stability, although lower than that of TNT. RDX is never handled pure and dry because of the danger of accidental explosion. It is used as a component in explosive mixtures, especially plastic explosives.

scent

a distinctive odour.

test site

the site at which a series of test boxes or lanes are prepared for the purpose of operational testing of MDD.

TNT (2, 4, 6 Trinitrotoluene)

one of the most widely used military high explosives. TNT is very stable, non-hygroscopic and relatively insensitive to impact, friction, shock, and electrostatic energy. TNT is the most widespread type of explosive used in mines and munitions.

Annex C **(Informative)**

MDD operational testing after mechanical ground processing

C.1. Introduction

Ground processing machines or systems target the mines or ERW, by actuating them or by breaking them up. A consequence of their use is that the necessity for post mechanical follow up search and clearance is reduced to the minimum possible.

Follow-up search, or in some cases clearance verification, is most often carried out by MDD, however other demining methodologies (manual or further mechanical tools) may also carry out these tasks.

As a result of mechanical ground processing the ground has been disturbed, the vegetation has been removed and any mines or ERW that were present have been detonated, disrupted or otherwise displaced. Explosive residue may have also been dispersed over a wide area by the processing. MDD need specific training to detect mines or ERW (or parts thereof) in mechanically processed ground.

This situation differs from the normal conditions that a MDD has to work under and poses special problems in the operational testing of MDD after mechanical ground processing. The ideal test would be to have test items placed in the ground before the mechanical processing takes place. However after processing, the exact locations of the test items will no longer be known, and some are likely to be broken up. Therefore this Annex proposes a compromise to ensure that operational testing after ground processing can be carried out.

C2. Aim of the test

The aim of the test is to determine the MDD's ability to detect target objects in machine processed ground, The operational test cannot fully replicate realistic scenarios completely because in practice the machine may spread the explosive and mine case contaminants and the explosive-contaminated soil surrounding the targets over a wide area, confusing the background scent level. This means that the test becomes a test of the MDD ability to pinpoint a target in an already highly contaminated background. So although it is not possible to design a manageable and unambiguous test with realistic target odour contamination from detonations and scattered/crushed mine fragments, the test does add some scattered target odour contamination to the surroundings.

C.3. Preparation of the test site

The layout of the test site is similar to the layout used for the standard operational test but the initial preparation differs. Details are as follows:

- a) The selected test site should ideally be an un-processed site, however if this is not possible, a processed area where no mines or ERW were encountered can be used. It is important that the test site selected is free from any mines, ERW or explosive residue prior to preparation.
- b) Test boxes within the test site are identified and marked using an offset marking system that permits the machine to process all the ground within the test boxes without disturbing the markers.

- c) Test items are then placed in the ground within the test boxes. The numbers of items, and the marking of the locations is exactly the same as for the standard test. Test items may be mines, ERW or fragments of mines and ERW. They must be items that the MDD will be required to search for on operations. Whole mines or ERW should have any plugs removed to assist in the transmission of the target odour to the soil.
- d) The locations of the test items are to be heavily watered to permit the transmission of the target odour into the soil. Other locations within the test boxes should also be watered as control points. The test items are to remain in the ground for a minimum of one day, ideally longer, with repeated applications of water.
- e) The test items are then removed from the test boxes and the ground processed by the same type of machine as will be used in operations. The number of passes of the machine should also be consistent with the number of passes used on operations, particularly with previously unprocessed ground.
- f) The test items should then be re-buried within the test boxes at their original locations. They should be buried no deeper than 2 cm below the soil surface, using the same procedures as for a standard test. There should be no evidence of the burial that may guide the MDD or handler to the location. If the test items are buried deeper, the test boxes will need to undergo a longer soak time prior to the test.
- g) The test item locations and other locations areas within the test boxes are then watered again to ensure that target odour from the test items migrates to the soil surface. The watering should be moderate and applied in a way that the locations are not detectable visually after drying. A soak time of 1 day or more should be applied.
- h) After the soak time the test can be undertaken.

C.3.1. Measuring and marking

The marking system used for initially determining the locations of the test items and then replacing them after ground processing must ensure the accurate locating of the items. This is critical. Visual marking of test items should not be carried out.

C.4. Management and control of the test

The procedures for the management and control of the test are the same as for the standard MDD operational test.

C.5. Operational test procedures

C.5.1. Pass/fail criteria

The pass/fail criteria should be the same as for the standard MDD operational test (see clause 10.8) except that the MDD should have four or fewer false indications per box, while finding all test items.

C.6. Management of records

Test sites for MDD operational testing behind ground processing machines are not permanently established sites so the requirements for maps and records as for a standard MDD operational test do not apply. However, the confidentiality of the locations of the test items and the requirement for the management of temporary test records do apply.

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.

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