Accreditation and operational testing of animal detection systems and handlers

Provisionally approved standard (12 months)

“At the direction of the IMAS Review Board a technical working group has been established to support further revisions of IMAS on ADS.

This working group is comprised of academic specialists, ADS operators and other relevant mine action stakeholders, it has been provided with a mandate to examine relevant research and operational experience as well as all practical implications of testing ADS. The intention of this initiative is to settle existing discrepancies of opinion about all principles of testing and licensing of ADS for mine action operations. The working group will also consider if there is merit at this stage to incorporate guidance related to the use of ADS where IED-operations are conducted.

The working group has directed to complete its mandate within 12 months of the date of this standard, including the development of any additional guidance on ADS that may be required within the IMAS framework.

The provisional approval of this document will be reviewed by the IMAS Review Board based on the working groups recommendations.”

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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

Animal detection systems (ADS) are a tool that may be used in land release processes to support Non-Technical Survey (NTS), Technical Survey (TS) and clearance. As an input to the Land Release process Animal Detection Systems (ADS) require testing, in accordance with IMAS 07.12 and 07.40, to confirm that they satisfy quality requirements, particularly in terms of their capability to detect EO including; landmines, ERW and other targets that may be specified by authorities, customers and other stakeholders. ADS may include Mine Detection Dogs (MDD), Mine Detection Rats (MDR) and other species.

Establishing and maintaining stakeholder confidence in the reliability of ADS requires that tests of the capability and performance of ADS are rigorous, realistic, reliable and transparent. Tests are carried out during initial accreditation and periodic reassessment (as described in IMAS 09.40 and 07.30).

The nature of ADS testing is such that there will always be some aspects of the situation that do not exactly replicate operational circumstances and conditions. Nevertheless, testing authorities and agencies strive to create test conditions that give mine action actors confidence that a successful result provides a reliable indication of competence to perform ‘live’ operations under field conditions.

Constraints of time, cost and efficiency may mean that operational testing at task sites in support of day-to-day operations cannot satisfy all the requirements of this IMAS, but any such testing should still seek to satisfy similar criteria, so far as possible, to ensure that tests are valid in relation to live operations.

Stakeholder confidence is further maintained through on-going monitoring and analysis of ADS performance data collected during operations on land release sites. Testing and monitoring go hand in hand to ensure that operators, authorities and other stakeholders trust ADS to perform the tasks they are assigned to the required standards.
Accreditation and operational testing of animal detection systems (ADS) and handlers

1. Scope

This standard sets out requirements and guidelines for the external accreditation/operational testing of Animal detection systems (ADS).

This standard does not apply to daily pre-work testing of ADSs, which is part of the internal Quality Management (QM) undertaken by ADS organisations at operational sites. ADS organisations should apply the same principles and approaches so far as is reasonably practicable for internal testing.

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 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:

- 'shall' is used to indicate requirements, methods or specifications which are to be applied in order to conform to the standard;
- 'should' is used to indicate the preferred requirements, methods or specifications; and
- '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 ‘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 ‘Animal Detection System (ADS) refers to the combination of animals, handlers, supervisors, managers, equipment, facilities, policies, procedures and other associated functions, that interact to provide a tool intended to detect vapour from Explosive Ordnance (EO). ‘Vapour’ may include vapour from the case material and other substances as well as from explosives.

The term ‘ADS organisation’ refers to any organisation (government, NGO or commercial entity) responsible for implementing demining projects or tasks with the use of ADS.

The term ‘ADS Unit’ refers to an animal and its handler (under the direction and monitoring of team/site management).

The term ‘demining’ refers to activities that lead to the removal of EO.
The term ‘Explosive Ordnance’ (EO) is interpreted as encompassing mine action’s response to the following munitions:

- Mines
- Cluster Munitions
- Unexploded Ordnance
- Abandoned Ordnance
- Booby traps
- Other devices (as defined by CCW APII)
- Improvised Explosive Devices

The term ‘Mine Detection Dog’ (MDD) refers to a dog specifically trained to detect and indicate vapour from EO.

The term ‘Mine Detection Rat’ (MDR) refers to a rat specifically trained to detect and indicate vapour from EO.

The term ‘target object’ is used to describe a specified object that the ADS is required to detect during live EO survey, search and clearance operations.

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

The term ‘test item’ is used for EO that are laid in the test site for detection by the ADS.

4. **Aim of ADS operational testing**

The aim of the operational test is to provide confidence in the ability of an individual ADS Unit, to detect specified target objects with a minimum of false indications, during land release operations.

Achievement of the aim is supported by ensuring that details of the test process:

- are appropriate to the capabilities and capacities of the test agency or authority;
- are subject to quality management by the testing agency or authority in accordance with IMAS 07.12;
- replicate operational circumstances and conditions, so far as is reasonably practicable;
- correspond to the procedures and methodologies that the ADS Unit will use during land release operations;
- do not offer the ADS Unit unintended clues as to the whereabouts of test items;
- cannot be predicted, guessed or otherwise ‘gamed’ by the handler;
- are adjusted in light of the results of analysis of performance data relating to the test process;
- are adjusted in light of the results of analysis of data relating to the operational performance of ADS Units that have undergone testing;
- are kept confidential when they relate to the number and location of test pieces in test areas; and
- are in accordance with the mine action organisations SOPs.

5. **Requirements for operational testing**

5.1 **Planning**

Prior to selecting the location of the test facility and establishing the test areas the authority or agency responsible for testing of ADS should conduct a survey of the proposed site, to confirm that it will offer sufficient space, environmental conditions, access and other features necessary to satisfy the requirements of this standard. The initial survey should additionally investigate:
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- current use of the land, including by animals;
- evidence of existing EO or explosive contamination;
- whether the land has previously been subject to EO clearance and/or in-situ open burning or demolition;
- security issues and any need for fencing/guarding;
- land ownership/leasing arrangements;
- landscape, fluctuations, vegetation and soil, including drainage and susceptibility to flooding;
- direction and strength of prevailing winds;
- weather and its potential impact on soil and the ability to operate ADS;
- evidence of pollution by petroleum products, fertilisers, chemicals, garbage and metals (including bullets and shrapnel);
- the likelihood and prevalence of atmospheric pollution from road traffic, industry or domestic burning; and
- the separation of the site, and ability to shield it, from disturbances.

When planning the test site planners should take into account:

- the anticipated throughput of ADS Units requiring testing;
- any seasonal limits or influences on operations/testing;
- avoidance of excessive noise, pollution or other disturbance from outside the site;
- the level of concurrent testing required to satisfy programme needs;
- the need to allow a soak time between each use of individual test areas;
- the accredited procedures/methods used by ADS organisations and their implications for the shape, size and arrangement of boxes/panels and the need for access areas around/between boxes/panels;
- climate, altitude, the availability of terrain, soil and, when testing free running animals, vegetation conditions representative of those found at operational work sites;
- any need for training areas sufficiently remote from test areas to satisfy the requirements of this standard;
- any anticipated requirement to test ADS Units in Technical Survey role in unprepared, vegetated area with unknown disturbances;
- any anticipated requirement to test ADS Units in mechanically processed land;
- the need to manage the site safely and efficiently;
- ease of access to resources such as water and power and for visitors to the site;
- security aspects; and
- the costs of establishing, running and maintaining the test site.

The test site establishment plan should be documented and approved by the national authority or other competent body.

5.2 Establishing and maintaining the test site

5.2.1 Establishing test areas

A number of test areas should be established within the test facility, sufficient to satisfy the requirements of the test site establishment plan. A commonly used procedure is to lay out the test site in 10m x 10m boxes with safe lanes in between. These boxes may be grouped into panels. Boxes in this format:

- are commonly used operationally;
- are easy to establish, monitor and control; and
- will allow searches from different directions making the test less reliant on a favorable wind direction.

Panels can be searched in a similar way.

Test areas shall:
be separated from adjacent test areas, and areas required for administrative purposes:
  o by a distance sufficient to allow ADS units to move freely around the perimeter of the box/area, without handlers or animals inadvertently entering an adjacent box; and
  o by at least 3m (unless boxes are grouped into panels).
be sufficient in number to allow each ADS Unit, during a test, to search the size of area specified for the methods/procedures subject to testing;
be marked and recorded:
  o using a fixed, clearly visible benchmark;
  o with a metal recognition pole (at least 30cm long) driven into the soil at each corner of each test area perimeter until its top is at surface level (unless the test area will be subject to mechanical processing, when a similarly accurate offset marking system should be adopted to allow processing of the entire test area); and
  o on a map showing the positions of turning/perimeter points, relative to each other and to the fixed benchmark location, to an accuracy of within +/- 5cm.
be away from steep slopes (irrespective of whether such terrain may be encountered during operations) to avoid the risk of test items moving should slopes slump or slip;
correspond to the procedural method (or methods) that the ADS Units will apply during field operations, including boxes, lanes or other arrangements adopted during field operations. If multiple methods will be applied then multiple test areas should be established, each corresponding to an applicable layout, methodology or procedure;
include soil, vegetation and terrain characteristics comparable to those encountered at operational sites;
include access to data from a weather station or other source capable of providing continuous readings before and during testing;
be free from undesired explosive contamination;
be cleared of metal fragmentation;
be free of pollutants or other contaminants;
be large enough to allow concurrent testing of animals at a level adequate for the scheduled and contingency accreditation testing and reassessment needs of the mine action programme;
be easy to establish, monitor and control, including during concurrent testing of several ADS Units;
allow for searches from different directions in response to changes in wind direction; and
include enough space for the establishment of training/practice areas far enough away from the test areas to avoid any cross-contamination or other effects that may invalidate test results.

The boundaries of tests boxes/panels should be marked using the same materials and procedures as are encountered on operational sites. If test authorities decide that visible marking should not be present on the test site, then suitable measures should be taken to ensure that the perimeter of test areas can be identified using below ground level metal pickets or other readily discoverable methods.

5.2.2 Test site security

Adequate security shall be established, maintained and monitored at the site to ensure that the validity of test areas is preserved and to satisfy normal personnel and property safety and security requirements.

If the test site has been subject to unauthorised intrusion, the site shall be thoroughly checked to ensure that it remains suitable for ADS testing. Any aspects found to have been compromised in any way shall be corrected before restarting testing.
5.2.3 Vegetation cutting

Vegetation cutting on ADS test sites should be carried out using equipment and methods that will not disturb the ground and leave undesired scent traces from humans and tools on the ground. The same minimum time delay between vegetation cutting and survey/clearance used on operations should be applied between vegetation cutting and testing on a test site.

5.3 Selection, storage, handling and use of test items and recognition pieces

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, and that no foreign items have been introduced to the test box.

5.3.1 Selection

Test items shall be representative of target items (mines, ERW, cluster munitions remnants, IEDs) that will be encountered during operations. Items recovered during field clearance operations should be used wherever possible. Items obtained from stockpiles or stores may be used as an alternative.

Pure explosive substances or artificially prepared scents should be avoided.

5.3.2 Storage

Test items recovered during field operations should be stored separately from items obtained from stockpiles/stores.

Test items should not be stored in close proximity to paints, petroleum products, fertilisers and chemicals prior to use.

5.3.3 Handling

Disposable odour-free gloves should be worn at all times when handling test items.

All test items, tools, accessories and recognition pieces shall be decontaminated prior to their use in a test area by:

- being washed and scrubbed in clean, pre-boiled water;
- items that do not contain explosives shall additionally be boiled in clean water for ten minutes, twice, with a change of water between boils;
- washing and scrubbing all items twice more in clean pre-boiled water; and
- drying all items in the sun/open air thoroughly after each washing/boiling.

5.3.4 Placing test items in test areas

The location of each test item within a box shall be irregular and unpredictable. The minimum distance between each test item in a test box or between items in neighbouring test boxes shall be 3 meters.

Most test items shall be buried at different depths representing the range of depths encountered under operational conditions, as indicated by evidence from operational monitoring/information management systems. At least one test item should be surface placed to enable correct indication behaviour when targets are accessible.

Test boxes (if used during testing) should have between zero and two test items per 100m$^2$ of area. Test panels (if used during testing) should have zero or one test item per lane and at least 20m separation between test items in adjacent lanes.
During testing of free running dogs for technical survey, no point in a test panel that contains no test items should be within 10m of any test item in an adjacent lane or other area. This is to avoid that the animal is tracking towards mines in adjacent panels.

The location of all test items in a box, panel or area shall be recorded to an accuracy within +/- 20mm over a 10m length, and shall be recorded on the test area map.

When burying test items:

- 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. If the hand protection splits during excavation, it should be immediately replaced;
- soil disturbance should be minimised. The top plug of soil should be kept in one piece if possible;
- 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;
- the original soil should be used to fill around the test item. The top plug should be re-placed on top of the test item; and
- only decontaminated equipment should be used during the test site preparation and during handling of the test items.

Additionally, when burying test items for use in areas that will be subject to mechanical processing:

- place and record the location of test items within the test area;
- heavily water the locations of the test pieces as well as other locations within the test areas;
- leave the test pieces in the ground for a minimum of one day, with repeated applications of water to the test locations and other locations while the test pieces remain in the ground;
- remove the test pieces and subject the ground to mechanical processing using the same type of machine and procedures as will be used during live operations;
- re-bury the test items at their original locations, using the same burial procedure as for non-mechanical test areas, and ensuring that there is no evidence of the burial at the surface;
- moderately water the locations of the test pieces and other locations as previously selected; and
- apply a soak time of at least one day before testing.

5.3.5 Use of recognition pieces

When low or zero metal content test pieces are used, the test site management shall ensure that recognition pieces are placed to allow confirmation of the location of test items with metal detectors, without need to disturb the ground.

The recognition pieces in use at a test site shall:

- all be made of the same material (such as cut reinforcing bar);
- not individually exceed 15g weight;
- be decontaminated as if they were test pieces;
- be placed in the ground centrally under the test item; and
- be placed taking precautions to preserve the decontaminated status of the test piece and recognition piece.

Whenever recognition pieces are used in conjunction with one or more test items in a test box/area, at least two additional recognition pieces shall be placed in the test area at locations away from test pieces as a control, to confirm that animals are detecting the test pieces rather than the recognition pieces.
5.4 Soak times after establishment of the test site

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 ADS test site should have a minimum soak time of three months before use (although six months is recommended if practicable), in order to permit:

- the target odour to migrate to the soil surface, contaminate the topsoil, and start to vaporise into the air; and
- any ground disturbance resulting from the burial of the target items to diminish.

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. No target item should be moved or disturbed during the soak period.

5.5 Management of testing

All ADS operational tests shall be overseen by a competent and authorised test manager. Individual tests may be monitored by competent and authorised test monitors satisfying the monitoring competence requirements detailed in IMAS 07.40.

5.5.1 Provision of training areas

Demining organisations may wish to train their ADS Units in a similar environment to the test site. In this case, the test manager shall ensure that the demining organisation is provided with a sufficiently large training area outside the immediate operational test box area, established and prepared in the same way as the test areas, and containing test items of the same type. The test manager shall provide the ADS organisation with details of training items and their coordinates.

Training shall not occur at any time on areas reserved for testing.

5.5.2 Soak times between tests

A minimum soak time of one month should pass between uses of individual search boxes, lanes or other areas. The soak time may be reduced to a period of no less than one week if the site experiences weather including periods of heavy rain and sunshine or water sprinkling during that time.

5.5.3 Minimum test requirements

The size of the search area, duration of testing and number of targets shall be determined, by the test manager, with the agreement of the NMAA, for each ADS method/procedure, taking into account:

- the species of animal;
- the normal working procedures and practices of the ADS organisation; and
- the prevailing circumstances and conditions.

ADS testing should adopt as minimum accuracy criteria:

- when testing an ADS Unit’s clearance performance indications should be within 1m of the actual location of the test item; and
- When testing an ADS Units’s technical survey an appropriate maximum performance indication distances should be defined by the National Mine Action Authority.
5.5.4 Actions before testing

Prior to testing, the demining organisation shall notify the test manager of any variations from the demining organisations SOPs necessary to meet test requirements. Any such variations shall be limited to the minimum necessary, and should be agreed with the relevant accrediting body.

Prior to testing, the test manager shall:

- review all relevant aspects of the SOPs of the organisation being tested, and clarify any areas of uncertainty;
- confirm that the intended test site is clear of any soak time restrictions relating to its previous use for testing;
- inspect the test site to ensure that it is properly prepared and ready for use;
- agree with the demining organisation that any proposed observers may observe the test;
- provide a test briefing, to all test participants and any observers, covering as a minimum:
  - site working practices, procedures and safety precautions;
  - site layout including administrative, test, rest and observation areas;
  - restrictions on the movement of personnel during testing; and
  - strict requirement that observers do not disturb or influence the conduct of the test.
- agree with the demining organisation that weather and site conditions are satisfactory, in accordance with the demining organisation’s SOPs, for the test to proceed, and jointly document that agreement.

5.5.5 Conduct of testing

The test manager shall assign test boxes/panels to the ADS handler immediately prior to the operational test. The ADS 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.

Tests shall be monitored by the test manager or other competent and authorised test monitor. Monitoring of the tests shall be carried out so as to minimise distraction or disturbance of the animal during testing.

The test manager shall monitor testing and implement effective measures, such as a required soak time, to ensure that no animal indicates at a location in response to a previous indication by another animal at the same location.

The ADS handler may evaluate the wind direction and other environmental factors prior to the test in accordance with the demining organisation’s SOPs, and decide the search direction. The handler may change the search direction at any time.

During testing of long/short leash methods using test boxes or lanes each ADS Unit shall search an area of at least 400m².

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

The test manager may terminate the test:

- when planned test activities are complete;
- for safety reasons;
- at the request of the ADS handler; and/or
- whenever there is any reason to doubt the continued validity of the test.
A single termination of the test may not constitute a failure to pass the test and the demining organisation may ask for a new test for that ADS Unit at any time. Repeated terminations of testing of an animal or ADS Unit may be grounds to refuse/withdraw accreditation and should be subject to assessment by the test manager to determine appropriate action to retest the ADS Unit or recommend other action.

Photos and videos of the test may be permitted by the test manager for monitoring and training purposes, provided that they do not interfere with the conduct of the test, nor make available information to demining organisations that might compromise the validity of future tests.

5.6 Results of testing

The following pass/fail criteria should be applied:

- the animal should indicate all test items in a test area that does contain test items;
- the animal should provide no more than two false indications per 100m² of searched ground;
- the ADS Unit should comply with the demining organisation’s SOPs (including any variations previously agreed to satisfy test requirements); and
- scratching behaviour during indications is a fail criteria for MDD while this behaviour is permitted for the much lighter MDR.

Any failure to meet the criteria should be treated as a test ‘fail’.

The test manager or monitor may additionally provide ‘observations’, as defined in IMAS 07.40, to the demining organisation. Observations do not constitute a test fail or quality nonconformity in themselves, but may highlight aspects of performance during the test that may benefit from review by the demining organisation and possible improvement action.

5.7 Acknowledgement of test results

The documented record of test results should include the signature of the ADS handler, as well as the test manager or monitor, any comments on the results of the test, including acceptance of the results or any appeal against the results lodged by the demining organisation.

5.8 Right of appeal

On completion of the test, the demining organisation should have the right to appeal a test result if it believes that an indication assessed to be false was in fact correct. The test manager, or authorised monitor, should inspect the site and compare the location of the animal’s indications with the recorded locations of test items and the documented pass criteria. Any indication assessed on appeal to be correct rather than false shall be disregarded from the test results.

the NMAA should ensure that a higher authority is identified and available for further recourse in the event that a demining organisation does not accept the result of an appeal and wishes to elevate the matter.

5.9 Follow up action

Following a pass result, the test manager should confirm to the demining organisation the date by which the next test of the ADS Unit must have been completed to satisfy accreditation requirements.

A ‘fail’ result should be treated as a nonconformity and managed in accordance with the requirements of IMAS 07.12 and 07.40. Root cause analysis (RCA) should be carried out, considering all aspects of the animal/handler relationship and the influence of other parts of the demining organisation’s systems and procedures, to identify any necessary corrective and improvement actions required on the part of the demining organisation.
Agreed actions, and readiness to submit an ADS Unit, individual handler, or animal for retesting, should take into account the different natures of the relationships between handler and animal depending upon the species of animal. In particular dogs should have a unique relationship with a handler, and be tested in that combination, whereas rats may be tested in combination with any handler.

Re-testing of the ADS Unit, individual handler or animal should only take place once the demining organisation has implemented, and confirmed the effectiveness of, agreed corrective and improvement actions.

6. Records

6.1 Records of the test site

Records of the test site shall include, as a minimum:

- 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;
- a map of each test box showing the test box or lane number; the exact location of the test box/lane markers; 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;
- details of the initial soak time period following initial preparation of test areas;
- a schedule of testing including soak times following each use of test boxes/lanes;
- results of test area inspections to confirm suitability and readiness for testing;
- training records for test managers and monitors; and
- results of internal and external monitoring of the test site, in accordance with IMAS 07.40.

6.2 Records of testing

Records of testing shall include, as a minimum:

- the date and time of testing;
- the demining organisation subject to test;
- the name and/or unique identifying reference of handlers and animals subject to testing;
- identification of the test box/lane associated with each animal and/or handler;
- weather conditions and other relevant environmental factors during the test;
- the results of the test;
- signatures of test manager/monitor and handler; and
- any appeals and the results of those appeals.

Additionally, for internal use only by the test site management, the location of all indications, true and false, made by the animal during the test.

6.3 Security of records

Records identifying the location and number of test pieces within test areas shall be kept securely and shall only be made available to those members of the test site management who need to know the information. Individuals who have access to records detailing test piece locations and numbers should have no affiliation to any demining organisation that will be tested at the site.

7. Monitoring and improvement of testing

All activities at the test site shall be subject to monitoring in accordance with IMAS 07.40.
Authorities and test site management shall implement effective measures to ensure that opportunities for improvement are identified, assessed and, where appropriate, acted upon.

8. Responsibilities

8.1 National Mine Action Authority (NMAA)

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

- establish systems, procedures and facilities for the operational testing of ADS operating within the demining programme in accordance with the specifications and guidelines included in this standard;
- provide ADS organisations with test items for training and test items for the accreditation test area;
- accredit and appoint a ADS operational testing authority, to include a suitably qualified and experienced test manager, to manage ADS operational testing on behalf of the NMAA in accordance with the procedures established by the NMAA and relevant national standards;
- produce standard working procedures for the operational test site;
- identify an individual or organisation responsible for dealing with appeals from demining organisations; and
- monitor the work of the ADS 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 organization acting on its behalf, should conduct periodic external QA audits on the ADS operational testing authority.

8.2 Test site management

The test site management shall:

- prepare the test site in accordance with the requirements set out in this standard;
- manage testing of ADS Units objectively and impartially, and in accordance with the requirements set out in this standard;
- promptly provide results of tests to demining organisations;
- maintain records of the test site and of testing;
- maintain adequate and appropriate security of test site data;
- make test results and the analysis of those results available to other stakeholders as directed by the NMAA;
- implement an effective internal quality management system; and
- comply with the requirements for external quality monitoring as directed by the NMAA.

8.3 Demining organisation

The demining organisation carrying out ADS operations shall:

- establish SOPs for the use of ADS on demining operations that are consistent with relevant national standards, or in the absence of national standards, with IMAS;
- make a copy of the demining organisation’s SOPs available to the test manager;
- agree any variations to SOPs, necessary to satisfy test requirements, with the test manager and accrediting authority;
- assist any appointed ADS operational testing authority with the establishment of systems, procedures and facilities for the management of ADS operational testing; and
- co-operate with the appointed ADS operational testing authority in the management and maintenance of national ADS test sites.
In the absence of a NMAA, the demining organisation should assume additional responsibilities. These include, but are not restricted to:

- assisting the host nation, during the establishment of a NMAA, in the development of systems, procedures and facilities for the operational testing of ADS; and
- in cooperation with other demining organisations employing ADS, carry out their own testing of ADS 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 07.12 Quality management in mine action
c) IMAS 07.30 Accreditation of demining organizations and operations
d) IMAS 07.40 Monitoring of mine action organisations

- IMAS 09.40 Animal detection systems – Principles, requirements and guidelines

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

Operational procedures for Mine Detection Dogs

The following guidance is provided during the provisional 12 month approval of this version of IMAS 09.41. It will be archived along with this document once the Review Board determines requirements for new guidance.

1. Scope
This standard provides specifications and guidelines for operational procedures to be adopted for Mine Detection Dog (MDD) operations. This IMAS does not cover Remote Explosive Scent Tracing (REST) operations, which are covered separately.

For the purposes of this standard, ‘operational procedures’ means procedures to be applied as part of a MDD operation. They include, but are not limited to operational accreditation, planning for MDD operations, preparation for MDD operations, MDD search procedures, MDD operations, environmental factors affecting MDD operations and rest and rotation of MDD, use of logbooks, and MDD health and capability checks.

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 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; 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 terms ‘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 that lead to the removal of mines and ERW hazards, (including unexploded sub-munitions).

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 also vapours 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 that 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. MDD operational testing and accreditation of MDD organisations

All MDD and their handlers employed on demining operations shall have passed all necessary operational testing, before being permitted to work-in an MDD-accredited organization. Specifications and guidelines for the operational testing of MDD and handlers are included in IMAS 09.42. Additional requirements for operational accreditation of MDD organisations may also be contained in relevant national standards.

5. MDD records

Demining organisations shall maintain records for each MDD to record important details concerning the health, training and work of the MDD. The records provide the demining organisation and external monitoring teams with a continuous written record of the MDD’s health, training and work experience. The following information should be included:

a) general data about the MDD such as breed, sex, genealogy, age (date of birth) and reproductive history;

b) medical details. This should include basic medical statistics of the MDD, dimensions weight etc; records of any illnesses, diseases or injuries and the treatment given; dietary requirements; and records of all routine health checks and inoculations;

c) training records to include the dates, duration and type of training carried out, including refresher training. Details should include instructors/handlers; environmental conditions (weather, atmosphere and site); operating procedures; target objects and laying details; results of training; and an analysis of the MDD’s performance during training; and

d) records of operational testing.

MDD records shall be managed in accordance with the requirements of the NMAA.

6. Health and capability checks

General

The ability of a MDD to perform properly can depend on its health and well-being, which means that a MDD’s detection reliability may vary on a daily basis. It is therefore necessary for demining organisations to assess their MDD on a daily basis before and during any work sessions.

The assessment shall consist of a health check, and a capability test to provide confidence in the MDD’s search capability. The capability test also acts as a ‘warm-up’ for the MDD.

Health checks

All MDD shall be given a health check each day before they are allowed to start work, and further checks should be made during the working day. If the check reveals that a MDD is ill or incapacitated in a way that might affect its detection ability, the MDD shall not be used until it has fully recovered. Guidance on the conduct of health checks is covered in IMAS 09.44. Further health checks are also required on completion of work each day.

Managers shall assess the MDD’s working abilities in consultation with the MDD handler and the veterinarian (or MDD medic) before the MDD is allowed to work. If a decision is made to use a MDD with a minor health problem, particular attention must be given to the MDD’s performance and well-being during the operations.
**Capability test**

All MDD shall be given a capability test each day before they are allowed to start work. The aim of the capability test is to determine whether the MDD is capable of detecting the target odour, and is sufficiently lively, motivated and focused to work. The test can be undertaken in a number of ways, but the following is recommended:

a) a test box should be prepared for each MDD in a safe area on the worksite, ideally some days in advance of the requirement for testing. The boundaries of the box should be marked. Mines or ERW (or parts thereof) of the types likely to be found during the demining operation should be placed in the ground. Small items may be placed just below the surface with tweezers or forceps. Additional spots within the test boxes should also show disturbance of the surface, and contain blind holes and non-mine targets; and

b) prior to commencing work, each MDD will carry out a search in an individual test box with the MDD handler evaluating the MDD’s obedience, motivation, concentration, and ability to detect the test items. When the MDD has demonstrated that it is searching and behaving satisfactorily, and can discriminate between the test items and other targets, the MDD can be considered fit for work for the day.

The same test box may be used for several days but it is recommended that new test boxes are prepared for use every second or third day. When using the same test box the search direction should be changed each day.

If a test box or lane is to be used several times, it is important to let each test item remain in the ground at the same location as it was originally placed. If the test items are moved the MDD may still detect the previous location due to soil contamination, so if test items must be moved, new sites should be built in a different location but in the same general area.

**Recording**

Demining organisations shall maintain a logbook for each MDD that records details of the daily activities of the MDD such as results of internal testing, deployment location, site conditions, injuries or illnesses, and comments about the performance of the MDD.

If someone other than the MDD handler has written the logbook, the MDD handler shall sign the logbook after each entry to verify the entry and acknowledge the comment made.

MDD logbooks shall be kept on the site where the MDD are working and presented to monitoring teams upon request.

**7. Planning for MDD operations**

When planning MDD operations there are a number of elements that should be considered:

a) the possible hazards. An assessment of the hazards should be carried out to ensure that the MDD have been trained and tested for the target(s) being searched for or any other hazards that may be present (eg tripwires). If any hazards may be present that the MDD have not been trained or tested for, the MDD should not be deployed in the area until either these hazards have been removed, or the MDD have been trained to respond appropriately and that response appropriately tested;

b) the number of MDD available for the task;

c) the search procedures to be used. Details of MDD search procedures are covered in clause 9;

d) the environmental conditions. The environmental factors that affect MDD operations are included in clause 10; and
the task management requirements. The task management requirements will dictate the control and administration areas required. Details of these are included in clause 8.4.

8. Preparation for MDD operations

8.1 General

Preparation for MDD operations involves:

a) ensuring that all training and testing requirements for the MDD (including accreditation of the MDD organisation) have been carried out and the MDD are ready for work. Details of the specifications and guidelines for the operational accreditation of MDD organisations are included in IMAS 09.42;

b) ensuring that if the demining task is to take more than five days, temporary boxes in a suitable training area are prepared for on-site maintenance training;

c) establishing the MDD worksite. The MDD worksite layout shall be established in accordance with the specifications and guidance included in this standard and IMAS 10.20; and

d) ensuring that all necessary support for the operations is in place. Such support will include logistic and administrative support, but shall also include medical support, both for personnel and the MDD. IMAS 10.40 specifies the minimum requirements for medical emergency preparedness for demining operations. IMAS 09.44 provides guidelines for medical support to MDD.

MDD worksite preparation

In establishing a MDD worksite it is necessary to ensure that:

e) the on-site maintenance training site (where needed under 8b) has been installed;

f) the minimum safety distances between MDD teams can be maintained;

g) there are sufficient search areas for the number of MDD to be deployed on the task;

h) any requirements for the management and supervision of the task can be complied with; and

i) consideration is to be given to factors such as possible changes in wind direction, the humidity of the soil and vegetation, and areas of high moisture content that may prevent effective search.

Safety lanes

Safety lanes, which are confirmed as clear of hazards, are used to provide access to and around the demining worksite. Safety lanes should not be less than 2.0m wide to allow safe passage for the handler and the MDD, and to allow casualty evacuation by stretcher in an emergency. Safety lanes shall be marked in accordance with the minimum requirements specified in IMAS 08.40.

Search areas

Currently the most common method of deploying MDD is to divide the area into search boxes or panels with safety lanes between them. When this system is used, the following rules shall apply:

j) clearly marked safety lanes are to be established around search areas. These may be cleared manually or by MDD with manual follow-up;

k) the corners of each search box or panel shall be clearly marked so as to be visible to the MDD handler from all sides;
l) when painted markers are used to mark the boundaries of search areas or other MDD working areas, they are to be painted a minimum of one week prior to starting operations to ensure that the paint is thoroughly dry; and

m) the whole area inside the box or panel shall be visible to the MDD handler. If the vegetation is such that the handler is not able to observe the MDD at all times during the search, the vegetation shall be removed or the box or panel shall be divided into smaller sections.

Control areas
Control areas for the management and supervision of the task shall be established for the MDD worksite in accordance with the specifications and guidance included in IMAS 10.20.

9. MDD operational procedures

Search patterns
The two most common search patterns currently in use for MDD operations are:

a) the search lane system. The MDD searches in a series of straight parallel lanes between 0.3m and 0.5m wide within a search box or panel. These lanes are typically up to 10m in length. The lanes may originate from any side of the search box or panel (depending on wind direction). The MDD may search with or without a leash, and the MDD may search on its way out from the handler only, or both on its way out and back; and

b) the short-leash system. The MDD searches in a series of straight parallel lanes between 0.3m and 0.5m wide within a search box or panel. The lanes may originate from any side of the search area (depending on wind direction). The MDD handler will walk beside and behind the dog in the lane which has been previously cleared by his/her own dog. In high-risk areas, the area should have been searched by two MDD before the handler walks on the ground. This generally means that the area has been searched by an MDD on a long-leash before the short-leash system is used.

There are advantages and disadvantages in both the search patterns above, and some programmes prefer to search an area once with the long leash system, and once with the short leash. The relative advantages are:

c) long leash can be faster, especially when the handler has clear oversight of the search lane; and

d) short leash makes it easier for the handler to monitor the performance of the dog, to ensure complete search to the end of the lane, and to work in difficult terrain with limited visibility.

The following procedures apply when searching with MDD:

e) the search shall follow the search pattern described in the demining organisation’s SOPs;

f) the MDD shall search the whole box or panel with no parts remaining un-checked;

g) the MDD should search with its nose close to the ground at all times during the search; and

h) neither the MDD handler nor any other person shall enter a suspected area before it has been searched by two MDD, except when a one-MDD search is carried out in accordance with the requirements of clause 9.3.

Safety distances
IMAS 10.20 provides specifications and guidelines on the establishment of safety distances for demining operations. With MDD operations, the minimum safety distance also ensures that working MDD are not distracted by the presence of other MDD in the area.

Numbers of MDD used
If MDD are used as the primary detection tool, then all areas are to be searched by at least two different MDD before being considered as cleared.

As an exception, one specially trained MDD can be used on its own in cases of urgent medical evacuation.

When used in technical survey, a search with one MDD may be sufficient, to raise confidence that no mines are present, but if mines are found, two MDD must then be used.

When MDD operations are carried out to provide secondary clearance or verification following manual or mechanical operations, or confidence building, one MDD can be used provided that clearance requirements as specified by the NMAA are achieved. Again, if mines are found, search with two MDD must be used.

Target indications
MDD shall be trained to indicate targets as described in the demining organisation’s SOP, for example by sitting or lying down next to the indication. When indicating, MDD shall not be in physical contact with the point of the indication.

If a MDD sits or lies down on the top of an indication or scratches at the ground during operations, training or testing, it should be withdrawn from operational service and re-trained until the fault is corrected.

The location of an indication by a MDD should be clearly and accurately marked. During marking, no person is to physically enter the uncleared area before it has been searched by two MDD.

The rewarding of MDD during operations should be avoided as much as possible, because it is impossible to judge whether the indication is a true target. If a MDD is rewarded during operations, the MDD shall not be permitted to enter any hazardous or un-searched area during the reward procedure. If a MDD is difficult to control during rewarding it should be withdrawn from operational service and re-trained until the fault is corrected.

When investigating MDD indications, the minimum area to be investigated is a 1m radius around the point of the indication. This should be extended and/or offset depending on the wind direction and other variables that the handler is aware of.

Recording search areas
The location of each search area shall be surveyed and recorded along with the details of the MDD and handlers that worked in that area.

Quality Management (QM)
MDD operations shall be subject to monitoring in accordance with IMAS 07.40 and post clearance inspections in accordance with IMAS 09.20.

10. Environmental factors affecting MDD operations

Wind
Wind has a significant effect on the conduct of MDD operations. A well-trained MDD should be able to indicate the exact location of a target with a head or side wind. The following rules should apply:

a) MDD should not be used if the wind speed (at ground level) is greater than 18m/s;

b) MDD should not be used if the wind speed is greater than 7m/s if the soil surface is very dry and dust is being raised; and
c) MDD should not search with a tail wind greater than 2m/s.

Rain
Light rain has minimal impact on the presence of target odours in the soil and subsequent evaporation may give a short-term release of odour that will improve the detectability of target items.

Heavy rain washes target odours deeper into the soil or disperses them over a wider area making MDD operations difficult.

After periods of heavy rain, demining organisations shall test MDD on test sites of identical soil conditions that have also been subjected to the same heavy rain to ensure that MDD can still satisfactorily detect target items. If MDD are unable to detect target items reliably then MDD operations shall not take place.

Snow
MDD should not be used when the ground surface is covered with snow.

Humidity
To ensure that MDD are capable of operating effectively in the prevailing humidity conditions, the MDD should be trained and tested under these conditions. If conditions change dramatically, additional training and testing should be introduced immediately to ensure that MDD are able to deal with the new conditions.

Atmospheric pollution
Atmospheric pollution may prevent a MDD from working effectively, therefore MDD shall not be used in areas where the atmosphere is obviously polluted by gases, smoke or odours from petroleum products, fertiliser, chemicals, garbage, domestic burning (including vegetation) and traffic or factory exhausts.

Vegetation
MDD should not be used in areas where vegetation prevents searching, or if vegetation restricts the ability of the MDD handler to view and control the search. Vegetation may be removed by cutting or burning.

Vegetation cutting may disturb the scent picture above target items and affects the scent plume. When vegetation cutting is required, irrespective of how the cutting is to be carried out, training and testing shall be carried out prior to any MDD operations taking place to determine:

d) the safe time delay between cutting and a MDD search; and

e) the indication accuracy of the MDD after vegetation cutting.

Burning of vegetation may have a negative effect on MDD detection capability. MDD shall not be used to search in areas where the vegetation has been burned unless they have been proven capable of detecting target items in burned areas.

Channelling of target odours underground
Plants with extensive and widespread root systems, or tunnel systems, (eg those made by rodents or insects), could result in target odours being transferred away from a target item. Under such circumstances a larger area should be investigated if nothing is found at the site of an indication.

Recording of environmental data
Demining organisations should establish procedures for a long term collection, recording and storage of environmental data during MDD operations and training.
The most useful data to measure and store are temperature, rain (before and during search), humidity in air/soil, wind speed/direction, solar radiation, soil conditions and vegetation type.

Use of a weather station
Weather stations should be considered as part of the MDD organisation’s ‘toolkit’. Weather stations typically measure wind velocity and direction, humidity, air pressure, and temperature in soil and air, but can measure most of the data listed in clause 10.8. The measurements can be done manually, but modern weather stations provide automatic recording of data at low cost.

11. Rest and rotation of MDD

General
Dogs are highly individual in their characters. While some MDD are capable of working continuously for several hours, others need frequent breaks. Environmental conditions also influence the work of MDD.

Demining organisations shall establish procedures for the rest and rotation of MDD that takes into account environmental conditions and the individual natures of the MDD.

Length of search periods
The length of search periods should be determined solely by the handler based on the capabilities of the MDD and the conditions under which the MDD is working.

First and second search MDD
All MDD are required to be operationally accredited independently. Thus if MDD are used as a pair, either MDD can work as the first or second search MDD. In order to ensure that a second-search MDD does not use odours from the first MDD to assist its search, the roles of the MDD should be changed regularly.

To ensure that the MDD is detecting the target odour in both roles, it must be trained not to indicate the MDD scent from the first search.

12. Responsibilities

The National Mine Action Authority (NMAA)
The NMAA, or an agency acting on its behalf, shall:

a) establish a clear and sustainable national policy on the use of MDD within the mine action programme;

b) develop and implement relevant national standards and other guidelines governing the use of MDD within the mine action programme;

c) develop and implement procedures for the QM of MDD operations (including operational accreditation and the monitoring of performance in the field) within the mine action programme and ensure that all personnel, male and female, charged with MDD QM are suitably qualified and experienced for their roles within this task; and

d) assist demining organisations employing MDD with the establishment of testing and training areas and other facilities to support MDD.

The 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;
b) establish places at each work site for daily on-site training where necessary;

c) ensure that testing of MDD teams is carried out on a regular basis under operational conditions; and

d) establish systems, procedures and facilities to ensure the occupational and general health care of dogs.

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

a) assisting the host nation, during the establishment of a NMAA, in framing national standards for MDD operations; and

b) establishing liaison with other demining organisations employing MDD to ensure a consistency in standards for MDD operations and cooperation in the testing of MDD team
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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