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Licensing of mine dogs in Mozambique

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Introduction

Mine dog detection differs from other demining methods in that each individual dog has its own and very distinct set of qualities which often varies significantly from day to day. A dog's ability to detect mines is dependent on a series of factors. The most prominent ones are how the dog is trained, and the genetic qualities of the dog. Whilst it is internationally recognized that dogs are indeed capable of detecting mines and UXO, the difficulty in assessing a dog's capability and reliability often negates the opportunity to undertake independent quality assurance based on visual inspections. A dog may appear to work well to inspectors but its nose sensor may not be "tuned" correctly.

Independent testing of mine dogs did not start until 1999 in Bosnia. The initial tests there revealed significant shortfalls in the way that the dogs were tested, but also in the capability of the dogs and handlers under test. As a result, some agencies were skeptical about the independent testing of their dogs, and claimed that there was no need for such tests, bearing in mind that manual deminers and mechanical equipments did not require testing on an individual basis. Experience from the few independent and national tests, however, suggests that the overall quality of mine dog detection increases significantly in the theatres where tests are undertaken.

The greatest challenge to independent testing of dogs is to replicate a realistic scenario to the extent that the test represents the dog's real capabilities in the field. A test will always be slightly artificial due to many factors. The chemical signature emanating from buried landmines is a fundamental property that is poorly understood. Although advances have been made in the understanding of the fundamental transport process that allow the chemical signature to migrate from the buried source to the ground surface, much remains to be done to fully understand this process. Chemical vapors emanate from a buried landmine by permeation through plastic case materials or through seals and seams, and from initial surface contamination of the case during the laying process. Although it would be desirable to have a sensor, which is tuned to the principal explosive chemicals found in landmines (TNT, DNT and RDX) it is unlikely that the dog recognizes a mine based on detection of a single substance. It is more likely that it detects a mixture of scents, or "bouquet" formed by several substances. The complete process of discrimination and bouquet detection also remains to be understood. The dominant effects of environmental conditions on mine dogs and the process of general scent detection will need further exploration to be fully understood. It is, however, possible to make some assumptions based on empirical experience and limited scientific research material.

The human factor also plays a significant role. It is well known that mine dog detection is highly dependent on good dog/handler communication and collaboration. The extra mental pressure to which the dog handler is exposed during a license test may cause crucial miss-readings of the dog's signals. Unfortunately there are no obvious ways of eliminating all these problems. The challenge is therefore to establish ways of testing dogs, which are fair, unambiguous and easily conducted and managed.

Although this standard is being drafted as one of the IMAS group, it is considerably more specific than most, more detailed, and longer. This is due entirely to the lack of accepted procedures in this area, and the need for more guidance than in other areas of mine action. This standard, therefore, provides national mine action authorities and demining agencies with guidance on how to prepare a test site, lay out the test field, handle test items and accessories, manage the test site/process and make/manage the records. Since there are still many unresolved scientific questions related to mine dog detection, some of the elements that are addressed in this standard may later prove to be redundant when sufficient research has been done. By contrast, some elements may prove to play an even more important role in the future than currently known. In the absence of proven scientific research, it is therefore necessary to incorporate and address as many known factors as possible, to ensure that a test becomes impartial, unambiguous and realistic.

Licensing of mine dogs

1. Scope

This standard provides specifications and guidelines for the establishment of licensing procedures and license test fields for mine detection dogs. It includes the selection and preparation of different license tests, and the conduct and management of these tests. Three different test scenarios have been developed;

a) License test 1 - Primary area and road clearance

b) License test 2 - Secondary clearance, verification after mechanical mine clearance (not included)

c) License test 3 - Tripwire detection (not included)

The standard offers general and specific elements of importance before and during preparation of test fields, such as: assessment of test areas, handling of test items, tools and accessories, ground preparation, marking/guarding and management/maintenance of test fields and test records. It also offers specifications and guidance for the establishment and management of a test regime and proposes pass/fail criteria for each test.

This standard does not apply to internal daily testing or "tuning" of mine dogs, which is part of internal quality assurance undertaken by each individual demining agency. Many of the same principles, however, should be considered when testing dogs as part of internal quality control.

IND issued MDD licenses will be valid for a period of six months from the time of issue and the demining agency must request re-licensed for a dog equipage in writing with 21 days notice. The re-licensed can be conducted during the seventh month without stoppage of operations for the dog equipage as long as the test has been booked for a period during the seventh month. If at the completion of seven months the dog equipage has not been re-licensed it is to cease operations.

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 and definitions

A list of terms and definitions used in this standard is given in Annex B. A complete glossary of all the terms and definitions used in the IMAS series of standards is given in IMAS 04.10.

In the IMAS series of standards, the verbs 'shall' and 'should' 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.

The term 'national mine action authority or authorities' refers to the government department(s), agency(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 'national mine action authority'.

The term 'demining agency' or ‘mine dog agency’ refers to any agency (government, NGO or commercial entity) responsible for implementing demining projects or tasks. The demining agency may be a prime contractor, subcontractor, consultant or agent.

The term ‘target object’ is used to describe the object, which the dog is supposed to detect during live mine/UXO detection. The target may be a mine of a type typically found in that area, or a certain type of UXO, which is commonly found during live operations.

The term 'target substance' is used to describe a substance or scent from the target object. It may be pure TNT or 2,4 DNT molecule scent or a bouquet from a mixture of substances emanating from the target object

The term ‘test item’ is used for mines, pieces of mines, UXO, tripwire or objects that are laid out in the test field for detection by the dogs

The term ‘recognition piece’ is used for a metal piece, which is placed under test items to make them recognizable by metal detectors

4. Test site, initial assessment and preparations

4.1. General

The establishment of a test site for independent confidence or license testing of mine dogs requires careful consideration of a series of factors. A test lane or test box must be considered as contaminated with undesired scent as soon as it has been used once. This undesired contamination must be allowed to diminish sufficiently before the test area or lane can be used again. This places a significant requirement for space. Moreover, it is not known which compound or components of explosives or the object casing is being used by the dog to discriminate target odors from the background. Nor can we assume that all dogs use the same components. It would, however, be unlikely that the target detection depends on a single ingredient but stems instead from the dog’s ability to distinguish an “odor” picture. It is therefore currently necessary to use representative examples of the most common target objects (complete or fractions of mines, UXO and tripwires) during tests rather than pure explosive substance or artificially prepared scents from the target object. Consequently it is necessary to use mines that are likely to appear in the theatre as test items. Ideally these mines should come from live minefields that have been in the ground for a long time. It may, however, be unfeasible to satisfy this desire since many demining agencies and national mine action authorities have recognized the potential danger of lifting and disarming live mines. The alternative is then to use mines and UXO from stocks or similar. This places new requirements in regards to decontamination and soak time since mines that have been stored long-term may emanate different scent substances than mines that have been in the ground.

Test areas or lanes can only be used once every 1-2 months for reasons described under paragraph 4.7. The required number of test areas and consequently the number of test items (mines or UXO) increase as the expected number of dogs increase. It is therefore necessary to undertake careful planning prior to the establishment of a test site. The following elements should be taken into consideration:

a) How many dogs will be tested, immediately and during a given time period.

b) How many of the dogs are anticipated to fail the test and consequently must be re-tested by the demining agency.

c) For what purpose are the dogs to be used operationally and which license tests should be undertaken. How many dogs are expected to apply for the different license tests.

d) What is the national mine action authority’s policy on re-testing in regards to required period between the first to the second and third test.

e) At what time of the year it is thought that the dogs will be tested (based on information provided by the IND and the demining agencies).

f) What is the length of the demining season, and consequently the test season?

g) What is the policy of the national mine action authority in regards to length of accreditation and licensing periods. When a dog that has passed a test require will re-testing.

h) Whether there is a requirement to establish additional areas for training and tuning of the dogs prior to testing.

4.2. Initial survey

Prior to the preparation of a test site, a survey should be carried out to determine potentially suitable test sites. The survey should consider the following factors:

c) What size of test site is needed?

d) Current use of the area and potential unauthorized use or entry after establishment of the test site.

e) Security issues and the need for fencing and guarding.

f) Ownership of land.

g) Landscape and vegetation requirements needed to match field conditions, and site limitations in this respect.

h) Soil analysis, to determine whether the soil type is representative and if changes in weather will significantly affect the consistency of the soil.

i) Rain and flooding to determine whether the area will flood during heavy rain, and whether puddles and swampy spots will appear during and after rainfall.

j) Potentially undesired contamination. It is necessary to know whether the area has been a previous mine- or battlefield with potential explosive contamination. Is the area polluted by other means (exhaust gas from traffic and factories, spill of oil, inorganic fertilizer or other chemical substance)? Is the area shattered with metal pieces, bullets, garbage and shrapnel?

k) Whether the area is sufficiently remote and calm or will it be necessary to shield it.

l) Whether the area is currently used by animals and whether these animals will continue to use the area;

It is important to pay extra attention to potential swamping or flooding during the wet season. The location of the test items will typically be unaffected by wet soil but if the area is swamped or flooded, mines may move closer to the surface or to the sides.

The process of establishing a test site is time and resource consuming. The test site suitability increases with age and thus it is desirable to maintain and use the same area for longer periods. This can typically be more than 10 years. When investigating the ownership of land and negotiating the right to use it, it is important to ensure the right to use the land and to negotiate possible rental fees for the overall usage period in beforehand.

4.3. Specific environmental considerations and recommendations

There are three basic types of license test. License test 1 applies to dogs detecting mines on roads or open land; this is described in detail in paragraph 8. License test 2 applies to the detection of tripwires; this is described in paragraph 9. License test 3 applies to conditions where dogs will be following mechanical clearance machinery. Each license requires slightly different conditions and attributes from the search test area.

If license test 1 and 2 are to be applied the following considerations shall be taken into account:

a) Landscape - Although dogs may be used in steep terrain, the test site should not be sited in steep areas. This may cause mines, or scent-contaminated soil, to move during rain periods.

b) Vegetation - The vegetation should be limited to a minimum. Dense vegetation will prevent the dog from moving freely when on a leash during the search. Vegetation will also impede monitoring of the search. The accuracy of each dog indication may also be reduced.

c) Soil type - The soil type should represent a typical but favorable soil type in the area of demining operation. Clay areas should, however, be avoided since the explosive vapor molecule transportation in clay is very unpredictable. Clay soil also facilitates movement of mines during heavy rainfall.

d) Undesired explosive contamination – The test site shall be as free as possible for undesired explosive contamination. Recently demined mine- or UXO-fields shall be avoided since the probability of undesired explosive contamination is high. The word "recently" is defined as less than two years. If the area was demined further back in time, it may be found suitable. However, if mines and/or UXO were blown in situ in the area and the exact location of the demolition spots is unknown, the area should be considered unsuitable as a test field due to spread explosive and case fragments. If the area is in other ways thought to be contaminated with the target substance, it should be disqualified as a test field.

e) Metal and shrapnel contamination – The test site shall be as free as possible for metal and shrapnel contamination since pieces of metal, metallic rubbish and shrapnel may be recognized as the target object by some dogs. All artificial objects should initially be removed after visual inspection. It is also desirable to search the area with a metal detector and remove all major metal pieces. This process may involve excavation and it is necessary to follow the principles described in paragraph.4.5 to prevent undesired contamination of the excavation points. If the area is severely contaminated by metal pieces and shrapnel, it should not be qualified for use as a license test field.

f) Other undesired contamination – The test site shall be as free as possible of any contamination that may affect the results of the tests negatively. If petroleum products, inorganic fertilizer or other chemicals have been spilled in the area, or if the soil is contaminated with gunpowder, a proper investigation shall be undertaken to determine the extent of the pollution and potential effects on the tests. If the area is considered as badly contaminated by such products, the area shall not be qualified as a test site. Moreover, if the area is considerably polluted by traffic, or factory exhaust gases, it shall also not qualify as a test site. If there is any doubt as to the level of undesired contamination, the area shall not be used as a test site.

g) Wind – If the proposed test area is regularly exposed to strong winds it should be disqualified as a test site. Dogs shall not be tested if the breeze is too high since the scent from neighboring mines may affect the accuracy of the indication by a dog. If a test site is frequently exposed to strong breezes, this will limit the potential use of the field and delay the test and licensing process. Research is to be undertaken to establish the upper limit of wind speed permissible for detection.

h) Noise and other disturbance – The test site should be protected against loud noises, traffic, and other activity that may disturb or distract the dog and the handler during search. The ideal location is a remote and calm area with minimum disturbance from the surroundings. If this is not possible it may be necessary to shield the test site physically.

4.4. Removal and replacement of soil

License tests 1 and 3 require that test items be buried in the ground. When burying test items, the following principles shall apply:

a) Double plastic bags should be used to cover the hands during the excavation and other contact with the soil. The plastic bags should be standard freezer or carrier bags or similar. Plastic bags that are made from oil products should under no circumstances be used, as they will have a very distinctive scent. Care must also be taken to prevent the bags from splitting during excavation.

b) The soil should be removed at least one day prior to the preparation of the test field.

c) The soil disturbance should be kept to a minimum. The soil top layer should be kept in one piece if possible.

d) Superfluous soil, due to the added volume of the test item, shall be permanently removed from the test site and not spread around inside the test area or neighboring test areas.

e) Upon placing the test item in the ground, the original soil shall be filled around the mine. The topsoil shall be placed on the top of the mine, again using wrapped or shielded hands.

f) Only de-contaminated equipment shall be used during the test site preparation and during handling of the mines and test items

Note 1: It is possible to contaminate the soil artificially by mixing the soil around the mine with the test item in a moist glass container. This will cause an immediate soil contamination and possibly reduce the requirements for soak time. This may be desirable if time does not allow for a long soak time

4.5. Decontamination of test items and accessories

Accurate and painstaking decontamination is vital because tiny amounts of contaminant transferred to test items may negate the function of the whole test area. All test items; tools, accessories and recognition pieces shall be decontaminated prior to use. There are several ways to de-contaminate equipment and accessories. The following procedures are, however, recommended:

a) Wash and scrub tools, accessories, recognition pieces, test items (including tripwires) in clean pre-boiled water (30-37º C).

b) Boil all washed items minus the test items containing explosives in clean water for a minimum of 2 x 10 minute with one water change between.

c) Dry and expose the boiled items and the test items containing explosives to fresh air for a minimum period of 4-8 hours, preferably in sunlight and with a breeze outdoors.

d) Wash and scrub all aerated and dried items with clean pre-boiled water one more time (30-37º C).

e) Dry all items in the sun or outdoors a second time.

f) When the test items are dry, spray them regularly with water, to allow them to dry up at least 3-4 several times over an 8 hours period. Turn all test items several times to allow all sides to dry completely between each spraying. The test items should ideally be allowed to dry in sunlight and with an outdoor breeze.

4.6. Initial soak time requirements

When a test field has been prepared, a soak time is required. During the soak time the field shall remain unused for the following reasons:

a) The target substance needs time to permeate to the soil surface, contaminate the top soil layer and start to vaporize into the air in the same way as old buried mines.

b) The dog is sometimes able to detect ground disturbance and other scent caused during the preparation of the test field. This disturbance will gradually diminish over time, depending on environmental factors, such as sun, rain, snow and wind.

A prepared License 1 test site shall have a minimum soak time of 3 months before it can be used. A longer soak time is desirable and it should ideally be 8 months or longer. The required soak time greatly dependents on the burial depth of the test items. Deep buried tests items require a significantly longer soak time than shallow buried ones. The minimum soak time shall, however, be applied to satisfy the requirement to allow any disturbance from the field preparation to settle down.

A prepared License 2 test site (for tripwire detection) should have a minimum of 1 month's initial soak time before it can be used. A longer soak time is desirable; it should ideally be 3 months or longer.

Rain and/or artificial moistening of the test field may, however, reduce the soak time requirements, as they appear to accelerate permeation of the vapor through to the surface. In areas with typical winters, the test items should ideally be allowed to rest in the ground during the winter period.

The effect of the soak time is greatly dependent on rainfall and moisture of the soil. In areas with little or no rain therefore, the test areas should be sprayed and soaked with clean water several times during the soak time. This removes some undesired contamination and facilitates a more natural transportation of target scent from the test item to the surface.

4.7. Soak time between each use of a test area

Since dogs typically are used in pairs, they may develop the habit of detecting the scent from a previous dog's indication of the target spot rather than the target substance itself. Consequently the dog handler may believe that the dog detects target objects. To ensure that a test area is not contaminated by scent from previous dog searches, a soak time of 1 month shall be applied between each time a test areas or lane is used. A longer soak period is, however, desired. Exceptions to these requirements are described in paragraph 6.7.

5. Maintenance of a test field

5.1. Verifying the location and state of the test items

The test site shall be regularly inspected by staff from the test and accreditation agency to ensure that it is marked, guarded and/or fenced in accordance with the policy established for that particular test field. All the mines in the test areas shall be identified at least once every year and preferably after the period with the heaviest rain or snowfall. If recognition pieces have been placed beneath the mines, the use of a metal detector is the preferred way of locating the mines, since the ground will not be disturbed. If the area has been subjected to unwanted intruders, the area shall be re-inspected and assessed, to determine whether the test site is still suitable for further use.

5.2. Disqualification of test areas

If some of the mines are found to be dislocated as a result of flooding or other means, the test area in which the dislocated mines were found shall be disqualified. In such cases the mines from this test area may be lifted and placed in a new test area, which shall be subjected to another initial soak time in accordance with paragraph 8.1. The original test area will probably be severely contaminated, and should not be used as a test area for the next two years.

5.3. Vegetation cutting

If vegetation is considered to be an obstacle, it may be cut prior to the test (License test 1 and 2). It should, however, not be cut immediately before a license test. The minimum soak time between vegetation cutting and license testing is 1 month. Only manual cutting equipment shall be used. Motorized vegetation cutters shall not be used since fuel spill and exhaust fumes may cause undesired contamination. During cutting, caution must be taken to prevent any distortion of the soil. The vegetation should be removed immediately after it has been cut. Equipment and accessories used to cut and remove the vegetation should be decontaminated according to the principles described in paragraph 4.5

6. Security and protection of the test field

6.1. Fencing

It may be necessary to fence a test field to prevent undesired use and vandalism of the area. The fence requirements will, however, depend on an individual evaluation of the situation in the test area. The aim may be to keep people away from walking through the test field or domestic animals from gracing. A 1 m fence is then probably sufficient. It has, however, often been necessary to prevent the local population, staff from demining agencies and other intruders from entering the area physically. A higher fence is then required.

It is recommended to protect all test sites for license tests 1 and 2 with at least 2 m high fences. This facilitates a better management and control of the test field, and ensures that the field is not contaminated by undesired scent caused by intruders.

6.2. Guarding

In some areas fencing alone may not be enough to prevent unintentional or malicious use of the area. It may then be necessary to establish a guarding system. Guarding may occasionally be required to prevent the local population from stealing the fencing or test area marking material due to its intrinsic value.

7. General management and control of license tests

7.1. General

The IND is responsible for appointing a qualified testing manager, whose responsibility is to prepare the test site, plan and prepare license tests, monitor and manage the tests and evaluate the handlers and dogs during the test. Moreover, the test manger has the ultimate responsibility for issuing positive and negative license recommendations to the IND based on the results from the tests, based on the pass/failure criteria established by IND. The test manager must possess the necessary skills in order to professionally evaluate and understand mine dog detection including all procedures and in particular the communication between the handler and the dog. It is also essential that the test manager is considered impartial by the demining agencies. IND may delegate the overall license responsibility to a test manager.

The test manager shall always enter the test site first during a test. The demining agency shall not be allowed to use the site for assigned training or “internal” testing before it has obtained an approval from the test manger.

7.2. Individual testing of each dog

The aim of the license tests is to enable licensing of each individual dog (the handler and the dog). It is not a process of licensing a system containing a number of dogs used in combination. Although the latter may be desirable, a more comprehensive test effort is required, which is beyond the scope of this NS. Each dog/handler “equipage” shall therefore have to be tested and evaluated individually.

The license and failure to obtain a license should follow the dog and not the handler. Consequently if a handler has failed to pass a test with one dog, he/she may well be tested immediately and obtain a license with another dog. A dog failing to pass a test, however, cannot immediately be tested again with a different handler. Failure sanctions shall then be applied to the dog only, and not the handler, according to regulations established by the IND. If a handler and a dog have passed the license test and obtained a license, another handler cannot handle the dog under the same license.

7.3. Initial preparations by the test manager

The test manager shall inspect the test site at least one day prior to the test, to ensure that the test field is suitable and that test and training test areas are adequately marked. Moreover, the test manger shall examine the demining agency's SOP and familiarize himself with all aspects of the SOP that may be relevant during the test.

7.4. Initial test brief prior to the test

The test manager shall brief the demining agency about rules and regulations to be applied during the test. The aim of the brief is to agree on the suitability of the weather and to provide the demining agency with information about test procedures, observation points, rest areas for dogs and handlers, movement restrictions inside the test site, marking of the test areas and other information that may be relevant for the demining agency. The test manager and the dog handler should jointly assess the weather. It may also prove useful if the test manager or the demining agency wish to analyze causes of potential failures during the test in order to suggest improvements. The demining agency may reject a test if it considers the weather conditions unsuitable for mine dog detection. The test can only be rejected, however, if the weather conditions are outside the scope of operational activity as described in the demining agency's SOP.

7.5. Training requirements

The demining agency may wish to train their dogs in a similar environment to the test field. If this is the case, the test manager shall ensure that the demining agency is provided with a training or "warm-up" area prior to the test. A training area can be a number of test areas or lanes with test items of the same type as found in the national authority's test areas. It is recommended that the national mine action authority and the test manager prepare a number of training test areas with test items as part of the overall test site preparation.

7.6. Assignment of test areas

The test manager shall assign all the test areas to the demining agency and the dog handler prior to the test. The dog handler shall have the right to inspect the test areas in any way he/she may desire prior to the test, provided that the test areas are not physically entered or disturbed during the inspection.

7.7. Visitors and observers

Representatives of the demining agency may wish to observe the test. This is acceptable provided that they obey the rules and regulations provided by the test manager and under no circumstances disturb or influence the test and the work of the test manager. Other observers may also be present during the test provided that this is agreed by the tested agency and that they follow the same rules.

If the test manager feels that some or all of the observers are disturbing the test, he/she may ask the observers to move to another observation point or to leave the entire area.

7.8. Photos and video

Photos and video should only be taken during the tests if this has been agreed with the tested agency and if it does not interfere with the test or in other ways disturb the handler and his dog, or the test manager and his/her staff.

7.9. Monitoring requirements

When a dog equipage (dog plus handler) is tested the test manager shall at all times monitor the search or a qualified person appointed by the test manager. The aim of the monitoring is to observe whether the equipage searches according to the demining agency's SOP. The monitoring shall be undertaken in such way that it doesn't disturb or distract the handler and the dog during search.

7.10. Management of records

The test manager shall ensure that the test area records are kept away from visitors and any of the members of the demining agency. The test manager shall not show the records of the test areas to the dog handler or other representatives from the demining agency.

7.11. Debrief

The test manager shall debrief the dog handler(s) and other members of the demining agency upon completion of the test. The debrief shall include information about the results of the test but will not include a review of the test area records. Moreover, it should address aspects related to the way the search was undertaken. The dog handler should be encouraged to express his/her view of the test during the discussion.

It may be necessary to debrief the management of the demining agency separately about the results of the tests. This should be considered if the test manager or some of his/her staff has observed severe weaknesses with all or some of the dog equipages. The test manager should express his/her views objectively and suggest what corrective action may be necessary. The demining agency is, however, not bound by these recommendations. The brief should be seen as a means of making the management of a demining agency aware of potential faults and weaknesses in the opinion of the test authority.

7.12. Approval of test protocol

Upon completion of the test, the test manager shall ask the dog handler to sign a test protocol as a confirmation on agreement to the way that the test was undertaken and the results of the test. The test protocol should include space for comments by the test manager and the dog handler. If the dog handler objects to the test procedures or other aspects of the test, his/her personal views and reservations may be written on the test protocol form.

8. License test 1 – Landmine test, primary clearance of land/roads

8.1. General

Taking into account the elements described under point 5, three principal license layouts appear suitable:

a) Dogs to be tested against buried test items in lanes that are oriented diagonally or in parallel with a base lane.

b) Dogs to be tested against buried test items in grids that are oriented in parallel with a base lane.

c) Dogs to be tested against buried test items in test boxes of various sizes.

The above three systems generally cover most methods of MDD operations in the international community.

This standard acknowledges the fact that different MDD agencies do train and operate dogs slightly differently. The test should reflect as much as possible the SOP of the agency. Therefore IND test areas will accommodate the three categories. License test 1 is applied when the requirement is to determine the capability of dog equipages to detect buried mines and UXO during primary clearance. There may, however, be circumstances when other systems will have a greater application. Most of the general preparation and management principles should, however, be applied for all systems of testing.

There may be some differences between operational procedures used for area and road clearance. The test site requirements proposed in this standard are, however, considered suitable as a license test for both categories of work.

IND shall also conduct testing using operational procedures of each contractor.

8.2. Aim of the test

While license testing of dogs that are intended to be used for regular mine/UXO detection can be undertaken in many different ways, the test should be founded on a few general principles:

a) The aim is to build confidence in a dog's capability to detect target objects with a minimum of false indications.

b) The test is not determining a dog's reliability in detecting a high number of mines during a longer time period. Much more comprehensive test procedures would then be required.

c) The test is not addressing the capability and reliability of a complete clearance system. It should be seen as a confidence test of an individual demining tool, which in this case is the handler and his dog.

d) Although the test should replicate realistic scenarios to the extent possible, the test must be manageable and unambiguous. Thus it should be designed and undertaken in such way that the handler and his/her dog is tested under significantly better conditions that the demining agency would tolerate during live operations.

8.3. Measures and marking

The size of each test area may differ dependent on the operational search system used by the demining agencies. The most common search length (distance that the dog moves from the handler) for a dog is, however, 10 m and the test areas used in the majority of the countries also measure 100m^2. It is often impractical to establish and manage a test field with different sizes of test areas. Thus, all demining agencies in a country should be encouraged to use the same search length to facilitate easier testing. The recommended search length is 6-10 m but there may be circumstances where different search lengths have a greater application.

The following measuring rules shall apply when preparing a test site with test areas (License test 1):

a) Each area shall be recorded on a 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. All corner markers shall be accurately recorded on the test site map.

c) All sides of a test area shall be marked with tape or similar material prior to the emplacement of the test items.

d) The temporary side marking shall be removed during the soak time. The test areas should as much as practically possible reflect the SOP marking system used by the agency. This also assists in monitoring of the test.

e) The accurate location of all test items and recognition pieces shall be recorded. There are several ways of measuring the exact location of the test pieces. Although all the test areas should ideally be rectangle and or square, this may not always be the case. A measuring system, which allows some degree of inaccuracy in the test area shape, is therefore preferable.

f) The test field should have one or several clearly recognizable benchmarks. Distance and compass bearings should be taken from at least one corner marker for each test area to a benchmark. This will ease the preparation and orientation of test fields and facilitate the location of the corner markers, as this can prove difficult after rain or the winter season.

8.4. Minimum distances

a) The minimum distance between each test area shall be 3m but the preferred distance is 5 m or greater. This will allow the handler and the dog to move freely around the test area with little risk of the dog running into neighboring test areas during rewarding, or the handler stepping into an adjacent test area by mistake.

b) The minimum distance between each mine shall be 3 m.

8.5. Burial depth

The test items shall be buried to varying depths, from surface laid (but camouflaged) to 10 cm (10cm to the upper most [top] surface of the target) or to the depth required by IND.

8.6. Recognition pieces

It is desirable to verify the exact location of the test items without disturbing the ground physically. Some of the test items may not contain metal or their metal content is limited. It may then be difficult to distinguish between the reading from a mine and potential metal fragments in the ground. Adding a piece of metal beneath the mine will artificially increase the metal content of the test items. A piece of metal is indeed theoretically detectable for dogs but this is not considered to have a significant impact on the results of the test. If recognition pieces are to be used, the following principles shall apply:

a) The recognition piece should be made of cut reinforcement rods or similar material.

b) Each metal piece should not exceed 15 g.

c) Each metal piece shall be decontaminated according to the principles described under paragraph 4.5.

d) The metal pieces should be placed centrally under the test items in the ground.

e) Care must be taken not to contaminate the mine or metal piece during attachment.

If metal recognition pieces are used during the training of a dog, this may lead the dog to believe that it should detect metal pieces and not the target substance. Consequently it is necessary during the test to ensure that the dogs are detecting the test items and not the recognition pieces. If all the test items are equipped with recognition pieces, additional recognition pieces should be buried at other additional locations inside the test area. If a dog also indicates these locations during the test, the test manger may terminate the test and prepare for new test in an area where recognition pieces have not been used.

8.7. Primary and secondary verification of a test area

Dogs are typically used for primary and secondary search due to the requirement for a minimum of two dogs in a search. The first search of an area is considered the primary search while the second search is the secondary search. NS 09.41 explains potential problems that that may occur with the secondary search dog detecting the scent from the primary search dog. For the purpose of this test all dogs that are used as both secondary and primary search dogs should be tested as primary search dogs. Consequently each dog should be given test areas that have not previously been searched by another dog or have been subjected to a minimum soak time of 1 month.

There may be circumstances where space and test area limitations prevent the test manager from assigning only unused test areas to each of the dogs. Although not recommended, two dogs can be tested in the same test area provided that the following conditions are applied:

a) Only the two dogs that work in pairs should be tested in the same test areas.

b) Each of the dogs should be tested as primary search dogs in at least one test area but preferably two test areas. If a dog is to be tested in three test areas, the first dog should search as a primary search dog in test area 1 and 2 and as a secondary search dog in test area 3. The second search dog then searches as a primary search dog in test area 3 and as a secondary search dog in test area 1 and 2. The use of four test areas will allow the two dogs to undertake primary search in two test areas each, which is recommended.

c) The first search dog should be ordered to sit randomly 3-4 times at spots in the test area after completion of the search and before the second search dog is allowed to search the test area.

8.8. SOP regulations

The dog equipage shall undertake the search according to procedures described in the demining agency's SOP. There may, however, be circumstances where search procedures must deviate from the SOP. Some demining agencies have established a system of withdrawing the dog upon indication of a mine. If manual inspection of the spot proves the presence of a mine or UXO, mine dogs are considered unsuitable for further work in that area. The dog may therefore be trained not to continue a search in an area after the discovery of the first mine. This habit may cause some confusion during testing when a dog is asked to continue the search in the same test area. Experience has, however, shown that this problem can easily be overcome with minor changes in the training procedures and that these changes will not be a delaying factor. It is impractical to use only one mine in each test area and thus the test authority shall have the right to ask for certain changes in the operational procedures to facilitate the accomplishment of the test. Such demands should be communicated to the demining agency well in advance of the test to allow re-training of the dogs if necessary.

8.9. Wind direction

The dog handler shall evaluate the wind direction and other environmental factors prior to the test and use own judgment when deciding the search direction. He/she may at any time during the search change the search direction if the wind direction changes.

8.10. Search break

The dog handler may ask for a search break at any time during a search. A break may be required because of a provisional concentration lapse, or the dog or the handler needs to drink water. If the dog handler uses two dogs, he may let the first dog rest and start the search with the second dog in another test area as assigned by the test manager. A dog equipage may not be able to complete the search of all the assigned test areas during one day. The search may then be continued the next day provided that the given time limitations contained in the test have not been exceeded.

8.11. Size requirement

Each dog equipage shall search a minimum area of 300 m^2 during License test 1. The national mine action authorities may, however, decide that a larger area should be cleared. Between 300m^2 and 500m^2 is recommended as suitable for the testing of one dog equipage.

8.12. Required number of test items

Each dog equipage shall be presented with a minimum of 5 test items during the test. It is, however, desirable to use a higher number of test items provided that the required minimum space between the test items (3 m) is maintained. The test items can be placed anywhere in the test areas and not all of the test areas need to contain test items.

8.13. Time restrictions

IND will establish a policy on time restrictions during license testing. This policy should reflect the normal time it would take for a dog equipage to search a similar area during live operations when the search is undertaken according to the demining agency's own SOP.

8.14. Termination of the test

The dog handler may terminate the test if at any time he/she believes that the dog is suffering from a lapse in concentration or for some reason is not working properly. The dog handler can ask for a termination of the test for one dog, and still complete the test with a second dog if desired.

A termination of the test is not considered a failure to pass the test and the demining agency may ask for a new test at any time. Frequent terminations by the same demining agency, however, may place an intolerable burden on the test authority and on the test field. In such situations the test manager should inform the demining agency, and if necessary apply sanctions. Such sanctions could be a delay before the demining agency is allowed to test their dogs again.

8.15. Pass and fail criteria

IND is responsible for establishing a policy on criteria for passing and failing license tests. In this process, the following minimum requirements shall be applied:

a) Due to the limited number of test items used in the license test, the dog should find 100% of all the test items during the test and have no more than 5 wrong indications per 100m^2 of test area.

b) If the dog handler believes strongly that a false indication in fact was a correct one, he/she shall have the right to complain to the test manager and ask for an inspection of the spot where the dog indicated. If the test manager upon inspecting the spot agrees that the false indication could possibly be caused by the presence of target substance (explosive, metal, plastic etc), he shall disregard the false indication.

c) Dogs have proven to be capable of detecting mine/UXO accurately (+/-30 cm) provided that the wind speed is limited and the soil conditions are favorable (limited clay content). The accuracy does, however, depend on the way a dog has been trained. Some dogs may not have been trained for accurate detection of mines. It is considered essential that dogs are capable of detecting mines accurately and thus dogs that are incapable of indicating accurately should be re-trained rather than applying changes to test requirements. IND standard allows a maximum tolerable distance between a test item and the indication given by the dog to be 1 m.

d) If a dog scratches repeatedly at the ground when sniffing for test items, it should be considered to have failed the test.

e) If the handler and his/her dog do not apply the search pattern and procedures as described in the demining agency's SOP, the test manager may fail the dog and the handler.

f) If the search has not been completed within the given time frame, the test manager may fail the dog and the handler. This decision should, however, be taken based on an individual evaluation of each situation. It may be that the dog has suffered from a contemporary concentration lapse with the result that it was taken out of the search for a period. If the dog equipage has followed a normal search speed during the effective search, the test manager may decide to issue a license even if the dog equipage failed to clear the area within the given time frames.

9. Sanctions

9.1 General

IND shall establish a policy of pass/failure criteria including sanctions to be applied against the equipage and the demining agency if one or several of its equipages fail to pass the test. It is assumed that when a demining agency applies for testing, it has already undertaken internal quality control on the performance of its equipages with positive results. Repeated failures to pass the test by some equipages, or the failure by a large percentage of the equipages of weak quality management within the demining agency. If 30% or more of the equipages tested fail to pass the initial test, IND should consider withdrawing the overall demining accreditation for given period. If more than 50% of the demining agency's dog equipages fail to pass the test, the national mine action authority should consider withdrawing the demining accreditation for longer periods.

The following recommendations should be taken into consideration when establishing a policy for appropriate sanctions to be applied against individual equipages and agencies:

a) If an equipage fails to pass the license test, it should not receive the license. The dog handler may, however, immediately obtain a license with another dog.

b) The demining agency may apply for a re-testing of the equipage. There should, however, be a minimum time delay between the first and the second test, to allow the equipage to undergo re-training. It will also be a reward for the equipages that manage to pass the test during first attempt. If an equipage fails to pass a test the first time it shall be denied the right to be re-tested for a minimum period of 1 week.

c) If the equipage fails to pass the second test, the demining agency may apply for a third re-test. An increased time delay between the second and third test shall, however, be applied. It is assumed that an equipage failing to pass a test twice will need a longer period of re-training. If an equipage failing to pass a test two times it shall be denied the right to be re-tested for a minimum period of 1 month.

d) If an equipage fails to pass the test three times, it can not be expected to detect mines consistently and thus it should not be allowed to apply for re-testing for a significant period of time. It is recommended that a dog equipage that fails to pass a test three times should be denied the right to be re-tested for a minimum period of 6-12 months.

10. Management of records

10.1 Record preparations

The test field shall be thoroughly recorded. The records shall include but are not limited to the following elements:

a) A map of the test site, which clearly shows the exact boundaries of the test field and all of the test areas as well as relevant supplementary information about the test field, such as prevailing wind direction, fencing, entrance, safe lanes, marking system etc.

b) A map with supplementary records of each test area. The map and the supplementary records shall contain the exact location of the test area, the test items, the depth, type and state of each test item, any recognition pieces located under the test items and elsewhere in the test areas and permanent test area markers. The map and the records should also include other relevant information about the test area, such as the names of the people responsible for the preparation of the test area, and the date when the test area was prepared.

c) It may not be necessary to prepare a map with supplementary information for each of the test areas separately. Several test areas with supplementary information may be incorporated into one map or record sheet.

10.2. Confidentiality requirements

The credibility of the test is dependent on a restricted access to the records, as well as confidentiality about the location and number of test items in the test areas. Thus only a few trusted people should be involved in the preparation of the test areas. None of them should be directly or indirectly affiliated to any of the demining agencies. The test manager alone should prepare two examples of the records and the maps, preferably. Both examples should be stored separately at secure locations notified by IND. The test manager should be the only person with access to the copy of the records. The original records should be stored at a secure location in such way that no one can access them without permission from the test manager, or without prior written confirmation from IND.

11. Responsibilities and obligations

11.1. IND

IND shall be responsible for defining national standards for dog detection operations, and for identifying and preparing and using suitable test sites according to and principles described in this standard. IND shall appoint a well-qualified test manger, which should be given the overall responsibility for the planning and preparation of the test site and the management of the test field and the tests.

IND shall ensure that a policy is established for the preparation of maps and records of the test field and that these records are stored in such way that only authorized people can have access to them.

IND shall ensure that the test field is secured in such way that undesired intruders are prevented from entering the area.

IND shall be responsible for the impartial and just policy on license testing of equipages and regulations for the pass and failure in accordance with this NS. The length of license for equipages in Mozambique is set at six months. Failure sanctions to be applied against an equipage and demining agency that owns it are in accordance with this NS. A demining agency can appeal results of license tests in writing to the IND Director.

11.2. Demining agency

The demining agency shall ensure that it trains its equipages to standards required by IND. The agency shall also endure that none of its staff or affiliates contaminate the test site before and during testing, by such acts as the spillage of petroleum products, or the unauthorized use of the test areas before and during testing.

The demining agency shall obey regulations provided IND and the test manager about general access restrictions to the test field during periods when the demining agency is not being tested.

The demining agency should also make every effort to assist IND in the creation and operation of test facilities, and the establishment of a high quality dog mine and UXO detection programme.

Annex A
(Normative)
References

The following documents when referred to in this standard, form part of the provisions of this standard

a) IMAS 09.40; Glossary of terms of definitions

b) IMAS 09.41; Operational procedures for mine detection dogs

The latest version/edition of these references should be used. UNMAS hold copies of all references used in this standard. A register of the latest version/edition of the IMAS standards and references is maintained by UNMAS, and can be read on the UNMAS website: (See www.un.org/Depts/dpko/mine/). National mine action authorities, employers and other interested bodies and agencies should obtain copies before commencing mine action programmes.

Annex B
(Informative)
Terms and definitions

1.1. test area
A rectangular and or square area that is developed for the purpose of being searched by mine dogs during the license test. A test area typically measures 100m^2 but other sizes may be preferred

1.2. scent
A distinctive, often agreeable odor.

1.3. decontamination
A process of removing undesired contamination from test items, tools and accessories that are used when preparing a test field

1.4. environmental factors
Factors related to the environment and that influence the transportation of scent from the mine, the detection of the target scent or the capability of people and dogs to work safely and effectively (i.e. wind, temperature, humidity, rain, altitude, sun and vegetation)

1.5. test site
The site at which a series of test areas or lanes are prepared for the purpose of License testing

1.6. recognition piece
A metal piece, which is placed under test items to make them recognizable with a metal detector

1.7. undesirable scent
Factors related to the environment and that influence the transportation of scent from the mine, the detection of the target scent or the capability of people and dogs to work safely and effectively. Such factors can be, wind strength, temperature, humidity, rain, altitude, sun and vegetation

1.8. 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.

1.9. DNT (Dinitrotolulene)
An impurity product of TNT. As the vapor pressure of DNT is much higher than that of TNT itself, it may prove easier to characterize a mine by detecting the vapor from DNT rather than TNT.

1.10. RDX (1, 3, 5-triazacyclohexane)
RDX is another military explosive, which is used extensively as a booster charge in many munitions formulations, especially in artillery shells. 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.

Annex C
(Informative)
Bibliography

The following documents when referred to in the text of this standard, form part of the provisions of this standard.

a) DERA (1996); *How does a dog smell? – 'A brief review of canine olfaction' (Helen Almey and Stephen Nicklin)*

b) BH MAC, Bosnia (1999); *Standards for mine dog detection*

c) UNMIC, Kosovo (1999); *Standards for mine dog detection*

d) NPA Mozambique (2000); *Procedures for the testing of min detection dogs*

e) Sandia National Laboratories (1998); *Simulation of the environmental fate and transport of chemical signatures from buried landmines (James M. Phelan and Stephen W. Webb)*

f) Sandia National Laboratories (1998); *Prediction of TNT signature from buried landmines (S.W. Webb, J. Phelan, K. Pruess and S.A. Finsterle)*

g) Sandia National Laboratories (2000); *Explosive fate and transport, FARPA Dog's Nose Program – 'Progress report' (J. Phelan, J.L. Barnet and P.J. Rodacy)*

h) Sandia National Laboratories (2000); *Post-Blast Residue from Antipersonnel Landmines (J.M. Phelan, J.L. Barnett and P.J. Rodacy)*