



# **Cambodian Mine Action Standards (CMAS)**

## **Chapter 13**

### **Clearance Marking Systems**

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## **Introduction**

The marking of mines and Explosive Remnants of War (ERW), including unexploded sub-munition hazards is undertaken to provide a clear and unambiguous warning of danger to men, women and children in the affected community and, where possible, to install a physical barrier to reduce the risk of unintentional entry into hazardous areas.

Marking must be of a distinct and durable character and must at least be visible to a person who is about to enter the perimeter-marked area.

Warning signs based on methods of marking readily recognizable by the affected community should be utilized in the marking. Signs and other hazardous area boundary markers should, as far as possible, be visible, legible, durable and resistant to environmental effects and should clearly identify which side of the marked boundary is considered to be within the contaminated areas and which side is considered to be safe.

This CMAS is to specify signs, markers and marking systems to be deployed before, during and after clearance operations, which are known as clearance marking systems. This CMAS does not describe systems to mark mine/ERW fields not for immediate clearance. Mine/ERW fields not for immediate clearance are generally not marked due to resources, environmental conditions and potential removal by the local population.

# Clearance Marking Systems

## 1. Scope

This standard specifies the minimum requirements for marking of minefields, ERW fields including sub-munition fields in preparation for immediate clearance operations. It also specifies marking systems used during clearance operations. Individual organizations shall ensure that their Standard Operating Procedures (SOP) meet the minimum requirements of this standard.

## 2. Terms and definitions

A complete glossary of all the terms and definitions, abbreviations used in the CMAS series of standards is given in CMAS 30.

## 3. General characteristics of marking systems

The design of marking systems should take account of local materials available and the period for which the marking system will be in place. It is accepted that materials used in marking systems should have little, if any, value or practical use for purposes other than the marking. If material of any practical or intrinsic value is used, then it is likely to be removed by the local population.

### 3.1. Signs and markers

A hazard sign is a permanent or semi-permanent notice giving information in a written and symbolic form which, when placed as part of a hazard marking system, is designed to provide clear warning to the local population of the presence of mines and ERW. Samples of hazard signs are given in Annex A. The words should represent the predominant hazard (mines or ERW) and the symbol should indicate 'danger' in a form which will be recognised nationally by men, women and children.

Hazard signs and markers should be clearly visible in daylight at a distance of 30m and from adjacent signs and markers. If markers are masked by vegetation or terrain, the use of additional markers should be considered.

Hazard signs and markers should not be constructed of munition casings, materials that may have contained explosives, or discarded weapon systems.

### 3.2. Marking systems

- a) The marking system should be applied prior to the commencement of clearance operations (boundary marking), during clearance operations (operational marking) and at the end of clearance operations (post-clearance marking).
- b) Improvised marking systems are generally placed or erected by the local population. Clearance organizations should avoid using improvised marking systems. Improvised marking systems erected by the local population should be replaced with a permanent marking system as soon as possible.
- c) On rocky ground or in areas where pickets cannot be driven into the ground, either red/white painted suitable objects or paint applied to the ground is to be used as a substitute. As clearance advances, any paint applied to rocky ground must be removed.

- d) Clearance marking generally consists of; 1) boundary marking; 2) operational marking and 3) post-clearance marking:
- i. **Boundary marking.** The purpose of boundary marking is to define the limits of clearance operations. Ideally, boundary marking should be commenced and completed before the start of clearance operations. Due to time consumed with boundary marking, clearance operators may carry out boundary marking concurrently with clearance operations.
  - ii. **Operational marking.** The purpose of operational marking is to differentiate unambiguously between cleared and uncleared areas. In addition, it is to designate clearly the layout of an operational site for clearance operations.
  - iii. **Post-clearance marking.** The purpose of post-clearance marking is to precisely record boundary of cleared area. Post-clearance marking is carried out concurrently with clearance operations or when clearance is completed. Post-clearance marking is done for future reference.

#### 4. Markers and marking systems

The following paragraphs describe locations where marking is required and the characteristics of markers and marking systems:

- 4.1 **Bench Mark:** The bench mark (BM) should be marked with a 150cm high, 15cm x 15cm wide concrete post painted white. Operators may write the name of their organization and logo on the post if they wish to. (See annex B, figure 1)
- 4.2 **Start Point:** The start point (SP) should be marked with a 150cm high, 15cm x 15cm wide concrete post painted white with 10cm on the top painted red. When the mine/ERW field is cleared/released, the whole concrete post must be painted white. (See annex B, figure 2)
- 4.3 **Control point (admin & parking area):** The control point (CP) is to be marked with 150cm high poles painted white at the top 20cm at all turning points and intermediate points. (See annex B, figure 3)
- 4.4 **Admin area:** The scrap metal pit, rubbish pit, mine debris pit, detector test area, demonstration area, access to and around the toilet, access to explosive storage and parking area should be marked with 50cm pickets painted white at intervals of a maximum of 2m distance. (See annex B, figure 4)
- 4.5 **Explosive store:** The mine/ERW field explosives store shall be kept at a safe distance from the admin area and marked with 150cm poles painted red/white/red and with a mine sign attached at every corner. It is to be clearly recognizable and kept away from possible flames/sparks. (See annex B, figure 5, 6)
- 4.6 **Neutralized-mine pit:** The pit for neutralized mines is to be marked with 150cm poles painted red/white/red and with a mine sign attached at every corner. (See annex B, figure 5)
- 4.7 **Boundary of mine/ERW field:** The boundary of mine/ERW field is to be marked with 150cm poles painted red/white/red with a mine sign attached to be placed at a maximum interval distance of 25m and at all turning points. If required, intermediate points should be introduced to ensure visibility of the poles. At the

turning points, the mine signs should be positioned in such a way that they are visible from both angles. (See annex B, figure 5)

- 4.8 **Mine/ERW field perimeter:** The mine/ERW field perimeter will be marked during clearance with 150cm poles painted red/white/red placed every 25m, with 50cm red pickets a maximum of every two meters where the ground outside the perimeter is suspect. Perimeter marking will only be moved during clearance if the mine/ERW field is expanded. (See annex B, figure 5, 6, 7)
- 4.9 **Start of working lane:** The start of working land should be marked with a 50cm blue picket placed at the start of work and kept in place until the end of work. This can then be used to measure the clearance progress and the daily achievement of each deminer. (See annex B, figure 12)
- 4.10 **Working lane:** For semi-permanent marking, a maximum interval of 2m is to be applied. For working lanes, the interval marking is dependent on the methodology and must be stipulated in operator's SOPs. (See figure 7)
- 4.11 **A discovered mine:** A discovered mine should be marked with a 50cm picket attached with a mine sign and two other 50cm red pickets are to be placed at 50cm from the mine. These three pickets are to be driven into the ground in line at 30cm spacing with the middle one attached with a mine sign at the top. (See annex B, figure 7, 8)
- 4.12 **Location of APM found:** The location where an APM was found should be marked with a 50cm yellow picket with the type and depth (in cm) of the mine clearly marked on the picket in English. (See annex B, figure 9)
- 4.13 **Location of ATM found:** The location where an ATM was found should be marked with a 100cm yellow picket with the type and depth (in cm) of the mine clearly marked on the picket in English. (See annex B, figure 10)
- 4.14 **Location of ERW found:** The location where an ERW was found should be marked with a 50cm picket painted yellow/white with the type of item clearly marked on the picket in English. (See annex B, figure 11)
- 4.15 **Temporary uncleared area:** On occasions it may be necessary to leave an uncleared area within the marked mine/ERW field perimeter. These areas shall be marked by 50cm red pickets at 2m intervals, with 150cm poles at the corners or turning points. When clearance is completed they are to be re-marked as defined in post-clearance marking. (See annex B, figure 5, 7)
- 4.16 **Contaminated soil piles:** The contaminated soil piles (fragmentation pits) shall be marked with 50cm white pickets with maximum 1m intervals. These contaminated soil piles shall be located in cleared ground. (See annex B, figure 4)
- 4.17 **Marking of cleared mine/ERW field:** On the completion of a clearance task, the perimeter turning points shall be marked with buried metal bars of 30cm in length driven into the ground to a depth of 30cm below the ground surface and, where possible, red/white concrete posts are also to be used. (See annex B, figure 16, 2)
- 4.18 **Internal QC areas:** Internal QC areas should be marked as the following:

- I. **Area QC by field staff:** The area QC by field staff (section, team, platoon, site commanders) should be marked by 50cm pickets painted green at the top 10cm. (See annex B, figure 13)
- II. **Area QC by regional staff:** The area QC by regional staff should be marked by 50cm pickets painted green/white at the top 10cm for each colour. (See annex B, figure 14)
- III. **Area QC by headquarters staff:** The area QC by headquarters staff should be marked by 50cm pickets painted green/white/blue at the top 10cm for each colour. (See annex B, figure 15)

## **5. Responsibilities**

### **5.1. Cambodia Mine Action Authority (CMAA)**

The CMAA shall prepare and publish standards for the design and construction of appropriate and affordable mine/ERW markers and marking systems and monitor its implementation.

### **5.2. Clearance organisations**

Clearance organizations must develop standard operating procedures (SOP) to comply with the requirements of this standard.

Clearance organization must brief men, women and children in affected communities and local authorities the markers and marking systems and request cooperation to maintain and respect the marking systems.

Phnom Penh 13 August, 2015  
Secretary General

PRUM Sophakmonkol

## Annex A Marking Signs

Figure 1: UXO sign



Notes:

1. The sign should have a red background with a white symbol for danger. The universal symbol for danger is the skull and crossbones.
2. The words 'Danger UXO' should appear on the sign in Khmer and English.
3. The rear surface of the sign should be white.
4. Dimensions should not be less than that indicated on the diagram.

Figure 2: Mine sign



Notes:

1. The sign should have a red background with a white symbol for danger. The universal symbol for danger is the skull and crossbones.
2. The words 'Danger Mines' should appear on the sign in Khmer and English.
3. The rear surface of the sign should be white.
4. Dimensions should not be less than indicated on the diagram.

## Annex B

### Markers (posts, poles, pickets, metal bars)

- a) **Post:** 150cm x 15cm x 15cm made of concrete painted white 50cm from the ground and red at the top 10cm (figure 1, 2)
- b) **Pole:** 150cm in length to be painted in 20cm for each colour (figure 3, 5, 6)
- c) **Picket:** 100cm in length painted yellow at the top 10cm for marking location of found ATM (figure 10)
- d) **Picket:** 50cm in length painted in 10cm for each colour (figure 4, 7, 8, 9, 11, 12, 13, 14, 15)
- e) **Metal bar:** 30cm in length is buried 30cm under the ground surface (figure 16)

