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Best Practice Guide on National Procedures for Stockpile Management, Security and Destruction of Man-portable Air Defense Systems (MANPADS)

This best practice guide was originally drafted and developed as Annex C – Man-portable Air Defense Systems (MANPADS) to the Best Practice Guide on National Procedures for Stockpile Management, Security and Destruction by the governments of the United States of America, Germany, Canada, France, United Kingdom, Italy, Russian Federation, Sweden and Turkey.

This revision establishes a stand-alone, best practice guideline on National Procedures for Stockpile Management, Security and Destruction of Man-portable Air Defense Systems (MANPADS), drafted by the government of the United States of America with review and recommendations submitted from Germany, United Kingdom, Russian Federation, Switzerland and OSCE Field Offices.

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I. Introduction

1. Aim

Man-Portable Air Defense Systems (MANPADS) require special attention and consideration in view of the devastating loss of life and potential effect on the civil aviation industry that a single MANPADS attack could cause. The aim of this best practice guide is to provide best practice guidance on Weapons and Ammunition Management for MANPADS, to include:

a. surface-to-air missile systems designed to be man-portable and carried and fired by a single individual; and

b. other surface-to-air missile systems designed to be operated and fired by more than one individual acting as a crew and portable by several individuals.

This best practice guide primarily addresses policy- and decision-makers as well as experts in the responsible authorities of the OSCE pS and Partners for Cooperation in charge of the life cycle management of MANPADS to help mitigate risks of illegal diversion and proliferation of MANPADS. Secondly, it provides guidance to stakeholders engaged in technical assistance projects uder the OSCE assistance mechanism, i.e., entities from assistance requesting and providing states as well as the OSCE executive structures engaged in assistance projects.

2. Purpose

The purpose of this guide is to:

a. Combat illicit trafficking in all its aspects through the adoption and implementation of national controls on MANPADS, including manufacture, propermarking and accurate, sustained record keeping(both of which contribute to improving traceability), effective export control, border and customs mechanisms, and through enhanced cooperation and information exchange among law enforcement and customs agencies at international, regional and national levels;

b. Contribute to the reduction, and prevention, of the excessive and destabilizing accumulation and uncontrolled spread of MANPADS, taking into accountlegitimate requirements for national and collective defense, internal security and participation in peace- keeping operations under the Charter of the United Nations or in the framework of the OSCE;

c. Build confidence, security and transparency through appropriate measures on small arms.

3. Scope

This best practice guide covers rules and procedures applicable to MANPADS. This includes:

a. Complete “Ready to fire” configurations;

b. The Weapon System (i.e., Launch tube and Gripstock);

c. The Energetic or Explosive Components (i.e., Missiles or Rocket Motors);

d. Supporting items (i.e., Thermal batteries and firing / user manuals).

These best practices are broadly applicable to other man-portable missile and rocket systems that are supplied in a fashion similar to those outlined above and likely to include Active Ordnance (ACTO).

4. References

A list of references can be found at the end of this document and includes complimentary reference to other, ancillary and supporting Best Practice Guidelines (i.e., BPG for National Procedures for the Destruction of SALW).

II. Procedures

1. Physical Security Measures for MANPADS stockpiling

a) The appropriate characteristics of stockpile location

Where the design of MANPADS permits, missiles and firing mechanisms (gripstocks) will be stored in separate storehouses and in locations sufficiently separate so that a penetration of the security of one site will not place the second site at risk. External, independent certification of the MANPADS sites and / or physical security measures should be introduced and executed regularly.

MANPADS should be stored in the most secure accommodation, providing the highest standards of physical security. MANPADS missiles should be stored in permanent structures, preferably in concrete ammunition storehouses equipped with adequate security doors, secured with at least two separate locks at each door (key control – see below). Firing mechanisms will be stored in a separate facility under physical security measures, which meet at least the requirements for SALW.

The perimeter of MANPADS storage sites should have clear zones, fences and internal and external lighting. Windows and other openings or access points should be kept to a minimum. All structures should be checked by facility security personnel at prescribed intervals, and random checks should also be conducted, including during off-duty hours. In cases where two or more units share a facility, one unit will be designated as responsible for the security of the entire facility.

In addition to certifying and testing locks on outer perimeter fencing, the inner (actual) MANPADS storage area should be continuously monitored (by security personnel or video surveillance) or have its own, secure inner fencing.

This inner fencing should be situated in relation to the structure so that a breach of the fence with an explosive device will not also breach the storage structure. Unless continuously guarded, all fence gates should be kept locked. Drainage structures, water passages or other objects penetrating the fence should be small enough to prevent any possible passage. A recommended minimum height of fences for MANPADS storage sites is 2 meters (or 6.5 feet)

Both internal and external locks must be certified and tested to delay unauthorized intruders attempting to gain access using battery powered tools by a minimum 10-minutes, allowing security forces to respond before MANPADS or their components can be damaged or removed.

Exterior building and door lighting is required for all structures where MANPADS are stored. The lighting should be of sufficient brightness to allow easy observation of unauthorized activity. Switches for exterior lights shall be installed in such a manner that they are accessible only to authorized individuals.

Additional security measures could include use of a combination of high security fencing, extra detection devices, CCTV, improved security lighting, biometric security devices, an independent/alternative power supply, increased patrolling or the introduction of guard dogs.

b) Surveillance

MANPADS storage sites should be placed under armed guards, and subject to continuous (24-hour per day) surveillance that will immediately detect any breach of security. The sites should therefore be equipped with an automatically operating, electronic intruder detection alert system.

Implementation of electronic security measures to prevent simultaneous access to separately stored missiles and firing mechanisms should be considered.

MANPADS storage facility sites should incorporate an intrusion detection system with physical security measures. The facility intrusion detection system should include point sensors on doors and other apertures allowing access by intruders, and interior motion or vibration sensors. All alarm signals should sound at a central control or monitoring station from which a response force can be dispatched. When a MANPADS storage facility is located outside a military installation, arrangements should be made to connect to local law enforcement or commercial security services from which immediate response to activated alarms can be directed. Alarm transmission lines should either have line security (electronically monitored to detect evidence of tampering or attempted compromise) or include two independent means of alarm signal transmission. Any visible lines should be regularly inspected for tampering. Alarm systems should also be tested regularly.

The intrusion detection alarm system, facility physical security measures and first responder security forces should be integrated so that, if an intrusion is detected and the alarm is transmitted, the physical security measures would delay any intruders and prevent access to stored MANPADS long enough for security forces to respond to the intrusion.

Storage areas should have a primary and backup means of communications that permit notification of emergency conditions. The backup system should be different from the primary.

The communication system should be tested daily. Radio could be one of the modes of communication.

Storehouses not under permanent technical surveillance should be permanently guarded. Ammunition storehouses which have a defective intruder detection system, or none at all, should be checked by guards at irregular intervals not exceeding 60-minutes.

Additionally, quick-reaction forces should be kept on standby, to be dispatched to any ammunition storehouse to investigate and establish the cause of an alarm.

c) Storage

MANPADS should be stored in original containers, banded, and sealed with tamper detection seals to reflect the integrity of the contents. Generally, containers weighing less than 225 kg (or 500 lbs.) should be fastened to a structure, or fastened together in groups, which have a total weight exceeding 500 lbs. with bolts or chains secured with padlocks unless such fastening would impede facility operations. Recommended additional security measures include the use of internal locking devices and two-person key control procedures. Hinge pins to doors should be welded or otherwise secured and windows and other openings kept to a minimum.

Airflow and climate considerations are essential to reduce the thermal cycling on ammunition. The erosion or reduction of stabilizers in explosive components could lead to reduced shelf-life and therefore, reliability and performance. It could also lead to potential instability increasing the likelihood of an Unplanned Explosion at a Munitions Site (UEMS) either in the depot, in transport or during use.

Unit-level stored stocks should typically be housed in a building used to store ammunition on a rifle range, or a military police / security force operations room. They should be stored in a secure arms room, vault, or a secured weapons storage container with minimum

standards (reference: BICC Starter Guide) for their structural integrity and access doors or points. If secured in combat vehicles, aircraft, ships, trailers, or in other configurations required by operational or training requirements, constant surveillance of the items should be established and maintained.

d) Review

The existing physical security measures for MANPADS stockpiling should at a minimum be reviewed in a five-year cycle by a designated group of experts and – if necessary – be revised and updated.

2. Access Control Measures

a) Personal Security

Access to MANPADS and parts thereof and any related classified material and information should be only limited to official personnel that meet the following requirements:

- with proper security clearance and an established need to know the information in order to perform their duties; and
- with access granted through a list of names issued by the head of the relevant storage facility.

Safeguards could be established under which entry to storage sites requires the presence of at least two authorized persons. All entries to MANPADS storage sites should be recorded in an access log, which should be kept as a record for a minimum period of at least one year. The quantity of MANPADS to be removed should be as small as possible to support specific missions or projects.

b) Lock-and-key handling and security

Keys to MANPADS storage areas should be stored separately from keys and devices for other conventional storage areas. Only personnel with authorized access to MANPADS should have access to keys.

Any authorized person should be authorized to receive only one key, ensuring that access to MANPADS storehouses is generally subject to a “two-person principle.”

Whenever a key is issued or returned, the following items of information should be recorded in writing:

- date and time when a key is issued or returned;
- key's serial number;
- signature of person issuing or returning a key;
- name and signature of the recipient.

All documents in which the issuance and return of keys is recorded will be kept for a minimum period of one year after the last entry has been made.

At prescribed intervals, typically every six months, the responsible officer of the storage facility concerned should check if the keys to the MANPADS storehouses are complete. The date and result of this check will be recorded in a security logbook, which should be periodically examined by the superior agency.

As soon as it becomes known or there is suspicion that a key has been lost or a duplicate key has been produced, the lock concerned should be immediately replaced.

Master keys deserves special attention. In case of loss of a master key, the replacement of the whole key system is absolutely necessary.

3. Handling and Transport

a) Secure handling

Where applicable, principal components - typically the missile in a launch tube and gripstock - should only be brought together and assembled:

- in the event of hostilities or imminent hostility;
- for firing as part of regularly scheduled

training, or for lot testing, for which only those rounds intended to be fired should be withdrawn from storage and assembled; and

• when systems are deployed as part of the point defense of high priority installations or sites.

Anyone handling or having direct access to classified MANPADS assemblies, components or pertinent documents (e.g. user manuals) should be subjected to an advance security / clearance check.

b) Procedures aimed at maximizing transport security

An in depth risk assessment and analysis should precede any movement, shipment or transportation of MANPADS regardless of the distance or duration of travel. All MANPADS and their components should be transported in a manner that provides for the highest standards and practice for safeguarding sensitive munitions in transit.

Where the design of MANPADS permits, missiles and firing mechanisms should always be transported and transshipped separately, and wherever possible in separate vehicles and at different times. MANPADS missiles and launch and control equipment should not be loaded into the same freight container. When missiles or firing mechanisms are transported or transshipped on public roads or inside civilian- / military-facilities, security should be provided by armed military transportation escort detachments. Transshipments should be conducted only by cleared and authorized personnel. In event that transportation is halted or delayed, the transport vehicles should be permanently guarded. Whenever possible rests or technical halts during a MANPADS transport should always be conducted in military facilities and placed under constant guard.

MANPADS should be transported in their original, sealed and locked shipping containers. When feasible, MANPADS shipments should be provided with a security vehicle escort. Positive control should be maintained over MANPADS transport as much as is possible. Clandestine transport, as detailed in the OSCE Best Practice Guide on National Procedures for Stockpile Management and Security, is not recommended for MANPADS transport under normal circumstances.

International transfers and / or transportation of MANPADS should be tracked and monitored via satellite tracking devices and / or with escorts in contact with a command and control center to ensure additional response should the shipment come under attack or require additional assistance.

A gapless accountability by serial numbers must be maintained from shipper to consignee. Shipping should be direct to its final destination with no delays or stop-overs in transit locations. Items moved by a unit or organizational transportation will be placed in the custody of a commissioned officer, warrant officer, senior noncommissioned officer, or civilian of equivalent rank.

A minimum of two authorized personnel are required if access to the MANPADS is necessary during transport. Each container should be checked for serviceability, ensuring the presence of a tamper-detectable seal, and physically locked by two individual agents of the shipper (in each other's presence) before delivery to the carrier. This two-person integrity is required at each transshipment point and terminal whenever the shipment loses its original identity (e.g., when two or more shipments are consolidated into another container for further movement or if repacking is required).

In the case of MANPADS shipments over water, prior to the voyage a written stow plan should be provided to the ship's captain detailing the location of the arms, ammunition, and explosives aboard ship and its protection requirements. MANPADS should be stowed in separate, locked containers, inaccessible to unauthorized personnel throughout ocean transit. MANPADS shipments should be direct-voyage to destination. If the cargo must be offloaded in route, it should be provided constant surveillance by government personnel, if available or by national crew-members pending reloading.

4. Inventory Management and Accounting Control Procedures

a. Management and System

A strong system of positive controls and accountability, from the lowest to the highest level should be put into place. Written verification should be provided on receipt of MANPADS. Diligent record-keeping is required for securing stockpiles, ensuring control, and providing safety surveillance. Training and staffing should be carefully managed to ensure dependable funding and personnel support to ensure accountability.

Inventory should be by serial number of firing mechanisms and missiles, with written records including serial numbers maintained. Procedures should be put into place that ensure regular reporting of missiles and rockets issued for training; missiles and rockets returned unexpended from training; and expended residue, as applicable. Procedures should be established for appropriate MANPADS inventory managers to verify requisition of MANPADS. These requisition verification procedures should include positive steps for rejecting excess and unauthorized requisitions. Any procurement plans or contracts should provide for individual item serialization.

It is important to have a separation of powers between issuing MANPADS and certifying them as expended: i.e., one person is authorized to issue but not expend; and another is allowed to certify expenditure but not issue the MANPADS.

Complete physical inventory of all MANPADS should be compiled at least once a month at the unit level, semi-annually at the installation level and annually at the depot level. A centralized national inventory should be maintained. Controls would include reconciliation of accounting documents against existing stockpiles. Such regular inspection ensures that any discrepancies are reported promptly. A complete count of the contents of any box should be undertaken if there is any evidence of tampering.

MANPADS components expended or damaged during peacetime should be accounted for by serial number. Obsolete MANPADS, MANPADS components or items beyond economical repair should be destroyed in a timely manner and in such a way as to avoid subsequent repair and re-use, with destruction accounted for by serial number. Responsibility for destruction rests with the country owning the MANPADS. However, the original producing country should provide technical advice and assistance on destruction procedures when requested. All confirmed thefts, losses, and recoveries of MANPADS should be promptly reported to the appropriate national law enforcement. All records of MANPADS turnover should be kept indefinitely.

As far as the issuance and return of classified and / or sensitive equipment, components, documents etc. relating to MANPADS are concerned, it should be ensured that the whereabouts of the issued materiel are traceable physically and to the responsible person(s) at any time.

MANPADS producing and / or exporting countries could supplement controls further by the introduction of invisible marking procedures into the missile and firing mechanism (gripstock) technology process. Other technologies such as RFID chips, could also be implemented for improving management and tracking of MANPADS.

III. Demilitarization and Destruction

There are destruction methods that are suitable for any contingency, quantity and type of MANPADS and the choice of methods will depend on any number of variables.

Table 1 places the destruction methodology into comparative groupings. These comparisons are subjective, simplistic and purposely general, and may not apply in all circumstances. Operator skill, type and composition of MANPADS, site organization, labor costs, security, urgency, and whether equipment is custom built or commercial-off-the-shelf (COTS) are primary but not sole determinants of these assertions.

Where applicable, national authorities and / or external actors executing demilitarization and destruction of MANPADS will comply with provisions outlined in Section II (Procedures). Where provided, costs are given in US dollar estimates.

For further details on various destruction procedures, users of this guide should refer to Report of the UN Secretary General on Methods of Destruction of Small Arms, Light Weapons, Ammunition and Explosives (See Key References below).

Table 1 lists methods generally applicable to States or areas involved in conflict or emerging from a post- conflict situation; where infrastructure may be poor; funds may be lacking; and requirements of speed and security are paramount.

These methods may also be applicable in situations where transparency and confidence-building are required. In these situations, environmental concerns may be subordinated to security concerns. To ensure that parts (e.g., rocket tube, gripstock, etc.) are not reused, repurposed or that a system cannot be reconstituted from spare parts or pieces: open burning, explosion and vehicle crushing should be followed by off-site disposal (preferably in a secure guarded site) depending on availability of funds and infrastructure.

Ultimately, total destruction of a MANPADS is the preferred disposition.

It should be made clear that warheads and rocket motors should not be crushed.

Table 1 **Low Cost and Field Expedient Techniques**
Selected Comparative Characteristics

Characteristics	Open-Pit Burning	Open-Pit Detonation	Crushing by Vehicles
Safety Concerns **(Assume properly trained personnel disassemble / remove warhead and rocket motor)[2]**	Low – depends if combustible material present	[1]High – if non-EOD personnel Moderate – for EOD (if HE munitions used)	Low – non-combustible material only
Environment and Ecological Issues	Moderate – depending on fuel used	Low to Moderate – depending on explosives used	No – properly dispose of non-combustible material
Capital Cost[3]	Low – fuel costs only	[1]High – reduced if increased amount of systems destroyed	Low – operating cost of suitable vehicle (bulldozer, tank, etc.)
Operating Cost per MANPADS **(No Labor)**	Low – few dollars each (due to limited numbers)	(See above)	Low – few dollars each (due to limited numbers)
Skill Level	Low	[1]High – for EOD skills	Low
Infrastructure	Low	Low	Low
Destruction Efficiency	Moderate – MANPADS must be checked post burn (depends on generated heat)	Very Effective (if properly executed)	Very Effective – no useable parts remain (checked in case 2nd attempt required)

Notes: provided by host-nation authorities

1 High capital costs in the open-pit detonation column can be further reduced by a) using "donor" charges provided by host country authorities (e.g., surplus explosives and conventional ammunition), and b) cross-fertilization with regular training initiatives of EOD units among others in support of preparation for peace-keeping operations.

2 Disassembly and removal of explosive warhead requires qualified expertise (Explosive Ordnance Disposal Technician).

3 Donors should recognize that costs associated with structural development, technical training, and equipment procurement of demilitarization facilities means that initial costs per MANPADS will be high but subsequent demilitarization is much cheaper as economies of scale take effect when national capacity has been established.

EOD = Explosive Ordnance Disposal; HE = High Explosives

IV. Key References

OSCE Strategy to Address Threats to Security and Stability in the 21st Century (*inter alia*, paragraphs 9,15, 29,31,46,47,48 and 54); 02 December 2003 https://www.osce.org/mc/17504

> *47. The OSCE is using all the tools at its disposal to address proliferation of man-portable air defense systems (MANPADS), including those provided for in the OSCE Document on SALW. As a first step, the FSC is promoting the application of effective and comprehensive export controls in respect of MANPADS, as well as encouraging States to seek assistance in destroying excess MANPADS and ensuring the security and integrity of national stockpiles to guard against theft or illicit transfer.*

FSC Decision on *MAN-Portable Air Defense Systems*; **FSC.DEC/7/03;** 23 July 2003
http://www.seesac.org/f/img/File/Res/OSCE-Documents/osce-decision-on-manpads-2003-114.pdf

> *To urge participating States, where appropriate, to propose projects for tackling MANPADS-related problems such as: stockpile security and management, reduction and disposal, improving border controls to prevent illicit trafficking, collection and control programs.*

FSC Decision on *OSCE Principles for Export Controls of MANPADS*; **FSC.DEC/3/04;** 26 May 2004
http://www.smallarmssurvey.org/fileadmin/docs/N-Instruments/2004-OSCE-Principles-for-Export-Controls-of-MANPADS.pdf

> *2.7 In addition, the exporting government will satisfy itself of the recipient government's willingness and ability to implement effective measures for secure storage, handling, transportation, use of MANPADS material, and disposal or destruction of excess stocks to prevent unauthorized access and use. The recipient government's national procedure designed to attain the requisite security include, but are not limited to, the following set of practices, or others that will achieve comparable levels of protection and accountability:*

MANPADS: *Combating the Threat to Global Aviation*; 2009 – 2017
https://2009-2017.state.gov/t/pm/wra/c62623.htm

APEC *Guidelines on Controls and Security of Man-Portable Air Defense Systems (MANPADS)*; **2004/AMM/035**;
http://www.smallarmssurvey.org/fileadmin/docs/N-Instruments/2004-APEC-Controls-Security-of-MANPADS.pdf

IATG 10.10 *Demilitarization and Destruction* (v.2); 01 Feb 2015 https://s3.amazonaws.com/unoda-web/wp-content/uploads/2019/05/IATG-10.10-Demilitarization-and-Destruction-V.2.pdf

MOSAIC 05.20, *Stockpile management: Weapons*, https://unoda-web.s3.amazonaws.com/wp-content/uploads/2019/05/MOSAIC-05.20-2012EV1.0.pdf

MOSAIC 05.30, *Marking and recordkeeping*, https://unoda-web.s3.amazonaws.com/wp-content/uploads/2019/05/MOSAIC-05.30-2012EV1.1.pdf

MOSAIC 05.40, *Collection of illicit and unwanted small arms and light weapons*, https://unoda-web.s3.amazonaws.com/wp-content/uploads/2019/05/MOSAIC-05.40-2012EV1.1.pdf

MOSAIC 05.50, *Destruction: Weapons*, https://unoda-web.s3.amazonaws.com/wp-content/uploads/2019/05/MOSAIC-05.50-2012EV1.0.pdf

The Report of the UN Secretary-General to the Security Council on Methods of Destruction of Small Arms, Light Weapons, Ammunition and Explosives; **S/2000/1092;**15 November 2003
https://reliefweb.int/report/world/methods-destruction-small-arms-light-weapons-ammunition-and-explosives-report-secretary

This report provides a more comprehensive examination of various destruction procedures and methodologies. The report provides guidance for the production of a reference field manual on environmentally sound methods of SALW destruction, including related ammunition and explosives - see the UN Department for Disarmament Affairs publication entitled A Destruction Handbook: Small Arms,Light Weapons, Ammunition and Explosives, available at: https://www.un.org/disarmament/publications/more/destruction-handbook/

It contains an overview of issues related to destruction, and a number of conclusions and recommendations. The Handbook is focused more on field destruction within a DDR scenario, but nevertheless has value for smaller scale destruction within a more benign domestic setting. It does not address in any detail large-scale SALW destruction and demilitarization conducted by national governments. Users of this Handbook should refer to the UN Report for destruction procedure details.