

Starter Guide

towards strong Arms and Ammunition Management Practices

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Bonn International Center for Conversion
B · I · C · C



Bundeswehr Verification Center



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Introduction

Unsafe, poorly managed and unguarded stockpiles of arms and ammunition is a challenging reality in many countries, especially in Least Developed Countries (LDCs) ¹ as they face a challenging environment with competing needs like improving health and education systems, infrastructure provision and other post-conflict transitional challenges. Lack of resources, technical experience and knowledge, infrastructure and unfavorable climate conditions represents a major challenge to the proper storage of SALW and ammunition for many countries throughout the world. The following describes the reality of many LDC: *“Extreme poverty, the structural weakness of their economies and the lack of capacities related to growth and development, often compounded by geographical handicaps, hamper efforts by these countries to improve effectively the quality of life of their peoples. These countries are characterized by their exposure to a series of vulnerabilities and constraints such as limited human, institutional and productive capacity; acute susceptibility to external economic shocks, natural and manmade disasters and communicable diseases; limited access to education, health and other social services and to natural resources; poor infrastructure; and lack of access to information and communication technologies.”*² This Guide addresses countries that wish to start improving their approaches to and practices of arms and ammunition management and are at relatively early stages of improvement.

Whenever this Guide uses the term “arms”, it refers to small arms and light weapons (SALW). This includes the related ammunition but partly also addresses other conventional ammunition. Keeping arms and ammunition safe and secure is of vital importance, not only for the readiness of countries to defend themselves, but also for their internal stability. Arms and ammunition are prone to theft, which can fuel crime and instability in the country. Propellants may degrade and become unstable and can then spontaneously ignite. Explosives can degrade and become more sensitive to shock/movement etc. but will need an external stimulus to ignite. This can cause large explosions which can destroy entire stocks, cause loss of life and destroy infrastructure. The risks can be significantly reduced or mitigated when stockpiles are maintained effectively. Arms and ammunition can act as ‘multiplier of violence’ and the unregulated availability of SALW can hamper development. Unless arms and ammunition are stored

¹ The concept of ‘least developed countries’ was established by the United Nations in 1971 and refer to the poorest countries with low socio-economic levels reflected by weak human and institutional capacities, as well as unequally distributed income and dearth of national economic resources. The current list of LDCs includes 48 countries and is accessible at www.unohrrls.org.

² UN Programme of Action for the Least Developed Countries for the decade 2001-2010, Brussels 2001.

and managed so that the risk of diversion and leakage as well as the risk of unintended explosions is low, countries are well advised to actively engage in improving Arms and Ammunition Management.

Arms and ammunition management is an internationally recognized requirement. The United Nations (UN) and other organizations developed international agreements and protocols requiring countries to take action. These are:

1. UN Programme of Action to Prevent, Combat and Eradicate the Illicit Trade in Small Arms and Light Weapons In All Its Aspects (UN PoA), UN Document A/CONF.192/15,
2. International Instrument to Enable States to Identify and Trace, in a Timely and Reliable Manner, Illicit Small Arms and Light Weapons (International Tracing Instrument, ITI),
3. UN Code of Conduct for Law Enforcement Officials, Adopted by General Assembly resolution 34/169 of 17 December 1979,
4. UN Protocol against the Illicit Manufacturing of and Trafficking in Firearms, Their Parts and Components and Ammunition, supplementing the United Nations Convention against Transnational Organized Crime (UN Firearms Protocol), UN Document A/RES/55/255.
5. UN General Assembly (UNGA) Resolution A/RES/61/72, Problems arising from the accumulation of conventional ammunition stockpiles in surplus. 06 December 2006;
6. UN General Assembly (UNGA) A/63/182, Report of the Group of Government Experts established pursuant to General Assembly resolution 61/72 to consider further steps to enhance cooperation with regard to the issue of conventional ammunition stockpiles in surplus. UN. 28 July 2008; and
7. UN General Assembly (UNGA) Resolution A/RES/63/61, Problems arising from the accumulation of conventional ammunition stockpiles in surplus. 12 January 2009.

***International agreements
and protocols on SALW***

Furthermore, regional agreements require member countries to bring approaches and practices of arms and ammunition management to a certain level (for example the Nairobi Protocol in the East African Region).

International standards and guidelines, supported by various best practice guides for arms and ammunition management exist.³ This Starter Guide makes reference to these existing guides but offers a systematic approach to strengthening arms and ammunition management where current approaches and practices within states are still basic. The lack of generally suitable storage infrastructure and processes can have a severe impact on safety as does the lack of training and effective legislation. This Starter Guide in addition to international standards/ best practice guides illustrates suitable roads forward besides describing an envisaged tolerable state of stockpile management.

³ See Annexures.

Box 1: ISACS and IATGs⁴

Key reference documents are the “International Small Arms Control Standards (ISACS)” and the “International Ammunition Technical Guidelines (IATG)”.

In collaboration with partners worldwide, the United Nations has developed International Small Arms Control Standards (**ISACS**) that provide clear, practical and comprehensive guidance to practitioners and policymakers on fundamental aspects of small arms and light weapons control.

The Standards are used by more than 20 UN entities that make up the UN Coordinating Action on Small Arms (CASA) mechanism to ensure that the United Nations as a whole consistently delivers, upon request, the highest quality advice and support to Member States on putting in place effective controls over the full life-cycle of small arms and light weapons.

The Standards fit within the global framework created by the UN Programme of Action, the International Tracing Instrument and the UN Firearms Protocol; and build upon best practices elaborated at regional and sub-regional levels.

In accordance with a UN General Assembly mandate, and under the UN SaferGuard Programme, the International Ammunition Technical Guidelines (**IATG**) were developed by the United Nations Office for Disarmament Affairs (UNODA) in full collaboration with the United Nations Mine Action Service (UNMAS), and overseen by a Technical Review Panel of experts from UN member states established to review the IATG and to have an advisory role in the UN SaferGuard Programme.

In October 2011, the Technical Review Panel approved the IATG as current, comprehensive and of the highest existing standards. All UN member states, in UN General Assembly Resolution 66/42, subsequently welcomed the completion of the IATG and the establishment of the UN SaferGuard knowledge resource management programme for the stockpile management of conventional ammunition.

The IATG are designed to assist states to establish national standards and national standing operating procedures (SOPs) by establishing a frame of reference, which can be used, or adapted for use, as a national standard. They contain an integrated risk and quality management system, and are structured into three progressive Risk Reduction Process Levels (RRPL), allowing for the very basic safety requirements to can easily be met as RRPL 1. This Starter Guide does not aim at achieving RRPL 1 of the IATG, but assists states to take important steps in the direction of achieving IATG RRPL 1.

Arms and ammunition management improvements require preparation, further assessments of the current state of arms and ammunition management and thorough planning. Improvement programs are often multi-year activities with strong links to wider security sector reform/transformation efforts. Improvement programs require significant attention, support and involvement in planning and implementation of the nation’s top leadership. This will also provide the required sense of accountability.

The aim of this Guide is to provide countries that intend to improve arms and ammunition management in challenging environments with step by

⁴ See www.smallarmsstandards.org and IATG 01.10., p.2.

step suggestions. Although the existing best practice guides generally aim at a high standard, the IATG have specifically been designed to allow for an incremental approach leading to major improvements in explosive safety for minimal investment. *"In the immediate aftermath of conflict, the conditions for a stable and long lasting peace are unlikely to be present. The civil infrastructure may have collapsed and there may be large numbers of refugees and internally displaced persons (IDPs). Initially, emphasis will be given to ensuring that conventional ammunition stockpiles are secure and do not impact on humanitarian activities and peacekeeping tasks, rather than building an effective indigenous capacity. UN peacekeeping operations shall ensure that they have an integral capacity to effectively secure and manage host nation stockpiles of conventional ammunition under these circumstances."*⁵

The systematic control of arms and ammunition is in keeping with a concept of 'due care' and requires that states take a pro-active, rather than a re-active, approach to ensuring that weapons and ammunition are adequately accounted for and secured.⁶

Weak practices vs. strong practices



Source: HALO Trust.

⁵ IATG 01.10, p. 6.

⁶ ISACS 05.20, 2012, S.v.

This Guide provides a step-by-step approach which supports countries to improve implementation and to move towards the basic elements of the International Standards⁷ and the recommendations of existing best practice guides:

Four Step Approach

After the Introduction and the Foundation Section, the Guide suggests four steps:

“Step 1: Where do we stand?” This step will show the reader how to assess the level of practices of arms and ammunition management to identify strength and weaknesses.

“Step 2: What can we do – Laying the foundations?” To ensure a sustainable approach to improving arms and ammunition management, the foundations need to be put in place first. Besides the emphasis on political will, the Guide specifies management structures and introduces the concept of program development.

“Step 3: What can we do? Taking Action—Regulatory tasks”: In this step, the reader learns about the legal framework, standard operating procedures and about training.

“Step 4: What can we do? Taking Action on the Ground”: This step introduces concrete recommendations that ought to be implemented to improve arms and ammunition management practices. These measures are mainly cheap and can be implemented mostly by the organized forces themselves even without any external assistance.

No secured facility can ever be 100 percent impervious to a determined attack or to theft/ diversion from within. Therefore, the aim of stockpile physical security should be to:

- deter and reduce any attempted incursions or internal thefts;
- thwart any attempted security breach;
- immediately detect a security breach or threat;
- delay the time necessary for the illegal removal of ammunition and explosives from storage areas;
- increase time to react with guards or readiness forces;
- allow security personnel to respond and take appropriate action;
- assess the scale of any security breach or threat.⁸

⁷ Regarding IATGs this refers to the target of reaching Level I.

⁸ Adapted from IATG 09.10., p. 2/3.

Foundation: Basic Knowledge on Arms and Ammunition Management

Stockpile control includes the management, administration, and securing of stockpiles. The purpose of stockpile control is to ensure that all firearms and ammunition are safe, secure, and accounted for.

2.1. Basic Definitions⁹

- **Stock:** A given quantity of small arms and/or light weapons, including their parts, components and ammunition.
- **Stockpile:** A large accumulated stock of small arms and/or light weapons, including their parts, components and ammunition.
NOTE: Often used interchangeably with “stock” or to denote the weapons or ammunition retained in a specific storage facility. (cf. stock; cf. stockpile, national).
- **Stock check** (inventory check): The process of counting and verifying the physical balance of stock as part of a system of inventory control.
- **Stockpile management:** Procedures and activities designed to ensure the safe and secure accounting, storage, transportation and handling of small arms and/or light weapons, including their parts, components and ammunition.



Basic definitions

Source: BICC.

⁹ ISACS 01.20.

- **Stockpile, national:** All small arms and light weapons (including their parts, components and ammunition) designated for use by armed services of the state.
NOTE: Includes weapons, both in active use and in storage, held by military forces (active and reserve), police, border guards, customs officers, wildlife officers, etc., irrespective of their classification (e.g. operational, training, awaiting disposal, etc.).
- **Surplus:** Functioning small arms and light weapons in a state's stockpile that are no longer required by the armed services of the state to ensure internal and external security.
- **Small arm:** Any man-portable lethal weapon designed for individual use that expels or launches, is designed to expel or launch, or may be readily converted to expel or launch a shot, bullet or projectile by the action of an explosive.
NOTE: Includes revolvers and self-loading pistols, rifles and carbines, sub-machine guns, assault rifles and light machine guns, as well as their parts, components and ammunition. Excludes antique small arms and their replicas.
- **Light weapon:** Any man-portable lethal weapon designed for use by two or three persons serving as a crew (although some may be carried and used by a single person) that expels or launches, is designed to expel or launch, or may be readily converted to expel or launch a shot, bullet or projectile by the action of an explosive.
NOTE: includes heavy machine guns, hand-held under-barrel and mounted grenade launchers, portable anti-aircraft guns, portable anti-tank guns, recoilless rifles, portable launchers of anti-tank missile and rocket systems, portable launchers of anti-aircraft missile systems, and mortars of a calibre of less than 100 millimetres, as well as their parts, components and ammunition.
- **Illicit small arms and light weapons:** Small arms or light weapons that contravene the laws of the state in whose jurisdiction they are located; have been illicitly manufactured (see "illicit manufacturing"); have been illicitly transferred (see "illicit transfer"); or are unmarked, inadequately marked or have had marks removed, obliterated or falsified.

2.2 Background Information on Small Arms and Light Weapons (SALW)

The weapons in store have specific requirements in terms of storage, safety, and security.¹⁰

¹⁰ BICC, Stockpile Control Course, Dr. Mike Ashkenazi, 2012.

Small arms are broadly categorized as those weapons intended for use by individual members of armed or security forces.¹¹ They include revolvers and self-loading pistols; rifles and carbines; sub-machine guns; assault rifles and light machine guns. Light weapons are broadly categorized as those weapons intended for use by several members of armed or security forces serving as a crew. They include heavy machine guns; handheld under-barrel and mounted grenade launchers; portable anti-aircraft guns; portable anti-tank guns; recoilless rifles; portable launchers of anti-tank missile and rocket systems; portable launchers of anti-aircraft missile systems; and mortars of calibers less than 100 mm.

Small arms and light weapons

Because of their size, SALW are notoriously vulnerable to theft. Moreover, they cause most of the deaths caused by weapons. Therefore, a great deal of attention should be devoted to them.

SALW stockpile composition:¹² The total national stockpile of small arms and light weapons (including their parts, components and ammunition) designated for use by armed services of the state should consist of a number of smaller function-specific stockpiles, including

- **operational weapons:** Necessary to support the routine training and operations of military, police, and other state security agencies during internal security operations, peace support operations, external conflict or war;
- **operational replacement weapons:** Necessary to replace
 - lost weapons,
 - weapons under repair or maintenance,
 - anticipated weapon losses during future operations (or as a general buffer stock).
- **reservist weapons:** Necessary to support the training and operations of reservist military, police, and other state security agencies during internal security operations, external conflict or war;
- **training weapons:** Necessary to support the initial training of military, police, and other state security agencies at training establishments and
- **weapons awaiting disposal:** Weapons that are surplus to requirements.

2.3. Background Information on Ammunition

Ammunition stockpile composition: An effective inventory management system should ensure that the type of ammunition stockpile is clearly defined and that detailed technical information on the quantity, location and condition of the ammunition itself, (by specific type), is readily available.

¹¹ Handbook of Best Practices on Small Arms and Light Weapons, OSCE, 2003.

¹² ISACS 05.20, 2012, p. 3.

There may be a range of separate ammunition and explosive stockpiles within a country that are under the control of different organizations, (such as the police, military (both active and reserve), border guards, ammunition production company holdings, etc.).¹³ Each of these organizational stockpiles should have one or more of the following generic parts:

a) Operational ammunition and explosives: Necessary to support the routine operations of military, police and other security agencies over an agreed period of time.

b) War reserve ammunition and explosives:

- The ammunition and explosives necessary to support the operations of military, police and other security agencies during external conflict or general war over an agreed period of time.
- 30 days at intensive expenditure rates is often used as the time period.

c) Training ammunition and explosives:

- The ammunition and explosives necessary to support the routine training of military, police and other security agencies. This will usually be an agreed percentage of the war reserve holdings.
- 15 percent would not be unreasonable, dependent on the training activities and frequency

Ammunition stockpile

d) Production ammunition:

- This type of ammunition is usually only held by those nations with a production capability.
- The ammunition and explosives that haven been produced and are awaiting sale under the control of the manufacturer. These may be available to the military during general war but would not form part of the war reserve as their availability cannot be guaranteed.

e) Ammunition and explosives awaiting disposal

The ammunition and explosives that have been identified as unserviceable, unstable or surplus to requirements.¹⁴

Ammunition is the generic name for all projectiles intended to be discharged from a weapon or manually deployed.

There are numerous kinds of ammunition: the average battalion-sized force will often require over twenty different types of ammunition.¹⁵ Ammunition projectiles can be inert (a piece of metal), explosive (the projectile explodes when reaching its target), penetrating (it may have a steel or tungsten core), illuminating (carrying a material that burns slowly providing illumination), smoke (for battlefield obscuration or signaling), incendiary, lachrymious (tear gas) or carry leaflets.

¹³ IATG 03.10., p. 6.

¹⁴ Following IATG 03.10., pp. 6/7.

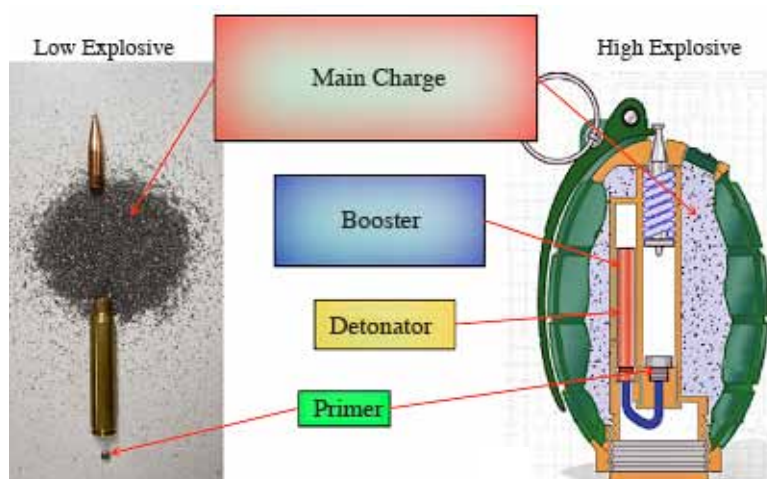
¹⁵ For example a NATO LIGHT Infantry Battalion will have at least: 5.56 Ball, 5.56 Tracer, 5.56 4B/1T, 7.62mm Ball Link, 7.62mm 4B/1T, 9mm Ball, 12.7mm Ball, 12.7mm 4B/1T, 51mm Mortar HE, 51mm Mortar Smoke, 51mm Mortar Illum, 82mm Mortar HE, 82mm Mortar Illumination, 82mm Mortar HE, 82mm Mortar WP, Plastic Explosive, Electric Detonators, Detonating Cord, Bangalore Torpedoes, Hand Grenade HE, Hand Grenade Smoke, Hand Grenade Signalling, Hand Flare Signalling, Schurmully Flares, 66mm HEAT, Milan ATGW, Triplares. That is at least 28 for a Battalion with no specialist vehicles!

Most small arms ammunition does not contain explosive in the projectile. Most light weapon ammunition is explosive. As a rule of thumb:

- **Ammunition projectiles at or below caliber 14.5mm are likely to be non-explosive and not fused.**
- **Ammunition projectiles/ ammunition of 20mm and above, are likely to be explosive and fused.**

Box 2: Explosive chain

Modern explosives are defined as primary or *secondary* depending on their sensitivity and ease of initiation.



Basic explosive sequence. Source: DTRA.

Trigger ⇒

1. ⇒ **Primary high explosive (fuse)**
2. ⇒ **Intermediate charge/booster/detonating cord (high explosive)**
3. ⇒ **Secondary explosive (high explosive) ⇒ explosion**

Primary high explosives include fuses and boosters intended to initiate an explosion through a mechanical, electrical, chemical, or heat trigger (or combination of).

The explosion then usually initiates a *secondary* explosive, which has greater mass and more explosive power and requires a shock wave to initiate it.

Sometimes an intermediate charge called a **booster** is used. This type of explosive is easier to initiate than a secondary explosive, but is safer to store than a primary explosive. These intermediate charges may be shaped in the form of a thick cord, which explodes along its length. In such a case, the primary explosive would initiate the accelerator, which will then transfer the force of its explosion by propagation of a shock wave to initiate the secondary explosive for a full explosion.

Explosive chain

Threat from temperature

During prolonged periods of storage, every 10°C (=50°F) rise in temperature above 30°C (=86°F) doubles the rate of chemical deterioration of propellants. Most propellants, dependent on design, have a shelf-life of at least 15 to 40 years when stored at a constant 30°C and will last much longer in temperate climates. In high heat environments, the stabilizer is depleted far quicker and the probability of spontaneous combustion due to auto-catalytic decomposition, leading to auto-ignition becomes much higher.¹⁶

Fuses

Fuses are defined as primary high explosives. They are small devices intended to initiate an explosion. Fuses exist in huge variety, some intended to start explosions of artillery or anti-tank ammunition, others to initiate explosions of demolition charges. All fuses must be viewed as **shock and flame-sensitive**. They must be stored with great care to avoid shock and/or atmospheric or heat changes. They must always be stored and transported away from other forms of explosives.

Different types of ammunition



Fuses. Source: MAG.

Artillery and mortar ammunition

Artillery and mortar ammunition for guns and mortars vary from 51–300mm.

Artillery for howitzer ranges from 75–210mm.

Mortar ammunition ranges from 51mm as light mortars, 81–110mm as medium mortars and 120–240mm as heavy mortars.

Artillery and mortar rounds (with the exception of some training rounds) are never inert. Artillery rounds vary in weight from 10 to 130 kg. With some artillery rounds, projectile and the propellant are stored separately (they are only brought together during loading before firing). Others are unified/cartridge-based (the projectile, cartridge, propellant, and primer are a single unit). A fuse may be attached or may be added at the point of firing (see 'fuses' above).

¹⁶ IATG 04.10., 20.

Most artillery rounds are cased individually for storage and transport, in a plastic/carton cylinder, or in a polyethylene bag. They are then packed in crates, between two and eight rounds to a crate or pallet. More advanced nations use Unit Load Containers (ULC) where projectiles, propellant charges and fuses are stored in one purpose-designed container.

Tank ammunition

Tank ammunition is either based on a kinetic-energy (KE) penetrator, high explosive rounds (HE) or hollow explosive charges (HEAT) and includes calibers of 75mm to 125mm.

A kinetic energy penetrator (KE) (also known as an amour piercing round) is a type of ammunition which, like a bullet, does not contain explosives. It uses only the kinetic energy to defeat the amour of the target. The hollow explosive (HEAT) charges use explosives to form a ductile metal (like copper) into a very high velocity plasma jet to defeat the target.



Tank ammunition (high explosive rounds / kinetic energy penetrator / shaped charge). Sources: German Armed Forces / HALO Trust.

Mortar bombs have an integral propellant (part of the round—known as the primary propellant cartridge) and an additional colored augmenting propellant charge (which can be separated to adjust the total amount of propellant before firing).



Mortar. Source: DTRA.

Artillery rockets¹⁷ are almost always explosive. Artillery rockets consist of a solid-fuel rocket motor and a variety of projectiles: fragmentation; anti-tank; cargo (sub-munitions) incendiary and smoke varieties. The caliber of artillery rockets ranges from 30mm to over 400mm. Artillery rockets do not need a gun barrel to be discharged, and, because they usually have stabilization fins or are spin-stabilized by canted nozzles (107mm rockets), can go a considerable distance even if self-initiated, or fired without an aiming device. As regards caliber, artillery rockets are in the intersection of light arms and artillery.



Rockets. Source: DTRA

All artillery and mortar rounds run a high risk of self-initiation because of their degrading double-base propellant containing nitro-glycerine and nitro-cellulose. This is particularly the case when propellant and projectiles are stored together as 'fixed' ammunition types.

Small arms ammunition

Small arms ammunition ranges in caliber from 4.6 to 14.5mm. It is primarily cartridge-based, it consists of a brass cartridge case, bullet, propellant and primer.

SALW ammunition



Small arms ammunition. Source: DTRA

¹⁷ Usually referred to as Free Flight Rockets (FFR).

Grenades are small bombs which are thrown by hand (hand grenades) at their target, projected by a rifle barrel or special projector (rifle grenade) (for firing like a rocket (RPG) see below). Most grenades are explosive or incendiary and must be treated as such (exception e.g. smoke /tear gas).



Hand grenade for display. Source: DTRA.

Light weapons: Barrel ammunition

Light weapons carry ammunition between the 14.5 and 100mm range as a rule of thumb. All of this ammunition is explosive/incendiary and cartridge-based (the projectile, cartridge, propellant, and primer are a single unit).

Depending on environmental and storage conditions, propellants have a high risk of self-initiation of propellant (by autocatalytic decomposition). Mortars have added secondary propellant charges, which are in the form of augmenting charges attached between the stabilizing fins in the rear and the body of the bomb. Mortars also have detachable fuses, which ought to be stored separately. Mortars are at particular high risk of self-ignition if the propellant has not been removed, as mortar propellant is known to be particularly susceptible to autocatalytic decomposition.

Light weapons: Rocket ammunition

Rocket Propelled Grenade (RPG)

Rockets are unguided weapons. The RPG warhead's caliber is 105mm or less. The most common rocket weapon is the RPG series grenade in which the launch motor and the missile are often stored separately but joined before use, and the weapon is discharged from a dedicated tube. The launch motor, which usually looks like a long plastic cylinder is highly flammable and can be easily ignited.



Disassembled RPG7. Source: DTRA.

Man-portable guided missiles (ground-effect)

Ground-effect (anti-tank, anti-bunker, and anti-personnel) missiles usually referred to as ATGM (anti-tank guided missiles), are robust, but have considerable explosive radius. Projectiles are always explosive/incendiary.

Man-portable air-defense systems (MANPADS)

MANPADS are shoulder-launched surface-to-air guided missiles. They are almost always enclosed in a disposable/ reusable cylinder, which serves as storage and firing mechanism. A MANPADS typically consists of the missile in a reusable launch tube, a battery coolant unit (BCU) to provide power for start-up and cooling for the infrared seeker, a thermal battery, as well as a detachable grip stock, which houses the trigger unit and targeting electronics.

- The **missile** itself is complicated but relatively robust. While it is easy to purposely disable it, a MANPADS weapon round (missile plus launch tube) is designed to withstand shocks, heat, humidity and dirt.
- While the **battery coolant unit (BCU)** and thermal battery have a limited shelf life, they are robust and easy to replace or circumvent using other power sources. To be used reliably, MANPADS do require a greater amount of training than, for example, hand guns. The very basics of MANPADS handling, however, can be acquired in about 30 minutes; although it is highly unlikely an individual could successfully engage a target with such little training.
- The **grip stock** is the only readily reusable part of a MANPADS—launch tubes can be rearmed, but only under factory conditions. Usually, armed forces acquire a small number of grip stocks and a larger quantity of weapon rounds. As a MANPADS missile cannot be used without a grip stock (at least not for its intended purpose), it is a key element from the perspective of stockpile security.



MANPADS. Source: DTRA.

MANPADS are expensive, and have a devastating effect, so they must be **very carefully secured** against possible theft or other forms of diversion.

Explosives

Explosives charges are used by military and civilian actors for a variety of purposes. They may be packed in a variety of different ways.

All explosives stored in bulk must be considered to have a wide lethality range.¹⁸



Military explosives. Source: DTRA.

Explosives are chemical mixtures made up of usually stable materials. Still, some primary explosives are inherently unstable. When these break down, an explosion is likely to occur. Different mixes create different degrees of sensitivity and inertness. As a matter of principle, highly unstable mixes are stored in minute quantities and only used to initiate explosions (“fuses” see below).

More stable mixes are used for main charges in large quantities in artillery shells, mines, and explosive charges.

Ammunition and explosives have a limited shelf life. Propellants may degrade and become unstable and can then spontaneously ignite. Explosives can degrade and become more sensitive to shock/movement etc. but will need an external stimulus to ignite.

Proper practice requires that

- a. manufacturers’ instructions about storage be followed to the letter, and
- b. a sample of each batch of propellants be tested periodically—surveyed and proofed—to ensure their stability and usefulness.¹⁹

¹⁸ See IATG 01.70 Formulae for Ammunition Management, IATG Software and eXdata APP.

¹⁹ See IATG 07.20 Surveillance and Proof.

2.4. Ammunition Management: Responsibility²⁰

The primary responsibility for conventional ammunition stockpile management shall rest with the Government of the state holding the ammunition. This responsibility should normally be vested in an authority, which is charged with the regulation, management and coordination of conventional ammunition stockpile management. The national authority shall be responsible for establishing the national and local conditions that enable the effective management of conventional ammunition.

The accumulation of conventional ammunition presents inherent hazards to local communities in the form of a risk of explosive events in ammunition storage areas. Every year, dozens of ammunition depot explosions are reported throughout the world. Since 2000, over 300 events occurred.²¹ Often, these events result in a large number of casualties, widespread destruction of infrastructure, and the disruption of the livelihood of entire communities. In addition to the immediate human suffering, such explosions can have terrible effects on the environment. In states with limited means to finance the technically challenging clean-up costs, local populations, especially children, are all too often exposed to the risk of injury or death due to the explosive ordnance that tends to litter large areas for extended periods of time after the explosion.

²⁰ IATG 01.10.

²¹ See www.smallarmssurvey.org/weapons-and-markets/stockpiles/unplanned-explosions-at-munitions-sites.html.

Step 1: Where do we stand?

The first step to systematically improve arms and ammunition management is an objective assessment of strengths and weaknesses of the current state of affairs in arms and ammunition management. Although combined in this publication, the reality on the ground is that weapons and ammunition management should be treated as separate issues. Weapons management is primarily a logistical and security challenge, whereas ammunition management requires a much greater depth of technical knowledge and allocation of resources to ensure that tolerable stockpile management conditions are achieved. An objective assessment of each area will be the starting point towards deciding what improvement activities are the right ones for the country and what activities should be implemented first. Such an objective assessment is a very important tool to enter into dialogue with the international community and donors to seek assistance and support.

Within the objective assessments for each type of stockpile, there are complementary issues such as political will and security that may be addressed together.

3.1. Political Will: The Key Ingredient

The most critical ingredient for arms and ammunition management is the political will and interest of the political top echelon (President/ Vice President) and top leadership of the organized forces to engage in improvement activities. This might not be there on its own.

Therefore, awareness-raising activities within the security sector and political leadership about the benefits and rationale of arms and ammunition management might be necessary (e.g. to prevent unintended mass explosions, leakage of arms, theft of arms and ammunition by criminal groups from badly secured stores, fight entrenched bad practices like the practice of taking weapons home after duty—which in turn requires appropriate facilities). Workshops, if required with external expertise, with the Senior Leadership of all Organized Forces could be a valuable first step. But also the middle management level is important, such as Captains, Majors and above. Subsequent training of middle management officers and senior Non Commissioned Officers (NCOs) who will directly be responsible for future training and munitions management will ensure sustainability of the project with oversight by international monitors for an agreed period to ensure quality and satisfactory implementation and control.

Preconditions for sustainable arms and ammunitions management

The political echelon needs to be constantly involved in this process and be informed about the findings and recommendations. Ideally, a clear statement from the top leadership of the country is made, stating the will and support to improve munition management in the country. This support is vital to achieve sustainable improvements of security and safety in the respective country.

Some people might have an interest to remain with the status quo. Potential spoilers comprise e.g. politicians or security sector staff that profit from the lack of control and management through e.g. selling/ trading arms and ammunition for personal gain. This group of people needs to be taken into account.

Areas of concern when arms and ammunition management is poor:

1. **Leakage of arms and ammunition into unauthorized hands from government stocks.** When there is poor control over stockpiles, arms and ammunition are likely to end up in the hands of unauthorized people, groups, criminals, terrorists or other armed groups. Thefts from stockpiles may negatively affect the security forces from whom the arms come, e.g. through the construction of Improvised Explosive Devices (IEDs).
2. **Negative operational effect:** The organized forces' mission whether it be to keep the peace or to protect the country can be negatively affected, since the reliability of the ammunition is lower than it could be. In the worst case, ammunition will fail and forces will not even be able to carry out their mission at all. The trust of staff in equipment will be low.
3. **Funding challenges:** Lost or stolen items, prematurely aged ammunition as well as the ignorance where particular items are stored (poor store organization), will result in further costs as these items will need to be replaced.
4. **Unintended explosions:** A lack of control over ammunition will almost always lead to major or minor safety problems, including unintended explosions.

Main concerns regarding weak practices

Box 3: Unplanned Explosions at Munitions Sites

Unplanned explosions at munitions sites (UEMS) are a global problem. Any nation possessing munitions is at risk of experiencing a UEMS event. The Small Arms Survey has recorded over 414 UEMS events over the past 25 years (1987 to 2011), affecting 91 different countries from every continent besides Antarctica.

Given the nature of munitions, even countries with highly developed physical security and stockpile management (PSSM) practices are at risk of accidental explosions. During the reporting period, 16 of the world's wealthiest countries experienced 31 events; despite practicing the most advanced international ammunition standards.²² Accidents of this nature are, however, more likely to occur in countries implementing substandard practices. Of the remaining 383 recorded explosions, which affected 75 countries, 78 events occurred in 16 'least developed countries' (LDCs), i.e. more than twice the average for the 16 richest countries. Poor and underdeveloped countries are more susceptible to experience one of these events due to the lack of institutional capacity and resources to implement proper standards.

In addition to differences in the frequency of recorded events, there is also an important disparity in the consequences of individual events; in particular with regard to human casualties. For example, during the eight US events, the average of casualties (both dead and injured) was just over two people per incident,²³ while the global average per event was 57.²⁴ Indeed, one explosion in Congo-Brazzaville, which occurred in March 2012, claimed at least 1700 casualties.²⁵ It is worth noting that, in the events with large numbers of casualties, civilians typically are the most affected.

The large disparity in casualties per incident comes down to PSSM planning and practice. Explosions need to be reported more systematically and in more detail to increase international understanding of this phenomenon and to identify the many ways in which states can strengthen their capacities to address their causes.

For more information visit www.smallarmssurvey.org/

Source: Small Arms Survey, 2012.

3.2. Fact Finding Mission to other Countries

A fact finding mission to another country with a more advanced level of arms and ammunition management can greatly increase technical knowledge and motivation. To find realistic answers to own challenges, the level of arms and ammunition management should not be too far

²² 31 OCDE state members belong to the high-income OECD category, based on the classification determined by the World Bank. High income economies perceived 12,000 USD or more according to 2011 gross national income per capita. See more here <www.worldbank.org> or here <www.oecd.org>.

²³ Eight events were reported in the US since 2000. A total of 12 people were killed during these events, and two injured.

²⁴ Since 2000 there have been 283 events outside of the US. In those events, 3,708 people were killed, and 12,518 injured.

²⁵ 282 dead and 1,500 other people were injured after a series of explosions occurred at camp Mpila.

advanced compared to one's own realities. The aim of such a mission would be to gather real-life impressions from a country whose level of arms and ammunition management can be achieved in some years. Regional alliances could be a source of support, too.

3.3. Initial Assessment of Arms and Ammunition Management

An assessment of the current approaches and practices of arms and ammunition management and the state of storage facilities ("HOW are things stored?") in your country is the first step to improving your understanding of the issues. After that challenges can be identified and starting points for improvement activities can be defined.

Assessment as entry point

How to assess? Interviews can be conducted, meetings and on-site visits in the country with the security sector leadership and relevant staff be arranged. A survey of the whole country would be ideal but spot tests / sample assessments are also sufficient as long as typical areas (urban, semi-urban, rural) are visited.

An assessment team would ideally consist of the representative of the Ministry of Defense and/or Interior, representatives from the respective organized forces and an appropriately trained external ammunition technical specialist (who may be sponsored by a donor or a mine action organization). A small specialist team is sufficient for the initial assessments.

Before the assessments get underway, there should be a preparatory meeting with all organized forces. This will ensure buy-in and ownership and spread the news that your government wants to take first steps to improve the management of arms and ammunition.

Annex 8 provides an example of a checklist that can be used for such assessments.²⁶

Additionally, the team should also examine the following for each organized force to have a reliable basis for further steps:

Infrastructure / Physical internal and external security and safety

Stores at all levels in the country should be visited. Questions to ask:

What is the state of a visited store **outside**:

- How easy would it be to gain unauthorized access?
- What security measures are taken (fencing, sun protection, locks)?
- Is there safety equipment in place to react to emergencies, especially fire-fighting equipment?

²⁶ ISACS 05.20 Stockpile Management – Weapons, IATG 06.70 Inspection of Explosive Facilities and IATG 09.10 Security Principles and Systems provide in depth know-how regarding assessments.

What is the state of a visited store **inside**:

- How does the store generally look inside?
- Is there some kind of store organization (racks, stacks)?

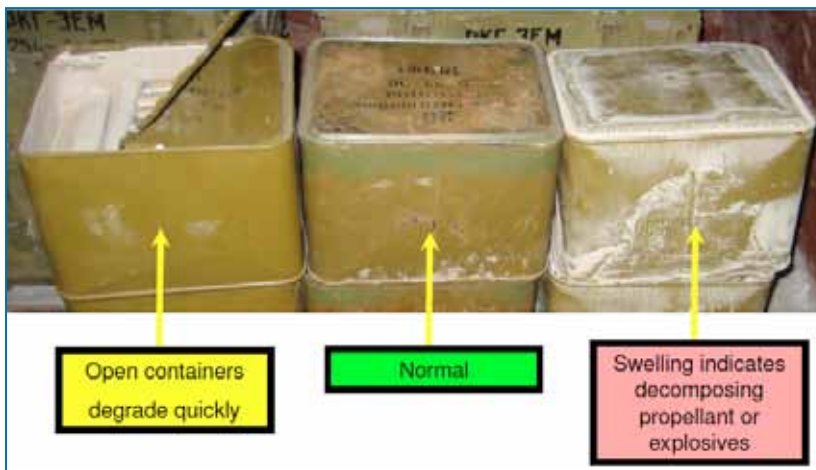
How are weapons, if so, destroyed?

How is ammunition stored? Is ammunition damaged/ degraded?

Is ammunition segregated?



Degrading ammunition. Source: MAG/ HALO Trust.



Stages of ammunition lifecycle. Source: DTRA.

Training/ Level of competency

- What is the competency level of different staff (to tailor training adequately)? Where/ when did they learn how to run a store?
- What is the level of the organized forces leadership regarding arms and ammunition management?
- What are the concerns of staff running the store?
- What are the concerns of the staff and what do they wish to improve as regards arms and ammunition management?
- Is there technical understanding of the issues regarding explosives, and are safety margins compatible with international best practice. For the assessment of ammunition watch out for certain indications of non-functional old ammunition. Only explosive ordnance disposal experts should remove or touch such ammunition.

Rules and Regulations

- Is there a responsible person assigned on a ministry level? Who is responsible for the management of ammunition and weapons in the different security organizations?
- Who is involved in arms and ammunition management and who decides on procurement and allocation of arms and ammunition?
- How is the inventory managed (ledger books? regular checks?) Did leakage or loss occur?²⁷
- How is transportation of arms and ammunition organized? Did accidents/ losses occur?²⁸
- Legislation provides the foundation for all activities relating to stockpile management, control, and maintenance. A number of questions should be clarified concerning national stockpile legislation.
- Are there nation-wide (or region-wide) standards for implementation?
- Are these standards observed and monitored?
- Are Hazard Definitions and compatibility groups used (see Chapter 6 below)?

Past projects/ activities

- What projects and activities took place in the past on which you could build?
- Are certain rules/ standards already in place and the challenge is their enforcement?

Conduct a basic *explosion consequence analysis* (ECA)²⁹ for a sample ammunition storage area to estimate the explosion effects on nearby personnel and structures. Use the results to describe and explain the existing risk to the political leadership.

As mentioned in Chapter 3.1., the political will of the political and organized forces' leadership is and will be critical for any meaningful steps ahead in the area of arms and ammunition management. Hence, the results of the assessments should be widely distributed and communicated accordingly. Ideally, a workshop with the leadership shall be organized in which the results are discussed and from which a political signal would ideally emerge ("We want to improve arms and ammunition management in our country...").

²⁷ IATG 03.10 Inventory Management.

²⁸ IATG 08.10 Transport.

²⁹ IATG 02.10. Introduction to Risk Management Principles and IATG Software.

Step 2:

What can we do? Laying the Foundations

This Chapter will give information on how to build on the activities conducted as described in Step 1. The political will and awareness will be required on a permanent basis to advance arms and ammunition management in the country.

4.1. Management Structures: Implementing the Political Will

Assuming that the political will was formulated and the organized forces provided the general backing, first concrete steps need to be taken. Setting-up of appropriate structures to further plan, prepare and implement more concrete activities is one basic element.

Management structures need to fit, if not yet existent, in the institutional landscape of each country.³⁰ Consequently, this Guide will not specify a certain structure. The management concerns the arms and ammunition in possession of civilians as well as of the state. It also concerns the flows of these items within the country and across its borders.

Management tasks or so-called national coordinating mechanisms on small arms and light weapons control are multi-disciplinary and comprise representatives of relevant government entities and other stakeholders. The efficient and effective functioning of such mechanisms is key to realizing the objectives of the “UN Programme of Action”. States may designate a single government agency to take the lead in providing overall political coordination and policy direction for national small arms and light weapons control efforts. Such an agency may be known as the national authority on small arms and light weapons.

The national authority should

- a) coordinate all government institutions and international agencies involved in small arms and light weapons control;

Management structures, Rules & Regulations and training are as important as infrastructure!

³⁰ Generic principles are contained within IATG 01.30 and Generic SOPs for weapons management are available from UN ODA (UNLIREC).

- b) encourage and support accountability and transparency in order to help build confidence among all stakeholders in the national coordination mechanism;
- c) ensure continuing financial and technical support from national and international sources; and
- d) be supported by a national technical planning and coordination body.

Either the government ministry responsible for the interior/ police or for foreign affairs should be designated as the national authority.³¹

Therefore, to have an impact and focus on all arms and ammunition in the country, the top level structure should be within the top government institutions. Most countries have national SALW authorities and a point of contact for small arms and light weapons has already been nominated in line with the UN Programme of Action. If not, it would need to be established.

A structure within the security sector needs to be in place which focuses on the management and regulation of all arms and ammunition within the respective organized force. The respective Ministries of Defense and Ministries of Interior are of special importance in that regard. The organized forces' logistics departments are especially important in managing arms and ammunition.

Priority tasks for management

High priority tasks for the management structures should be:³²

1. Develop the appropriate legal framework for SALW control,
2. Determine the aim of an enhanced small arms and light weapons control strategy (which may include amendments to policy, legislation and activities) within the jurisdiction of the state in consultation with relevant stakeholders;
3. Derive from this aim the strategic and operational objectives of a small arms and light weapons control strategy in consultation with relevant stakeholders;
4. Identify and designate the government entities that will have responsibility for each aspect of small arms and light weapons control in order to ensure a comprehensive approach and to prevent the duplication of roles;
5. design and disseminate an implementable *National Action Plan*³³ on small arms and light weapons control intended to meet the strategic and operational objectives in consultation with relevant stakeholders; and
6. establish a budget for all related running costs and activities and ensure the availability of (and mobilize where necessary) sufficient resources to implement the national action plan within the required timeframe. The sources of funding should be made public.

³¹ ISACS 03.40., 2012, pp. VI and 5.

³² ISACS 03.40., 2010 and IATG 01.30 Policy Development and Advice.

³³ ISACS Module 04.10. provides detail on this National Report development.

It is important to note that the management of arms and the management of ammunition require partly different responses. The (future) institutional set up should reflect this.

4.2. Program Development

The tasks of those who make up this management structure is to jointly develop proposals and activities to improve arms and ammunition management.

These proposals can, as an example, focus on the following **objectives for weapons management**:

- Objective 1:** Armorers and staff associated with weapons management (stockpile management) activities are **trained**.
- Objective 2:** All organized forces' weapons are **marked** and **registered**.
- Objective 3:** **Legal Frameworks** for weapons management in the organized forces (Standing Operating Procedures—SOPs) are developed and enacted.
- Objective 4:** Harmonized **inventory accounting** system is developed and operationalized.
- Objective 5:** Existing storage facilities are **upgraded**.
- Objective 6:** **New standard armories** are built, where required.

Setting objectives provides guidance

The implementation of objectives for *ammunition management* will necessarily be more complex due to the greater logistical and technical challenges requiring greater resources and investment than for weapons management.

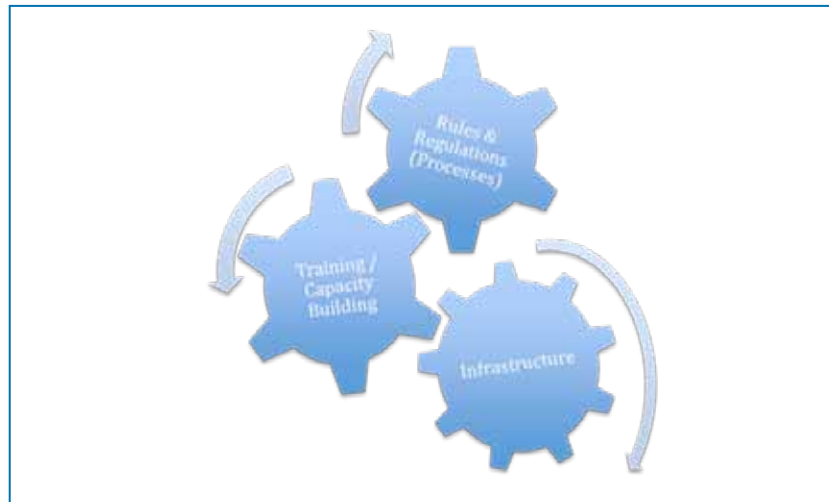
Example objectives may include:

- Objective 1:** Full ammunition technical assessment conducted.
- Objective 2:** Ammunition is relocated to a safe place.
- Objective 3:** Ammunition management staff is trained to an appropriate professional and technical level.
- Objective 4:** Ammunition is stored and segregated in appropriate environment depending on resources.

...

The program development should strongly take into account the inter-related nature of activities undertaken to advance safe storage. All parts of a properly functioning safe storage system work in cohesion and mutual support. For example, police weapons locked away safely but without inventory accounting are not properly managed. Aging ammunition guarded to the highest standards but stored in hot and humid environments may not be safe, either.

Aspects of Arms and Ammunition Management are interconnected and interdependent!



Three integrated components of arms and ammunition management. Source: BICC.

Building on the results of the assessments (see Section 3.3) the program development phase will define the details of a potential improvement program or activities. Planning should be based on the assessments and take the most urgent needs and basic project goals into account (priorities). The subsequent chapters will provide more details and things to consider.

Ideally, the government in cooperation with the organized forces (focal points) would develop a rough outline of long-term storage requirements: How many arms and ammunition are required in each organized force to meet the national security objectives?³⁴

In developing plans to build new stores, it must be kept in mind that population centers tend to grow and that further urbanization can result in people living closer to esp. ammunition storage sites identified for storage-building or refurbishment than recommended in case of unintended explosions (see below). As a result, it is critical that safety distances be identified in planning the locations for major ammunition depots.³⁵

Logistics will often be a major issue and challenge as road conditions often remain critical, especially during rainy season. The transport of explosives on crowded or poorly maintained roads will likely be of particular concern. Transportation will be a huge undertaking requiring trucks, drivers, loaders, maintenance and fuel.

³⁴ Guidance on determination of appropriate levels is contained within IDSACS 05.20 and IATG 01.30.

³⁵ IATG 02.20 Quantity and Separation Distances and IATG 02.30 Licensing of Explosive Facilities.

Other government institutions and programs might interrelate with the programs and objectives of arms and ammunition improvement activities. An example are disarmament, demobilization and reintegration (DDR) activities. Ex-combatants could be employed to support the improvement and building of storage facilities in the country. Depending on the nature and choice of the reintegration training, even refurbishing and/or building new facilities can profit from ex-combatants. But many other government activities like formal education programs might be relevant for arms and ammunition management improvements.

Information-sharing between organizations like for example the army and police regarding arms and ammunition management is a great benefit to any program. However, improvement activities can also be separate depending on the specifics of a country.

Generally, a **phased programming** is a good approach to structure the improvement activities:³⁶

Large multi-year arms and ammunition management improvement programs normally run in phases, usually in one year intervals, based on the availability of donor funds. Operating in phases allows both parties (the host country and the supporting partner (e.g. donor)) to set goals for the allotted time period. Evaluations occur at the end of each phase, providing the opportunity to assess the previous work, make recommendations or changes as needed, or allow each party to decide whether it is worthwhile continuing with the program. If donors do not see genuine efforts being made by host countries or if hosts find donors unreliable in their commitments, then programs end early.

The planning process should take the most urgent needs and basic project goals (e.g. prevention of unintended explosion/ leakage of high value items) into account and draw up a plan based on the resources that are available. The less urgent program goals will be addressed in parallel and later phases, depending on the availability of resources. A hierarchy of projects based on the urgency of their need does not imply that non-urgent areas need not be improved.

***Phased programming:
Step by step***

Improvement programs can often become quite large, so having realistic expectations during the planning stage makes it more likely that the program will succeed. A logical, intelligently sequenced plan is the best method for making the entire system work properly, piece by piece.

4.3. External Support

A request to potential donors and institutions can help to raise external funds for improvement activities.

³⁶ Preparing PSSM Programmes: Avoiding the Inevitable Problems?, Benjamin King and F. David Diaz, Safer Stockpiles, (ed.) Benjamin King, pp. 25-27, 2011.

Types of improvement activities

Three levels of activities: A lot can be done without external assistance

Activities to improve arms and ammunition management can be allocated to three types (I to III). The groups describe the level of complexity and level of required external assistance.

Type I: Low complexity level improvements and activities

A government can order its security sector services to implement activities that are relatively inexpensive and can be very effective to raise physical internal and external security. Many tasks that will provide cost-effective improvements demand little more than labor and leadership. Staff of the Services generally can provide much of the labor. These activities are called low cost–high value measures and represent the main focus of this Starter Guide.

Step 4 will present these activities in more detail.

Type II: Medium complexity level improvements and activities

Type II activities are arms and ammunition management improvements and activities, which require some limited external advice/ assistance to be realized.

Type III: Complex level improvements and activities

Type III activities are arms and ammunition management improvements that can require substantial external assistance (incl. financial assistance), e.g. the building of new facilities/ armories.

In case of **international support**, initial steps should be taken to start the resulting complex diplomatic relationship between the supported country and the supporting partners. It will be important to avoid false expectations and to develop a realistic view of what is possible and what support can be secured.

There is a mutuality of interest between more developed and developing countries in controlling the spread of illegal arms and ammunition. Consequently, developed nation donors are often very interested to provide assistance in the form of funds or capacity upgrading, to developing least developed countries.

Funds are not distributed blindly. Donors have learned to their cost that they must ensure that the money is spent wisely. This means:

- Funds will be provided for projects that are do-able within the capacity of the fund receiver.
- Funds usually go through an implementing partner with a good track record and experience in arms and ammunition management.
- Funds are often allocated with the expectation that there will be some continuity or overall program that will benefit from them.

- The beneficiary government must convince the donor that there is a real problem, and that the solution proposed in the proposal is the solution to the problem.
- The beneficiary must convince the donor that there will be transparency in all allocations and use of funds.
- Potential donors will require full access to storage facilities in the country if they are expected to provide funds for improvement activities! Building of mutual trust is important!

Relevant potential supporters might come from:

United Nations: In some countries, the United Nations is sometimes linked to issues relating to arms and ammunition management through its Peacekeeping Mission (DDR Section, Security Sector Reform (SSR) Section, UN Police, United Nations Mine Action Service), the UN Office for Disarmament Affairs (UN ODA), Regional Disarmament Centers and also the United Nations Development Programme (UNDP). These actors are potential providers of building equipment or more sophisticated package solutions, advice and training.

The UN “Matching Needs and Resources” mechanism³⁷ is an important opportunity to publish needs and attract donor support. It is run by the UN Office of Disarmament Affairs in New York.

Non governmental organizations and commercial entities: Non governmental organizations (NGOs) and commercial Explosive Ordnance Disposal (EOD) companies with technical expertise in humanitarian mine action (mine and UXO clearance) sometimes have considerable expertise in the area of weapons and ammunition management dependent on the qualifications of staff deployed in the country.³⁸ They should be contacted and involved as much as possible in program development and planning. Those organizations will furthermore have existing funding relations with potential donors.

Military

Other nations’ embassies can be approached (diplomats/ military liaison officers) for technical assistance.

Other nations which might have military contingents in the country (on-site presence) might be able to support the host country.

A list of agencies can be found in **Annex 2**.

Sources of support

³⁷ See www.poa-iss.org/InternationalAssistance/InternationalAssistance.aspx

³⁸ If not, their HQ can arrange for the deployment of appropriately qualified and experienced staff.

Step 3: What can we do? Taking Action: Regulatory Tasks

5.1. Legal Framework / Standard Operating Procedure (SOP) Development

A legal framework (law) regulating the possession of SALW in the hands of the civilians as well as the security sector is the key foundation to advance arms and ammunition management in a country.

The legal framework needs to be developed or taken into account when standard operating procedures (SOPs) are developed for the arms control sector. In some cases, however, SOPs can be introduced in the absence of legal frameworks which does not mean that they need not be developed.

As a first step, the drafting of procedures which regulate the execution of safe, effective and efficient arms and ammunition management is a highly valuable and necessary step. Designing SOPs for arms and ammunition management is critical for the sustainable execution of arms and ammunition management in the organized forces in the whole country.

SOPs need to reflect the preferences of the respective organized forces and need to be developed from within and cannot be imposed from outside. SOPs should be designed and applied as much as possible in a harmonized way between the organized forces to avoid different standards and practices in the respective forces. However, in reality, the Army will need different SOPs (often called Standing Orders) as their operations and systems in use differ from those in the other organized forces like Police or Prison Service.

Generic SOPs for arms and ammunition management (see **Annex 4**) have been developed within the UN system and can be a very valuable basis for the development of national SOPs.

The national management structures for arms and ammunition management

can e.g. designate a drafting committee to draft SOPs or consider adoption of a UN generic SOP. Some external support (consultant) might be required.

Annex 4 provides a list of existing generic SOPs which can be accessed and used in the national drafting process.

5.2. Training

The International Ammunition Technical Guidelines (IATGs)³⁹ state the following regarding ammunition management but it is equally true for arms management:

“In countries with limited national capacity to effectively and safely manage conventional ammunition stockpiles, the development of an indigenous capacity should be key to long-term stockpile safety and security. At the national level an indigenous capacity is characterised by a state’s ability and willingness to develop and articulate stockpile management policy and direction. It also about a state’s ability to plan, coordinate, manage and sustain a safe, secure and effective conventional ammunition stockpile management programme. This includes the technical capability to develop, maintain and apply appropriate national standards for conventional ammunition stockpile management. Developing States, that may have limited financial and technical resources, may not be able to initially achieve a minimum standard of safe, efficient and effective ammunition.”

Training and staff selection

The need for arms and ammunition management training activities is generally high in least developed countries. Often, curricula do not exist.

It is important to ensure that those people who receive training are relevant and are/will be tasked with arms and ammunition management in the organized forces. Often, not those who perform day-to-day duties receive places in the courses.

Box 4: Staff selection

Physical security and inventory management systems are all vulnerable to failure should staff not accept their responsibilities, fail to follow standard operating procedures (SOPs) or become subverted. This means that organizations shall make every effort to ensure that:

- a) those who do not have criminal convictions and are unlikely to possess criminal tendencies are selected as staff,
- b) staff are trained effectively,
- c) staff stay in the position for an adequate period of time and
- d) staff are likely to remain loyal, well motivated and appropriately rewarded.

³⁹ IATG 01.10, p.3/4.

Poorly paid, trained and motivated staff are more likely to be involved in malfeasance (including laxity in carrying out duties, being susceptible to bribery, failure to follow procedures or even active involvement in conventional ammunition theft and sale).

Stockpile management organizations should ensure that appropriate procedures are developed and followed for the security vetting⁴⁰ of staff prior to employment in arms and ammunition storage areas and that they are security vetted at regular intervals throughout their employment. It should also be a condition of their contracts that they shall report any relevant changes in personal circumstances to security vetting staff.

Source: Adapted from IATG 09.10.

It is very important that the development of training curricula be owned by the organized forces and be firmly rooted in the respective SOPs. Training must reflect the competency levels of trainees (i.e. illiteracy) and should be hands-on; graphic illustrations should also be considered as training materials.

It might be possible to develop a uniform training curriculum for all organized forces tasked with internal security as their arms and ammunition tend to be comparable. The training for the army, however, will differ due to the different requirements that result from higher hazard class ammunition, weapons and systems.



Training Course. Source: German Armed Forces.

Training of basic activities like tidying up the store, removing rubbish, reorganizing stores, inspection of certain ammunitions and conducting basic inventory can dramatically reduce levels of threats to depots e.g. unintended explosions and losses.

⁴⁰ Security vetting is a process used to perform background checks on an individual's suitability for a particular appointment. It normally consists of: 1) confirming an individual's identity; 2) looking at associations that may cause a conflict of interest; and 3) determining vulnerabilities in an individual's life through which improper pressure could be applied.

It can take several months for trainees to develop a basic level of proficiency regarding arms and ammunition management. A realistic time period has to be allotted to allow trainees to develop particular skill and/or to unlearn old practices. A follow-up on-the-job training phase and later re-training should be included. Generally, a train-the-trainer approach would be required.

In general, training curricula can for instance be designed for three staff groups:

- i. **Technical staff: Technical course:** This training will address all elements of physical security & stockpile management regarding arms and ammunition. It will train those who do the actual work as armorers in the storage facilities. Several levels (basic to advanced, etc.) can be built in.
- ii. **Security sector staff: Basic weapon handling:** This training would be included in basic training of all security sector staff that is carrying weapons. *How to properly handle and use weapons* is its main focus. It also includes regulations of how to behave when handling weapons (not randomly pointing at people, clearing the weapon properly before storing, etc.).

Security sector staff: Arms and ammunition management: A course for those engaged in managing arms and ammunition (not the technical staff running explosive storage areas / armories). The training targets the Officer level whose work relates to arms and ammunition management (like e.g. Battalion commanders).

- iii. **Oversight body staff:** A course training the staff that is engaged in executing oversight regarding arms and ammunition management, e.g. in the headquarters or national institutions.

Under the UN SaferGuard Programme, the following training courses regarding **ammunition**, based on the International Ammunition Technical Guidelines are available:⁴¹

1. Training course on Small Unit Ammunition Stockpile Management
2. Training course on Military Ammunition Stockpile Management
3. Training course on Ammunition Accounting and Tracing

⁴¹ UNODA



Training Course. Source: German Verification Center.

Once basic skills are taught, it is important to develop the internal capacity and processes necessary to train staff if people are relocated.

The international community, UN and/or non governmental organizations often are well placed to support and facilitate training as well as curricula development.

The security sector forces should consider tests/ routine evaluations for the participants (especially technical staff) to ensure proper learning.

Security Training

Key personnel should receive periodic training on regulations, behavior and procedures relating to security within SALW stockpile locations, inventory management and record-keeping. This specific security training should be provided at the time of assignment to duty and should be regularly updated. If any changes are made, or new directives or regulations come into effect, a training update should be provided. For emergency situations, such as damage to property, burglary and theft, intrusion and intelligence activities, or fire and natural disasters, special training should be given which also includes appropriate practical exercises.

The organized Force should consider tests/ routine evaluations for the participants (especially technical staff) to ensure proper learning.

Step 4: What Can We Do? Taking Action on the Ground

Arms and ammunition security refers to the protection of ammunition, weapons, and explosives against any malevolent actions, including theft, sabotage, damage, or tampering.

The diversion (theft) of ammunition and arms contributes to the illicit trade in arms and allows criminal factions and politically motivated groups to augment their firepower. Ensuring stockpile security is therefore a primary consideration for all stockpiles, whether they are small or large in volume.

6.1. Basic Organizational and Procedural Improvements

The type of unit, its organization and local procedures determines the daily management of the storage facility. Still, the following two points should be followed at all times:

- a) weapons should be stored together by type, as this assists the inventory management process;
- b) locks securing crates, containers, cabinets, racks, etc. containing weapons should be sealed with official, tamper-disclosing tape or other materials in order to reduce the need to open them during stock checks.⁴²

Relatively cheap measures can drastically improve the internal and physical security of storage facilities and overall stockpile management practices. These most important measures are introduced below and should be introduced in all storage facilities. They are often called “low cost—high value measures”.

6.1.1. Security Regulations

Countries’ stockpile security measures differ in scope and scale, but it is clear that a security plan is the foundation of effective stockpile security.

In cases where stockpile security is comprehensive, plans follow national regulations, adapt to the specific realities of the store in question, and are known in detail to the management and staff of stockpile facilities. The

Simple improvement measures are:

- Remove dirt and waste from armory.
- Build and install simple wood racks to improve internal store organization.
- Check and separate stocks in “active” and “reserve” weapons. Maintain active stock well (oil/clean) and arrange in racks.
- Arrange ammunition properly and store separately, if possible.
- Check or re-start “General Ledger Book” as well as “Duty Weapon Book” (+ ideally an “Ammunition Ledger Book”) to record and update inventory.
- Ensure regular inventory checks by superior.

⁴² ISACS 05.20., 2012, p. 20.

plan should also be updated regularly to reflect changing circumstances and requirements.⁴³ **Annex 3** outlines a model security plan.

6.1.2. Inventory Management and Record-Keeping (Accounting)

6.1.2.1. General Comments

“Effective inventory accounting measures must be established in order to ensure that any stock leakages are identified as quickly as possible.”⁴⁴

“Accounting” refers to information management systems and the associated operating procedures that are designed to record, numerically monitor, verify, issue, and receive [arms and] ammunition in organizations and stockpiles.⁴⁵

Record-keeping

Accounting is necessary

- to control stocks and ensure security,
- to identify stockpile losses or inaccuracies resulting from misplaced munitions, and wrongly issued or illicitly diverted stocks,
- for effective technical management of ammunition.
- to record physical inspection reports to make the management of unstable ammunition easier and to minimize safety risks.

An accounting system is a *procedure*. If maintained on a regular basis, **with no exceptions permitted**, the basis of security and safety can be ensured. Moreover, it becomes possible to survey ammunition and weapons stocks for usage, and use patterns, and thus enhance national security and effectiveness.

Without

- proper **storage** separating different classes of items,
- usable and effective **safety** systems,
- effective **security** systems,
- **input-output** control and
- an **accounting** system,

you are likely to end up with a pile of material rotting away in some shack, which is useless for national defense and, at the same time, a hazard to everyone in the area.

Overall, accounting contributes to both safety and security of the stockpile. No class, item, storage depot/ armory is exempt from being counted or recorded.

The stockpile inventory must be replicated at the national, individual organized force and unit level. As a general rule, changes at one level will always be reflected in other levels.

⁴³ See Annex A to ISACS 05.20 and Annex C to IATG 09.10 Security Principles and Systems for Model Security Plans.

⁴⁴ RMDS/G 5.30, p. 4.

⁴⁵ IATG 03.10, p.1.

Already existing **record books** should be checked and updated. Another good option is to set up the inventory afresh and substitute the older **inventory** books by doing a full stock check of all weapons.

Create

- **One book for duty weapon issues/receipt (“Duty Weapon Book”)**
- **One book containing all the arms in store (“General Ledger Book”)**
- **One book recording ammunition issues and receipt (“Ammunition Ledger Book”) combined with Stack Tally cards (see below).**

A weak point in all depots are the points of entry and exit. Not unnaturally, stockpiles are *dynamic* which means material and personnel coming and going. This in turn means that all entry and exit are monitored without exception.

A functioning accounting system is designed to provide the person in charge of a depot, and his/her superiors, with an immediate picture of available and unavailable stocks. At the same time, a good system will immediately pinpoint stockpile leakages and safety risks.

Three books for good inventory management

Records are to be kept and not thrown away.⁴⁶

Paper records

Paper records are a very suitable accounting style. Paper records should be in **books** and not ring binders to make sure that pages are **not** removed! No tip-ex allowed!

Paper records require, in terms of infrastructure:

- A location at the single point of entry/ exit of all items where the transfer can be recorded in comfort.
- An absolutely reliable secure storage for all records. Attention must also be paid to ensure that records are not modified in any way after they have been recorded, that all records have a secure backup well away from the site and that all records are securely stored. In this case ‘secure’ means that they are not accessible to unauthorized persons, they are protected from accidental loss or destruction/ erasure (by fire, damp, insects, etc.), and they are stored in some order that they can be accessed immediately.

Computer records

Computer records are complex to manage and require specialized high capacity staff.

- Like paper records, computers and their data must be carefully secured against unauthorized access.
- Records must be backed up to hard media. One backup copy at least must be stored away from the site.
- Computers and their records must be stored securely, as noted for paper records.

⁴⁶ The International Tracing Instrument (ITI) specifies 30 years for SALW.

6.1.2.2. Record-Keeping / Accounting for Arms

Inventory books are very important documents which should be looked after and maintained! Keep them in a dry and secure place.

The arms bookkeeping system should at least consist of:

1. "Duty Weapon Book"

When an individual SALW is issued or received from an authorized staff member, it is entered in this book.

Duty Weapon Book

The book only needs to record

- when (date and time) issued,
- model and serial number (e.g. last five digits)/butt number,
- receiving staff's name and signature,
- issuing staff's name and signature,
- number and type of ammunition issued/ received and
- date/ time/ recipient of return,
- remarks.

2. "General Ledger Book"

This book contains every SALW in store.

General Ledger Book

The following information must be entered into the book:

- Ledger Book number,
- entry date,
- type/make of SALW,
- serial number,
- year of manufacture,
- older markings (e.g. manufacturer serial number and import marks),
- location/ current holding unit, and
- exit comments (destruction, loss, theft or transfer to xyz, i.e. other country),
- remarks.

The General Ledger Book should contain a page which specifies the overall account of weapons, disaggregated by type.

Example 1: Duty weapon book

Duty Weapon Book Service - HQ Armory Template to be applied:							
Issuing Date + Time	Model	Last 5 serial numbers + Butt Number	Recipient (Name + Signature)	Issuer (Name + Signature)	No + Type Ammunition Issued Received	Return Date / Time / Recipient / Signature	Remarks
Example:							
<i>11.09.12 2:34pm</i>	<i>AKM</i>	<i>57891 BN 44</i>	<i>Cpl XYZ</i>	<i>Sgt XYZ</i>	<i>20x 7.62 18x 7.62</i>	<i>12.09.12 1pm Sgt ABC</i>	<i>Magazine missing</i>
...							
							Page Number

Example 2: General ledger book

General Ledger Book Service - HQ Armory Template to be applied:							
No.	Entry Date	Type	Serial number Butt Number	Year of Manu- facture	Location/ Unit	Exit comments Date + Reason (e.g. De- struction, Loss, Theft, Transfer to XYZ)	Remarks
Examples							
<i>24</i>	<i>12.09.09</i>	<i>AKM</i>	<i>56HG766123 BN 12</i>	<i>1977</i>	<i>Head- quarter</i>	<i>-</i>	<i>-</i>
<i>177</i>	<i>27.10.10</i>	<i>AKM</i>	<i>788ZHG566262 BN 133</i>	<i>1960</i>	<i>County Hq, XYZ County</i>	<i>19.03.11, Theft. Reported to DG 20.3.11 Case File No 221</i>	<i>Weapon was damaged and slider missing (unservice- able)</i>
							Page Number

Weapon Cards

A simple way to improve the access control to arms is the introduction of weapon cards. Each soldier/ member of staff receives a personal picture ID weapon card as displayed below. When a weapon is handed out, the **weapon card** is retained for records. Upon return of the weapon, the individual will receive his/her weapon card.



Example of a weapon card and its use. Source: HALO Trust/ DTRA

Weapon Cards and Weapon Discs can make the work easier in the armory.

Weapon cards can be especially valuable when many weapons need to be issued at the same time. The data of the collected weapon cards can be entered into the Duty Weapon Book after the weapons have been issued against receipt of the weapon card.

Weapon Discs

Weapon discs are a simple, low-tech solution for controlling personal arms access. Weapon discs are a cheap and durable alternative to weapon cards.

Most military forces stamp personal ID discs ("dog tags") for their staff members who are allowed to bear arms. Such a personalized metal disk shall be stamped with:

- the individual's ID/serial number,
- the individual's name,
- some form of stamp by the issuing agency.

Weapon discs are worn around the neck and are considered issue items. They should be checked in morning/ evening parade and are absolutely personal. They should be a different shape, but of similar size to dog tags, to avoid mistakes and loss.

Upon receiving a weapon from the issue store, the owner gives the disk to the armorer who then places the weapon disk in the weapon's empty place.

Advantages of weapon discs:

- They assist armorers in a sight check of weapons inventory.
- They help identify the start of a paper trail for a missing weapon.
- They ensure better control of issued weapons.
- They supplement, but do not replace entry in the Duty Weapon Book

Example: Ghana

Ghana uses the system of weapon disks which specify:

- serial number of the weapon,
- type of weapon,
- butt number of the weapon in store and
- holding unit.



Weapon disk. Source: Ghana Armed Forces.

6.1.2.3. Record-Keeping/ Accounting for Ammunition⁴⁷

Not only does the storage of arms need proper accounting practices which should be established and enforced (see specific section). So does ammunition! At the unit level, a single 'Ledger Book' as recommended below may be appropriate, yet on the national level much more complex systems are needed if effective surveillance and proof systems are to be implemented.⁴⁸

"Ammunition Ledger Book"

Accurate records should be kept in an Ammunition Ledger book by

- specific type,
- quantity,
- lot and/or batch number,
- UN Hazard Division,
- UN Compatibility Code,
- Condition Classification Code,
- exact location,
- date of manufacture / shelf live date,
- date / number received, and
- date / number issued.

Ammunition Ledger Book

Either manual or computer ammunition accounting systems may be used. Although manual systems are labor intensive and time consuming compared to computer systems, and the transmission of information between higher formations and units is slow, they have proven capability and are simple to use when individuals are appropriately trained. Their effectiveness is determined by the administrative instructions for their use and the standing

⁴⁷ IATG 03.10.

⁴⁸ See IATG 03.10 Inventory Management.

operating procedures used within the ammunition depot. For reasons of accounting accuracy, explosive safety and operational efficiency parallel systems that can identify specific ammunition by either stockpile location or by lot/batch number are required. Ammunition accounting and storage units must regularly report on inventory levels and condition to the stockpile management organization.⁴⁹

No ammunition storage organization is likely to be able to achieve 100 percent accuracy in its ammunition accounts. For example, if storage staff issues the right type of ammunition, but of the wrong lot or batch number, there is automatically a discrepancy until the error is identified and rectified during a regular stock check. In this example, the quantity of ammunition in storage would be the same and there has been no criminal intent, but the ammunition account would be inaccurate as 100 percent visibility of that particular lot or batch number has been lost.

Stack Tally Cards

The use of **stack tally cards** is an effective measure that supports accurate ammunition accounting, assists in stock taking and deters theft. Each stack of ammunition⁵⁰ should have a tally card attached to it that records the following information for that particular stack.

stack tally cards per stack



Stack tally cards. Source: HALO Trust.

Stack tally cards as integral part of ammunition accounting

The following is an example stack tally card which covers the most important points. Each stack should be equipped with one stack tally card and updated whenever ammunition is removed or added. The numbers on the stack tally cards have to be adjusted in the corresponding Ammunition Ledger Book.

⁴⁹ Reporting frequency will depend on expected usage rates, and the current condition of the stockpile. It is recommended that reports should be submitted monthly.

⁵⁰ A stack is the amount of ammunition that is contained within a particular place in an explosive storehouse. This may range from a single ammunition box to a block of many pallets stored vertically.

Stack tally cards should contain as information the type of ammunition, the lot number and the hazard class. If no lot number is available, stacks can be arranged by type!

Table 1: Example of a stack tally card ⁵¹

UNIT XYZ - Stack Tally Card					
Ammunition Type: 7.62 x 51 Lot Number: ABZZ2287 Hazard Class: 1.4.					
Date	Received	Issued	Balance	Signature	Name
11.4.2001	100	-	100	Xxxxxx	xxxxxx
20.5.2001	-	50	50	Xxxxxx	Xxxxxx
21.5.2001	10	20	40	Yyyyyy	yyyyyy
...					

Inventory checks are very important to enforce accountability!

6.1.3. Inventory Check (weapons)

Inventory checks are fundamentally important for a functioning arms and ammunition management system. If properly executed, potential corruption and mismanagement will be severely restricted. Losses can be properly identified and eventually be followed up. More importantly, arms inventories are up to date and the loss of arms (national property) and data will be severely limited. The leadership of the Organized Forces will have to demand and enforce inventory checks.

The safety culture should be such that staff members feel able to report anything they consider is a risk to health, safety or the environment, and that they know their reports will be taken seriously and acted upon in a timely manner. The results of the inspection should be recorded on an inspection record sheet. The national technical authority shall set the frequency of inspection but it is generally accepted as best practice that monthly is sufficient, coupled with some non-routine inspections.⁵²

Internal checks/ unit check:

The contents of weapons stocks shall be verified on a regular basis against the unit's inventory books. Specifically:

- daily sight count by the armorer and duty officer (e.g. check for missing weapons in racks),
- monthly full parade of stock and check against books.

⁵¹ Adapted from IATG 03.10.

⁵² IATG 06.70., p. 2.

**2 weapons handed
out/ missing**



Daily sight count. Source: DTRA.

External inventory check:

It is important that the superior administrative level periodically checks inventories and state of facilities on all levels. Six months is an appropriate interval.

The assessment team should check arms inventories against existing files (full physical parade, if possible) and check ammunition accounting.

Any suspected loss or theft of a weapon shall immediately be reported to the appropriate authority, which should immediately instigate an independent investigation by an individual or organization unconnected with the weapons management system.⁵³

Butt numbering

Each weapon should ideally receive an individual store number running from 1 to X to make the inventory checking process easier (besides the serial number of course).



Butt number. Source: BICC.

⁵³ ISACS 06.20., 2012, p. 21.

6.1.4. Guarding / Access Control

Physical entry to SALW⁵⁴ storage facilities should be limited to those that must enter to perform their official duties.

Access to keys shall be regulated. Keys should be kept centrally and handed out against signature registered in a “Key Book”. Controlling the access to keys is cheap and a very effective way of increasing the security of a stockpile.

Key Control

“Keys to all areas and devices that store or secure small arms and light weapons—including buildings, containers, racks, intruder detection systems, etc.—shall be stored separately from other keys, and shall not be left unsecured or unattended at any time.

Such keys shall be accessible only to authorized personnel whose duties require them to have access to the weapons. The local authority responsible

for weapons security within the facility should maintain a regularly updated roster of authorized personnel (custodians).

The number of such keys shall be kept to the minimum possible, but master keys shall not be used.”⁵⁵

Staff shall not take keys out of the premises e.g. for lunch or after duty.

All locks have individual keys (a master key can be kept, well-secured, in case of emergency).

To increase security controlling keys is cheap and effective.



Key locker. Source: HALO Trust.

Guarding is a basic protection activity

A 24/7 guarding cycle shall be set up where not yet introduced.

⁵⁴ Although IRMDS/G refers to SALW this is equally true for ammunition storage facilities.

⁵⁵ ISACS 05.20., 2012, p. 9.

Walls and fences do not prevent unauthorized access to a stockpile. They rather delay illegal entry until security personnel can intervene to prevent it. The physical presence of guards is essential and one of the key factors in security.

Training, motivation, and regular pay are key ingredients in ensuring the effectiveness of the personnel charged with securing stocks. By contrast, poor pay and training can encourage staff involvement in malfeasance (including being subject to bribery or tempted into the theft of ammunition for sale) or misfeasance (such as laxity in carrying out guard duties and failing to follow procedures).

The careful and systematic selection and recruitment of all personnel involved in tasks regarding stockpile management and security of SALW is essential. The requirements should include reliability, trustworthiness, and conscientiousness, as well as the appropriate professional qualifications. In addition, every individual should be subject to security clearance.

Guarding patterns vary considerably, but there are essentially three different guard functions:

- **Static guard** posts enable personnel to oversee the facility and intercept potential intrusions. Static guards need to be able to both see and act (either physically or by alerting mobile guards) to stop intrusion or extrusion of people and materials. The use of animals assists the guarding of stockpiles. Dogs are a notable security measure, but geese and other animals that audibly respond to intrusion can be used to supplement human guards.
- **Mobile guards** are a deterrent to potential intrusion or extrusion, and can intercept any unauthorized movement of persons and materiel.
- **Random patrolling** patterns hinder planned illicit entry to the facility. Guard patrols should be made at regular intervals, but in addition, random checks must be made.

6.1.5. Transportation of Weapons and Ammunition⁵⁶

Weapons and ammunition can be transported by land with marked or unmarked military vehicles (sometimes even armored vehicles), civilian transport, or secured and sealed railway wagons or containers. If civilian contractors are used to move SALW by land, then procedures for authorization, security, monitoring and inspection of both the movements and the contractors themselves should be in place beforehand. They should be either equipped with specific protection measures (e.g. alarm systems on vehicles or electronic tracers in boxes), monitored by the military police or guarded by military or security forces, depending on the quantity of

⁵⁶ OSCE Best Practice Guide on National Procedures for Stockpile Management and Security, p. 9, Vienna: OSCE, 2003 // See also ISACS 05.20 and IATG 08.10.

SALW transported and the respective risk assessment. Transport routes should generally be planned in advance and information concerning these routes should be treated as classified.

Before transport, the **bolt** and/or other critical parts, if applicable, **shall be removed** from the transported arms and be transported **separately**. If the arms are stolen/ ambushed, they cannot be used easily.

Prior to loading into the containers, **ammunition shall** be placed in boxes and **be sealed/ locked**.

Shipments shall be checked upon receipt and, where possible during transit, to ensure that seals are intact. If there are indications of theft, tampering or damage, an immediate stock check shall take place to determine whether a loss has occurred.

A general security principle is that ammunition and weapons should be transported separately during vehicle moves.

6.2. Basic Infrastructure Improvements

The improvement of existing infrastructure as well as the construction of new facilities is an important component in improving arms and ammunition management.

Countries should first of all implement the simple measures that do not cost a lot of money and can be executed even without external assistance. Below, a variety of these measures are presented. It is important to notice that improvements of processes are equally important. A too strong reliance on infrastructure is not sufficient. Training, rules and regulations and infrastructure have to be understood as interdependent!

6.2.1. Basic Considerations

This section will discuss how classes of stockpile items are to be stored. Specifics will vary in each country depending on local conditions and local legislation. Nevertheless, the *principles* will remain the same wherever storage is practiced.

Weapons

Storage for arms requires a number of levels which will ensure that the weapons are usable in times of need, and yet are secure. Safety considerations apply as well when handling arms. However, a well-maintained store will **only keep arms unloaded and checked**.

Every weapon must be securely locked while it is in storage. It is inefficient to lock each weapon individually. Instead, a number of weapons may be secured in a **rack** by a bar/ metal rope (e.g. through their trigger guards) which are then locked to the rack.

The racks or cabinets storing weapons should ideally contain only one type (e.g. pistols, assault rifles). Each rack or cabinet must be attached immovably to the fabric of the storeroom. That is, concreted bolts should be used to attach the racks or cabinets to a concrete floor or wall. The use of chains and metal ropes running through the trigger guards is highly recommended.



Arms secured with trigger guard chain. Source: BICC/ German Armed Forces.

A clearing barrel should be installed at each facility where small arms are issued and returned. Only here is the discharge procedure to be executed before a weapons is returned into the store. It can be easily constructed using a sand filled pipe, a barrel and sand:



Clearing Barrel. Source: HALO Trust, DTRA.

6.2.2. Racks and Shelves - Weapons

Stores often lack proper internal organization. In many cases, the provision of racks is the best and quickest solution and increases storage conditions for SALW and ammunition/ magazines considerably (e.g. individual rather than bulk storage of SALW/ separation of weapon and ammunition).

Racks should ideally be produced locally against an approved design. It would be beneficial if community members/ ex-combatants for instance, were trained in producing these racks and executing the work e.g. on behalf of the UN Peacekeeping Mission or funded through other sources.

A role model weapon room.



Example Metal Racks for SALW and ammunition storage. Sources: MAG Burundi / HALO Trust/ DTRA/ DDP Weapon Storage.

Simple wood racks can be hand-made.

Where storage facilities are in use, simple SALW **storage wood-racks** as well as **shelves** to store items properly in existing facilities should be built and installed. This would help to reduce the often confused storage mix found inside many facilities, better use limited space and increase protection against rats, etc. This is also an opportunity to separate serviceable and non-serviceable SALW and also ammunition.



Well arranged armory with racks. Source: HALO Trust.

Where it is required to protect the arms from the view of visitors / public (e.g. in police stations / guard houses), closed racks should be used:



Closed rack cabinet. Source: HALO Trust.

6.2.3. Internal Store Organization: Ammunition

Stockpiles should be organized into stacks and aisles free of obstruction.⁵⁷ Staff should tidy up stores by removing waste and organize items in separated stacks.

**Ammunition stored for the longer term should be:
on pallets or piles**

- 1. clearly separated from other piles (to lift off the ground as protection against water, etc.);**
- 2. where each pallet/ pile contains only one type of ammunition/ explosive;**
- 3. which are clearly marked as to nature, and shelf life.**

6.2.4. Infrastructure⁵⁸

Storerooms for weapons must be secure. Walls, floor, and roof must be made of a strong material such as concrete, that will take a great deal of effort, and preferably, of noise, to penetrate. Windows must be secured by bars sunk deeply into the walls.

⁵⁷ Ibid.

⁵⁸ Partly referencing to ISACS 05.20., 2012, pp.11/12.

If the existing infrastructure does not fulfill the requirements, it can be upgraded by lining:



Upgrading of infrastructure. Source: HALO Trust.

Often, the installation of proper **doors and locks** would make a huge difference. They need to be robust and prevent forced entry. Doors should ideally be made of steel or of solid hard wood with steel sheets on the outside. Door and gate frames should be rigidly anchored to prevent disengagement of the lock bolt by prying or jacking the doorframe; hinges should be located on the inside and should be of the fixed pin security type or equivalent; doors and gates shall be secured with high security padlocks.



Appropriate door and hinge. Source: DTRA

Windows, ventilation holes and other openings in weapons storage buildings shall be kept to a minimum and shall be equipped with security bars or grilles equipped with appropriate locks. Openings are often an entry point for dust which can negatively affect the items in store. Furthermore, windows/openings should be protected by a ventilation grill.



Secured window, locks. Sources: German Armed Forces/ DTRA/ HALO Trust.

Facilities shall be protected from the sun by sun roofs.



Example of a sun protection roof. Source: BICC.

6.2.5. Fencing

Weapons and ammunition storage facilities should be fenced in. Barriers and warning signs should be considered. This will limit access and increase time needed for criminals to break in and also represents a deterrent.

Fencing and external lighting allow stockpile security personnel to monitor the movement of personnel and materiel in and out of the facility and ensure that passage occurs only through controlled access points. Where lack of constantly available electricity, a big issue in many countries, occurs, the option of installing exterior and interior lighting is difficult to implement. Yet it is necessary to refer to the principle behind internal and external lighting.

Fencing is mandatory

Fences should provide security, but also facilitate monitoring. However, maintaining security necessitates regular inspection of the physical integrity of fences and immediate repairs to fences that are damaged and potentially insecure.



Simple fence with gate. Source: DTRA.

Due to the fact that fences can be pierced or climbed, effective stockpile security dictates constant observation of any points where persons could approach them. Approach points should be well lit (from around 15 minutes before dusk and after dawn) and regularly maintained. If power is drawn from a national grid, backup transformers should be in place to supply lighting in the event of power failure.

At minimum, a security fence⁵⁹ provides minimum security and is at least 1.5m high. It is intended only to mark a boundary and will delay a determined intruder only for a short time.

This fencing material might not be available on short notice but procurement and set up of fencing should be prioritized.



Simple Class 4 fence. Source: HALO Trust.

⁵⁹ IAW ISACS 05.20., 2012, p.13.

6.2.6. Preventing Fires / Preparing for Fire Outbreak:⁶⁰

Immediate fire fighting appliances shall be made available within and outside storage facilities. Portable fire water and, if available, foam extinguishers should be available and capable of extinguishing small fires within the premises. Fire beaters should be available outside the storage facility to fight small vegetation fires.

Smoking and open fire must not be permitted within 20m around facilities where ammunition is stored.



Vegetation fire. Source: MSAG.

In some states, the local authority fire and rescue service may be available to support fire fighting activities and they would have the major appliances (such as tenders, mobile pumps and extendable ladders) necessary to fight major fires.

The following immediate actions should be taken by unit staff if

- a fire is detected before any ammunition and explosives are involved,
- a fire is small enough to be dealt with by unit level fire fighting equipment:
 - a) immediately attempt to extinguish or control the fire with the immediate fire fighting equipment available;
 - b) sound the fire alarm, if available;
 - c) evacuate all non-essential personnel in the immediate vicinity of the fire to an appropriate safe distance;
 - d) immediately call the appropriate fire and rescue service and request their assistance, if available (as time may be a factor later on if first aid fire-fighting fails); and
 - e) prepare personnel for a wider evacuation should immediate fire fighting fail to extinguish or control the fire.

⁶⁰ IATG 02.50., p. 4/5.

Should the immediate fire fighting actions fail to control the fire and should it begin to spread towards the ammunition and explosives, the following immediate action should be taken:

- a) all personnel are to be evacuated to an appropriate safe distance based on the separation distance for the potential explosion site involved in the fire;
- b) a roll call should be taken to ensure that all unit personnel and visitors are accounted for;
- c) the fire and rescue service should be alerted (en route if necessary) that immediate firefighting has failed and that the fire is spreading towards the ammunition and explosives;
- d) the fire safety plan should be instigated.

Fire practices to test arrangements at the unit level should be held at irregular intervals of no less than two months.

Cutting grass and removing trees reduces the risk of fires and is the simplest and cheapest fire prevention measure of them all: There is a major fire risk with any uncontrolled growth of vegetation, particularly during dry weather conditions. Therefore grass, trees and vegetation shall be controlled to ensure that they do not present a hazard to explosives.

No vegetation should be permitted within one meter around facilities (with the exception of earth covered buildings). This will provide a basic fire-break. Trees and shrubs may be permitted within explosives areas provided that they do not provide a means by which a fire can bridge a firebreak. Cut vegetation, such as grass clippings, fallen branches, hay, etc, should be removed from the short grass areas immediately after cutting. If the cuttings are removed to a distance of not less than 50m from a PES, they may be temporarily stacked to await removal. Such removal shall be completed within three days from the date of cutting. Cut vegetation should not be burnt within or close to the explosives facility.

Zones clear of vegetation should be established and maintained for a minimum of four meters inside a security fence and ten meters outside a security fence (real estate permitting).⁶¹

6.2.7. Marking: Weapons⁶²

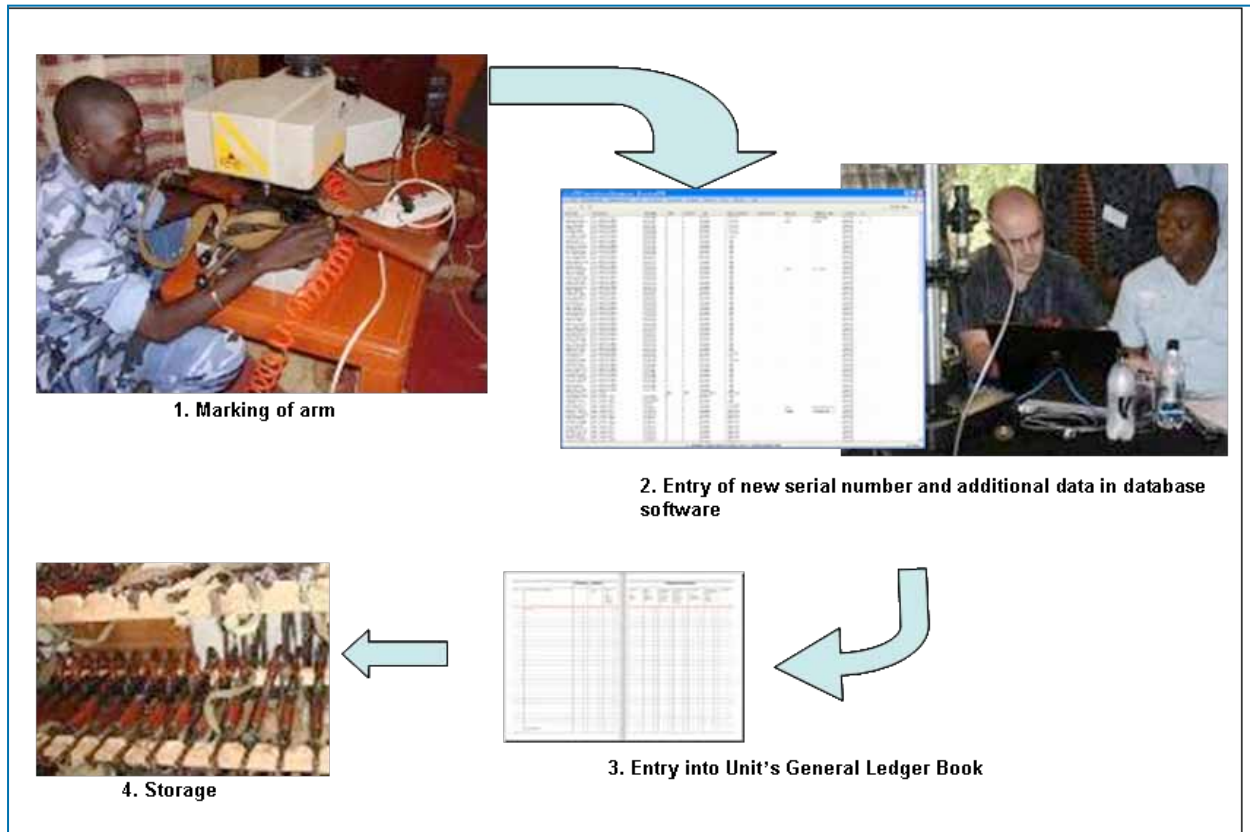
The ability to trace illicit small arms light weapons—as well as illicit parts, components and ammunition—back to the point, in space and time, where they passed from the legal to the illicit realm is a prerequisite for taking effective action to prevent further diversions from taking place. Furthermore, a mark on a weapon deters staff from selling or diverting arms which are normally registered individually by serial number and personal signature at the time of issuing, e.g. in the morning at the beginning of a shift. So

⁶¹ ISACS 05.20., 2012, p. 15.

⁶² Adapted from ISACS 05.30., 2012.

when the marked and registered arm is surfacing on the black market or at a crime scene it is possible to identify the responsible staff.

The following picture displays the basic process of marking and registration:



Marking and registration process. Source: BICC.

A country needs to decide on the exact marks on a weapon. The mark shall be applied to the part of the weapon that is most essential to its operation (e.g. the frame and/or receiver).

The most important mark is the new serial number which will have to be entered in the respective accounting system (books and/or computerized system) before storage. It is very important to make sure that the process is in place before marking actually begins. Staff needs to be fully trained on how to operate the marking equipment. A standard operating procedure which is binding for all organized forces needs to be developed and endorsed in the security sector.

The establishment of a functioning marking and registration system is a demanding task and needs to be thoroughly thought through, discussed, planned and prepared. Often, external support is crucial for the success in that endeavor.

The removal or alteration of markings on a SALW without prior authorization from a competent state authority shall be considered a criminal offence.

Recommended marking

When SALW are imported from other countries, the following marks should be applied:

- country code,
- abbreviation of Organized Force,
- in case of import: Year of import,
- unique serial number (especially, when no serial number is marked on the weapon).

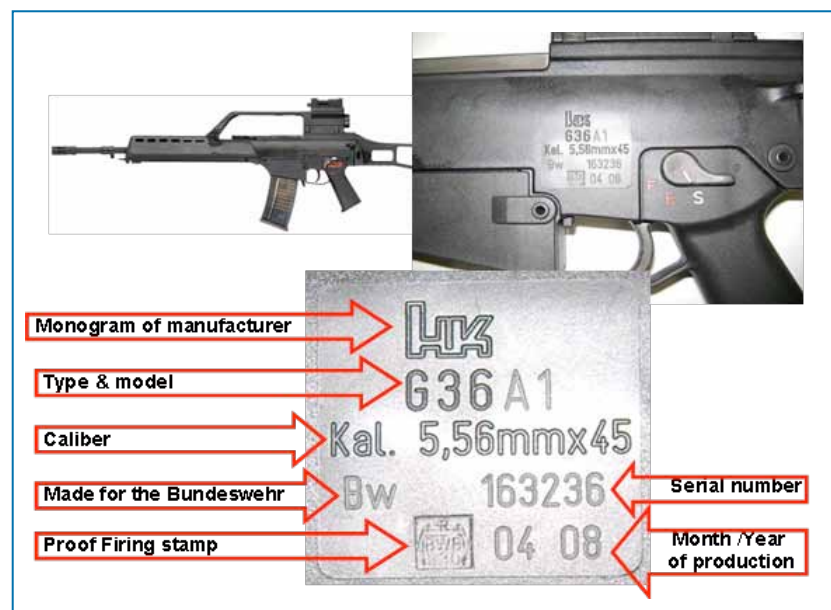
Example for import:

Example Country Abbreviation	XY
Police Service	PS
1999, year of import	99
unique serial number	90026ZH73773

Example for existing stocks:

Example Country Abbreviation	XY
Police Service	PS
unique serial number	90026ZH73770

Marking systems often offer the option of adding a scanable mark to the serial number which can make data entry into the database easier and prevent typing errors.



Markings of German G36. Source: German Verification Center.

6.3. Specifics on Ammunition Storage



Separately stored arms and ammunition. Source: German Verification Center.

Ammunition is the element that gives a weapon its actual relevance and value in operations. As ammunition is normally higher in numbers compared to arms, it seems like it is more difficult to control. Indeed, managing ammunition is a challenging activity, however, given the risks associated countries should make every effort to strengthen this area.

Ammunition requires special consideration whilst determining the layout of a storage site. Different natures of ammunition pose different hazards. An example of this would be propellants and low explosives which are easily ignited and as such need to be stored away from primary high explosives that are extremely sensitive to heat, shock and friction.

Explosive storehouses should be marked on the outside to denote the hazard generated by the ammunition contained within.

It is essential that all ammunition being stored be clearly and correctly marked both on the ammunition itself and on the packaging. This is to ensure that the potential hazards and any specific storage requirements can easily be identified. The markings also serve as an aid to quality control, logistics and military planning as well as for the purpose of reducing the likelihood of an explosive event or accident occurring. The markings found on the ammunition serve some of the following purposes:

They provide information on the

- caliber of the ammunition and the length of the cartridge case,
- manufacturer of the ammunition,
- date the ammunition was produced (year and/or month).
- production lot to which the ammunition belongs.

Basic rules for unic storage:

- Ammunition and firearms must be stored separately.
- Weapon types should be racked together.
- Ammunition should be segregated by type and where possible by lot.
- Explosive rounds must be placed in separate berms or buildings.
- A weapon put back in store must be properly checked to ensure it is not loaded

6.3.1. Ammunition Management and Rotation of Ammunition Stocks

Maintaining a good ammunition stockpile should also include rotating the stockpile to include using the serviceable ammunition for training when its serviceable date is about to expire.

Ammunition rotation should include close coordination between the logistics officer and training officer. By understanding the principle of stock rotation and using serviceable ammunition for training purposes, a host country should be able to determine the amount of ammunition required to maintain operational stocks, war reserves, and the training stockpile.

“Use it before it goes bad.”



Well arranged ammunition stacks. Source: HALO Trust.

Of course, good ammunition management requires detailed inventory controls to be in place. Good record-keeping identifies unserviceable stocks, tracks lot numbers, tracks malfunctions, and traces suspect lots. The result of good record-keeping improves reliability of the ammunition and reduces ammunition accidents. It will also prove to be more cost-effective and enable ammunition forecasting and promote a good surveillance program as well.

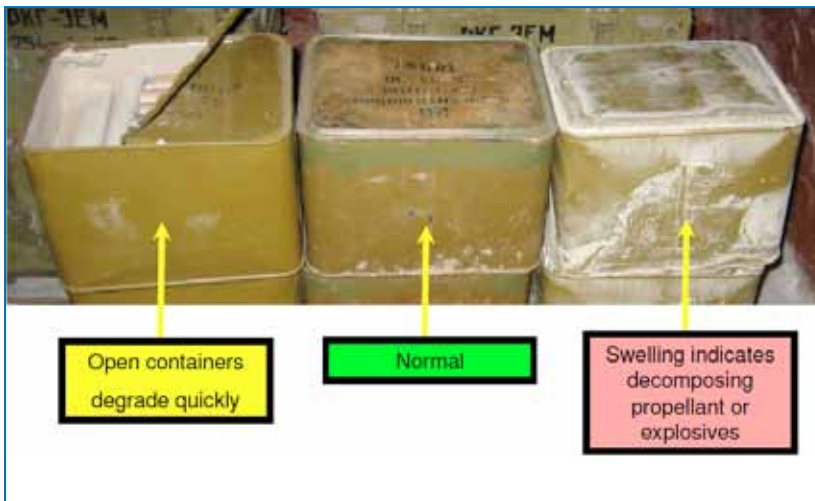
6.3.2. Characteristics of Unserviceable Ammunition⁶³

The serviceability of ammunition can often be visually determined by the physical condition of the ammunition as well as visual signs of chemicals exuding or the strong smell of ammonia. Excessive corrosion can be seen on the brass or steel canisters or the paper and plastic will show signs of deterioration. Severe heat, humidity and large temperature changes will decrease the normal life of munitions. Under ideal conditions, the expected operational life cycle of ammunition is approximately 22 years dependent on type and quality of manufacture.

⁶³ See IATG 07.20 Surveillance and Proof.



Degrading ammunition. Source: MAG / HALO Trust.



Stages of ammunition lifecycle. Source: DTRA.

Components deteriorate chemically, electrically, and mechanically.

- Chemical deterioration is characterized by de-bonding of inert surfaces, stabilizer depletion, migration of energetic material, and cracking of materials.
- Electrical deterioration is characterized not only by the age of the components but by component shock damage.
- Mechanical deterioration is characterized by O-ring or gaskets rotting, visual corrosion and unsmooth surfaces, which are often the result of vibration.

Evaluation of ammunition

Having given a few characteristics of unserviceable ammunition, nothing replaces a good surveillance program by trained ammunition specialists. Propellants inside the ammunition will deteriorate over time and only proper testing can provide the assurances that provide that soldiers entrust in their equipment when required to perform in battle or training.

Therefore a good surveillance program, which evaluates

- the properties,
- characteristics, and
- performance capabilities

of ammunition throughout its life cycle through a valid systematic process, has to be developed and implemented.

A surveillance program:

- insures reliability;
- verifies performance;
- insures effectiveness;
- monitors chemical stability;
- prevents failures and accidents;
- predicts aging characteristics and
- supports ammunition procurement.

You can conduct **ammunition surveillance** visually,

- to detect propellant degradation, chemical decomposition, rodent damage, insect damage, corrosion, mold, poor maintenance, improper disposal, poor storage, obsolete ordnance, and water damage.
- by disassembling the munitions. Then you can see interior damaged parts where they may not be seen from the outside and you can see whether explosive crystals have formed due to internal damage,
- by functions testing, and
- by live firing: Live firing of an item from a certain lot will provide information on the condition of the lot.

A chemical analysis can test the stability of the ammunition. The chemical composition of the propellants can deteriorate with heat, humidity, and friction. A chemical test will provide information about the chemical composition which allows assessing the stability of the ammunition to prevent unintended explosions or malfunctions.

6.3.3. Hazard Division⁶⁴







Stockpile management organizations need to ensure that ammunition and explosives are classified according to their danger or hazard following the following hazard classification system.

These Hazard Divisions (HDs)⁶⁵ are used commonly for determining safe separation distances between storage locations and other facilities outside the explosive perimeter. The six UN Hazard Divisions are:

⁶⁴ IATG 01.50 UN Explosive Classification System and Codes

⁶⁵ IATG 01.50., p. 4 / Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Annex 1., HALO Trust.

Table 2: Hazard Divisions







CATEGORY AND DESCRIPTION	EXAMPLE OF WHAT WOULD BE IN CATEGORY	SYMBOL USED FOR EACH CATEGORY
<p>1.1 Mass detonation</p> <p>There is a mass explosion hazard; a mass explosion is one which affects the entire load virtually instantaneously.</p> <p>The major hazards of this division are blast, high velocity projections and other projections of relatively low velocity. The explosion results in severe structural damage, the severity and range being determined by the amount of high explosives involved. There may be a risk from heavy debris propelled from the structure or the crater in which the explosion occurs.</p>	<p>High explosive e.g.:</p> <ul style="list-style-type: none"> - Artillery projectiles, - dynamite - anti-tank mines - 155mm projectiles - detonating cords - fragmentation grenades - most guided missiles and launchers 	
<p>1.2 Detonation with fragments</p> <p>Substances and articles which have a projection hazard but not a mass explosion hazard. The explosion results in items burning and exploding progressively, a few at a time. Furthermore, fragments, firebrands and unexploded items may be projected in considerable numbers; some of these may explode on impact and cause fires or explosions. Blast effects are limited to the immediate vicinity.</p>	<p>High explosive, e.g.:</p> <ul style="list-style-type: none"> - Mortar ammunition - 120mm, 82mm, 81mm, 60mm ammunition - Some guided missiles and launchers 	
<p>1.3 Mass fire</p> <p>Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard. This division comprises substances and articles:</p> <ul style="list-style-type: none"> • which give rise to considerable radiant heat; • which burn one after another, producing minor blast, projection effects or both. <p>This division includes some items which burn with great violence and intense heat emitting considerable thermal radiation (mass fire hazard) and others which burn sporadically. Items in this division may explode but do not usually form dangerous fragments. Firebrands and burning containers may be projected.</p>	<p>Propellants, e.g.:</p> <ul style="list-style-type: none"> - 155mm propellant charge - surface trip flares - ground illumination signal 	
<p>1.4 Moderate fire</p> <p>This division includes items which have primarily a moderate fire hazard. They do not contribute excessively to a fire. The effects are largely confined to the package. No fragments of appreciable size or range are to be expected. An external fire does not cause the simultaneous explosion of the total contents of a package of such items.</p> <p>Some, but not all, of the above items are assigned to Compatibility Group S. These items are so packed or designed that any explosive effect during storage and transportation is confined within the package unless the package has been degraded by fire.</p>	<p>Small arms ammunition, e.g.:</p> <ul style="list-style-type: none"> - 9mm, 5.56mm, .50cal, 7.62mm, 12.7mm 	
<p>1.5 Mass explosion hazard</p> <p>Very insensitive substances which have a mass explosion hazard. This division comprises substances which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions. The probability of transition from burning to detonation is greater when large bulk quantities are transported or stored.</p> <p>For storage purposes, such substances are treated as hazard division 1.1 since, if an explosion should occur, the hazard is the same as for items formally assigned to hazard division 1.1 (i.e. blast).</p>	<p>Commercial blasting agents, e.g.:</p> <ul style="list-style-type: none"> - ammonium nitrate fuel oil (ANFO) and ammonium nitrate emulsions 	
<p>1.6 Explosion</p> <p>Extremely insensitive articles without a mass explosion hazard. This division comprises articles which contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation. The risk from articles of hazard division 1.6 is limited to the explosion of a single article.</p>	<p>Non-mass explosion, e.g.:</p> <ul style="list-style-type: none"> - extremely insensitive detonating substances (EIDS) 	

These divisions will also inform fire fighters when reacting to a fire at a store of ammunition or during a transport accident to react accordingly depending on the hazard division, although simpler separate Fire Division symbols are used.

Fire Divisions⁶⁶

The six Fire Divisions, which equate to the Hazard Divisions, should be indicated during storage and transportation by one of four distinctive symbols so that the fire-fighting personnel approaching the fire scene can immediately recognize them. Hazard Division symbols may also be used for this purpose. A Fire Division number is shown on each symbol. Due to similar fire-fighting hazards, the Fire Division 1 fire symbol and number are also used for Fire Division 5, and the Fire Division 2 fire symbol and number are also used for Fire Division 6. The symbols in the following Table shall be used when Fire Divisions are indicated during storage and transport:

Table 3: Fire division symbols (IATG)

Fire Division (= Hazard Division)	Symbol	Remarks
1.1		
1.2		
1.3		
1.4		
1.5		Fire Division 1 symbol used due to similar fire-fighting hazards.
1.6		Fire Division 2 symbol used due to similar fire-fighting hazards.



⁶⁶ IATG 01.50., p. 4 / Globally Harmonized System of Classification and Labelling of Chemicals (GHS), Annex 1.

6.3.4. The Concept of “Compatibility Group”

There may be hundreds of thousands of individual ammunition items, of many different types, stored in a single stockpile. The different types of ammunition will vary in purpose, caliber, type of explosive and manufacturer, all with varying degrees of volatility. In order to improve overall safety by reducing the probability of an accident or the magnitude of an accident that may occur, each specific type of conventional ammunition should be allocated to a compatibility group.⁶⁷




The requirement of compatibility group leads to the need of at least three separate buildings if all types of ammunition are in store.

Table 4: Compatibility groups






Compatibility Group	Short Description ⁶⁷	Examples
A	Primary explosive substance.	Examples are lead azide, lead styphnate, mercury fulminate, tetracene, dry RDX, and dry PETN.
	 <p>lead azide</p>	 <p>lead styfnate</p>
B	Articles containing a primary explosive substance and not containing two or more effective protective features.	Examples are detonators, blasting caps, small arms primers, and fuses without two or more safety features. Some articles, such as detonators for blasting, detonator assemblies for blasting and primers, cap-type, are included, even though they do not contain primary explosives.

⁶⁷ IATG 01.50.

⁶⁸ Full descriptions may be found in the UN Model Regulations.

Compatibility Group	Short Description ⁶⁷	Examples
		
<p>C</p>	<p>Propellant explosive substance or other deflagrating explosive substance or article containing such explosive substance.</p>	<p>Examples are single-, double-, triple-based, and composite propellants, rocket motors (solid propellant), and ammunition with inert projectile.</p>
 <p data-bbox="268 1512 542 1545">Examples for propellants</p>	 <p data-bbox="802 1512 981 1545">Solid propellant</p>	
<p>D</p>	<p>Secondary detonating article containing a secondary detonating explosive substance without means of initiation and without a propelling charge.</p>	<p>Examples are bulk TNT, Composition B, wet RDX, bombs, projectiles, warheads, or fuses with two or more safety features.</p>

Compatibility Group	Short Description ⁶⁷	Examples
 <p data-bbox="300 815 352 846">TNT</p>	 <p data-bbox="778 815 842 846">fuses</p>	
<p data-bbox="284 907 304 938">E</p>	<p data-bbox="411 875 911 974">Article containing a secondary detonating explosive substance without means of initiation, with propelling charge.</p>	<p data-bbox="932 875 1417 943">Examples are artillery ammunition, rockets, or guided missiles.</p>
		
<p data-bbox="284 1451 304 1482">F</p>	<p data-bbox="411 1420 895 1518">Article containing a secondary detonating explosive substance with its own means of initiation, with a propelling charge.</p>	<p data-bbox="932 1420 1401 1451">An example is a rocket propelled grenade.</p>
		
<p data-bbox="284 1883 304 1915">G</p>	<p data-bbox="411 1852 895 1919">Pyrotechnic substance, or article containing a pyrotechnic substance, or article.</p>	<p data-bbox="932 1852 1406 1951">Examples are flares, signals, incendiary or illuminating ammunition, and other smoke and tear producing devices.</p>

Compatibility Group	Short Description ⁶⁷	Examples
		
<p>H</p>	<p>Article containing both explosive substance and white phosphorus.</p>	<p>Examples are WP, plasticized white phosphorus (PWP), or other ammunition containing pyrophoric material.</p>
		
<p>J</p>	<p>Ammunition containing both explosives and flammable liquids or gels.</p>	<p>Examples include liquid- or gel-filled incendiary ammunition.</p>
		

Compatibility Group	Short Description ⁶⁷	Examples
K	Articles containing both an explosive substance and a toxic chemical agent.	Examples are artillery or mortar ammunition (fused or unused), grenades, and rockets or bombs filled with a lethal or incapacitating chemical agent.
 		
L	Explosive substance or article containing an explosive substance and presenting a special risk needing isolation of each type.	Examples are pre-packaged hypergolic liquid-fueled rocket engines, TPA (thickened TEA), and damaged or suspect ammunition of any group.
 		
N	Hazard division 1.6 ammunition containing only extremely insensitive detonating substance (EIDS).	Examples are bombs and warheads. If dissimilar Group N munitions, such as Mk 82 and Mk 84 Bombs, are mixed together and have not been tested to assure non-propagation, the mixed munitions are considered to be Hazard division 1.2, compatibility group D for purposes of transportation and storage.
S	Substance or article so packed or designed that any hazardous effects arising from accidental functioning are confined within the package.	Examples are small arms cartridges (ball), explosive switches or valves.

Source: MAG (pictures)

Mixing rules

Ideally, a higher degree of safety may be achieved by storing every ammunition type separately, but this is usually not practicable for reasons of storage capacity. Ammunition of different compatibility groups may be stored together to maximize the efficient use of available storage space.

Conventional ammunition should be stored by compatibility group in accordance with the mixing rules illustrated in the Table in Annex 6. It illustrates the acceptable combination for the common storage of respective ammunition groups. Whenever combinations are not acceptable then separate ammunition stores must be used.

Certain types of conventional ammunition should always be **stored separately**, (or under specific conditions), from other types of ammunition:⁶⁹

- Detonators and blasting caps (separated from compatibility groups C, D, E, and F by a dividing wall capable of preventing sympathetic detonation of other items).
- White phosphorous (storage site equipped with appropriate equipment required to take immediate action in case of leakage).
- Damaged ammunition (if considered unsafe for storage, damaged munitions should be destroyed at the earliest convenience).
- Ammunition in an unknown condition (should be stored at great enough distance that detonation of this ammunition will not jeopardize the national stocks). Such ammunition should be assessed and if its condition remains unknown it is recommended that it be destroyed at the earliest convenience.
- Ammunition which has deteriorated and become hazardous (should be stored in isolation and destroyed at the earliest convenience).
- Pyrotechnics and propellants.

6.3.5. Infrastructure / Safety Distance and other Protection Measures

The unit explosives store or magazine should consist of a single room, or a number of compartments separated from each other by internal walls. A receipts and issues (R&I) room may form an integral part of the explosives store but should be situated at one end of the building. Each compartment should only have one door and this should open outwards. In certain situations, (for example where only Hazard Division (HD) 1.4 ammunition is to be stored) a purpose-built explosives store is not required. The physical infrastructure should be in line with the guidance contained within International Ammunition Technical Guidelines (IATG) 05.20 "Types of buildings for explosives storage".⁷⁰

⁶⁹ IATG 01.50., 2011, p. 8.

⁷⁰ IATG 12.20., p. 3.

Ammunition and explosives need to be stored at a minimum safe distance from habitations or concentrations of individuals. Anyone dealing with the storage of explosives or ammunition must be familiar with the nationally legislated standards. Safety distances, which must be in the order of 400 meters⁷¹ at least between an ammunition/ explosives store and locations frequented by civilians or other personnel.⁷² Even this minimum safe distance will not allow for the safe and legal storage of much ammunition. If only small arms ammunition is stored, the distance can be smaller (e.g. 50m).

The **safety distance** around a store will determine its maximum explosive holding capacity.⁷³

All facilities used for storing and processing explosives should be licensed⁷⁴ as suitable for the intended purpose. For an explosives license to be issued the appropriate technical authority shall be satisfied that the facility will generate risks to people that are as low as reasonably practicable when operating within the terms of that license. This should equate to the tolerable risk that has been determined as appropriate to that society.

The calculation and issue of an *Explosive Limit License* is difficult and should be done only by qualified personnel⁷⁵. Yet it is very important to display the existing storage limit prominently and not to exceed the amount of explosive in a single storage area.

Storage temperature⁷⁶

Many ammunition items are subject to operational and storage limitations. Explosives storehouses should be so designed and equipped that the inside temperature rarely falls below 5°C and rarely rises above 25°C. Additionally, daily temperature variations should not differ by more than 50°C and the relative humidity (RH) should be no greater than 75 percent.

Temperature reduction is a simple way to reduce the speed of degradation of ammunition.

In hot environments, everything should be done to keep the maximum temperature and the variations as low as possible. Simple measures could be:

- a) proper ventilation,
- b) additional roofing (sun protection roof),
- c) white/ bright painting of the outer roof and walls and,
- d) earth-covered or buried containers for sensible ammunition.

There are many explosives that can safely be kept in storehouses with no space heating, insulation or air conditioning installed. However, an adequate and serviceable means of ventilation in storehouses will prevent deterioration of the building structure, increase the service life of the ammunition and enhance ammunition safety.

⁷¹ IATG 02.20., p. 28.

⁷² Specific safety distances have to be calculated based on the type and quantity of the ammunition as specified in the IATG 02.02 module.

⁷³ IATG 02.30.

⁷⁴ Explosive Limit Licences (ELL)

⁷⁵ According to the IATG 02.30.

⁷⁶ IATG 06.30., p. 8.

Barricading

As a matter of course, ammunition and explosives should be barricaded. Barricades/ berms/ traverses protect the contents of the storehouse they surround from the effects of high velocity low angle fragmentation from undesirable explosions in surrounding storehouses.



Examples of barricading. Source: HALO Trust.

Lightning protection: In cases where basic storage areas are likely to be a mid-term solution to ammunition storage, they should be protected from lightning. In all cases, ammunition stacks should be located no less than 15m from trees, telegraph poles, and pylons.

6.3.6. Handling of Ammunition

All personnel involved in the physical handling of ammunition shall exercise the greatest possible care at all times. This applies not only to storage facilities but also to ammunition being transported within the explosives facility. Ammunition should not be slid, rolled, dropped or exposed to possible misuse.⁷⁷

White phosphorus ammunition⁷⁸: White phosphorus (WP)-filled munitions shall be stored under the coolest conditions practicable and shall not be exposed to sunlight either directly or through windows.

A regular inspection regime shall be instituted to detect leaks in all storage buildings containing white phosphorus-filled munitions early. The frequency of the inspections will depend on the local conditions. The failure to detect a leaking item can lead to catastrophic fires.

⁷⁷ IATG 06.30., p. 3.

⁷⁸ IATG 06.30., p. 5 and IATG 06.50., p. 2.

WP unless wet, ignites spontaneously in air. It can be extinguished by immersion in water but steps shall be taken to prevent re-ignition. A suitable container of clean water, large enough to immerse a complete package or item, shall be kept available at stacks, loading points, etc. for immersion of leaking stores if necessary prior to their disposal. Leaking munitions should only be handled by trained personnel.

Packages containing white phosphorous ammunition items may be loose stacked but it is recommended that the following limitations are applied:

- a) loose packages may be stacked up to 1.5m in height;
- b) packages should be placed on pallets so that there is immediate access to each package or pallet to allow prompt removal of any leaking package.
- c) containers of water shall be provided, accessible from any point in the potential explosion site and sufficient in number and dimensions to immerse any size of leaking package/ item contained within the facility;
- d) a supply of clean water shall be provided for First Aid treatment. Additionally, a supply of copper sulphate solution (CuSO₄) should be kept in the immediate vicinity of the storage facility for instant treatment of any phosphorous burns;
- e) personal protective equipment in the form of goggles or eye-shields, a protective apron, elbow-length fire retardant gauntlets and fire retardant head protective wear shall be available.

Munitions containing **red** phosphorus may generate phosphine gas during normal storage, which is toxic and flammable. It is therefore necessary to ensure good ventilation.

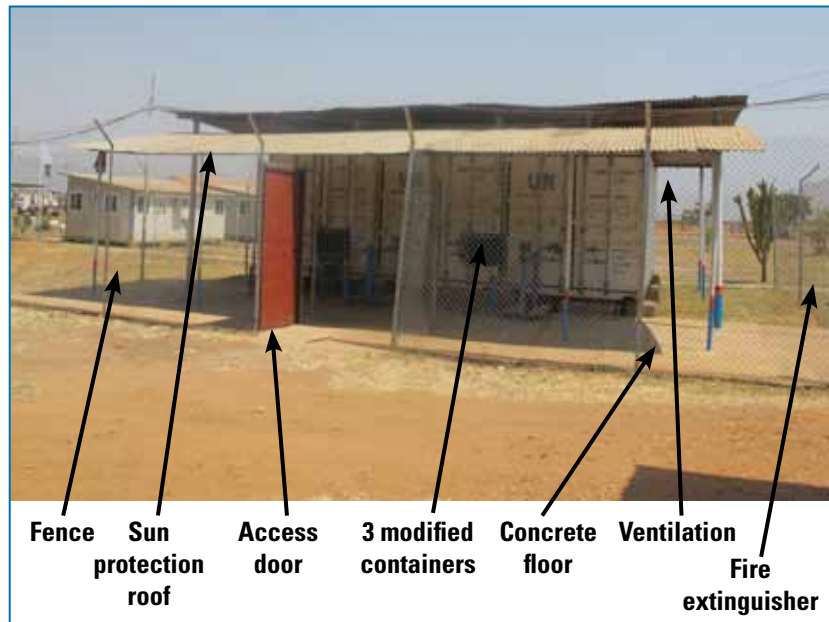
6.4. Containerized Storage Modules

Containers for storing arms and ammunition can be a useful interim solution. If containers are grouped on a concrete floor, each slightly elevated, a proper roof for protection against rain and sun is installed and the containers are adequately modified and fenced in, it can be an option. Existing containers should be modified for the safe and secure storage of weapons.

Arms storage containers should be equipped with storage racks for *individual guns* (no bulk store for in-use stores) and a separate lock for magazines/ SALW ammunition.

It would be beneficial if community members, for instance, were trained in modifying containers and executing the work.

An **example** of a containerized storage module can be seen here. You find plans for more details in **Annex 5**.



Containerized arms storage facility. Source: BICC.

Please refer to **Annex 5** to see technical drawings provided by UNMISS. The number of weapons that a container can store depends on the type of racks used.



Inside in-use SALW storage container. Source: MAG Burundi.

6.5. Building of new SALW Facilities

Arms and ammunition management improvement activities will likely have to plan for the building of new facilities to properly store arms and ammunition. Storage facilities often barely exist or are totally inappropriate, especially outside of capitals or bigger towns. In some cases, existing facilities can be refurbished. The building also has to include the equipment inside, e.g. racks and shelves.

The actual building of new facilities can be costly and has to be done based on careful assessment and planning where it is urgent. Experience shows that newly built facilities fell into disrepair as they were not properly integrated into a holistic and sustained improvement plan. Refurbishing of existing stores and the option of new building of stores needs to be balanced.

Building of new facilities needs to be carefully planned.

The assessments mentioned above will provide the details to decide where which approach is appropriate. The organized forces need to decide which facilities are appropriate for their needs. Especially the army will require different facilities for arms and ammunition as the armies normally own higher hazard class ammunition.

Ammunition storage requires separate buildings and other additional security precautions (e.g. the use of sand/ soil for dug-in ammunition bunkers or dirt walls around the facility).

The physical infrastructure should ideally be in line with the guidance contained within *International Ammunition Technical Guidelines* (IATG) 05.20 "Types of buildings for explosives storage".⁷⁹

A potential local building material could be so-called hydroform bricks. They are a dried mixture of compressed earth/ cement. This material can be produced manually, locally and provide labor, e.g. to employ ex-combatants.



Manual hydroform brick production. Source: BICC.

⁷⁹ IATG 12.20., p. 3.

The German Armed Forces provided the following assessment of hydroform bricks:

“These bricks have regularly a higher resistance to the penetration of projectiles and splinters. Where such materials are mixed with dried grasses, this mixture shows considerable deformation capacity and ductility at the impacted components. However, for the storage of ammunition, which is capable of mass detonation, this building material tends to disintegrate into large and high energy debris upon explosions. A remote diagnosis or evaluation of the construction material is not really possible. Therefore, it is recommended to take the following into consideration for the selection of building material: If mass explosion can be excluded (the ammunition is not UN Hazard Class 1.1.),⁸⁰ the considered material (sand + cement) can be considered for building safe storage facilities. For ammunition capable of mass detonation, one should select rather “reinforced earth” which is earth filled into bulk bins.”

It would also be beneficial if, for example, community members/ex-combatants could be trained to produce racks for interior equipment and execute improvement work.

6.6. Building of Containerized Low-Cost Ammunition Storage Facilities

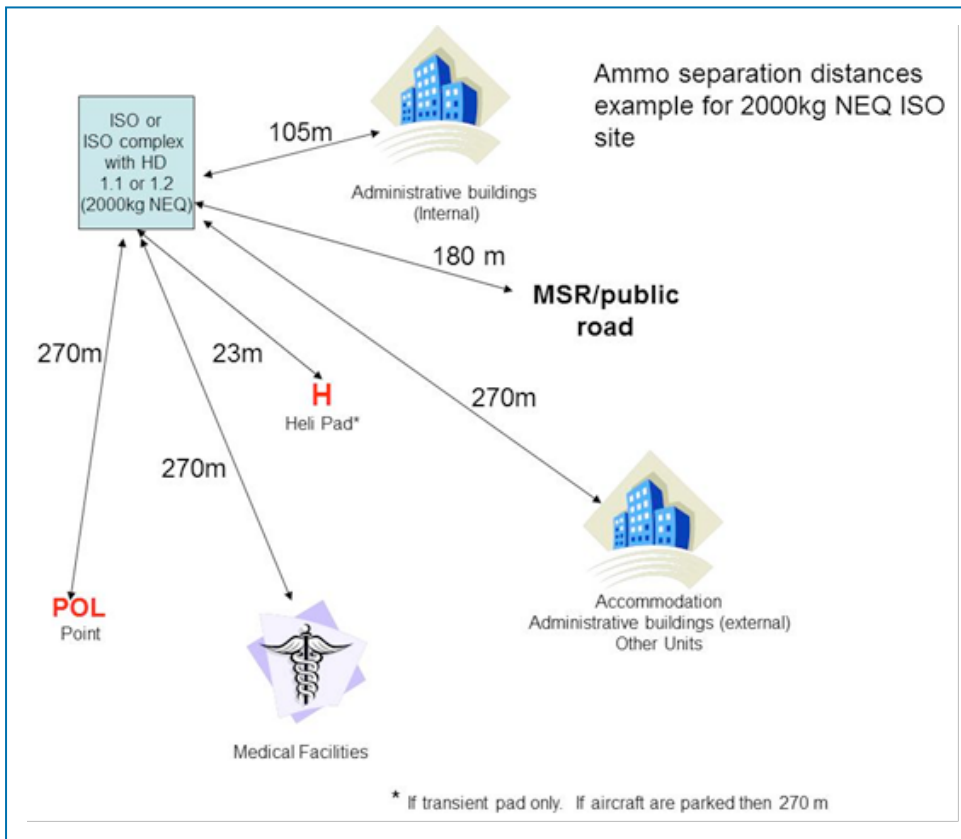
Ammunition storage areas are divided into storage sections and further subdivided into storage units and stacks to ensure adequate dispersion for operational safety purposes.

If assets are adequately dispersed, the ammunition storage facility is not an inviting target from the air. When possible, quantities of each type of ammunition should be stored in two or three widely separated sections. If the contents of one section is destroyed, the entire supply of any one item will not be lost. When space is not sufficient to disperse the ammunition, construct earthen barricades to help reduce the hazard.

As mentioned above, safety and efficiency must be top priorities when selecting an ammunition storage site. It is essential that explosives experts be involved early on in this process to preclude possible future disruptive, safety-driven relocations of established ammunition facilities.

Based on reconnaissance information, site recommendations are submitted to the superior level for approval. The selection process may have to be repeated, or higher headquarters may identify an area for the location of the storage area.

⁸⁰ Regrettably for Ammunition PSSM over 80% of the stocks are likely to be UN HD 1.1.

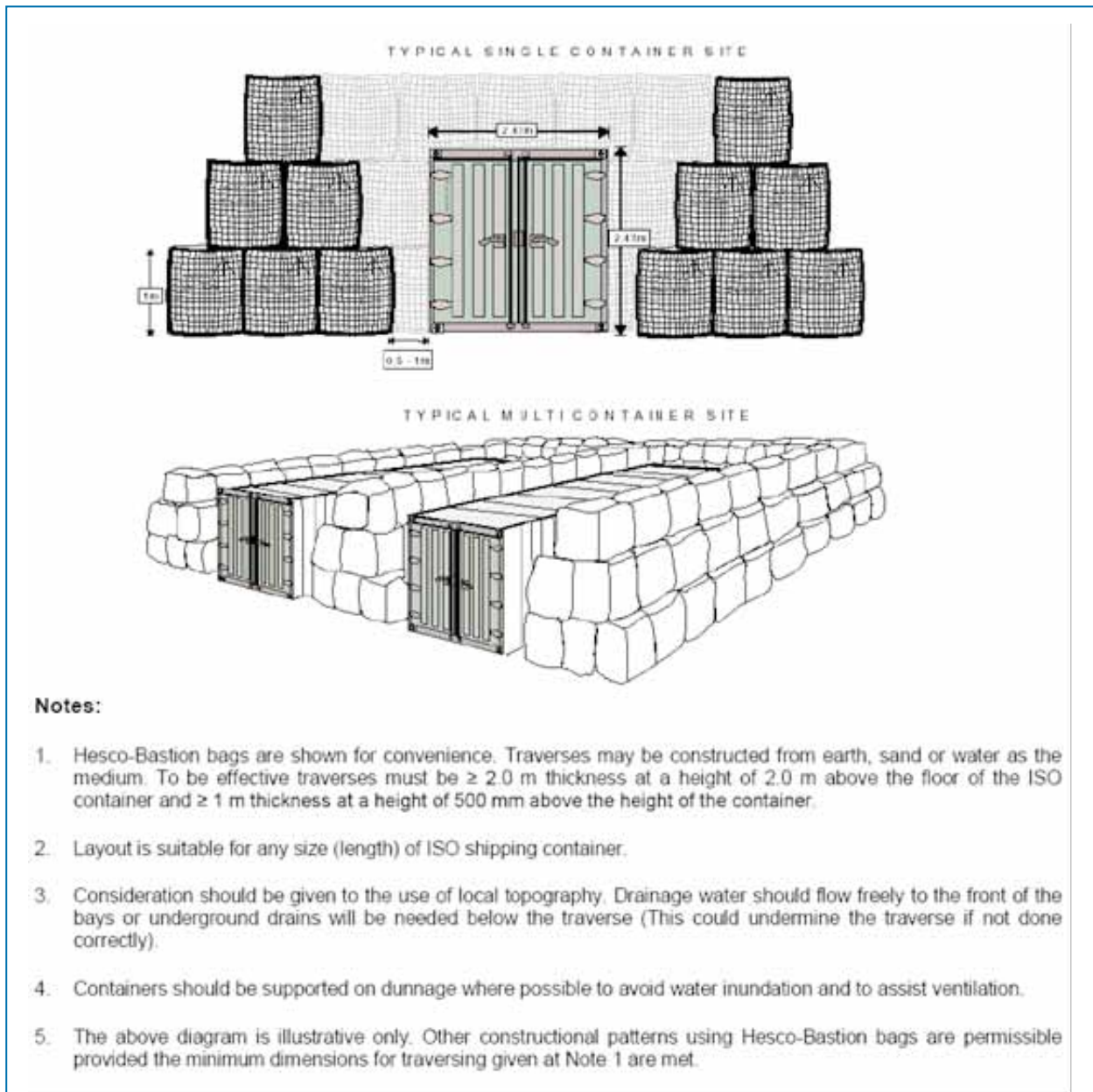


Separation distances example. Source: DTRA

Barricades and earth cover for magazines: Properly constructed and sited barricades or undisturbed natural earth can protect against low-angle fragments and reduce shock overpressure loads near the barricade.

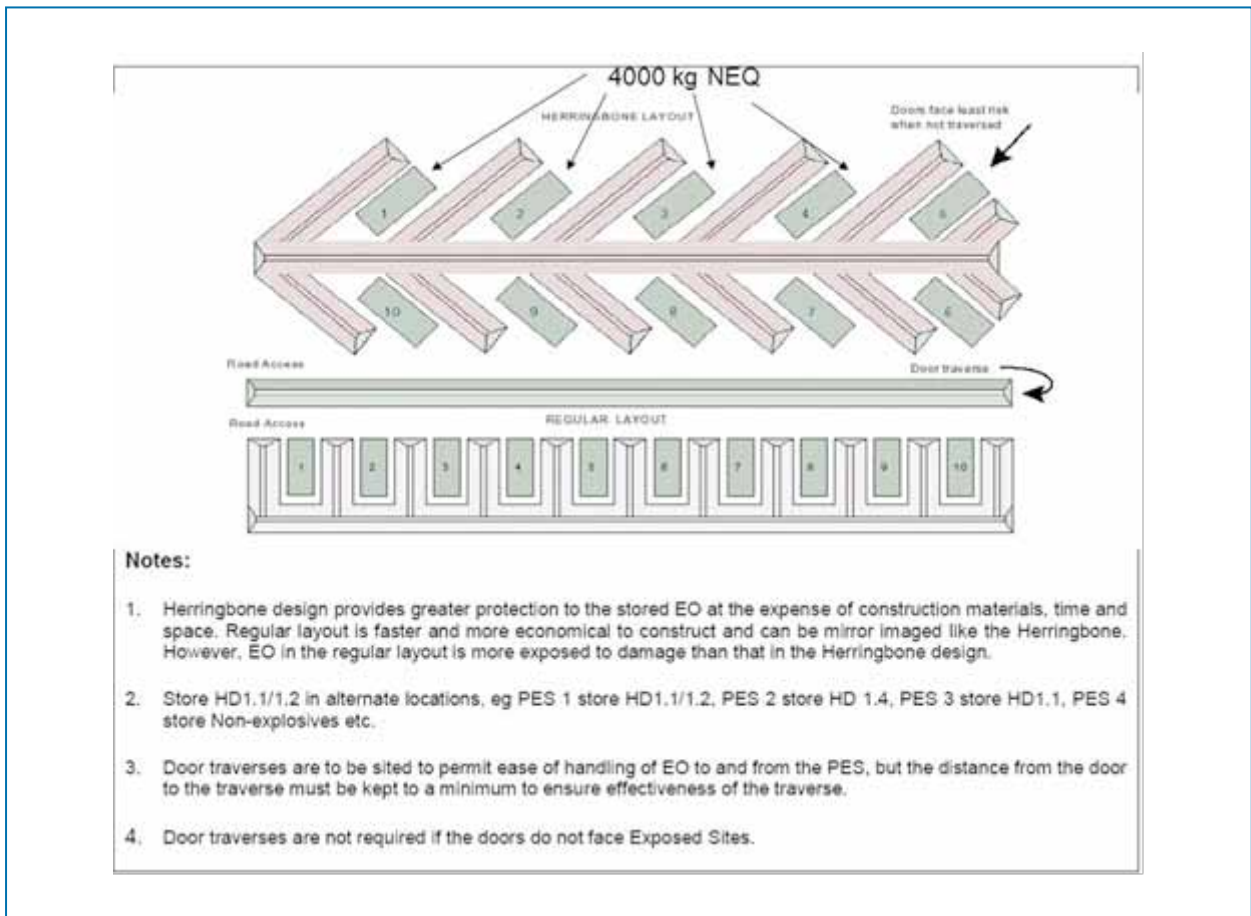
To reduce hazards from high-velocity, low-angle fragments, the barricade must be placed between the explosive site and the exposed site so that the fragments of concern impact the barricade before the exposed site. The barricade must be thick enough to reduce fragment velocities to acceptable levels and it must be high enough to intercept the ballistic trajectories of the fragments of concern. Barricades cannot provide protection against high-angle fragments.

A barricade placed between an explosive site and an exposed site interrupts the direct line-of-site motion of the shock wave. If the barricade has sufficient dimensions and is located close enough to the exposed site, shock loading to selected areas of the exposed site may significantly be reduced.



Example for barricading. Source: DTRA.

Designs and Construction Materials: Diagrams below show conceptual designs and construction materials for barricades. Materials for earthen barricades (including the earth-cover over magazines) shall be reasonably cohesive (solid or wet clay or similar types of soil may not be used as they are too cohesive) and free from harmful organic matter, trash, debris, and big stones. The earthen material shall be compacted and prepared, as necessary, for structural integrity and erosion control. If it is impossible to use a cohesive material, for example, in sandy soil, the barricade or the earth cover over magazines shall be finished with a suitable material to ensure structural integrity.



Example storage arrangement. Source: DTRA.

Unless means are provided to control erosion, the slope of an earthen barricade must be adjusted (2 horizontal to 1 vertical).

The earth-fill or earth cover between earth covered magazines may be either solid or sloped, but a minimum of two feet of earth cover shall be maintained over the top of each magazine



Example facility. Source: DTRA.

ISO containers can be used if available which are standard steel shipping containers that include commercial 20 foot and 40 foot variants. ISO containers are often readily available and provide required security levels according to the best practice standards.

6.7. Location of Arms and Ammunition Stores

To determine the location of armories, several items must be kept in mind. Determining how many, what kind of infrastructure and the location should be part of a systematic and detailed planning process as outlined in Chapter 4.1.2..

Financial elements: How much does a particular location cost? How much does securing a particular quantity at a particular location cost? For major stores and depots, one needs to consider issues such as the cost of security, access, manpower needed to maintain stockpile, cost of safety and preventative maintenance. Even small private stores may need financial investment, in, for example, locked storage boxes.

Safety risks: What safety risks are posed by the particular store? Ammunition is obviously far riskier than guns. Explosives even riskier. Thus a store that may serve very well for weapons may not be safe at all for explosives. Small holdings will have similar problems, though at a smaller scale.

Security risks: What risks are represented by a particular store? Weapons and ammunition are attractive to criminals and armed groups. Children and occasional thieves may well try to help themselves to stored materials. .

Environmental risks: What environmental risks are particular to a store? Large stores and, to a lesser degree, smaller ones can represent an environmental hazard. This is particularly true if the stores are in dry wooded or brushy areas or if the store includes explosives or ammunition whose dissolution has environmental consequences.

At the **national level** the location of stockpiles depends on three factors:

1. National defense policy, which will determine whether stockpiles need to be close to a particular security threat, so that troops or police can access these quickly.
2. Safety distances, which are likely to be greatly in excess of the 400 meters⁸¹ minimum safe distance between an ammunition/ explosives store and locations frequented by civilians or other personnel. Stock levels and the type of infrastructure will determine the actual safe distances.
3. Local security assessments which determine security concerns (e.g., in isolated areas, more security forces may be necessary on-site).

⁸¹ IATG 02.20., p. 28.

At the **local level**, the location of any store depends on the following factors:

1. The needs of local security forces or other consumers of the weapons/ ammunition. Ideally, transportation times should be as short as possible, to avoid diversion.
2. Safety distances from nearest habitation. It is important also to consider the local development trajectory: whether, for instance, a community will grow and encroach on the safety zone. Please refer to Chapter 6.3.5. above.
3. For ammunition, it is important to assess whether the location might cause ecological problems due to leakage of chemicals from explosive deterioration.
4. Natural catastrophes such as floods, earthquakes, fires, etc.
5. Ongoing intelligence assessment of susceptibility to attack.
6. Vulnerability to attack: locations of security barriers, availability of guard personnel, neighboring units, including guard, safety, ambulance, and fire services.



Example of destruction consequences of an unintended explosion. Source: MAG.

An unintended explosion can have devastating consequences depending on the location of the depot!

6.8. Destruction of Weapons and Ammunition

Weapons and ammunition management improvement activities can include destruction activities of identified weapon and ammunition surpluses (obsolete arms and ammunition). External assistance might be required. Priority areas for destroying surplus are surplus man portable air defense systems (MANPADS), old propellants, detonators, bulk explosives, anti-tank mines and rockets.⁸²

⁸² SEESAC et.al. 2005, "Ammunition Stocks: Promoting Safe and Secure Storage and Disposal, Briefing 18", Biting the bullet.

Reducing surplus arms and ammunition is a way to reduce the burden on the country.

Surplus, and older conventional ammunition and explosives constitute significant risks:

- The local community and the environment close to ammunition depots are at risk if not properly managed.
- Costs are higher due to spending on security and maintenance of excess facilities and space.
- There is a likelihood of illicit trafficking and leakage.

The destruction of such stocks should be considered as a practical safety requirement.

Box 5: Assets vs. liability⁸³

While there is certain logic to perceiving surplus stocks as assets, modern militaries generally view them as a liability. Direct costs and inherent risks are associated with retaining surpluses. These factors motivate states to get rid of any surpluses as soon as they are identified. The costs of retaining surplus weapons and ammunition are significant. The OSCE best practice guide states that surpluses should be stored separately from other stocks⁸⁴, which means that states will have to pay for electricity, maintenance, and additional salaries for depot guards for these separate storage units for an indefinite period⁸⁵. Indirect costs also arise in the form of reduced space to store needed stocks in depots. This makes retaining surplus stocks counter-productive to many physical security and stockpile management (PSSM) program goals, particularly for countries trying to drastically reduce the number of their depots, such as Bosnia and Herzegovina's attempts to reduce this number from 54 to seven⁸⁶. Risks are also associated with retaining surplus stocks, as time increases the possibility of both accidental explosions and diversion (theft). These threats can have both financial and political consequences for the responsible entities. This encourages states to get rid of surplus weapons and ammunition by whatever means necessary.

6.8.1. Destruction of Weapons

As a general rule, it is preferable to destroy the gun so that it is obvious that the weapon can no longer be used. If e.g. only internal changes are applied (removal of firing pin or else) it can still be used in ambushes, etc. by displaying the weapon even though it does not function.

It is most important and the aim to render the gun beyond use and cannibalization when destroying it.

⁸³ Preparing PSSM Programmes: Avoiding the Inevitable Problems?, Benjamin King and F. David Diaz, Safer Stockpiles, (ed.) Benjamin King, p. 23, 2011.

⁸⁴ Handbook of Best Practices on Small Arms and Light Weapons. Vienna: OSCE, 2003.

⁸⁵ Faltas, Sami. 2010. 'Cooperative Destruction.' In Aaron Karp, ed. The Politics of Destroying Surplus Small Arms: Inconspicuous Disarmament. New York: Routledge, pp. 81–107.

⁸⁶ SEESAC (South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons), 'Bosnia and Herzegovina.' South Eastern Europe SALW Monitor 2006. Belgrade: SEESAC, 2006.

Furthermore, every gun destroyed needs to be accounted for (destruction certificate/ registry). Inventories need to be updated (weapons crossed out of General Ledger Books).

ISACS 05.50 Destruction –Weapons explains all of the possible options for weapons destruction techniques. Some are highlighted below (not in priority order in terms of costs, effectiveness or production rates):

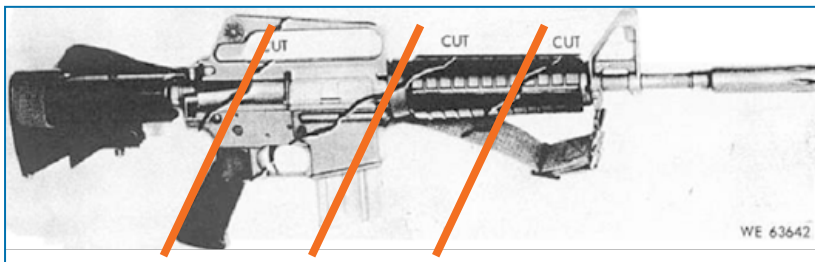
Option 1:

Use of petrol chop saw

Arms are cut in several pieces to ensure they cannot be reused.



Mobile petrol chop saw. Source: HALO Trust.



Example of required three cuts. Source: German Armed Forces.

Option 2:

Use of hydraulic shears



Hydraulic shear in use. Sources: MAG, HALO Trust.

Option 3:

Cement

Required:

- One or more cans, old oil barrels or any other container sufficient for quantity of arms to be destroyed.
- One or more sacks of Portland cement and 1/3 quantity sand, mixed.

Instructions

- Mix cement and water to soft slurry (you should be able to stir it with a paddle or spade).
- Check, record and then strip weapons, placing slides, springs, firing blocks, receiver/ barrels in separate piles.
- Dip receiver/ barrels in cement from both sides and lay aside to dry.
- Drop all small components (slides, firing blocks, springs) into cement barrel making sure all are covered by cement. Allow to dry.

Once that has been done, there is no way to recondition the components without long hard labor. The cement is also acidic, so it weakens the steel.

Advantages	Disadvantages
Almost no training needed	Recovery of weapons is possible but will be labor intensive and expensive
Cheap	Weapons part pirating is always a threat with this method
Safe	Proper accounting of weapons could be a problem

Option 4:

Oxyacetylene and plasma cutting

Advantages	Disadvantages
Proven cutting ability	Very labor intensive and time consuming
Relatively cheap start-up cost	Low operational output
All equipment is portable and easy to handle	Always a risk that all working components of weapons are not destroyed

6.8.2. Destruction of Ammunition

Overall, the choice of ammunition and explosives for destruction should be considered very carefully, on a regular basis, as these stocks become obsolescent and need to be replaced on a regular basis.

The destruction of ammunition requires a detailed technical response, as the risks and hazards are great, particularly where stockpiles are large. It should therefore be left to commercial ammunition demilitarization or explosive ordnance disposal specialists. Ammunition shall be destroyed in line with IATG 10.10 Demilitarization and Destruction.

Annex 7 provides a Guide for constructing a field expedient incinerator for the destruction of small arms ammunition only.

What Next?

The implementation of all the suggestions and recommendations in this Starter Guide is challenging. However, with the commitment and strong will of the leadership and some external support, it is possible!

This Starter Guide is intended to provide tangible solutions for countries that are just starting with the improvement of their arms and ammunition management practices and infrastructure. The International Standards (ISACS and IATG Level I) describe the next level that a country should aim at after having implemented the first simple improvement steps.

The improvement of arms and ammunition management is not merely an international requirement. It is much more than that. It will contribute to safety and security in the organized forces of a country and contribute to civilian protection and development.

Annexes

1. Reference Materials

- *International Ammunition Technical Guidelines (IATG)*, UNODA, 2011. See: www.un.org/disarmament/convarms/Ammunition/IATG
- *International Small Arms Control Standards (ISACS)*, UN Co-ordinating Action on Small Arms (UN CASA), 2012. www.smallarmsstandards.org
- *Physical Security of Sensitive Conventional Arms, Ammunition, and Explosives (AA&E)*, No. 5100.76, April 2012, United States of America Department of Defense Manual.
- *Preparing PSSM Programmes: Avoiding the Inevitable Problems?*, Benjamin King and F. David Diaz, Safer Stockpiles, (ed.) Benjamin King, pp. 25-27, 2011. See <http://www.smallarmssurvey.org/fileadmin/docs/B-Occasional-papers/SAS-OP27-Safer-Stockpiles.pdf>

2. Points of Contacts

Regional Centers of Excellence

- Regional Center on Small Arms (RECSA), Nairobi, Kenya
- Economic Community of West African States (ECOWAS), Small Arms Control Program, Abuja, Nigeria
- Southern African Regional Police Chiefs Cooperation Organisation (SARPPCO), South African Development Community (SADC)
- Organization for Security and Co-operation in Europe (OSCE), Paris, France
- South Eastern and Eastern Europe Clearinghouse for the Control of Small Arms and Light Weapons (SEESAC), Belgrade, Serbia
- UNODA Regional Disarmament Centres
 - Regional Centre for Peace, Disarmament and Development in Latin America and the Caribbean (UNLIREC), Lima, Peru
www.unlirec.org
 - Regional Centre for Peace and Disarmament in Africa (UNREC), Lome, Togo
www.unrec.org
 - Regional Centre for Peace and Disarmament in Asia and the Pacific (UNRCPPD), Kathmandu, Nepal
www.unrcpd.org.np

United Nations Agencies

- UN Office of Disarmament Affairs (UNODA), www.un.org/disarmament
- United Nations Mine Action Service (UNMAS), <http://www.mineaction.org>
- UN Department of Peacekeeping Operations (DPKO) and Peacekeeping Missions, if applicable.
- UN Development Programme (UNDP), In-country Office

International Donors

Address specific embassy in country capital.

Organizations and NGOs with Arms and Ammunition/ Explosive Ordnance Removal (EOD) experience

- US Defense Threat Reduction Agency (DTRA) (through US Embassy)
- Bonn International Center for Conversion (BICC), www.bicc.de
- The HALO Trust, www.halotrust.org
- Mines Advisory Group (MAG), www.maginternational.org
- Small Arms Survey (SAS), www.smallarmssurvey.org
- Danish Demining Group (DDG)
- Danish Church Aid
- Norwegian Peoples Aid
- Geneva International Centre for Humanitarian Demining (GICHO)
- Handicap International, etc.

Commercial Companies

- Explosive Capabilities Limited, www.explosivecapabilities.com
- Sterling Global Operations, www.sterlinggo.com
- G4S Ordnance Management
- MineTech International
- ELS. etc.

3. Model Security Plan⁸⁷

The following is an indicative list of subjects that should be covered in a security plan related to the stockpile management of small arms and light weapons:

- a) Name, location and telephone number of the establishment security officer.
- b) Scope of the plan.
- c) Content and value of the stocks.
- d) Generic security threats.
- e) Detailed diagrams of the layout of the site, including all its buildings, entry and exit points, and of the location of all features such as electricity generators/substations; water and gas main points; road and rail tracks; wooded areas; hard and soft-standing areas etc.

⁸⁷ Adapted from ISACS 05.20, 2012, Annex A

-
- f) Outline of physical security measures for the site, including but not limited to details of
- fences, doors and windows;
 - lighting;
 - guards;
 - guard dogs;
 - locks and containers;
 - control of entry and exit of persons;
 - control of entry and exit of goods and material;
 - secure rooms; and
 - hardened buildings.
- h) Security responsibilities (including but not limited to the following personnel, as applicable):
- security officer;
 - safety officer;
 - armament officer;
 - transport officer;
 - heads of department;
 - stores/supply officers;
 - foreman in charge of operations/ accounting/ movement;
 - workers; and
 - all personnel authorized to have access to the site.
- i) Security procedures to be followed in production/process areas; storage areas, servicing; processing; trials; quality assurance; climatic and other tests as well as further activities in respect of weapon stockpile management.
- j) Control of access to storage and processing rooms, buildings, structures and areas.
- k) Procedures for handling and transport of weapons.
- l) Control of security keys – those in use and their duplicates.
- m) Accounting – audits and stock checks.
- n) Security education and briefing of staff.
- o) Action on discovery of loss/surplus.
- p) Details of response force arrangements (e.g. size, response time, orders, activation and deployment).
- q) Action to be taken in response to activation of alarms.
- r) Action to be taken in response to emergency situations (e.g. fire, flood, raid etc).

4. Generic Standard Operating Procedures (SOPs)

United Nations Regional Centre
for Peace, Disarmament and Development
in Latin America and the Caribbean



Centro Regional de las Naciones Unidas
para la Paz, el Desarme y el Desarrollo
en América Latina y el Caribe

UNLIREC Standard Operating Procedures (SOPs)

UNLIREC's generic Standard Operating Procedures (SOPs) for stockpile management and destruction of small arms and light weapons (SALW) have been designed and developed to assist States in their compliance with international agreements and norms, while providing them with specific guidance that can be easily adapted to their own administrative and operational systems. These SOPs are based on and incorporate the UNODA-developed International Small Arms Control Standards (ISACS) and International Ammunition Technical Guidelines (IATGs). To date, UNLIREC's SOPs have been implemented in Ecuador, Guatemala, Jamaica, and Trinidad and Tobago.

UNLIREC SOPs include:

Series 01 – SALW Inventory Management

01.10 Accounting (*Terms and definitions/General/Classification of weapons/National weapons register(s)/Unit weapons register/Daily issue and receipt of weapons/Loss or recovery of weapons/Destruction of weapons*)

01.20 Surplus Weapons (*Terms and definitions/Identification of surplus weapons/Storage of surplus weapons/Accounting for surplus weapons*)

01.30 Unique Secondary Marking (*Terms and definitions/Background/Technical Committee (Weapon Marking)/National Marking Authority/Marking requirements/Accounting*)

Series 02 – SALW Stockpile Management

02.10 Risk Management (*Terms and definitions/General/Risk management responsibilities/Concept of risk and threat/Stockpile risk assessment/Risk analysis*)

02.20 Security (*Terms and definitions/General/Security responsibilities/ Security threat/Protective security measures/Physical Security Measures/Inventory Security/Security Education/Security during destruction/Reporting of losses and investigations/Action on Activation of Alarms*)

02.30 Transport (*Terms and definitions /General security requirements/Specific transport requirements/Documentation/ Reporting of losses and investigations*)

Series 03 – SALW Destruction

03.10 Destruction Planning (*Terms and definitions/General/Planning sequence/Destruction planning activities*)

03.20 Handling and Safety (*Terms and definitions/General/ General safety precautions (weapons)/Normal safety precautions (NSP) (weapons)/Safety precautions (destruction equipment)/Actions on accidents or incidents*)

03.30 Actions on Accidents (*Terms and definitions/General/ Accident procedures/Investigation of Accident/Classification of Accident*)

03.40 Destruction Operations (*Terms and definitions/General/ Physical destruction processes*)

03.50 Disposal of Waste (*Terms and definitions/General/Types of waste/Waste metals/Waste wood/Waste plastic/Emissions to air/Waste water/Prohibition of deep sea dumping*)

03.60 Small Arms Ammunition Burning Tank (SAABT) Operations (*Terms and definitions/General/SAABT design/ Ammunition types authorized for burning/Safety/SAA destruction operations/Ammunition accounting guidance (loose rounds)*)

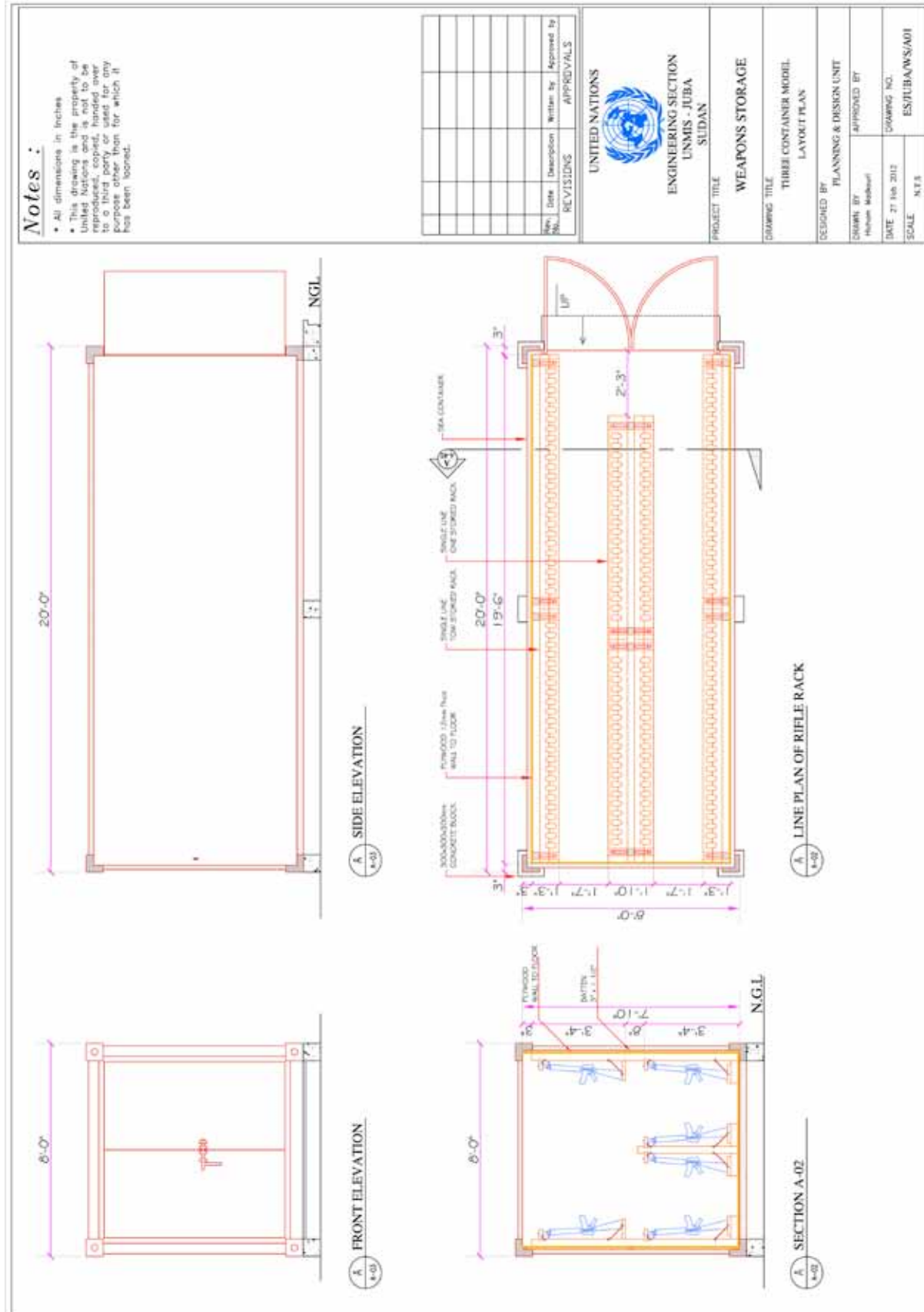
03.65 SALW Destruction (*Field Expedient SAA and Pyrotechnic Destruction Techniques by Burning*) (*Terms and definitions/General/System design/ Ammunition and pyrotechnic types authorized for burning/Safety/Destruction operations/ Ammunition accounting guidance (loose rounds)*)

03.70 Pyrotechnic Burning Tank (PBT) Operations (*Terms and definitions/General/PBT design/Ammunition types authorized for burning/Safety/Pyrotechnic and propellant destruction operations*)

03.80 Open Burning and Open Detonation Operations (Ammunition) (*Terms and definitions/General/Priorities and principles/Authority for disposal/Persons authorized to carry out disposals/Methods of local disposal – general/Siting of disposal sites/Approval of disposals sites and SOPs/Planning and preparation/Conduct of disposals*)

UNLIREC SOPs are available upon request at: programme@unlirec.org

5. Sketch of Containerized SALW Storage Module



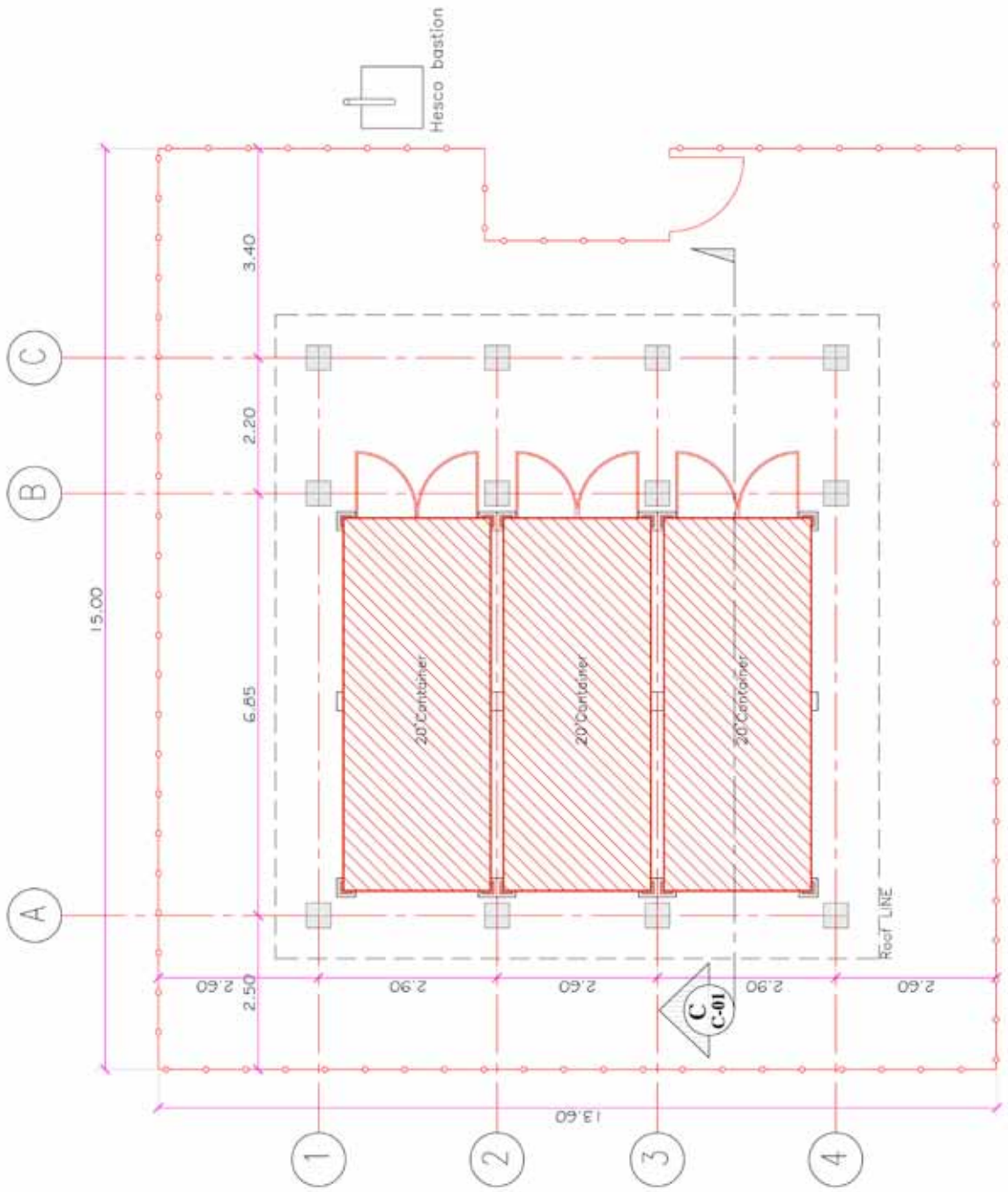
Notes :

- All dimensions in inches.
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Rev.	Date	Description	Written by	Approved by

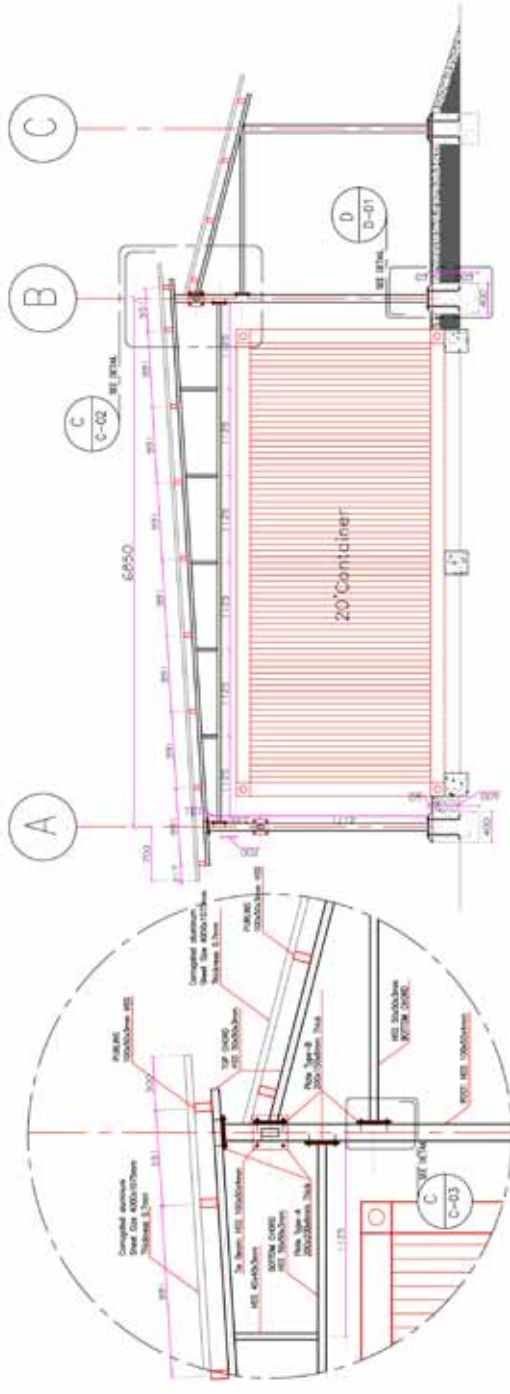

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 ENGINEERING SECTION
 UNMIS - JUBA
 SUDAN

PROJECT TITLE: **WEAPONS STORAGE**
 DRAWING TITLE: **THREE CONTAINER MODEL MASTER PLAN**
 DESIGNED BY: **PLANNING & DESIGN UNIT**
 DRAWN BY: **Hesam Mubarek**
 DATE: **27 Feb 2012**
 SCALE: **N.T.S**



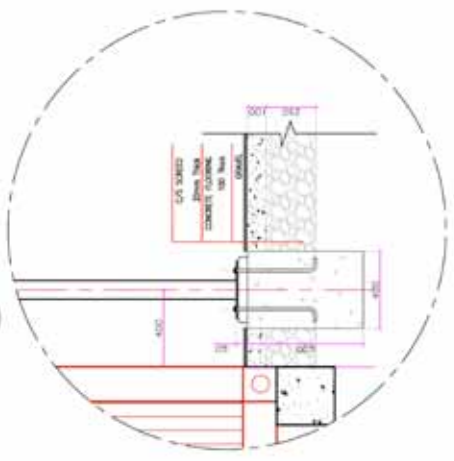
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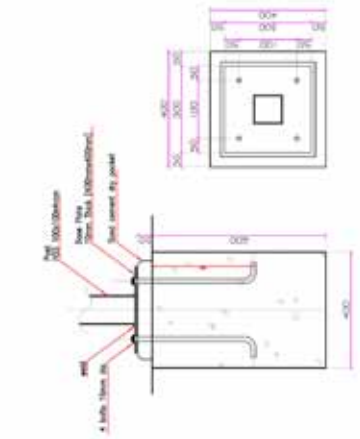


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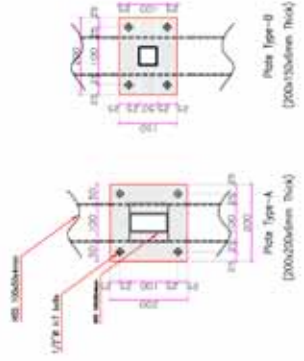
C CROSS SECTION
C-01



D CONCRETE FLOORING
D-01



D FOOTING POST
D-02



C PLATE TYPE - A & B
C-03

Rev. No.	Date	Description	Revision by	Approved by


UNITED NATIONS
ENGINEERING SECTION
UNMIS - JUBA
SUDAN

PROJECT TITLE
WEAPONS STORAGE

DRAWING TITLE
THREE CONTAINER MODEL
ROOF DETAILS

DESIGNED BY
PLANNING & DESIGN UNIT

DRAWN BY
Hicham Mubkur

DATE
27 Feb 2012

SCALE
N.T.S

DRAWING NO.
ES/JUBA/WS/J04

6. Mixing Table by Compatibility Group

This Table shows which compatibility groups can be stored together (green ■) and which not (red ■)! The yellow (■) color indicates field storage conditions. Numbers are notes below.

Compatibility Group: Mixing Rules

Compatibility Group	A	B	C	D	E	F	G	H	J	K	L	N	S
A	X												
B		X	X (1)	X (1)	X (1)	X (1)	X (1)						X
C		X (1)	X	X	X	X (2)	X (3)					X (4)	X
D		X (1)	X	X	X	X (2)	X (3)					X (4)	X
E		X (1)	X	X	X	X (2)	X (3)					X (4)	X
F		X (1)	X (2)	X (2)	X (2)	X	X (2,3)						X
G		X (1)	X (3)	X (3)	X (3)	X (2,3)	X						X
H								X					X
J									X				X
K										X			
L											(5)		
N			X (4)	X (4)	X (4)							X (6)	X (7)
S		X	X	X	X	X	X	X	X			X (7)	X

- NOTE 1 Compatibility Group B fuses may be stored with the articles to which they will be assembled, but the Net Explosive Quantity (NEQ) shall be aggregated and treated as Compatibility Group F.
- NOTE 2 Storage in the same building may be permitted if effectively segregated to prevent propagation.
- NOTE 3 Mixing of articles of Compatibility Group G with articles of other compatibility groups is at the discretion of the National Competent Authority.
- NOTE 4 Articles of Compatibility Group N should not in general be stored with articles in other compatibility groups except S. However, if such articles are stored with articles of Compatibility Group C, D and E, the articles of Compatibility Group N should be considered as having the characteristics of Compatibility Group D and the compatibility groups mixing rules apply accordingly.
- NOTE 5 Compatibility Group L articles shall always be stored separately from all articles of other compatibility groups as well as from all other articles of different types of Compatibility Group L.
- NOTE 6 It is allowed to mix 1.6N munitions. The Compatibility Group of the mixed set remains N if the munitions belong to the same family or if it has been demonstrated that, in case of a detonation of one munition, there is no instant transmission to the munitions of another family (the families are then called 'compatible'). If it is not the case the whole set of munitions should be considered as having the characteristics of Compatibility Group D.
- NOTE 7 A mixed set of munitions 1.6N and 1.4S may be considered as having the characteristics of Compatibility Group N.

7. Construction and use of a mobile incinerator⁸⁸

Part One - Construction and use of a mobile incinerator

1.1 Brief description

This SAA incinerator is designed as a portable incinerator and is designed to safely burn SAA up to 14.5 mm in calibre. The incinerator uses an external heat source,(normally diesel) to initiate the destruction of ammunition with the subsequent combustion of gunpowder within the SAA reinforcing the heating effect which accelerates the speed of operation. The incinerator is constructed in such a manner as to ensure that all fragmentation is contained within the incinerator so the main risk associated with this system is that of fire. Therefore an open area devoid of long grass or other combustible material is required whenever a mobile incinerator is used.

1.2 Description of construction

- The box should be constructed from 5mm sheet steel
- Ventilation holes should be drilled in the walls and the floor of the incinerator
- The holes should be no more than 5 millimetres in diameter or smaller than the diameter of the smallest round to be burnt.
- Holes drilled in the base of the box at the same diameter also allow for the transfer of heat.
- A suggested size for the box for quantities of up to 100kg of ammunition is 1m in length x 0.4m in depth x 0.6m wide . However for smaller quantities of ammunition (up to 30kg of ammunition) suggested dimensions are 0.4 x 0.25m x 0.3m
- The box should have metal legs which are 0.2m long.
- The incinerator should have a removable door with 2mm of tolerance around all edges to allow for expansion of the metal when hot.
- The door should have a sliding bolt to ensure that it can be held locked in position
- If diesel is used as the primary heat source then a drip tray that is 0.1m longer and 0.1m wider than the incinerator should be constructed that should be 0.15m in depth.
- This tray needs to be sealed on all sides as it is required to hold up to 10 litres of diesel.

1.3 Illustrations



Ventilation holes should be drilled in the floor and walls of the incinerator they should be no larger than the smallest calibre round to be incinerated. The door should be loose fitting. The drip tray should be larger than the incinerator with a sufficient gap to allow the free flow of air around it

⁸⁸ HALO Trust.



The door of the incinerator should be secured with a sliding bolt or similar retaining pin
The opening can be either on the side or on top but needs to be loose enough to allow for the expansion of the metal due to the heat transfer without jamming.

Part Two - The Burning process

2.1 Preparations

The primary hazard when using the incinerator is fire, so it is important that the immediate environment is free from loose grass or other combustible material and that the incinerator itself is surrounded on three sides by a wind break.

This may be a temporary construction, made using corrugated iron and sand bags, or for locations where repeated burns are planned a brick or breeze block structure can be assembled.



The incinerator should be protected on three sides by a wind break, this can be made from corrugated iron, sandbags or breeze blocks

2.2 Loading the incinerator

All ammunition to be destroyed should first be inspected by a qualified official to check that the ammunition is suitable for burning.

The following amounts of ammunition are recommended as maximum quantities for a single burn:

Type of Ammunition	Common weapon type	Small Incinerator 25 kg (0.4 x 0.3 x 0.25)	Medium Incinerators 75 kg (1m x 0.6m x 0.4m)
5.45mm x 39mm	AK74 /RPK74	2,250	6,800
5.56mm x 45mm	M16	2,000	6,250
7.62mm x 25mm	Tokarev	2,250	6,800
7.62mm x 39mm	AK47 / RPK	1,500	4,400
7.62mm x 51mm	FN FAL/ HK G3	1,000	3,000
9mm x 18mm	Makarov	2,500	7,500
9mm x 17mm	Browning	2,500	7,500
12.7mm x 108mm	DshK	180	550
14.5mm x 114mm	KPV-T (BTR 60/BRDM2)	100	340

Remove the door of the incinerator

For the most efficient loading of the incinerators the ammunition should be pre-loaded into sandbags or sacs which can then be put into the incinerator, or they may be loaded loose or in belts.



- When the ammunition has been loaded the door should be secured with the sliding bolt
- The area within fifteen metres of the incinerator should be evacuated
- The heat source should then be prepared, either by pouring up to ten litres of diesel into the drip tray, or connecting the gas to the burners, or placing wood or char-coal beneath the burner.

Part Three - Lighting the incinerator and controlling the burn

3.1 For diesel fuels

- Tie a rag to a stick and douse it in petrol. Then set light to the petrol soaked rag and place it in the corner of the drip tray. It will take approximately 1 to 2 minutes for the diesel to ignite and become hot enough to begin to cook of the SAA.
- Once the fuel has been lit all observers should remain under cover or at a safe distance (50m) from the incinerator and should not approach the incinerator for a period of at least 30 minutes after last bullet has exploded. smoke has been seen. At this point the box will still be too hot to handle, ideally it should be left for 2 hours to cool down. The incinerator can be cooled more rapidly by dowsing it with cold water.
- Thick leather gloves should be worn when handling the scrap as the fragmentation from the brass cases are very sharp.
- **Note if the lip of the tray is too high it will prevent air flow and will lead to the pool of diesel being heated to the point at which it reaches its flash point (approximately 60 degrees centigrade) when a fireball may develop.**

3.2 For gas fuels

- Ensure the gas pipes are suitably insulated against the heat of the burn and remove the tanks to a safe distance and protect them using sandbags.
- Turn on the gas and light the burners.
- Continue to run the burners on full heat until ten minutes after the last bullet has exploded, then turn off the gas and wait ten minutes before advancing to inspect the incinerator. . At this point the box will still be too hot to handle, ideally it should be left for 2 hours to cool down. The incinerator can be cooled more rapidly by dowsing it with cold water.

3.3 For solid fuels

- Prepare sufficient combustible material beneath the incinerator to allow a fire to burn for at least one hour. Since it is not advisable to approach the incinerator during the ammunition destruction process this relatively long burn time is best achieved using charcoal. Kindling of some kind will be necessary to start the burn.
- Light the fire and retire to a safe distance.
- This method leads to increased burn times and the results are not as predictable as the other fuel sources , so do not approach the incinerator until ten minutes after the last smoke has been seen.
- Thick leather gloves should be worn when handling the scrap as the fragmentation from the brass cases are very sharp



Diesel should be lit using a petrol soaked rags. Gas can be lit using a standard firelighter

3.4 Emptying the incinerator

When the incinerator has cooled, the residue from the burnt SAA should be inspected by the senior member at the site to ensure that the percussion caps have all been detonated (this is a precaution as it has not been known to leave any unfired to date)

Unloading the incinerator. This is best done using thick leather gloves and a rake to empty the burnt residue to minimize any contact with hot surfaces.



A sample of bullets should be inspected to ensure that the percussion caps have been properly burnt.

Part Four - Safety

The following safety points should be observed:

- Prior to destruction all ammunition should be inspected by a suitably qualified official to verify that it is suitable for incineration
- Medical staff should be present throughout any destruction process
- Staff working in close proximity to the incinerator should wear clothes made only of natural fibres
- The incinerator must be well below its operating temperature when it is loaded. If the incinerator is reloaded while the surfaces are still hot then bullets may explode.

General safety rules should apply and first aid kit should have burns dressings in it along with extra water and fire fighting equipment. If possible foam extinguishers suitable for use with fuel fires should be used.

8. Example check list for initial assesment of arms and ammunition management⁸⁹

General Data	
Name of facility	
Type of facility	
Nearest bigger town	
Address	
Commander	
Type of visit	
Reporting team	
Date / time of visit	
Reporting date	

⁸⁹ MSAG / German armed forces

Physical Security Assessment	
1. Natural Hazards Management	
Lightning	
Bushfire	
Flooding	
Special Remarks	
2. Intrusion Management	
Gates / Fence	
Guards / Patrols	
Key Mgmt	
Doors / Locks	
Alarm System	
Lights	
Intervention Means	
Excercises	
Special Remarks	
3. Infrastructure Layout	
Site Layout	
Access Road	
Special Remarks	
4. Staff Management	
Selection / Vetting	
Initial Training	
Refresher Training	
Excercises	
Medical Issues	
Special Remarks	

Stockpile Management Assessment	
1. Surveillance / Lifecycle Management	
Surveillance Method	
Age Structure	
Surplus Management	
Special Remarks	
2. Safety Management	
Site Layout	
Guarding cycle	
Store Construction	
Explosives Limits	
Quantity Distance	
Compatibility Groups	
Signs / Postings	
Storage Techniques	
Emergency Protocols	
Special Remarks	
3. Inventory Management	
Accounting / Books	
Racks / Internal Organization	
Net Explosive Quantity (NEQ) Determination	
Physical Inventory (Quantity per Type / Age / State)	
Loss / Theft Procedures	
Inspections / Inventory Check	
Special Remarks	