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Lotting and Batching

UN SaferGuard
Securing ammunition, protecting lives

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Warning

The International Ammunition Technical Guidelines (IATG) are subject to regular review and revision. This document is current with effect from the date shown on the cover page. To verify its status, users should consult www.un.org/disarmament/ammunition

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Foreword

Ageing, unstable and excess conventional ammunition stockpiles pose the dual risks of **accidental explosions at munition sites** and **diversion to illicit markets**.

The humanitarian impact of ammunition-storage-area explosions, particularly in populated areas, has resulted in death, injury, environmental damage, displacement and disruption of livelihoods in over 100 countries. Accidental ammunition warehouse detonations count among the heaviest explosions ever recorded.

Diversion from ammunition stockpiles has fuelled armed conflict, terrorism, organized crime and violence, and contributes to the manufacture of improvised explosive devices. Much of the ammunition circulating among armed non-State actors has been illicitly diverted from government forces.[1] In recognition of these dual threats of explosion and diversion, the General Assembly requested the United Nations to develop **guidelines for adequate ammunition management**.[2] Finalized in 2011, the International Ammunition Technical Guidelines (IATG) provide voluntary, practical, modular guidance to support national authorities (and other stakeholders) in safely and securely managing conventional ammunition stockpiles. The UN SaferGuard Programme was simultaneously established as the corresponding knowledge-management platform to oversee and disseminate the IATG.

The IATG also ensure that the United Nations entities consistently deliver high-quality advice and support – from mine action to counter-terrorism, from child protection to disarmament, from crime reduction to development.

The IATG consist of 12 volumes that provide practical guidance for 'through-life management' approach to ammunition management. The IATG can be applied at the guidelines' **basic, intermediate, or advanced levels**, making the IATG relevant for all situations by taking into account the diversity in capacities and resources available. Interested States and other stakeholders can **utilize the IATG for the development of national standards and standing operating procedures**.

The IATG are reviewed and updated at a minimum every five years, to reflect evolving ammunition stockpile-management norms and practices, and to incorporate changes due to changing international regulations and requirements. The review is undertaken by the UN SaferGuard Technical Review Board composed of national technical experts with the support of a corresponding Strategic Coordination Group comprised of expert organizations applying the IATG in practice.

The latest version of each IATG module can be found at www.un.org/disarmament/ammunition.

[1] S/2008/258.

[2] See also the urgent need to address poorly-maintained stockpiles as formulated by the United Nations Secretary-General in his Agenda for Disarmament, *Securing Our Common Future* (2018).

Introduction

Ammunition and explosives may deteriorate more rapidly or become damaged unless they are correctly stored, handled and transported, with the resultant effect that they may fail to function as designed and may become dangerous in storage, handling, transport and use. It is therefore important that the location of specific items of ammunition and explosives can be rapidly identified in order that the appropriate remedial action can be taken to ensure safety during these activities. A system of Lotting and Batching is an important component of this safety mechanism.

Lotting and batching is a means by which a discrete and homogenous quantity of ammunition may be identified. It will usually have been manufactured at the same time, using the same raw materials, using the same process and may therefore be expected to provide a uniform and similar performance. Whether it is appropriate to use Lotting or Batching for an item of ammunition will normally depend upon the complexity of the ammunition (ie the number of different components) and will require technical judgment.

Lotting and Batching is also important for stockpile accounting and to allow for timely and reliable identification of diversions through loss or theft.

Lotting and Batching

1 Scope

This IATG module introduces the concept of Lotting and Batching of ammunition and introduces a system that can be used to support the safe, effective and efficient management of conventional ammunition.

2 Normative references

A list of normative references is given in Annex A. These documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

A further list of informative references is given in Annex B in the form of a bibliography, which lists documents that contain additional information related to the contents of this IATG module.

3 Terms and definitions

For the purposes of this module the following terms and definitions, as well as the more comprehensive list given in IATG 01.40 *Glossary of terms, definitions and abbreviations,* shall apply.

The term ‘ban’ refers to *a moratorium placed on the issue and use of ammunition, usually pending technical investigation*.

The term ‘Batch’ refers to *a discrete quantity of ammunition which is assembled from two or more Lotted components (one of which will be the Primary Governing Component), is as homogeneous as possible and under similar conditions may be expected to give uniform performance*. Within the batch a number of sub-batches may be found.

The term ‘batch key identity’ refers to *a term used to identify a particular Lot or Batch of ammunition*.

The term ‘constraint’ refers to *the imposition of a limitation or restriction in the use, transportation, carriage, issue, storage or inspection of a munition*.

The term ‘Lot’ refers to *a predetermined quantity of ammunition or components which is as homogeneous as possible and under similar conditions may be expected to give uniform performance*. *A Lot is normally manufactured from the same raw materials, using the same production technique and in the same production run.*

The term ‘primary governing component’ refers to *the component in a Batch which is considered to be of major importance to the correct functioning of the round. This component governs the size, homogeneity and the identity of a batch. An ammunition batch contains only one lot of the governing component. It may also be referred to as the Batching Component.*

The term ‘secondary governing component’ refers *to the component in a Batch which is considered to be second in importance in the correct functioning of a round after the Primary Governing Component. It may also be referred to as the Sub-Batching Component.*

In all modules of the International Ammunition Technical Guidelines, the words 'shall', 'should', 'may' and 'can' are used to express provisions in accordance with their usage in ISO standards.

a) **'shall' indicates a requirement**: It is used to indicate requirements strictly to be followed in order to conform to the document and from which no deviation is permitted.

b) **'should' indicates a recommendation**: It is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required, or that (in the negative form, 'should not') a certain possibility or course of action is deprecated but not prohibited.

c) **'may' indicates permission**: It is used to indicate a course of action permissible within the limits of the document.

d) **'can' indicates possibility and capability**: It is used for statements of possibility and capability, whether material, physical or casual.

4 Background

Explosive safety during the storage, handling, use and transport of ammunition cannot be assessed without detailed technical information on every ammunition item within the national stockpile. This information should include a means of identifying all items of ammunition that are, for example: 1) filled with the same type of explosive or propellant made from the same production run with the same raw materials; or 2) contain the same component(s) made on the same production run from the same raw materials. A system of Lotting and Batching should be used to achieve this.

Empty components that consist of one or more factory pieces (i.e. shell bodies with no explosive content) are produced as empty Lots, each Lot being considered to be homogeneous. Empty Lots should be given empty Lot numbers for identification purposes (i.e. if metallurgical failure is responsible for an ammunition accident, then all filled ammunition made from that particular Lot may be identified and appropriate remedial action taken).

Bulk high explosive and propellants are manufactured from individual constituent materials, and the final product should be given a unique Lot number, which may be considered as the primary governing component when it is used to fill empty ammunition components (i.e. shell bodies).

Empty Lots of components become filled Lots when they are filled with explosive, propellant or pyrotechnic compositions. The explosive used to fill an empty component Lot should also be from a homogeneous Lot of explosive. The filled components should then be given a unique, filled Lot number for future identification and records kept of the Lot numbers of the empty component and the explosive used to make up the filled Lot.

When ammunition is assembled from two or more critical components, the two most critical components should be nominated as the primary and secondary governing components (see Clause 8), and the item should be Batched. The primary governing component should be used to determine the Batch size.

5 Lotting and Batching system requirements

The requirements of a Lotting and Batching system should be:

a) to identify a homogeneous quantity of ammunition which should give uniform performance under similar conditions of use;

b) to simplify the identification of specific items and/or rounds of ammunition items when an unsatisfactory report (due to an ammunition accident, performance failure or fault) is made on a particular Lot or Batch of ammunition;

c) to simplify the tracking in storage and the subsequent withdrawal or replacement of those components which have proved unsatisfactory, have become life expired or have been replaced by later marks, models and types;

d) to enable smaller quantities to have their 'history' tracked, ie where it has been stored and the conditions, how it has been transported and other factors potentially affecting its future condition;

e) to identify a definite quantity in which the results of inspection, proof and test can be representative;

f) to facilitate the establishment and maintenance of technical records and surveillance;[3] and

g) to reduce the amount of marking on ammunition containers.

The terms Lot, Batch and sub-Batch are all used to identify discrete and homogeneous quantities of ammunition. Which term is used depends on the complexity of the ammunition (the number of component parts) and, ultimately, the approving authority.

6 Lotting and Batching system responsibilities (LEVEL 2)

The appropriate authority within the wider ammunition management organisation should:

a) develop and implement a system of Lotting and Batching, or similar, in order that the requirements of Clause 5 are met;

b) determine exactly which ammunition should be Lotted and which should be Batched;

c) determine which components (i.e. HE filling, propellant, fuze etc.) should control the Lotting or Batching of service ammunition; and

d) assign manufacturers monograms and Lot, Batch, sub-Batch, and logistic Batch[4] codes and numbers.

7 Lot and Batch numbering system (LEVEL 2)

7.1 Lot number

The Lot number is a unique identifying number allocated to individual ammunition Lots at the time of manufacture, assembly or modification that identifies a particular Lot. It is normally associated with the identity of a significant, major component (i.e. the Lotting component). An item is Lotted when it is constructed of either only one major component or is of fairly simple construction.

7.2 Batch number

The Batch number is a unique identifying number allocated to individual ammunition Batches at the time of manufacture, assembly or modification. It is allocated in accordance with the identity of the significant, major component (the primary governing component) and the secondary governing component (for a sub-batch – see below). When the lot number of the primary component changes, so does the batch number. This system only works when all components of a batched items are recorded on the accounting system. The reliable way to gain this information is from the manufacturer of the ammunition in a full technical data package.

Sub-Batch number

When the quantity of the governing component used is so large that in the event of a failure of another component the total quantity of the complete round at risk would be unacceptable, the Batch should be divided into sub-Batches. In order to reduce the degree of risk, the secondary component should

[3] This also assists in the investigation of cases of diversion of ammunition to illicit users.

[4] See Clause 7.8 for logistic batching.

be used to govern the sub-Batch size. The addition of a suffix letter to the Batch number should be used to identify the sub-Batch.

7.3 Allocation of Lot numbers (except propellant)

Lot numbers should normally be issued as a process of consultation between the manufacturer and the ammunition management organisation. For ammunition purchased abroad it may be permissible to accept the Lot number allocated by the manufacturer at the time of production.

A system of numbering should be developed that ensures that there can be no repetition of a Lot number. Such a system may look like the example in Table 1:

	Manufacturers Monogram	Date of Assembly or Manufacture	Unique Identification Number	**Suffix**	**Remarks**
Requirement	▪ Up to Three letters	▪ In format MMYY	▪ Up to six numerals	▪ One letter	
Example	**HG**	0817	005	**D**	
Range	▪ A to ZZZ		▪ 000001 to 999999	▪ A to X (Excluding B or R)	▪ B or R are uniquely used for propellant Lot numbers.
Example Lot Number	**HG 0817 005D**				

Table 1: Example system of ammunition and explosive Lot numbering

7.4 Allocation of Lot numbers (propellant)

Propellant Lot numbers should normally be issued as a process of consultation between the manufacturer and the ammunition management organisation. For ammunition purchased abroad it may be permissible to accept the propellant Lot number allocated by the manufacturer at the time of production.

A system of numbering should be developed that ensures that there can be no repetition of a Lot number. Such a system may look like the example in Table 2:

	Manufacturers Monogram	Date of Assembly or Manufacture	**Unique Identification Number**	**Suffix**	**Remarks**
Requirement	▪ □ Up to Three letters	▪ In format MMYY	▪ 1 numeral onwards (to 6)	▪ One letter	
Example	**BD**	0817	**004**	**(B)**	
Range	▪ A to ZZZ		▪ 1 to 999999	▪ B, R or nothing only	▪ B indicates that the propellant was been re-blended at some stage in its life cycle. ▪ R indicates that the propellant has been reworked at some stage in its life cycle. ▪ A suffix is not mandatory.

	Manufacturers Monogram	Date of Assembly or Manufacture	Unique Identification Number	Suffix	Remarks
Example Lot Number	**BD 0817 004**				

Table 2: Example system of propellant Lot numbering

7.5 Allocation of Batch numbers

Batch numbers should normally be issued as a process of consultation between the manufacturer and the stockpile management organisation. They shall only be used for the calibre and type of ammunition for which they are issued.

A system of Batch numbering should be developed that ensures that there can be no repetition of a Batch number. Such a system may look like the example in Table 3:

	Manufacturers Monogram	Date of Assembly or Manufacture	Unique Identification Number	Remarks
Requirement	▪ Up to Three letters	▪ In format MMYY	▪ 1 numeral onwards	▪
Example	**GD**	**0817**	**020**	▪ It is useful to prefix numbers with a zero.
Range	▪ A to ZZZ		▪ 01 to 999999	▪
Example Batch Number	**GD 0817 020**			

Table 3: Example system of Batch numbering

The Batch number is also often known as the Batch Key Identity (BKI) during accounting and other inventory management processes. A batch number is identifiable by being underlined when written in text and when marked on containers and ammunition bodies.

There are also specific rules that should be followed during the allocation of Batch numbers:

a) the date of assembly or manufacture shall be that of the month in which production commenced;

b) that date of assembly or manufacture may be used for a maximum period of three months, (i.e. if production commenced on 01 August 2017 and finished on 23 October 2017, then the BI would use 0817 as the date); and

c) if assembly or manufacture of a Batch exceeds the three month period, even if the process is continuous, then a new Batch number must be brought into use.

7.6 Special case – small arms ammunition

For small arms ammunition the Lot number (or workdate as it is often known) should consist of the manufacturer's monogram and a work date as shown in Table 4:

	Manufacturers Monogram	Date Filling Commenced	Remarks
Requirement	▪ Up to Three letters	▪ In format DDMMYY	▪
Example	**FG**	**011115**	▪ Laser marking systems for SAA now allow a full Batch number as per Table 3 to be used. ▪ A suffix may be used to identify different Lots (production runs) that commenced production on the same day.
Range	▪ A to ZZZ		▪

	Manufacturers Monogram	Date Filling Commenced	Remarks
Example Batch Number	**FG 011115**		

Table 4: Example system of Lot numbering for SAA

7.7 Special case – logistic Batching (LEVEL 3)

Logistic Batching is a system of Batching that allows the enhancement of the operational efficiency of ammunition supply units during operations whilst ensuring accounting accuracy. When, for example, HE shells, propelling cartridges and fuzes are supplied separately to an artillery unit during operations, if they run out of one item (i.e. fuzes) then firing must stop until that item is re-supplied. In order to ensure that this does not happen, it may be desirable to have pre-made up pallets containing all the individual ammunition items needed to make a complete round for use (i.e. HE shell, propelling cartridge, primer and fuze). Although this solves a problem for the user, it creates problems for the ammunition manager, because all the individual ammunition items on the pallet would have different and unique BKIs. Either ammunition item has to be accounted for by BKI and pallet, an onerous task, or an alternative system of Batching needs to be developed.

One such system is the use of logistic Batching, which ammunition managers may choose to adopt. A logistic Batch number should be similar to a Batch number but with differences in its makeup. Logistic Batch numbers should normally only be issued by the ammunition management organisation and the individual BKI within each logistic Batch recorded in the ammunition accounting system.

A system of logistic Batch numbering should be developed that ensures that there can be no repetition of a logistic Batch number. Such a system may look like the example in Table 6:

	Assemblers Monogram[5]	Date of Assembly	Unique Identification Number	Remarks
Requirement	▪ One to three letters	▪ In format MMYY	▪ Six numerals	▪
Example	**TTN**	**1117**	**000035**	▪ .A suffix may be used to identify logistic sub-Batch numbers.
Range	▪ Developed from the depot name. For example TTN for Toytown.		▪ 000001 to 999999	▪
Example Batch Number	**TTN 1117 000035**			

Table 6: Example system of logistic Batch numbering

There are also specific rules that should be followed during the allocation of logistic Batch numbers:

a) a logistic Batch should be as homogeneous as possible in terms of the Lot and Batch numbers of ammunition items within the logistic Batch;

b) only one logistic Batch should be packed on each pallet or in each ammunition container where possible;

[5] Usually the ammunition depot in which the assembly of the multi-item pallets took place.

c) no more than two separate logistic sub-Batches should be packed on each pallet or in each ammunition container. A Logistic Sub-Batch is a predetermined quantity of palletised ammunition, within a Logistic Batch which is formed when the Secondary Governing Component is changed; and

d) details of the ammunition component Lot and Batch numbers of the ammunition items that form the logistic Batch or sub-Batch should be clearly marked on the pallet or on the ammunition container.

7.7.1. Marking logistic Batch containers or pallets

A pallet or logistic container that contains a logistic Batch or sub-Batch should be marked with the following to ease identification:

a) quantity;

b) type of ammunition by complete round (e.g. Round 152mm HE w/Chg Prop);

c) model or mark (if applicable);

d) logistic Batch number or logistic sub-Batch number;

e) monogram of assembler;

f) date of assembly; and

g) details of the ammunition items forming the logistic Batch or sub-Batch (see Clause 7.8(d)).

8 Lotted or Batched governing components (LEVEL 2)

In order to provide guidance on which generic types of ammunition should be Lotted or Batched, and what the primary governing component should be, Table 7 illustrates a system that may be considered for use by the stockpile management organisation:

Generic Ammunition Type	Lotted or Batched	Primary Governing Component	Secondary Governing Component
Flare (illuminating)	Lotted	Filled Flare	
Grenades (Hand)	Lotted	Filled Lot	
Grenades (Rocket Propelled)	Batched	Propellant	Fuze
Mortar Bomb HE (>60mm)	Batched	Primary Cartridge	Fuze
Mortar Bomb HE (81mm – 160mm)	Batched	Augmenting Cartridge	Primary Cartridge
Mortar Bomb Smoke (>60mm)	Batched	Primary Cartridge	Augmenting Cartridge
Mortar Bomb Smoke (81mm – 160mm)	Batched	Augmenting Cartridge	Primary Cartridge
Round Cannon HE (20mm – 30mm)	Batched	Propellant	Primer
Tank Round HE	Batched	Propellant	TVE (Tube) (Primer)
Tank Round Smoke	Batched	Propellant	TVE (Primer)
Artillery Shell HE (Complete Round) (>155mm)	Batched	Propellant	Fuze
Artillery Shell Smoke (Complete Round) (>155mm)	Batched	Propellant	Fuze
Artillery Shell HE (>155mm)	Lotted	Filled Shell	
Artillery Shell Smoke (>155mm)	Lotted	Filled Shell	
Propelling Charge (Separate) (>155mm)	Lotted	Propellant	
Fuzes Nose Percussion	Lotted	Filled Fuze	
Fuzes Nose Mechanical Time	Lotted	Filled Fuze	
Primer Percussion	Lotted	Filled Primer	
Primer Electrical	Lotted	Filled Primer	
Safety Fuze	Lotted	Filled Lot	
Fuze Instantaneous	Lotted	Filled Lot	
Detonating Cord	Lotted	Filled Lot	
Detonator Non-Electric	Lotted	Filled Lot	

Generic Ammunition Type	Lotted or Batched	Primary Governing Component	Secondary Governing Component
Detonator Electric	Lotted	Filled Lot	
Charge Linear Cutting	Lotted	Filled Lot	
Charge Demolition HE	Lotted	Filled Lot	
Mine Anti-Tank	Lotted	Filled Lot	

Table 7: Example system of Lotting, Batching and governing components by generic type

9 Availability of ammunition technical data (LEVEL 2)

The availability of the following basic data for the specific types of ammunition in a national stockpile is essential to the development of an effective, efficient, safe and secure ammunition management system:

a) ammunition Lot numbers;

b) ammunition Batch numbers (if applicable); and

c) technical drawings.

If this basic technical data is not available for each specific item of ammunition then the integrity of the overall ammunition management system is dangerously compromised. This is the basic data that allows for effective and appropriate remedial action when a technical investigation identified a fault in the ammunition. Without this data the only option is to take remedial action on each individual item of the particular type of ammunition identified as at risk that was manufactured in the same year. (For example, 60mm mortar propellant, where the only available data identifies a year of production of 1967 as this is marked on the rounds and packaging, spontaneously ignites during storage. The only possible and effective remedial action in this case should be the destruction of all propellant for all mortar bombs where the ammunition is marked 1967.)

For those stockpile management organisations that do not hold the technical data above for each item of ammunition, the only short-term solution shall be to conduct a 100% stocktake of all ammunition and record all markings on that ammunition and its packaging. Informed decisions shall then be taken about instigating a Lotting and Batching system, based on the principles of logistic Batching, which is integrated with the ammunition accounting system and that allows the ammunition managers a degree of visibility of the entire stockpile by individual ammunition type. This may be a massive task, dependent on the stockpile size, but it is the only way to gain effective control over the ammunition and to reduce the inherent explosive risks during storage, handling and use.

Annex A
(normative)
References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of the guide. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of the guide are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO maintain registers of currently valid ISO or EN:

a) IATG 01.40 *Glossary of terms, definitions and abbreviation*. UNODA. 2020.

The latest version/edition of these references should be used. The UN Office for Disarmament Affairs (UNODA) holds copies of all references[6] used in this guideline and these can be found at www.un.org/disarmament/un-saferguard/references/. A register of the latest version/edition of the International Ammunition Technical Guidelines is maintained by UNODA, and can be read on the IATG website: www.un.org/disarmament/ammunition/ . National authorities, employers and other interested bodies and organisations should obtain copies before commencing conventional ammunition stockpile management programmes.

[6] Where copyright permits.

Annex B
(informative)
References

The following informative documents contain provisions, which should also be consulted to provide further background information to the contents of this guide:

b) IATG 01.60 *Ammunition faults and performance failures*. UNODA. 2020;

c) IATG 01.70 *Bans and constraints*. UNODA. 2020; and

d) UK Defence Standard 13-96 *Lotting and Batching of Ammunition*. Parts 1 - 3. UK Defence Standardization. 2009.

The latest version/edition of these references should be used. The UN Office for Disarmament Affairs (UNODA) holds copies of all references[7] used in this guide and these can be found at: www.un.org/disarmament/un-saferguard/references/. A register of the latest version/edition of the International Ammunition Technical Guidelines is maintained by UNODA, and can be read on the IATG website: www.un.org/disarmament/ammunition/ . National authorities, employers and other interested bodies and organisations should obtain copies before commencing conventional ammunition stockpile management programmes.

[7] Where copyright permits.

Amendment record

Management of IATG amendments

The IATG are subject to formal review on a five-yearly basis. This does not preclude amendments being made within these five-year periods for reasons of operational safety, efficacy and efficiency or for editorial purposes.

As amendments are made to this IATG module they will be given a number, and the date and general details of the amendment will be shown in the table below. The amendment will also be shown on the cover page of the IATG by the inclusion of the amendment number and date.

As the formal reviews of each the IATG module is completed, new editions will be issued. Amendments will be incorporated into the new edition and the amendment record table cleared. Recording of amendments will then start again until a further review is carried out.

The most recently amended, and thus extant, IATG module is posted on www.un.org/disarmament/ammunition

Number	Date	Amendment Details
0	01 Feb 15	Release of Edition 2 of IATG.
1	31 March 21	Release of Edition 3 of IATG.