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Transport of ammunition



UN SaferGuard ✓
Securing ammunition, protecting lives

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Contents

Contents.....	2
Foreword	3
Introduction	4
1 Scope.....	5
2 Normative references	5
3 Terms and definitions	5
4 General	5
4.1 UN Model Regulations	6
5 Transport of ammunition by road.....	7
6 Transport of ammunition by rail	7
7 Transport of ammunition by air	7
8 Transport of ammunition by sea	9
9 Ammunition logistics hubs, inter-modal changes, and secure holding and safe haven locations (LEVEL 1).....	10
10 Security during transport (LEVEL 1).....	10
10.1 General security requirements (logistic movement).....	10
10.1.1 Road transport.....	11
10.1.2 Rail transport	11
10.1.3 Air transport.....	11
10.1.4 Sea transport	12
10.2 Documentation.....	12
10.3 Emergency procedures.....	12
Annex A (normative) References.....	13
Annex B (informative) References.....	14
Annex C (informative) Structure of UN Model Regulations	15
Annex D Transport of ammunition by road	16
Amendment record	26

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

The transport of dangerous goods (which includes ammunition and explosives) should be regulated in order to prevent, as far as possible, accidents to persons or property and damage to the environment, the means of transport employed or to other goods.

With different regulations in every country and applying to different modes of transport, the international movement of ammunition and explosives would be seriously impeded, if not made impossible and unsafe, without international agreements. As ammunition and explosives can also be subject to other kinds of constraints (i.e. safe storage requirements and environment protection factors), consistent agreements for their safe transport within and between States are essential.

In order to ensure consistency between various regulatory systems, the United Nations has developed mechanisms for the harmonization of hazard classification criteria³ during transport and safe transport conditions. These are accepted by other international agreements that relate to the transport of ammunition and explosives by road, rail, air or sea.

Changes to the original packaging invalidates the hazard classification and requires reassessment.

³ Refer to IATG 01.50 *UN Explosive Hazard Classification System and Codes*.

Transport of ammunition

1 Scope

This IATG module introduces the extant international agreements and instruments for the safe transportation 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.

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 General

Responsibility for the transport of dangerous goods issue within the UN system lies with the UN Economic Commission for Europe (UNECE)⁴ whose mandate includes the establishment of norms, standards and conventions to facilitate international cooperation on transportation within and outside the European region.

UNECE is responsible for the Globally Harmonized System of Classification and Labelling of Chemicals (GHS).⁵ This is a single, globally harmonized system to address the classification of chemicals, labels, and safety data sheets during transportation; this includes military and civil explosives, which is explained more fully in IATG 01.50 *UN Explosive Hazard Classification System and Codes*.

⁴ <http://www.unece.org/trans/danger/what.html> .

⁵ *United Nations Globally Harmonized System of Classification and Labelling of Chemicals (GHS)*. ST/SG/AC.10/30/Rev.6. Geneva. United Nations. 2016.

4.1 UN Model Regulations⁶

The *United Nations Recommendations on the Transport of Dangerous Goods* (referred to as *UN Recommendations* and sometimes as the '*Orange Book*') have been developed by the United Nations Economic and Social Council's Committee of Experts on the Transport of Dangerous Goods in the light of technical progress, the advent of new substances and materials, the exigencies of modern transport systems and, above all, the requirement to ensure the safety of people, property and the environment. They are addressed to governments and international organisations concerned with the regulation of the transport of dangerous goods, including ammunition and explosives.

The *UN Recommendations* are presented in the form of the *United Nations Recommendations on the Transport of Dangerous Goods Model Regulations*⁷ (referred to as the *UN Model Regulations*). They aim at presenting a basic scheme of provisions that will allow uniform development of national and international regulations governing the various modes of transport; yet they remain flexible enough to accommodate any special requirements that might have to be met. It is expected that governments, intergovernmental organisations and other international organisations, when revising or developing regulations for which they are responsible, will conform to the principles laid down in the *UN Model Regulations*, thus contributing to worldwide harmonization in this field.

The structure, format and content of the *UN Model Regulations* should be followed to the greatest extent possible in order to create a more user-friendly approach, to facilitate the work of enforcement bodies and to reduce the administrative burden. Although only a recommendation, the *UN Model Regulations* were drafted in the mandatory sense (i.e., the word 'shall' is employed throughout the text rather than 'should') in order to facilitate direct use of the *UN Model Regulations* as a basis for national and international transport regulations.

The *UN Model Regulations* that relate to ammunition and explosives are structured as shown in Annex C.

The *UN Model Regulations* are a complementary document to the GHS and contain details of the symbols and hazard classifications required for the safe transport of ammunition and explosives. This hazard classification system is explained within IATG 01.50 *UN Explosive Hazard Classification System and Codes*, which is a normative reference to this IATG.

Ammunition and explosives should, therefore, be classified, labelled and marked during transportation in accordance with the requirements of IATG 01.50 *UN Explosive Hazard Classification System and Codes*.

Ammunition and explosives should be transported in accordance with the requirements of the *United Nations Recommendations on the Transport of Dangerous Goods Model Regulations*.⁸

In order to meet the UN hazard classification criteria, thus ensuring, as far as possible, that ammunition and explosives are safe to transport, Class 1 items must be packaged in their full-service pack (FSP). Once outside their FSP their UN Hazard Classification Code (HCC) is no longer extant. HCC are allocated after a series of stringent tests; the HCC is only applicable to that specific item packed in the packing configuration in which it was tested.

⁶ Extracted from http://www.unece.org/trans/danger/publi/unrec/rev13/13nature_e.html.

⁷ *United Nations Recommendations on the Transport of Dangerous Goods Model Regulations*, (Nineteenth revised edition), ST/SG/AC.10/1/Rev.19, , New York and Geneva, United Nations, 2015. (Referred to as the *UN Model Regulations*). <https://shop.un.org/>

⁸ The *UN Model Regulations* have been used as the basis for transport mode specific requirements, which are covered in this IATG under Clauses 5 to 8.

5 Transport of ammunition by road

Although the *UN Model Regulations* provide the basic framework for the safe transport of explosive by road, they are designed to be generic of transport mode and not specific to road transport. The *European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR)*⁹ was therefore developed by the UNECE, which is specifically designed to cover the transport of dangerous goods (including ammunition and explosives) by road. ADR closely follows the layout, structure, language and requirements of the *UN Model Regulations*.¹⁰

The Agreement itself is short and simple. The key article is the second, which states that, apart from some excessively dangerous goods, other dangerous goods (including ammunition and explosives) may be carried internationally in road vehicles subject to compliance with:

- a) the conditions laid down in ADR Annex A for the carriage of ammunition and explosives, in particular as regards their packaging and labelling; and
- b) the conditions laid down in ADR Annex B, in particular as regards the construction, equipment and operation of the road vehicle carrying the ammunition and explosives.

Ammunition and explosives should therefore be transported by road in accordance with the requirements of the *European Agreement Concerning the International Carriage of Dangerous Goods by Road*.

6 Transport of ammunition by rail

The international agreement that regulates the safe transport of dangerous goods (including ammunition and explosives) by rail is the *Convention for International Carriage by Rail (COTIF)*.¹¹

COTIF is managed through the Intergovernmental Organization for International Carriage by Rail (OTIF)^{12 13} whose principal objective is to develop the uniform systems of law that apply to the carriage of passengers and freight in international through traffic by rail. These systems of law have been in existence for decades and are known as the CIV¹⁴ and CIM¹⁵ Uniform Rules which are effectively contracts of carriage across state boundaries.

OTIF has further developed an *International Ordinance on the Transport of Dangerous Goods by Rail (RID)*, (*Appendix I to Annex B to the Convention for International Carriage by Rail*).

Ammunition and explosives should therefore be transported by rail in accordance with the requirements of the *International Ordinance on the Transport of Dangerous Goods by Rail (RID)*.

7 Transport of ammunition by air

Dangerous goods, which include ammunition and explosives (Class 1), are carried regularly and routinely by air. To ensure they do not put an aircraft and its occupants at risk there are extant

⁹ *European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)*, ECE/TRANS/257 (Vol 1 and II), New York and Geneva. 01 January 2017.

¹⁰ ADR is also consistent with the structure of RID (see Clause 6) and of the IMDG Code (see Clause 8).

¹¹ *Convention for International Carriage by Rail (COTIF)*. Edition 1. December 2010

¹² www.otif.org

¹³ 50 states are members of OTIF (as at 1 May 2017).

¹⁴ *Uniform Rules concerning the Contract for Carriage of Passengers and Luggage by Rail*.

¹⁵ *Uniform Rules concerning the Contract for Carriage of Goods by Rail*.

international standards, which each State, under the provisions of the *Chicago Convention*,¹⁶ ¹⁷ should introduce into national legislation. This system ensures governmental control over the carriage of dangerous goods by air and gives world-wide harmonization of safety standards.

Annex 18 of the *Chicago Convention* deals with the safe transport of dangerous goods by air. In general, it sets down broad principles, but one of the Standards requires that dangerous goods be carried in accordance with the *Technical Instructions for the Safe Transport of Dangerous Goods by Air*¹⁸ (referred to as the '*Technical Instructions*'). States are required by Annex 18 to have inspection and enforcement procedures to ensure that dangerous goods are being carried in compliance with the requirements.

The '*Technical Instructions*' are managed by the International Civil Aviation Organization (ICAO) and contain a very comprehensive set of requirements; among other things they provide for the classification of dangerous goods and have a list of them. The list identifies those goods that are:

- a) forbidden under any circumstances;
- b) forbidden on both passenger and cargo aircraft in normal circumstances but could be carried in exceptional circumstances subject to exemption by the States concerned;
- c) forbidden on passenger aircraft but permitted on cargo aircraft in normal circumstances; and
- d) permitted on both passenger and cargo aircraft in normal circumstances.

The '*Technical Instructions*' require that all dangerous goods be packaged and, in general, restrict the quantity per package according to the degree of hazard and the type of aircraft (i.e. passenger or cargo) to be used. There is generally no restriction on the number of packages per aircraft.

The '*Technical Instructions*' stipulate the packing type and methods to be used, including the detailed specifications for the packaging and the stringent testing regime they must successfully complete before they can be used. There are requirements for the markings and labels for packages and the documentation for consignments.

In the '*Technical Instructions*' there is a requirement that every package of dangerous goods is inspected externally by the operator before carriage to ensure it is in a fit state and appears to comply with all the relevant requirements. Packages are subject to:

- a) loading restrictions;
- b) segregation of those containing incompatible dangerous goods; and
- c) restraining methods to prevent movement in flight.

Aircraft operators should be aware of what dangerous goods have been loaded on their aircraft; in the event of an aircraft accident the '*Technical Instructions*' require that they shall, as soon as possible, inform the State in which the accident occurred of what was on board and where it was located. However, it is possible that, depending on the circumstances and place of an accident, this information may not be available instantly.

¹⁶ *Convention on International Civil Aviation, Annex 18. The Safe Transport of Dangerous Goods by Air.* (Fourth Edition). ICAO. July 2011.

¹⁷ There are currently 191 signatories to the Chicago Convention.

¹⁸ *ICAO Technical Instructions for the Safe Movement of Dangerous Goods by Air.* (Doc 9284).

The *'Technical Instructions'* also require that operators shall report to the relevant authority accidents and incidents involving dangerous goods. States in turn should have procedures in place to investigate such occurrences.

The *'Technical Instructions'* contain training requirements, which should apply to everyone involved in consigning, handling and carrying dangerous goods, cargo and passenger baggage. These include the need for refresher training at two-year intervals and the keeping of training records. There are specific responsibilities for shippers and operators. Consignment shippers shall ensure staff preparing consignments of dangerous goods receive training or that another organisation with trained staff is used. Aircraft operators shall ensure their own staff and those of their handling agents are trained. Training programmes for operators should be subject to approval by the State of the operator.

Therefore, ammunition and explosives should be transported by air in accordance with the latest versions / amendments to:

- a) Annex 18 to the *Convention on International Civil Aviation, The Safe Transport of Dangerous Goods by Air*. (Fourth Edition). IACO. July 2011; and
- b) *IACO Technical Instructions for the Safe Movement of Dangerous Goods by Air*. (Doc 9284).

The International Air Transport Association (IATA) has produced a 'field manual' version of the ICAO *'Technical Instructions'*. The IATA *Dangerous Goods Regulations*¹⁹ (DGR) present the requirements for shipping dangerous goods by air in a user friendly, easy to interpret format. It also includes additional information that can assist shippers in making sure their consignments are in compliance and will be accepted quickly and easily by the airlines. Finally, since IATA member airlines are somewhat stricter in their requirements than the *ICAO Technical Instructions*, the DGR specifies more precisely how to prepare a shipment. The DGR should, therefore, also be consulted prior to transporting ammunition on an IATA member airline.

8 Transport of ammunition by sea

The carriage of dangerous goods (including ammunition and explosives) at sea falls under the remit of the *International Convention for the Safety of Life at Sea (SOLAS)*.^{20 21} Chapter VII, Part A of SOLAS concerns the carriage of dangerous goods.

Chapter VII, Part A covers the carriage of dangerous goods in packaged form. It includes provisions for the classification, packing, marking, labelling, documentation and stowage of dangerous goods. States parties to the convention are required to issue instructions at the national level. Chapter VII makes mandatory use of the *International Maritime Dangerous Goods Code (IMDG)*,^{22 23} developed by the International Maritime Organization,²⁴ which is constantly updated to accommodate new dangerous goods and to supplement or revise existing provisions.

Ammunition and explosives should be transported by sea in accordance with:

- a) Part A to Chapter VII of the International Convention for the Safety of Life at Sea (SOLAS); and

¹⁹ *IATA Dangerous Goods Regulations (DGR)* (58th Edition). 2017. .

²⁰ *International Convention for the Safety of Life at Sea, (SOLAS)*, IMO, 1974. (Entered into force of 25 May 1980).

²¹ There are currently 172 Member States and three Associate Members to SOLAS.

²² *International Maritime Dangerous Goods (IMDG) Code*. (Amendment 38-16). IMO. 2016.

²³ IMDG is based on the contents of the *United Nations Recommendations on the Transport of Dangerous Goods* (see Clause 4.1).

²⁴ www.imo.org

- b) the *International Maritime Dangerous Goods (IMDG) Code*. (Amendment 38-16). IMO. 2016.

9 Ammunition logistics hubs, inter-modal changes, and secure holding and safe haven locations (LEVEL 1)

With the exception of ammunition cargo ships, which always have associated quantity distances (see IATG 02.20 *Quantity and separation distances*), ammunition in transportation does not generally require the application of explosives safety quantity-distances (QD), while in movement. However, when ammunition in transit stops for more than a temporary halt, or is being loaded to or unloaded from or between transportation conveyances (handling), it shall have appropriate QD applied to all surrounding exposures or risk management principles shall be applied. Examples include transportation hubs such as ports, airfields, railyards, inter-modal change areas (e.g. rail-to-truck, ship-to-truck, truck-to rail or ship), secure holding areas for ammunition conveyances, and safe havens that are stopping places for safe and secure temporary holding of an ammunition conveyance en-route to its final destination.

Such locations shall each be considered as an explosives facility or location and must meet the siting requirements of IATG 05.10 for the ammunition hazard divisions and quantities present. When QD requirements of IATG 02.20 cannot be met, then risk management principles and processes detailed in IATG 02.10 Introduction to risk management principles shall be applied and appropriate risk assessments, risk analyses and explosives safety cases shall be conducted and risk decisions obtained from appropriate decision-makers. Any residual risk must be communicated to all affected parties.

Ideally, planning of ammunition movements will have been conducted well ahead of time, with all required documentation (e.g. explosives safety site plan or risk decision) in place, prior to the arrival of the ammunition shipment.

It is possible to construct a harbour area (transit area) near to, or within, an existing ASA using barricades to reduce the QDs (IATG 05.30 Barricades). Natural ground features may be used for this purpose, but the most common forms are artificial earth mounds, reinforced concrete and masonry walls, or a combination of these types. A barricade may be completely destroyed in an explosion, but its design should be such that it will stop or sufficiently slow down low angle, high velocity fragments before it collapses or is dispersed. If personnel protection is being afforded by a barricade, then its design will need to ensure that it does not present an additional hazard.

Security of this harbour area must be to the same standard as for an ASA. Access must be strictly controlled, contraband measures put in place and all fire precautions, fire-fighting equipment and emergency procedures must be in position.

To be effective, a barricade shall be constructed of properly specified materials to a minimum effective thickness.

10 Security during transport (LEVEL 1)

10.1 General security requirements (logistic movement)

Ammunition should only be transported in locked and sealed containers. The locks of such containers should be in accordance with the requirements of the European Standard EN12320:2001, *Building hardware – Padlocks and padlock fittings – Requirements and test methods*.²⁵

²⁵ Although this standard is aimed at building security, the section on lock types is equally valid for container security.

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.

Ammunition boxes or crates should be secured and sealed prior to loading into the containers.

10.1.1. Road transport

Road transport may be conducted by marked or unmarked military vehicles, (sometimes even armoured vehicles), or civilian transport.

If civilian contractors are used to move ammunition by road, then procedures for authorization, security, monitoring and inspection of both the movements and the contractors themselves should be in place beforehand. They should be equipped with specific protection measures, (e.g. alarm systems on vehicles or electronic tracers in boxes), monitored by the police, or guarded by military or security forces, depending on the type and quantity of ammunition transported and the respective risk assessment.

Transport routes should generally be planned in advance and information concerning these routes should be treated as classified. Procedures for regular traffic between the same two locations should be varied and reviewed regularly.²⁶

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

10.1.2. Rail transport

End-opening containers²⁷ shall be placed door to door during rail shipments. Barriers on rail cars should be used to protect side-opening containers and deter their opening.

10.1.3. Air transport

Air transport can be conducted by transport agents. These are individuals or organisations, such as cargo companies or air freight agencies, who assume primary responsibility for facilitating, managing or organising the transport of ammunition from the point of dispatch to their final destination. They may use leased or chartered freighter aircraft with hired aircrews. Such agents should obtain the necessary over-flight authorisation for the countries over which the goods will be transported. Detailed flight and routing plans should be charted and overseen to ensure adherence and security.

End-opening containers shall be placed door to door during air shipments. Where possible, containers of non-sensitive items should be placed on either side of side-opening ammunition containers to protect them and deter their opening during transit.

Ammunition should not be shipped on aircraft that do not offer a direct flight to the destination airport in order to reduce the possibility of the ammunition container(s) being offloaded en-route in error or by criminal design. Refuelling stops only may be permitted.

Ammunition should not be shipped using airlines that have been named in previous UN Sanctions Committee monitoring group reports.

²⁶ Strategies for clandestine movement of ammunition may be developed, but guidance on such strategies falls outside the scope of this IATG.

²⁷ As opposed to side opening containers which have doors or protective sheeting along their length.

10.1.4. Sea transport

End-opening containers shall be placed door to door during sea shipments. Containers of non-sensitive items should be placed on either side of side-opening ammunition containers to protect them and deter their opening during transit.

Prior to the voyage the consignor of the ammunition should liaise with the master of the vessel to agree the most appropriate location(s) for ammunition containers on the vessel stow plan.

Ammunition should not be shipped on vessels that do not offer a direct voyage to the destination port in order to reduce the possibility of the ammunition container(s) being offloaded en-route in error or by criminal design.

Ammunition should not be shipped using vessels that have been named in previous UN Sanctions Committee monitoring group reports.

10.2 Documentation

Each transport movement of ammunition should be accompanied by cargo documentation/freight papers. Hand-over/take-over protocols requiring signatures upon receipt should also be in place.

10.3 Emergency procedures

Ammunition and related weapons should always be transported in separate vehicles. Only in exceptional circumstances may they be transported together. In the case of an accident, standardised contingency plans should be at hand that include:

- a) advice for traffic control and safety regulation;
- b) instructions for immediate first aid; and
- c) notification procedures for contacting the appropriate authorities, (including how to gain access to ammunition specialists, Explosive Ordnance Disposal (EOD) support, medical and fire prevention personnel).

Annex A (normative) References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this part of the guideline. 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 guideline 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:

- d) *Convention on International Civil Aviation, Annex 18. The Safe Transport of Dangerous Goods by Air. (Fourth Edition). ICAO. July 2011.* <http://www.imo.org/en/Publications/Pages/Home.aspx>;
- e) *European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR), ECE/TRANS/257 (Vol 1 and II), New York and Geneva. 01 January 2017.* <http://www.unece.org/trans/danger/publi/adr/adr2017/17contentse0.html>;
- f) European Standard EN12320:2001, *Building hardware – Padlocks and padlock fittings – Requirements and test methods*;
- g) IATG 01.50 *UN Explosive Hazard Classification System and Codes*. UN ODA. 2015;
- h) *ICAO Technical Instructions for the Safe Movement of Dangerous Goods by Air. (Doc 9284). ICAO.* <https://www.icao.int/safety/DangerousGoods/Pages/technical-instructions.aspx>;
- i) *International Convention for the Safety of Life at Sea (SOLAS), Chapter VII – Carriage of Dangerous Goods. IMO. 1974 (Entered into force of 25 May 1980)*;
- j) *International Maritime Dangerous Goods (IMDG) Code. (Amendment 38-16). IMO. 2016.* <http://www.imo.org/en/Publications/Pages/Home.aspx>;
- k) *International Ordinance on the Transport of Dangerous Goods by Rail (RID), (Appendix C to the International Agreement on Rail Freight Transport). COTIF. 1 January 2017.* http://otif.org/fileadmin/new/2-Activities/2D-Dangerous-Goods/RID_2017_E.pdf; and
- l) *United Nations Recommendations on the Transport of Dangerous Goods Model Regulations, (Nineteenth revised edition), ST/SG/AC.10/1/Rev.19, New York and Geneva, United Nations, 2015. (Referred to as the UN Model Regulations).* <https://shop.un.org/>.

The latest version/edition of these references should be used. The UN Office for Disarmament Affairs (UNODA) holds copies of all references²⁸ used in this guideline and these can be found at: www.un.org/disarmament/un-safeguard/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.

²⁸ 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 guideline:

- a) *Handbook of Best Practices on Conventional Ammunition*, Chapter 3. Decision 6/08. OSCE. 2008. <http://www.osce.org/fsc/33371>; and
- b) *IATA Dangerous Goods Regulations (DGR)* (58th Edition). 2017. <http://www.iata.org/publications/store/Pages/dgr-print-manuals.aspx>

The latest version/edition of these references should be used. The UN Office for Disarmament Affairs (UNODA) holds copies of all references²⁹ used in this guideline and these can be found at: www.un.org/disarmament/un-safeguard/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: . National authorities, employers and other interested bodies and organisations should obtain copies before commencing conventional ammunition stockpile management programmes.

²⁹ Where copyright permits.

Annex C (informative) Structure of UN Model Regulations ³⁰

Part	Title	Chapter	Title
1	General Provisions, Definitions, Training and Security	1.1	General provisions
		1.2	Definitions and units of measurement
		1.3	Training
		1.4	Security provisions
2	Classification	2.0	Introduction
		2.1	Class 1 – Explosives
3	Dangerous Goods List, Special Provisions and Exceptions	3.1	General
		3.2	Dangerous Goods List (DGL)
		3.3	Special provisions applicable to certain articles or substances
		3.4	Dangerous goods packed in limited quantities
		3.5	Dangerous goods packed in excepted quantities
4	Packing and Tank Provisions	4.1	Use of packagings, including intermediate bulk containers (IBC)
		4.1.5	Special packing provisions for goods of Class 1
5	Consignment Procedures	5.1	General provisions
		5.2	Marking and labelling
		5.3	Placarding and marking of transport units
		5.4	Documentation
6	Requirements for the construction and testing of packagings	6.1	Requirements for the construction and testing of packagings
7	Provisions concerning Transport Operations	7.1	Provisions concerning transport operations by all modes of transport
		7.2	Model provisions
A	Appendix A - List of generic and NOS proper shipping names ³¹		
B	Appendix B - Glossary of Terms		

Table C.1: Structure of UN Model Regulations

³⁰ Only those regulations relating to ammunition and explosives are contained within this structural summary.

³¹ A list of ammunition and explosives has been extracted from this document and is included at Annex C to IATG 01.50 *UN Explosive Hazard Classification System and Codes*.

Annex D Transport of ammunition by road

1. Introduction

Safety and security of ammunition do not end at the Ammunition Storage Area (ASA) gate. An ammunition specialist needs to be aware of all requirements for transportation of ammunition to ensure that the load gets to the intended place and intended user in a manner that is as safe and secure as possible. There will be situations which cannot be avoided - traffic accidents, delays, attacks/fires - but as long as SOPs for transport cover the actions to be taken and the escorting personnel and drivers are trained in these actions, the chances of catastrophe are reduced.

An ammunition specialist should be able to advise on all transport safety and security matters and tell transport operatives how to ensure a successful journey during ammunition movements.

2. Regulations

This module, Transport of ammunition, briefly covers transport of ammunition by road. It mainly tells us where to find more detailed transport instructions.

The United Nations Recommendations on the Transport of Dangerous Goods Model Regulations (colloquially known as the Orange Book or the UN Model Regulations) provide the basic framework for the safe transport of explosives by road, but are designed to be generic to all transport modes and are not specific to road transport. They cover the hazards associated with all dangerous goods, including ammunition and explosives (AE). However, they do not go into practicalities.

The European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) is specifically designed to cover the transport of dangerous goods (including AE) by road. The ADR closely follows the layout, structure, language and requirements of the UN Model Regulations. Although it is a publication for European use, it is often used worldwide as a 'best practice' guide to the road movement of ammunition.

This annex is a series of useful extracts from the Orange Book and ADRs. Nations may have their own transport regulations, but in the same way that IATG offers them a guide to the best way of carrying out ammunition management, this note gives guidance on ammunition safety and security during road transport. As with any IATG, if a nation's own regulations make the ammunition and populace safer and more secure than the guidance here, then they should follow their regulations. If not, they can adapt and adopt the advice here.

3. Explosives safety

AE can be assumed to be SAFE when all the following have been satisfied:

The chemical composition of each explosive item in the munition, submunition or component has been tested and accepted as safe and suitable for service in accordance with current procedures.

They have been classified for storage and transport by the relevant authority.

The time elapsed since manufacture has not exceeded the service life. Some items will come under the category of Safe to Move (for subsequent disposal), but not necessarily Safe to Use in their design.

All removable safety devices are correctly fitted.

Non-removable safety devices are set to safe or other non-live positions, as appropriate to their state of preparation.

They can be seen not to be damaged, corroded, distorted or incorrectly assembled, and are known not to have been involved in an accident/incident or otherwise subjected to excessive heat, friction, or abnormal shock.

They are not subject to 'Restrictions in Use'.

AE are to be regarded as UNSAFE when they do not meet the SAFE conditions, or when their condition is unknown. They are to continue to be regarded as unsafe until such time as a competent person has confirmed their safety.

Normally, only those explosive substances and articles which are listed in the Dangerous Goods List in the Orange Book chapter 3.2 may be accepted for transport. However, competent authorities retain the right to approve transport of explosive substances and articles for special purposes under special conditions. Entries have been included in the list for 'Substances, explosive, not otherwise specified' and 'Articles, explosive, not otherwise specified'. These are for use when no other method of operation is possible. (Orange Book Vol1: ch 2.1).

4. Purpose of Classification of Explosives

Classification is a legal requirement for the transport of explosives. This classification is also used for storage. The classification becomes inapplicable when the explosives item is removed from its authorised packaging. Safety in storage and transportation is based on the assignment of explosives into various Hazard Divisions (HD), further Storage sub-Divisions (SsD) and Compatibility Groups (CG), resulting in a Hazard Classification Code (HCC) (e.g., 1.1 D). The Classification Regulations deal with such matters as:

The standards and marking of packages.

Segregation based on sensitivity and compatibility.

The type of explosive hazard anticipated if the items are involved in a fire or explosion (e.g. probability of mass explosion).

Maximum quantity limits based on the effects of an accidental fire or explosion.

The possibilities of fighting a fire in which the items are involved.

5. Documentation (Orange Book Vol 2: Ch 5.4)

The consignor who offers dangerous goods (i.e. AE) for transport shall provide the carrier with a dangerous goods transport document, either in paper form by electronic data process (EDP) or electronic data information (EDI) technique. The consignor should still produce a paper copy for the carrier. The copy provided to the carrier, whichever method is used, should be signed and completed by the consignor. (Orange Book vol 2: para 5.4.1.1, 5.4.1.2)

The dangerous goods transport document shall contain the following information: (Orange Book Vol 2: para 5.4.1.2)

Name and address of the consignor; (Orange Book Vol 2: para 5.4.1.3)

Name and address of the consignee; (Orange Book Vol 2: para 5.4.1.3)

The date of preparation of the document plus the date it was given to the carrier; (Orange Book Vol 2: para 5.4.1.3)

The following information for each dangerous substance or article for transport: (Orange Book Vol 2: para 5.4.1.4)

The UN Serial Number (UNS), e.g. UNS 0014;

The proper shipping name, including the technical name in parenthesis where applicable; (Orange Book Vol 1: para 3.1.2, 3.1.2.8)

The HCC of each type of ammunition;

Any subsidiary hazard class for subsidiary risks (e.g. radioactive material in some weapon sights).

The NEQ of each separate item by UNS. (Orange Book Vol 2: para 5.4.1.5.1)

In addition, a document will be provided by the consignor to the carrier, in the appropriate language, regarding actions to be taken by the carrier. This shall include (as a minimum): (Orange Book Vol 2: 5.4.1.5.7.2)

Any supplementary requirements for loading, stowage, transport, handling and unloading;

Restrictions on the transport and routeing instructions;

Emergency arrangements appropriate to the consignment.

A certificate or declaration is to be provided by the consignor stating that the consignment is acceptable for transport and the ammunition is packaged, labelled, marked and classified, and is in a proper condition for transport in accordance with the applicable regulations. The text of this certificate shall be:

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packaged, marked and labelled, and are in all respects in proper condition for transport according to applicable international and national government regulations.

This certificate shall be signed and dated by the consignor. (Orange Book Vol 2: 5.4.1.6.1)

All documents should be held by the carrier away from the dangerous load so it is available in case of accident or emergency. (Orange Book Vol 2: para 5.4.3)

The consignor shall retain a copy of all documents for at least 3 months. (Orange Book Vol2: 5.4.4.1)

6. Control of AE movements

To ensure the safety of AE stocks and personnel, all AE movements are to be conducted according to the rules. (ADR 7.5.11)

AE are to be transported in accordance with the manufacturers' instructions and specifications.

When orientation arrows are required, packages and overpacks shall be orientated in accordance with such marks. (ADR 7.5.1.5)

Measures must be taken to ensure the security of AE (e.g. tarpaulin, secured to the vehicle using fibre straps, clearing of inflammable materials from vehicle, etc.). (ADR 7.5.7.1)

The security of the AE must be assured. Someone must always remain with the vehicle carrying the AE when in an unsecured area. (ADR Vol 2 8.4.1)

Safety is paramount. Ensure that vehicles are loaded according to all rules and properly accounted for and secured to the vehicle. (ADR 7.5.11)

Where substances and articles of different divisions of class 1 are loaded on one transport unit, the load as a whole shall be treated as if it belonged to the most dangerous division (in the order 1.1, 1.5, 1.2, 1.3, 1.6, 1.4). The net mass of explosives of CG 'S' shall not count towards the limitation of quantities carried. (ADR 7.5.5.2.2)

Where substances classified as 1.5D are carried on one transport unit with those in HD 1.2, the entire load shall be treated for carriage as HD 1.1. (ADR 7.5.5.2.2)

CG mixing rules for transport by road must be adhered to. They are different than those for storage (see table below, Orange Book vol2: 7.1.3.1.2 and ADR 2019 vol 2 para 7.5.2.2).

Articles of CGs D and E may be fitted or packed together with their own means of initiation provided that such means have at least two effective protective features designed to prevent an explosion in the event of accidental functioning of the means of initiation. Such articles and packages shall be assigned to CGs D or E. (Orange Book Vol 1: para 2.1.2.1.1 note 1)

Articles of CGs D and E may be packed together with their own means of initiation, which do not have two effective protective features when, in the opinion of the competent authority of the country of origin, the accidental functioning of the means of initiation does not cause the explosion of an article under normal conditions of transport. Such packages shall be assigned to CGs D or E. (Orange Book Vol1: para 2.1.2.1.1 note 2)

When AE is moved by road it should be in convoy, whether with other vehicles carrying ammunition or with escort vehicles. A minimum distance of 50m should be observed between each transport unit. (ADR 2019 vol 2 para 8.5 S1 (5))

Generally, AE should not be transported at night. If vehicles must stop for the night and the AE stay on the vehicle, the vehicle shall be placed under continuous guard. (ADR 2019 vol 2 para 8.5 S1 (6))

7. CG mixing rules for explosives transported by road

CG	A	B	C	D	E	F	G	H	J	L	N	S
A	X											
B		X		a								X
C			X	X	X		X				bc	X
D		a	X	X	X		X				bc	X
E			X	X	X		X				bc	X
F						X						X
G			X	X	X		X					X
H								X				X
J									X			X
L										d		
N			bc	bc	bc						b	X
S		X	X	X	X	X	X	X	X		X	X

Above table: Compatibility Group mixing rules for transport of AE (taken from ADR 2019 vol 2 para 7.5.2.2) by road.

Key to CG mixing in transport (above) (taken from ADR 2019 vol 2 para 7.5.2.2)

X Mixed loading permitted

a Packages containing articles of CG 'B' and those containing articles or substances of CG 'D' may be loaded together provided they are effectively segregated such that there is no danger of transmission of detonation from the articles of CG 'B' to the articles or substances of CG 'D'.

b Different types of articles of HCC '1.6N' may be carried together as '1.6N' only when it is proven by testing or analogy that there is no additional hazard of sympathetic detonation between the articles. Otherwise, they should be treated as HD '1.1'.

c When articles of CG 'N' are carried with articles or substances of CG 'C', 'D' or 'E', the articles of CG 'N' should be considered as having the characteristics of CG 'D'.

d Packages containing substances or articles of CG 'L' may be loaded together on one vehicle or in one container with packages containing the same types of substances or articles of CG 'L'.

Note: Definitions and explanations of compatibility groups are in the Orange Book Vol 1: para 2.1.2.1.1, ADR Vol 1 2.2.1.1.6) and in IATG 01.50 para 6.2).

8. Training (see Orange Book Vol1: Chapters 1.3 and 1.4.2) and (ADR 2019 vol2 8.2.1&2)

All personnel involved at any stage during the movement of AE must be fully trained in their responsibilities. They shall only carry out those tasks they have been trained in, under supervision at first, then alone, once the supervisor is satisfied they are efficient.

All shall be familiar with the general requirements of the regulations for the carriage of dangerous goods (AE). They will be trained in the hazards related to AE. They will be trained in safe handling techniques and in the emergency actions to be carried out in the case of an accident or incident.

Initial training must be followed up with annual refresher training. This may be general or, if a particular incident has occurred due to incorrect procedures, the correct way to carry out those procedures must be reinforced.

The unit or organisation which oversees the AE management and transportation must keep records of when and where all training has been carried out, together with a list of names and whether the person passed or failed the training where applicable.

9. Movements

When AE is moved by road in convoy, a minimum of 50m distance must be left between vehicles. In built up areas and where speed is restricted, this can be adjusted to fit the circumstances. On all occasions, someone must always remain with the vehicle carrying the AE. (ADR Vol2 8.5.S1(5))

Vehicles carrying AE will have a means of communication with their HQ. Vehicles carrying electric detonators are not to use radios except in an emergency.

10. Vehicle requirements

It is accepted that, in some parts of the world, getting ideal vehicles will prove impossible. That said, the best, safest vehicles available should always be used for transporting AE. (Orange Book Vol2:7.1.3.3.1 and ADR 7.5.1.2)

Vehicles carrying AE shall be serviceable, have a spare wheel and a wheel changing kit. (ADR 9.1.2)

All vehicles carrying AE shall comply with the requirements of ADR 9.2.

Vehicles used for the transportation of AE shall be suitable for the load to be carried and the road conditions on which the vehicle is to travel. (ADR 9.1.2)

Vehicles with trailers can be used if the trailer has a braking system which is operated automatically should the trailer become loose from the vehicle. (ADR 9.1.2)

11. Equipment

Vehicles carrying AE, including to and from the ASA, shall carry the following equipment: (ADR Vol 2 8.1.5.2)

Personal protective and prevention equipment in order to carry out general actions and protect against hazards in specific emergency situations. This must include protective gloves and goggles.

A high visibility vest for each person.

A contraband container for storing smoking materials, matches, lighters, cigarettes etc. This is to be under control of the convoy commander.

Eye rinsing liquid.

A wheel chock of a size suited to the maximum mass of the vehicle and to the diameter of the wheel.

Two sealed beam hand torches with a constant light which can be seen at 150m distance.

Two self-standing red warning triangles for marking stationary vehicles on the road.

Two red warning flags.

A shovel and pickaxe.

When the security situation allows, the internationally recognised 'explosives' symbol and explosive hazard division will be displayed on both sides and the rear of the vehicle for the highest risk HCC. This does not apply to consignments of 1.4S only. (Orange Book Vol 2: 5.3.1.1.2 ADR 5.3.1.1.2, 5.3.1.5.1)

12. Driver requirements

Some parts of the world may have different driving regulations, for instance, the age that people can drive heavy goods vehicles with dangerous cargoes may be less than 22. This may be the case, but it is not an excuse to lower other standards, such as training.

Vehicles transporting AE shall have a co-driver.

Drivers and co-drivers of vehicles carrying AE shall be trained in the handling and transport of AE, in particular those methods relating to the particular AE being carried. Both shall hold a certificate issued by a competent authority stating they have been on a training course and passed an examination on the particular requirements that have to be met during the carriage of dangerous goods. (ADR Vol 2 8.2.1.1)

Drivers and co-drivers shall be in good health before starting out on a journey with AE.

Both the driver and co-driver shall be the national minimum legal age and have the appropriate driving license for the class of vehicle they will be driving.

Both shall be briefed about the type of AE carried and the hazards associated with them. (ADR Vol 2 8.2.2.3.4)

They shall be briefed on the security situation (where appropriate) in the area of travel and actions to be taken in event of problems. (ADR Vol 2 8.3.2)

NO passengers are allowed to be carried (other than the co-driver). (ADR Vol 2 8.3.1)

13. AE packaging

AE is given an HCC in its authorised packaged state. It may react differently when not in this packaging. Always bear this in mind when deciding what to transport on each vehicle.

AE will ALWAYS be carried in packages, except for large bulk items, e.g. large artillery shell.

Use the original boxes where possible. If this is impossible, use a similar box and ensure all AE is tightly packed inside it. This method of packaging ammunition shall only be used when the alternative is to leave the AE in a place where it may be taken illegally.

14. Markings

The package/box should be marked with a MINIMUM of:

The word 'EXPLOSIVES'.

The contents of the box (type of ammunition).

The hazard classification code (HCC).

UN Serial number and proper shipping name. (Orange Book Vol1; para 2.0.2.2, ADR 5.2.1.5, 5.2.2.1)

The weight or quantity of items in the box.

The box shall be accompanied by a printed instruction sheet giving details of storage, handling and disposal requirements for the contents.

15. Fire safety

Prevention is better than cure.

A serviceable CO2 fire extinguisher will be carried in the cab. To balance effectiveness (capacity) against ease of extraction and use, a 10kg extinguisher is recommended. (ADR Vol 2.8)

Smoking is not permitted in the vehicle or within 30m of the vehicle. (ADR 7.5.9)

Fuel shall not be carried anywhere other than in the fuel tank.

No fire-making materials, matches, lighters or similar shall be carried in AE carrying vehicles.

Vehicles transporting AE shall be fitted with a grounding strap to permit the release of any build-up of static electricity.

16. Loading and unloading AE

As well as ensuring the safety of the AE during transportation, they must be secured. Check the contents of a vehicle before it begins its journey and at the end of its journey. If the vehicle must stop for any reason, check the contents at the stop and before beginning the journey again. Report any discrepancies to HQ immediately.

AE should, where possible, be transported on a separate vehicle from any other goods.

Where this is NOT possible, AE and general cargo (NOT dangerous cargo) will be secured to ensure no movement from either load. Exceptions to this rule are if the AE is 1.4S and if safety devices, pyrotechnic in 1.4G are mixed with safety devices, electrically initiated in class 9. (ADR 7.5.2.1, 7.5.7.1)

AE are to be evenly spread across the vehicle load area and are not to be stacked above the side and tail boards.

AE should be prevented from moving by use of chocks and battens.

If on an open lorry, the AE should be covered by a secured tarpaulin or similar waterproof cover. (ADR 7.5.7.1)

When detonators are being carried, they must be in an approved metal or wooden box.

Ideally detonators should be carried on their own vehicle. If not, they should be carried in the cab, well away from the other AE.

Except in an emergency, only load or unload AE at a recognised ammunition site.

Where possible, only load/unload during daylight.

The engine of the carrying vehicle shall be shut off during loading/unloading, unless the engine has to be used to drive any equipment connected with loading/unloading. (ADR Vol 2 8.3.6)

Use the CG mixing rules for transport (see table Compatibility Group mixing rules for transport of AE (taken from ADR 2019 vol 2 para 7.5.2.2)).

For maximum loads by NEQ for different types of vehicle and different HDs, see table below (total NEQ in kg, all HDs added and considered as worst case except for CG S). (ADR 7.5.5.2.1)

Transport Unit	HD	1.1		1.2	1.3	1.4		1.5 & 1.6	FFE packages
	CG	1.1A	Other 1.1			Other 1.4	1.4S		
EX/II ^a		6.25	1 000	3 000	5 000	15 000	Capacity	5 000	Capacity
EX/III ^b		18.75	16 000	16 000	16 000	16 000	Capacity	16 000	Capacity

- Note: ^a EX/II unit is a vehicle designed to carry AE with a flat bed.
^b EX/III unit is a vehicle designed to carry AE in a tank.

17. Safe driving

The speed of vehicles carrying AE shall not exceed 90 km/h. A speed limiting device should be fitted to vehicles over 3.5 tonnes. Maximum speeds should be adjusted dependent on the state of the roads being travelled on. (ADR Vol 2 9.2.5)

Drivers of vehicles carrying AE shall avoid rapid acceleration or, where possible, sudden braking.

18. Actions on breakdown/accident (Orange Book Vol 2: 7.1.9 & 7.2.4)

Extinguish any fires and disconnect the vehicle battery.

Use the wheel chock to immobilise the vehicle (in case the brake cables burn through).

Secure the scene using red triangles and warning flags.

Ensure safety and security of the AE by whatever means are necessary.

Contact nearest police or military, tell them you are carrying AE and request assistance.

Report the accident to your HQ, your departure point and your destination. Stop people approaching the vehicles. Await assistance.

If a broken-down vehicle needs repairing, unload all AE first.

Move broken down vehicle onto the side of the road.

If an uncontrollable fire breaks out, evacuate and secure an area 500m around the vehicle. Use local help to secure the area and warn others away.

A broken-down vehicle may be towed, but only to a nearby repair facility. Speed is not to exceed 40kph.

19. Summary

Remember – an ammunition specialist's responsibility for the safety and security of the AE does not stop at the ASA gate. As the expert, it is your job to ensure that when others transport AE away from the ASA, they do it correctly. Although accidents are impossible to avoid, by following the basic rules in this note, many accidents are preventable and, if an accident does occur, further damage can be minimised.

