



Good Practice Guide

Transport of UN 3507

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01

Introduction

Samples of uranium hexafluoride (UF₆) in excepted packages transported under the UN number UN 3507 are classified in Class 6.1, with subsidiary risks of Class 8 and Class 7.

The scope of this good practice guide is to facilitate the understanding of the regulations associated with the transport of UF₆ under this specific UN number and to harmonise the implementation of the rules.

02

Regulations for Reference

This guide is based on the 62nd Edition of the International Air Transport Association IATA Dangerous Goods Regulations (DGR) manual, applicable as from 1st January 2021, and on the 2019-2020 edition of the Technical Instructions for the Safe Transport of Dangerous Goods by Air (TI) of the International Civil Aviation Organization (ICAO). These documents will be referred to as IATA-DGR and ICAO-TI in this guide. When paragraph references are indicated, the one within brackets is that of ICAO-TI, the other one is that of IATA-DGR.

This good practice guide has been developed with the support of the IATA.

This guide also includes in Appendix 2 specificities relative to the implementation of the European Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR) – 2021 Edition and in Appendix 3 specificities relative to the implementation of the IMDG-Code 2020.

03

Packing Instructions, Marking and Labelling, Limitations

UF₆ samples shipped under UN 3507 shall be classified in conformance with 10.3.11.1.5 (IMDG 2;7.2.4.1.1.5 and ADR 2;2.7.2.4.1.1(e)), packed in accordance with packing instruction 603 and special provisions A139 and A194, including references contained within.

Important points of the regulations are listed in Appendix 1.

Many good practices of packaging and transporting UF₆ samples exist. Below is one example of a packaging process for P10 tubes and the related labelling process.

a. Each P10 tube (primary inner receptacle) is to be wrapped individually or packed separately in a way so as to prevent contact with other P10 tubes. This is the case when multiple P10 tubes are placed in a secondary packaging (pot, bottle ...). A good practice would be to report the identification number of the P10 on the wrapping material.



P10 tube

b. The wrapped P10 tubes are to be placed into a leakproof and rigid secondary packaging (pot, bottle...) in a way that under normal conditions of transport, they cannot break, be punctured or leak their contents into the secondary packaging (pot, bottle...).

c. If shipping to or within a European Union (EU) Member State, the GHS (Globally Harmonized System of Classification and Labelling of Chemicals) markings should be attached to the secondary packaging (pot, bottle, ...) according to European Regulation (EC) No 1272/2008 (European Regulation (EC) No 1272/2008 on classification, labelling and packaging of substances and mixtures came into force on 20 January 2009 in all EU Member States, including the UK. It is known by its abbreviated form, 'the CLP Regulation' or just plain 'CLP').



Plastic pot (inner packaging for liquid dangerous goods in combination packaging) with large opening as secondary packaging with GHS markings



Wrapped P10 in the plastic pot before closing of the pot



Another example of possible secondary packaging: plastic bottle UN 1H1 for liquid dangerous goods with large opening

d. The secondary packaging (pot, bottle...) must be placed into an outer packaging (fibreboard box, steel drum...) with suitable cushioning material to prevent movement. If multiple secondary packagings are placed in a single outer packaging, they must be either individually wrapped or separated so as to prevent contact between them.

e. Before sealing the outer packaging (fibreboard box in these examples) with tamper proof sealing place a "Radioactive" mark on top of the cushioning material or on the closure of the secondary packagings. The mark should be immediately visible on opening of the outer packaging (fibreboard box, steel drum...).

RADIOACTIVE



Fibreboard box UN 4GV/X4/S as outer packaging



Bottle UN 1H1/Y1.3/150 as secondary packaging



Secondary packaging wrapped in the outer packaging with the mark "RADIOACTIVE"



2 secondary packagings wrapped in a UN 4GV/X fibreboard box as outer packaging with the mark "RADIOACTIVE"



4 secondary packagings wrapped in a UN 1A2/X steel drum

- For the marking and labelling requirements associated with “UN3507 URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE” the requirements for Class 6.1 apply according to Special Provision A194 (IATA-DGR 4.4).
- Apply the markings: UN number, proper shipping name, name and address of shipper and consignee and net quantity

N.B.: Although the indication of net quantity is only mandatory when IATA-DGR is applicable, it is recommended to mark it on the package at all times.

- Hazard Label Specification – Class 6.1 – Toxic and Class 8 – Corrosive, a Class 7 hazard label is not required, see Special Provision A194.
- Marking of UN specification outer packaging (fibreboard box) including the complete code of the package.

f. Mark and label the outer packaging (fibreboard box or steel drum) as described below:



Label No 6.1

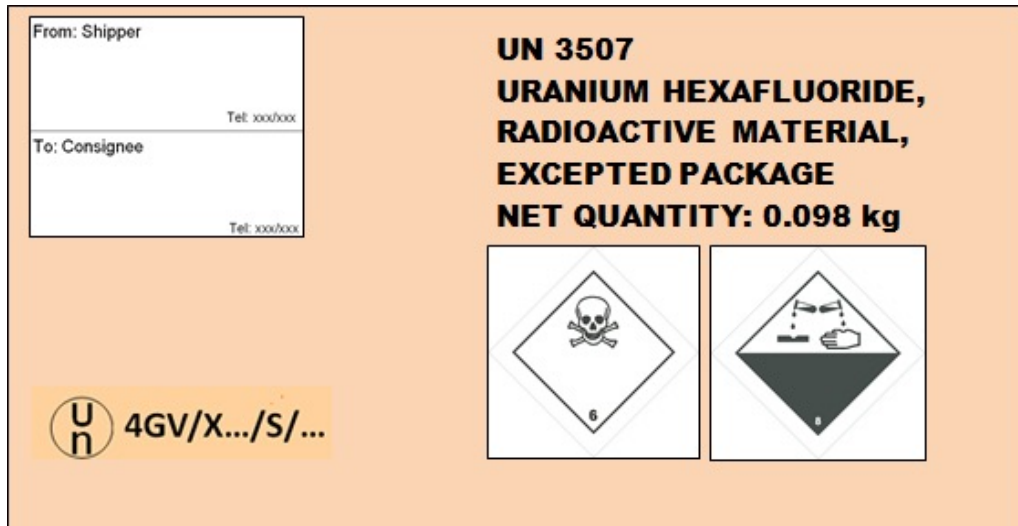


Label No 8



Cargo Aircraft Only Label (only when required by a specific Country or Airline)

1st example of marking and labelling on a package having a large side (UN number, proper shipping name and labels shall be gathered on a same surface of the package, labels are oriented square-on-point).



2nd example of marking and labelling on a small package (UN number, proper shipping name and labels shall be gathered on a same surface of the package, and in the case the size of the package does

not allow orienting the labels square-on-point, labels may be laid horizontally, rotated by 45 °, as allowed in 7.2.6.2.5).



Sides 1 and 2



Sides 3 and 4

The orientation arrows as can be seen above are not required, however combination packages which do have these arrows pre-printed may be used.

04

Transport Documents

The requirements for the transport document are described in Section 8 of the IATA-DGR (chapter 4 of Part 5 in ICAO-TI). The shipment type shall be “NON-RADIOACTIVE” as per para. 8.1.6.8. Paragraph 10.8.8.3 (5;1.2.4.2) exempts Class 7 excepted packages from the shipper’s declaration, therefore the requirements for completion of the shipper’s declaration are

only those stated in Section 8 (as per 10.8.8.3.4) (requirement of 5;4.1 except those required for radioactive material in 5;4.1.5.7).

See further an example of the shipper’s declaration for dangerous goods.

SHIPPER'S DECLARATION FOR DANGEROUS GOODS						
Shipper Who ever Company Where ever street 21 Somewhere in the World XYZ			Air Waybill No. Page 1 of 1 Pages Shipper's Reference Number <i>(optional)</i>			
Consignee Who ever Ltd Where ever road 75 Somewhere in the World ZYX			<i>For optional use for Company logo name and address</i>			
<i>Two completed and signed copies of this Declaration must be handed to the operator.</i>			WARNING Failure to comply in all respects with the applicable Dangerous Goods Regulations may be in breach of the applicable law, subject to legal penalties.			
TRANSPORT DETAILS This shipment is within the limitations prescribed for: <i>(delete non-applicable)</i>						
<input type="checkbox"/> PASSENGER AND CARGO AIRCRAFT		<input checked="" type="checkbox"/> CARGO AIRCRAFT		Airport of Departure: ABC		
Airport of Destination: BCA				Shipment type: <i>(delete non-applicable)</i> <input checked="" type="checkbox"/> NON-RADIOACTIVE <input type="checkbox"/> RADIOACTIVE		
NATURE AND QUANTITY OF DANGEROUS GOODS						
Dangerous Goods Identification						
UN or ID No.	Proper Shipping Name	Class or Division (Subsidiary Risk)	Packing Group	Quantity and type of packing	Packing Inst.	Authorization
UN3507	URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE	6.1 (7,8)	I	1 fibreboard box x 0.098 kg	603	
Additional Handling Information 24-hour-phone-number...						
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/placarded, and are in all respects in proper condition for transport according to applicable international and national governmental regulations. I declare that all of the applicable air transport requirements have been met.				Name/Title of Signatory Max Mustermann Place and Date Somewhere, 1st January 2017 Signature <i>Max Mustermann</i> <i>(see warning above)</i>		

N.B.: The same shipper’s declaration can also be used for other modes of transport with additional information to be provided (Tunnel Restriction Code (D) and the statement “carriage in accordance with 1.1.4.2.1” when the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) applies).

05

Transport Documents

There is no specific limit on the number of packages or consignments per aircraft as the radioactive properties are classified as an excepted package, and exclusive use shipment is not required.

07

State and Operator Variations

State and Operator variations need to be checked against toxic, radioactive and corrosive properties.

06

Checklist

An acceptance checklist (non-radioactive) must be performed prior to acceptance (check list provided by IATA : <https://www.iata.org/dgr-updates>)

The per package net quantity limit is indicated in Packing Instruction 603;

The Class 7 hazard label is not required (SP A194)

The radioactive material, excepted package label is not required (10.7.4.4.3.1, Note)

Appendix 1

Specific detailed requirements for carriage by air (IATA)

- Special provision “A139 (317) “Fissile-excepted” applies only to those packages complying with 10.3.7.2”.
- Mass of UF₆ shall be less than 100g per package (see 10.3.11.5 (a) and 10.3.11.5.2 (a)),
- Mass of U-235 shall not exceed (for enrichments in U-235 higher than 1%):
 - 3.5 g per package and 45 g per consignment in case of uranium with a maximum enrichment of 5% by mass of U-235 (see 10.3.7.2.3);
 - 2 g per package and 15 g per consignment in other cases (see 10.3.7.2.4);
 - 15 g per package for transport within the US or 3.5 g per package for transport to or from the USA (consequence of USG-1 variation, fissile-excepted material shall comply with the provisions specified in 49 CFR §173.453).
- UF₆ shall be contained in one or several metal or plastic primary inner receptacles that comply to 10.3.11.5.2.(b) and (c) (ullage of at least 5% at maximum temperature specified for the plant system, UF₆ in solid form and pressure not above atmospheric pressure when presented for transport) and which should be able to be withstand ambient conditions of 55°C and atmospheric pressure at sea level without loss of UF₆;
- Evidence of the compatibility between material of the primary receptacle and UF₆ shall be made available to the competent authority on request (see 5.0.2.6).
- The combination packaging used (outer packaging with secondary packagings) shall be of a type design as allowed in the packing instruction 603, successfully tested for solid or liquid Packing Group I dangerous goods, marked as required in 6.0.4;
- The primary inner receptacle (P10 tubes for example), the outer packaging, or the secondary packaging, shall be capable of withstanding a pressure differential of not less than the the maximum normal operating pressure (MNOP) + 95kPa without loss or dispersal of radioactive content taking account of the maximum ambient temperature of 55°C (see 10.6.1.3) (MNOP should at least correspond to the increase of inner pressure due to increase of temperature of the package between the ambient temperature at which the package has been prepared and closed and 55°C);
- The packer shall be in possession of the manufacturer information of the outer and inner packagings regarding procedures to be followed (see 6.0.1.4) and shall conform to them when preparing the consignment;
- Primary (outer surface), secondary (outer and inner surfaces) and outer packaging (outer and inner surfaces) shall be free from non-fixed contamination (definition in Appendix A of IATA-DGR);
- The primary inner receptacles shall be packed in secondary packagings in a way that, under normal conditions of transport, they cannot break, be punctured or leak their content into secondary packagings (see PI 603);

- The secondary packagings shall be properly secured in the outer packaging with suitable cushioning material (see PI 603);
 - Before closing the outer package, the marking “RADIOACTIVE” shall be placed in a manner that it will be visible at opening of the outer packaging (see 10.3.11.1.5 (d));
 - Radiation level at any point on the external surface of the package shall not exceed 5 µSv/h (see 10.3.11.1.1.2. and IMDG 2.7.2.4.1.2).
 - UN number, proper shipping name, net quantity of UF₆ content and the labels of Class 6.1 and Class 8, shall be placed next to each other on the same surface of the package, (see 7.1.4.1);
 - “Radioactive Material – Excepted Package” label shall not be used for UN3507 see 7.2.4.6);
 - Full name and address of the shipper and consignee, shall be placed on the same surface of UN number and proper shipping name if the package dimensions are adequate (see 7.1.4.1 and 7.2.6.2);
 - Markings and labels added at the time of shipment shall not obliterate packaging marks required in 6.0.4 (see 7.1.3.1 and 7.2.6.1 a)).
 - Other irrelevant marking and labels already on the package shall be removed or obliterated (see 7.1.1 (b) and 7.2.1)
 - Package marking character size and label design shall conform to 7.1.4.4 and 7.2.2.3 respectively.
 - Language for markings shall be English in addition to the language that may be required by the state of origin (see 7.1.3.3 and 7.2.6.2.3).
 - See Package Labelling Example in Figure 7.2.A of IATA-DGR.
 - Size of labels are specified in 7.1.4.4.
-

Appendix 2

Specific detailed requirements when carried by road in European countries (ADR).

When road carriage in EU Countries and/or between ADR Contracting Parties is part of a transport chain including air carriage (see ADR 1.1.4.2.1):

- The packaging, labelling, marking and documentation shall conform to the ICAO-TI (or IATA-DGR) if they don't conform to ADR;
 - When a IATA document is used as the ADR transport document, the sentence "**Carriage in accordance with 1.1.4.2.1**" shall be added to the IATA-DGD as specified in 5.4.1.1.7 of ADR, and the tunnel restriction code "**(D)**" shall be added at the end of the information required in 8.1.6.9.1 of IATA-DGR (Identification Sequence in accordance with 8.1.2.2.1 of IATA-DGR). As an alternative, when a separate road transport document according to ADR (for example an CMR consignment note) is used this information can be put in this document, without need to include it in the IATA-DGD.
 - UN3507 is assigned to transport category 1 for the purposes of exemption related to quantities carried per transport unit, and as such, up to 20 kg of UF₆ per transport unit (more than 200 packages) may benefit from all the exemptions listed in 1.1.3.6.2 of the ADR.
- When carriage is only performed by road in EU Countries and/or between ADR Contracting Parties:
- The packaging, labelling, marking and documentation shall conform to the ADR;
 - Package design: in comparison to what is required for a package transported by air, the only difference is that the package is not required be capable of withstanding a pressure differential of 95kPa + MNOP;
 - Labelling: in comparison to what is required for a package transported by air, the only difference is that "cargo only" label and "Radioactive Material - Excepted Package" labels do not exist in ADR;
 - Marking: in comparison to what is required for a package transported by air: the proper shipping name is not required to be marked on the package, both names and addresses of the shipper and consignee are not required, only the consignee or the shipper is sufficient (see ADR 5.2.1.7.1);
 - Transport document: the transport document shall contain the information required in 5.4.1.1.1 of ADR; with the addition, in case of fissile excepted, the ADR paragraph number of the exception, the mass of U-235 in grams per package and the total mass of U-235 in the consignment (example: "fissile excepted 2.2.7.2.3.5 c), 3.4g U-235/package, 17g U-235 in total")
 - UN3507 is assigned to transport category 1 for the purposes of exemption related to quantities carried per transport unit, and as such, up to 20 kg of UF₆ per transport unit (more than 200 packages) may benefit from all the exemptions listed in 1.1.3.6.2 of the ADR.
 - In case of fissile-excepted following 2.2.7.2.3.5 c) or 2.2.7.2.3.5 d) of the ADR, due to the consignment limits assigned in 7.5.11 CV33 (4.3) c) or 7.5.11 CV33 (4.3) d) of the ADR, it is recommended to not carry UN3507 packages of one consignment together with packages containing fissile material in the same container;

Appendix 3

Specific detailed requirements when carried by sea (IMDG-Code).

When carriage is performed by sea:

- The packaging, labelling, marking and documentation shall conform to the IMDG Code;
- Package design: in comparison to what is required for a package transported by air, the only difference is that the package is not required be capable of withstanding a pressure differential of 95kPa + MNOP;
- Labelling: in comparison to what is required for a package transported by air, the only difference is that “cargo only” label does not exist in IMDG-Code;
- Marking: in comparison to what is required for a package transported by air: both names and addresses of the shipper and consignee are not required, only the consignee or the shipper is enough (see IATA-DGR 7.1.4.1 and 7.2.6.2);
- Transport document: the transport document shall contain the information required in 5.4.1.1.1 of IMDG Code; with the addition, in case of fissile excepted, the IMDG Code paragraph number of the exception, the mass of U-235 in gramms per package and the total mass of U-235 in the consignment (example: “fissile excepted 2.7.2.3.5.3, 3.4g U-235/package, 17g U-235 in total”)-
- UN3507 shall be segregated from other dangerous goods as specified for class 8; however, in relation to class 7, no segregation needs to be applied (see SG 77 in Part 7 of IMDG-Code)
- Stowage category A (on deck or under deck for cargo ships and all passenger ships);
- In case of fissile-excepted following 2.7.2.3.5.3 or

2.7.2.3.5.4 of IMDG Code, due to the consignment limits assigned in 5.1.5.5.3 or 5.1.5.5.4 of the IMDG Code, it is recommended to not carry UN3507 packages of one consignment together with packages containing fissile material in the same container or road vehicle;

When road or rail carriage in EU Countries and/or between ADR or RID Contracting Parties is part of a transport chain including sea carriage (see ADR or RID 1.1.4.2.1):

- The packaging, labelling, marking and documentation shall conform to the IMDG Code if they don't conform to ADR or the RID;
- When an IMDG Code document is used as the ADR transport document, the sentence “**Carriage in accordance with 1.1.4.2.1**” shall be added to the IMDG Code's DGD as specified in 5.4.1.1.7 of ADR, and the tunnel restriction code “**(D)**” shall be added at the end of the Sequence of dangerous goods description as allowed in 5.4.1.4.2 of IMDG Code. As an alternative, when a separate road transport document according to ADR (for example an CMR consignment note) is used this information can be put in this document, without need to include it in the IMDG Code's DGD.
- UN3507 is assigned to transport category 1 for the purposes of exemption related to quantities carried per transport unit, and as such, up to 20 kg of UF₆ per transport unit (more than 200 packages) may benefit from all the exemptions listed in 1.1.3.6.2 of the ADR.
- Placarding: freight container carrying UN3507 shall be placarded with Class 6 and Class 8 in accordance with 5.3.1.1.4.1 of the IMDG Code. The Class 7 placard is not required for UN3507 due to the exception for excepted packages in 5.3.1.1.5.1 of IMDG Code.
- UN Number: freight container carrying UN3507 is not required to be displayed with this UN number on the freight container, as long as the exclusive use shipment is not required or the 4000 kg gross mass of packaged UF₆ under UN3507 is not reached or exceeded.

Substance: URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, less than 0.1 kg per package, non-fissile or fissile-excepted		
(1) UN No: 3507	(2) PSN: URANIUM HEXAFLUORIDE, RADIOACTIVE MATERIAL, EXCEPTED PACKAGE, less than 0.1 kg per package, non-fissile or fissile-excepted	
(3) Class: 6.1	(4) Subsidiary Hazards: 7 8	(5) Packing Group: I
(6) Special Provisions: 317 369	(7a) Limited Quantities: 0	(7b) Excepted Quantities: E0
Flashpoint:		(15) Emergency Schedule: F-I, S-S
Instructions		Provisions
Packing	(8) P603	(9) _
IBCs	(10) _	(11) _
Tanks	(13) _	(14) _
(16a) Stowage and Handling		(16b) Segregation
Category A, SW12		SG77
(17) Properties and Observations		
See 1.5.1.		
Labels/Marks/Signs: For further information on the use of labels, marks and signs, see part 5 of the IMDG Code.		



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