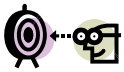
Introduction to the Technical Instructions

Objectives



- Describe the applicability and the layout of the ICAO Technical Instructions
- Define "Dangerous Goods"
- Describe 9 hazard classes
- Determine proper shipping name
- Identify difference between " package" and "packaging"

ICAO Technical Instructions for the Safe Transport of dangerous Goods by Air

"The Technical Instructions"

"The T.I."

ICAO TI Applicability

Applies to international civil air transport of dangerous goods:

- Offering
- Accepting
- Transporting

ICAO TI 1; 1.2

ICAO TI vs. IATA DGR

ICAO Technical Instructions
- Adopted as law by countries
- Enforceable by governments
- Published biennially

IATA Dangerous Goods Regulations
- Adopted as policy by airlines
- Not enforceable by governments
- Published annually
- Based on ICAO TI—sometimes more restrictive but should not be less

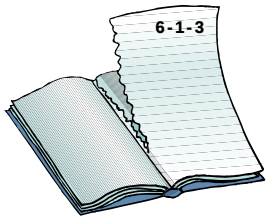
How To Use The ICAO TI

- Page Format
- Paragraph format
- Table of Contents
- Index
- Definitions

Also see ICAO TI Foreword, p. iv & v

Page Format

- Part
- Chapter
- Page (within that chapter)



6 – 1 – 3

Part 6 **Chapter 1** **Page 3**

Paragraph Format

- Part 5
- Chapter 3
- Paragraph 3.2
- Sub-paragraph 3.2.7.a

(On page 5-3-1)

3.2 APPLICATION OF LABELS

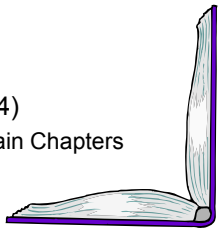
3.2.7 Each label must:

a) Be affixed to a background of contrasting colour….

Citation: 5; 3.2.7.a

ICAO TI Contents

- Foreword p. iii
- Table of Contents p. vii
- Parts 1-8
  - Parts contain Chapters
- Attachments 1-4 (A1-A4)
  - Some Attachments contain Chapters
  - **A4 is the Index**



Definitions

Found in:

- Part 1
- Chapter 3
- Paragraph 3.1.1

(1;3.1.1 or Page 1-3-1)

Followed by conversion tables

What are dangerous goods?

"Articles or substances which are capable of posing a risk to health, safety, property or the environment and which are shown in the list of dangerous goods in these Instructions or which are classified according to these instructions."

—ICAO TI 1; 3.1.1

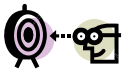
Lesson Review

After completing this lesson you should be able to:

- Describe the applicability and the layout of the ICAO Technical Instructions for the Safe Transport of Dangerous Goods
- Define "Dangerous Goods"

Classification

Objectives



- **Describe the nine hazard classes of dangerous goods and their divisions**
- **Describe the physical properties of each hazard class/div and give examples**
- **Identify packing groups**
- **Determine the hazard class, subsidiary risk, and packing group of a given material**

Classification

To aid in determining when something is an item of dangerous goods for transportation, the UN classifies material into nine different hazard classes.

Each of these hazard classes has its own technical and scientific criteria.

Classes

There are nine classes of dangerous goods. Some classes are further divided into divisions.

1 - Explosives

2 - Gases

3 - Flammable Liquids

4 - Flammable Solids

5 - Oxidizing Substances & Organic Peroxides

6 - Toxic & Infectious Substances

7 - Radioactive Material

8 - Corrosives

9 - Miscellaneous

ICAO TI Part 2; Intro Chapter, 2.1

Packing Groups

Packing Group I
High Danger

Packing Group II
Medium Danger

Packing Group III
Low Danger

ICAO TI Part 2; Intro Chapter, 2.4

Class1
Explosives

Examples:

- Dynamite
- Detonators
- Fireworks / firecrackers
- Ammunition

Six Divisions: 1.1, 1.2, 1.3, 1.4, 1.5, 1.6

ICAO TI Part 2, Chap 1

Class 2
Gases

Examples:

- Propane
- Aerosols
- Compressed air

Three Divisions:

2.1- Flammable Gases

2.2 - Nonflammable, Non-Toxic Gases

2.3 - Toxic (Poison) Gases

ICAO TI Part 2, Chap 2

Class 3
Flammable Liquids

Examples:

- Gasoline
- Camping fuel
- Ethanol, Methanol, Isopropanol
- Acetone
- Paint thinner

Also includes desensitized explosives that are liquids

ICAO TI Part 2, Chap 3

Class 3 Packing Groups

Packing Group	Flash Point	Initial Boiling Point
PG I	--	≤ 35°C
PG II	< 23 °C	> 35 °C
PG III	≥ 23 °C ≤ 60°C	> 35 °C

ICAO TI 2;3.2

Example A

Table 2-4. Packing group based on flammability

Packing group	*Flash point (closed-up)*	*Initial boiling point*
I	—	≤ 35°C
II	< 23°C	> 35°C
III	≥ 23°C ≤ 60°C	> 35°C

- Flashpoint: **40°C** Boiling Point: **55°C**
- Packing Group: **III**

Example B

Table 2-4. Packing group based on flammability

Packing group	*Flash point (closed-up)*	*Initial boiling point*
I	—	≤35°C
II	<23°C	>35°C
III	≥ 23°C ≤ 60°C	>35°C

- Flashpoint: **21°C** Boiling Point: **33°C**
- Packing Group: **I**

Example C

Table 2-4. Packing group based on flammability

Packing group	*Flash point (closed-up)*	*Initial boiling point*
I	—	≤35°C
II	<23°C	>35°C
III	≥ 23°C ≤ 60°C	>35°C

- Flashpoint: **21°C** Boiling Point: **37°C**
- Packing Group: **II**

Example D

Table 2-4. Packing group based on flammability

Packing group	*Flash point (closed-up)*	*Initial boiling point*
I	—	≤ 35°C
II	< 23°C	> 35°C
III	≥ 23°C ≤ 60°C	> 35°C

- Flashpoint: **62°C** Boiling Point: **37°C**
- Packing Group:
  - **Not regulated as flammable liquid**

Class 4
Flammable Solids

Examples:
- Matches
- Sulphur

Three Divisions

4.1 - Flammable Solids

4.2 - Spontaneously Combustible

4.3 - Dangerous When Wet

ICAO TI Part 2, Chap 4

Class 5
Oxidizers & Organic Peroxides

Examples:
- Oxygen generators
- Hydrogen Peroxide, 50% solution

Two Divisions

5.1 - Oxidizers

5.2 - Organic Peroxides

ICAO TI Part 2, Chap 5

Class 6
Toxic (Poisonous) & Infectious Substances

Two Divisions:

Division 6.1 – Toxic

Examples: Arsenic, Pesticides

Division 6.2 – Infectious Substances

Examples: HIV, Hepatitis, Anthrax

ICAO TI Part 2, Chap 6

How toxic is it?

Div. 6.1 Packing Groups

	Oral toxicity LD_{50}	Dermal toxicity LD_{50}	Inhalation toxicity LC_{50}
PG I	≤ 5	≤ 50	≤ 0.2
PG II	>5 and ≤ 50	> 50 and ≤ 200	> 0.2 and ≤2
PG III[a]	> 50 and ≤ 300	> 200 and ≤ 1000	> 2 and ≤ 4

a. Tear gas substances must be included in Packing Group II even if their toxicity data correspond to Packing Group III values.

ICAO TI Table 2-8

Example A

Table 2-8. Grouping criteria for administration through oral ingestion, dermal contact and inhalation of dusts and mists

Packing group	*Oral toxicity LD_{50} (mg/kg)*	*Dermal toxicity LD_{50} (mg/kg)*	*Inhalation toxicity by dusts and mists LC_{50} (mg/L)*
I	≤ 5	≤ 50	≤ 0.2
II	>5 and ≤ 50	>50 and ≤ 200	>0.2 and ≤ 2
III[a]	> 50 and ≤ 300	> 200 and ≤ 1000	>2 and ≤ 4

a. Tear gas substances must be included in Packing Group II even if their toxicity data correspond to Packing Group III values.

- Oral Toxicity LD_{50}: 40 mg/kg

Example A

Table 2-8. Grouping criteria for administration through oral ingestion, dermal contact and inhalation of dusts and mists

Packing group	*Oral toxicity LD_{50} (mg/kg)*	*Dermal toxicity LD_{50} (mg/kg)*	*Inhalation toxicity by dusts and mists LC_{50} (mg/L)*
I	≤ 5	≤ 50	≤ 0.2
II	>5 and ≤ 50	>50 and ≤ 200	>0.2 and ≤ 2
III[a]	> 50 and ≤ 300	> 200 and ≤ 1000	>2 and ≤ 4

a. Tear gas substances must be included in Packing Group II even if their toxicity data correspond to Packing Group III values.

- Oral Toxicity LD_{50}: 40 mg/kg
- Packing group: **II**

Example B

Table 2-8. Grouping criteria for administration through oral ingestion, dermal contact and inhalation of dusts and mists

Packing group	*Oral toxicity LD_{50} (mg/kg)*	*Dermal toxicity LD_{50} (mg/kg)*	*Inhalation toxicity by dusts and mists LC_{50} (mg/L)*
I	≤ 5	≤ 50	≤ 0.2
II	>5 and ≤ 50	>50 and ≤ 200	>0.2 and ≤ 2
III[a]	> 50 and ≤ 300	> 200 and ≤ 1000	>2 and ≤ 4

a. Tear gas substances must be included in Packing Group II even if their toxicity data correspond to Packing Group III values.

- Dermal Toxicity LD_{50}: 200 mg/kg

Example B

Table 2-8. Grouping criteria for administration through oral ingestion, dermal contact and inhalation of dusts and mists

Packing group	*Oral toxicity LD_{50} (mg/kg)*	*Dermal toxicity LD_{50} (mg/kg)*	*Inhalation toxicity by dusts and mists LC_{50} (mg/L)*
I	≤ 5	≤ 50	≤ 0.2
II	>5 and ≤ 50	> 50 and ≤ 200	>0.2 and ≤ 2
III[a]	> 50 and ≤ 300	> 200 and ≤ 1000	>2 and ≤ 4

a. Tear gas substances must be included in Packing Group II even if their toxicity data correspond to Packing Group III values.

- Dermal Toxicity LD_{50}: 200 mg/kg
- Packing group: **II**

Example C

Table 2-8. Grouping criteria for administration through oral ingestion, dermal contact and inhalation of dusts and mists

Packing group	*Oral toxicity LD_{50} (mg/kg)*	*Dermal toxicity LD_{50} (mg/kg)*	*Inhalation toxicity by dusts and mists LC_{50} (mg/L)*
I	≤ 5	≤ 50	≤ 0.2
II	>5 and ≤ 50	>50 and ≤ 200	>0.2 and ≤ 2
III[a]	> 50 and ≤ 300	> 200 and ≤ 1000	>2 and ≤ 4

a. Tear gas substances must be included in Packing Group II even if their toxicity data correspond to Packing Group III values.

- Tear gas substance, Oral Toxicity LD_{50} : 300mg/kg

Example C

Table 2-8. Grouping criteria for administration through oral ingestion, dermal contact and inhalation of dusts and mists

Packing group	*Oral toxicity LD_{50} (mg/kg)*	*Dermal toxicity LD_{50} (mg/kg)*	*Inhalation toxicity by dusts and mists LC_{50} (mg/L)*
I	≤ 5	≤ 50	≤ 0.2
II	>5 and ≤ 50	>50 and ≤ 200	>0.2 and ≤ 2
III[a]	> 50 and ≤ 300	> 200 and ≤ 1000	>2 and ≤ 4

a. Tear gas substances must be included in Packing Group II even if their toxicity data correspond to Packing Group III values.

- Tear gas substance, Oral Toxicity LD_{50} : 300mg/kg
- Packing group: **II**

Example D

Table 2-8. Grouping criteria for administration through oral ingestion, dermal contact and inhalation of dusts and mists

Packing group	*Oral toxicity LD_{50} (mg/kg)*	*Dermal toxicity LD_{50} (mg/kg)*	*Inhalation toxicity by dusts and mists LC_{50} (mg/L)*
I	≤ 5	≤ 50	≤ 0.2
II	>5 and ≤ 50	>50 and ≤ 200	>0.2 and ≤ 2
III[a]	> 50 and ≤ 300	> 200 and ≤ 1000	>2 and ≤ 4

a. Tear gas substances must be included in Packing Group II even if their toxicity data correspond to Packing Group III values.

- Oral Toxicity LD_{50}: 40 mg/kg
- Dermal Toxicity LD_{50}: 300 mg/kg
- Inhalation Toxicity LC_{50}: 0.1 mg/L

Packing Group: ?

Example D

Table 2-8. Grouping criteria for administration through oral ingestion, dermal contact and inhalation of dusts and mists

Packing group	*Oral toxicity* LD_{50} *(mg/kg)*	*Dermal toxicity* LD_{50} *(mg/kg)*	*Inhalation toxicity by dusts and mists* LC_{50} *(mg/L)*
I	≤ 5	≤ 50	≤ 0.2
II	>5 and ≤ 50	>50 and ≤ 200	>0.2 and ≤ 2
III[a]	> 50 and ≤ 300	> 200 and ≤ 1000	>2 and ≤ 4

a. Tear gas substances must be included in Packing Group II even if their toxicity data correspond to Packing Group III values.

- Oral Toxicity LD_{50}: 40 mg/kg
- Dermal Toxicity LD_{50}: 300 mg/kg
- Inhalation Toxicity LC_{50}: 0.1 mg/L

Packing Group: I

Class 7
Radioactive Material

Examples:

- Radioactive medicines
- Isotopes used in research (Carbon-14, etc.)
- X-ray machines and other equipment with radioactive sources

ICAO TI Part 2, Chap 7

Class 8
Corrosives

Examples:

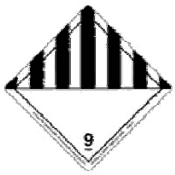
- Batteries
- Sulphuric Acid
- Bleach
- Paint stripper
- Drain cleaner

ICAO TI Part 2, Chap 8

Class 9
Miscellaneous

Examples:

- Dry Ice
- Engines & vehicles
- Lithium batteries



These items are considered dangerous but are not suitable for inclusion in the first eight hazard classes.

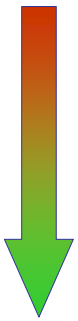
ICAO TI Part 2, Chap 9

Multiple Hazards

- A material that meets the criteria of more than one hazard class is classified in accordance with the precedence of hazard rules. Table 2-1 is used for some hazard classes.
- There will be a primary hazard class and then subsidiary risk(s).

ICAO TI Part 2, Intro Chapter & Table 2-1

Precedence of Hazards*



- Class 1
- Class 2
- Liquid desensitized explosives of Class 3
- Self-reactive substances and solid desensitized explosives of Division 4.1
- Pyrophoric substances of Division 4.2
- Division 5.2
- PG I inhalation hazards of Division 6.1
- Division 6.2
- Class 7
- Remaining hazard classes: Table 2-1

*When not already determined in Dangerous Good List

ICAO TI Part 2, Intro Chapter, 4.1

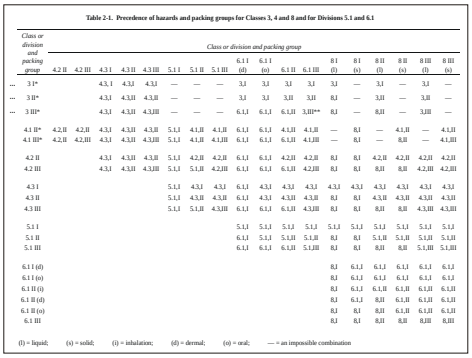


Table 2-1. Precedence of hazards and packing groups for Classes 3, 4 and 8 and for Divisions 5.1 and 6.1

Class or division and packing group	Class or division and packing group															
	4.2 II	4.2 III	4.3 I	4.3 II	4.3 III	5.1 I	5.1 II	5.1 III	6.1 I (d)	6.1 I (o)	6.1 II	6.1 III	8 I (l)	8 I (s)	8 II (l)	8 II (s)	8 III (l)	8 III (s)
... 3 I*			4.3, I	4.3,I	4.3,I	—	—	—	3,I	3,I	3,I	3,I	3,I	—	3,I	—	3,I	—
... 3 II*			4.3,I	4.3,II	4.3,II	—	—	—	3,I	3,I	3,II	3,II	8,I	—	3,II	—	3,II	—
... 3 III*			4.3,I	4.3,II	4.3,III	—	—	—	6.1,I	6.1,I	6.1,II	3,III**	8,I	—	8,II	—	3,III	—
4.1 II*	4.2,II	4.2,II	4.3,I	4.3,II	4.3,II	5.1,I	4.1,II	4.1,II	6.1,I	6.1,I	4.1,II	4.1,II	—	8,I	—	4.1,II	—	4.1,II
4.1 III*	4.2,II	4.2,III	4.3,I	4.3,II	4.3,III	5.1,I	4.1,II	4.1,III	6.1,I	6.1,I	6.1,II	4.1,III	—	8,I	—	8,II	—	4.1,III
4.2 II			4.3,I	4.3,II	4.3,II	5.1,I	4.2,II	4.2,II	6.1,I	6.1,I	4.2,II	4.2,II	8,I	8,I	4.2,II	4.2,II	4.2,II	4.2,II
4.2 III			4.3,I	4.3,II	4.3,III	5.1,I	5.1,II	4.2,III	6.1,I	6.1,I	6.1,II	4.2,III	8,I	8,I	8,II	8,II	4.2,III	4.2,III
4.3 I						5.1,I	4.3,I	4.3,I	6.1,I	4.3,I	4.3,I	4.3,I	4.3,I	4.3,I	4.3,I	4.3,I	4.3,I	4.3,I
4.3 II						5.1,I	4.3,II	4.3,II	6.1,I	4.3,I	4.3,II	4.3,II	8,I	8,I	4.3,II	4.3,II	4.3,II	4.3,II
4.3 III						5.1,I	5.1,II	4.3,III	6.1,I	6.1,I	6.1,II	4.3,III	8,I	8,I	8,II	8,II	4.3,III	4.3,III
5.1 I									5.1,I	5.1,I	5.1,I	5.1,I	5.1,I	5.1,I	5.1,I	5.1,I	5.1,I	5.1,I
5.1 II									6.1,I	5.1,I	5.1,II	5.1,II	8,I	8,I	5.1,II	5.1,II	5.1,II	5.1,II
5.1 III									6.1,I	6.1,I	6.1,II	5.1,III	8,I	8,I	8,II	8,II	5.1,III	5.1,III
6.1 I (d)													8,I	6.1,I	6.1,I	6.1,I	6.1,I	6.1,I
6.1 I (o)													8,I	6.1,I	6.1,I	6.1,I	6.1,I	6.1,I
6.1 II (i)													8,I	6.1,I	6.1,II	6.1,II	6.1,II	6.1,II
6.1 II (d)													8,I	6.1,I	8,II	6.1,II	6.1,II	6.1,II
6.1 II (o)													8,I	8,I	8,II	6.1,II	6.1,II	6.1,II
6.1 III													8,I	8,I	8,II	8,II	8,III	8,III

(l) = liquid; (s) = solid; (i) = inhalation; (d) = dermal; (o) = oral; — = an impossible combination

Example A

Table 2-1. Precedence of hazards and packing groups for Classes 3, 4 and 8 and for Divisions 5.1 and 6.1

Class or division and packing group	Class or division and packing group											
	4.2 II	4.2 III	4.3 I	4.3 II	4.3 III	5.1 I	5.1 II	5.1 III	6.1 I (d)	6.1 I (o)	6.1 II	6.1 III
... 3 I*			4.3, I	4.3,I	4.3,I	—	—	—	3,I	3,I	3,I	3,I
... 3 II*			4.3,I	4.3,II	4.3,II	—	—	—	3,I	3,I	3,II	3,II
... 3 III*			4.3,I	4.3,II	4.3,III	—	—	—	6.1,I	6.1,I	6.1,II	3,III**
4.1 II*	4.2,II	4.2,II	4.3,I	4.3,II	4.3,II	5.1,I	4.1,II	4.1,II	6.1,I	6.1,I	4.1,II	4.1,II
4.1 III*	4.2,II	4.2,III	4.3,I	4.3,II	4.3,III	5.1,I	4.1,II	4.1,III	6.1,I	6.1,I	6.1,II	4.1,III

(l) = liquid; (s) = solid; (i) = inhalation; (d) = dermal; (o) = oral; — = an impossible combination

Class 3, PG II and Division 6.1(oral), PG I

Primary: 3 / Subsidiary: 6.1 / PG: I

Example B

Table 2-1. Precedence of hazards and packing groups for Classes 3, 4 and 8 and for Divisions 5.1 and 6.1

Class or division and packing group	Class or division and packing group											
	4.2 II	4.2 III	4.3 I	4.3 II	4.3 III	5.1 I	5.1 II	5.1 III	6.1 I (d)	6.1 I (o)	6.1 II	6.1 III
... 3 I*			4.3, I	4.3,I	4.3,I	—	—	—	3,I	3,I	3,I	3,I
... 3 II*			4.3,I	4.3,II	4.3,II	—	—	—	3,I	3,I	3,II	3,II
... 3 III*			4.3,I	4.3,II	4.3,III	—	—	—	6.1,I	6.1,I	6.1,II	3,III**
4.1 II*	4.2,II	4.2,II	4.3,I	4.3,II	4.3,II	5.1,I	4.1,II	4.1,II	6.1,I	6.1,I	4.1,II	4.1,II
4.1 III*	4.2,II	4.2,III	4.3,I	4.3,II	4.3,III	5.1,I	4.1,II	4.1,III	6.1,I	6.1,I	6.1,II	4.1,III

(l) = liquid; (s) = solid; (i) = inhalation; (d) = dermal; (o) = oral; — = an impossible combination

Division 4.1, PG III and Division 6.1, PG II

Primary: 6.1 / Subsidiary: 4.1 / PG: II

Example C

Table 2-1. Precedence of hazards and packing groups for Classes 3, 4 and 8 and for Divisions 5.1 and 6.1

	Class or division and packing group	*Class or division and packing group*											
		4.2 II	4.2 III	4.3 I	4.3 II	4.3 III	5.1 I	5.1 II	5.1 III	6.1 I (d)	6.1 I (o)	6.1 II	6.1 III
...	3 I*			4.3, I	4.3,I	4.3,I	—	—	—	3,I	3,I	3,I	3,I
...	3 II*			4.3,I	4.3,II	4.3,II	—	—	—	3,I	3,I	3,II	3,II
...	3 III*			4.3,I	4.3,II	4.3,III	—	—	—	6.1,I	6.1,I	6.1,II	3,III**
	4.1 II*	4.2,II	4.2,II	4.3,I	4.3,II	4.3,II	5.1,I	4.1,II	4.1,II	6.1,I	6.1,I	4.1,II	4.1,II
	4.1 III*	4.2,II	4.2,III	4.3,I	4.3,II	4.3,III	5.1,I	4.1,II	4.1,III	6.1,I	6.1,I	6.1,II	4.1,III

(l) = liquid; (s) = solid; (i) = inhalation; (d) = dermal; (o) = oral; — = an impossible combination

Class 3, PG III and Division 5.1PG I

Impossible combination

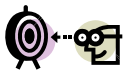
Lesson Review

After completion of this lesson, you should be able to:

- Describe the nine hazard classes of dangerous goods and their divisions
- Describe the physical properties of each hazard class/div and give examples
- Identify packing groups
- Determine the hazard class, subsidiary risk, and packing group of a given material

Identification and the Dangerous Goods List

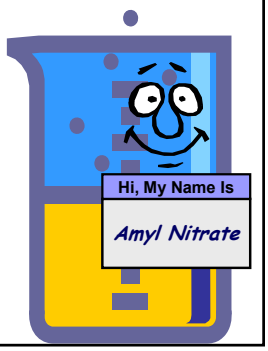
Objectives



- **Determine proper shipping names and UN numbers for Dangerous Goods**
- **Use the Dangerous Goods List to find:**
  - **Proper shipping names and UN numbers**
  - **Hazard classes and divisions**
  - **Labels**
  - **Packing groups**
  - **Special provisions**
  - **Packing instructions**
  - **Net quantities allowed**

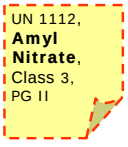
Identification: Proper Shipping Name

- Each dangerous good has a proper shipping name (PSN) that identifies it
- PSN's will be marked on packages and entered on transport documents
- Rules for PSN's can be found in 3; 1.2 and 3; 2.1.1 as well as in the Intro chapter of Part 2



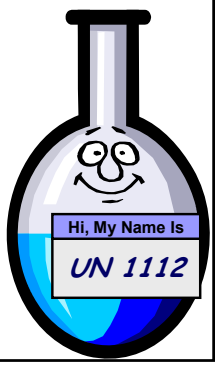
Proper Shipping Name

- PSN's will be marked on packages and entered on transport documents
- Rules for PSN's can be found in 3; 1.2 and 3; 2.1.1 as well as in the Intro chapter of Part 2



Identification: UN Number

- Like the PSN, a UN number is used to identify a particular dangerous good
- It will also be used as a marking and shipping paper entry
- There is a numeric list of UN Numbers in Attachment 1
- ICAO assigns "ID" numbers to items that do not yet have a UN number. They are in the 8000's ("ID 8000")



Dangerous Goods List
(Table 3-1)

- The DGL has 12 columns
- 3; 2.1 contains detailed explanations of each of the 12 columns
- Alphabetical by name

A
Acetal
Acetalaldehyde
Acetalaldehyde ammonia
Acetic acid, glacial
Acetic acid solution
Acetic anhydride
Acetone

Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft: Packing instruction	Passenger aircraft: Max. net quantity per package	Cargo aircraft: Packing instruction	Cargo aircraft: Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12
Acetone	1090	3		Liquid flammable			II	305 Y305	5 L 1 L	307	60 L
Acetoin, see **Acetyl methyl carbinol**											
≠ **Aerosols,** flammable	1950	2.1		Gas flammable				203 Y203	75 kg 30 kg G	203	150 kg
Batteries, wet, filled with alkali, electric storage †	2795	8		Corrosive		A 51		800	30 kg G	800	No limit
N,N-Dimethylcyclohexylamine	2264	8	3	Corrosive & Liquid flammable			II	808 Y808	1 L 0.5 L	812	30 L
Ethanol	1170	3		Liquid flammable		A3 A58	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L	307 310	60 L 220 L
Fireworks †	0037	1.4S		Explosive 1.4				135	25 kg	135	100 kg
Flammable liquid, n.o.s.*	1993	3		Liquid flammable			I II III	302 305 Y305 309 Y309	1 L 5L 1 L 60 L 10 L	303 307 310	30 L 60 L 220 L
Isopropyl chloroformate	2407	6.1	3 8	Toxic & Liquid flammable & Corrosive	AU 1 CA 7 GB 3 NL 1 US 3 US 8	A1	I	FORBIDDEN		604	2.5 L

Column 1 - Name

Name	*UN No.*	*Class or division*
1	2	3
Acetone	1090	3
Acetoin, see **Acetyl methyl carbinol**		
≠ **Aerosols,** flammable	19	
Batteries, wet, filled with alkali, electric storage †	27	
N,N-Dimethylcyclohexylamine	22	
Ethanol	11	
Fireworks †	00	
Flammable liquid, n.o.s.*	19	
Isopropyl chloroformate	24	

- Alphabetical by name
- Proper shipping names in bold
- See 3; 2.1.2 for symbols (≠, †, *, etc.)
- See Attachment 1, Chap. 2, for a list of all generic & n.o.s. names

Bold vs. Non-bold

Name	*UN No.*	*Class or division*
1	2	3
Acetone	1090	
Acetoin, see **Acetyl methyl carbinol**		
≠ **Aerosols,** flammable	1950	
Batteries, wet, filled with alkali, electric storage †	2795	
N,N-Dimethylcyclohexylamine	2264	
Ethanol	1170	
Fireworks †	0037	
Flammable liquid, n.o.s.*	1993	
Isopropyl chloroformate	2407	6.1

If it's not in **bold type**, it's not a part of the proper shipping name.

However, non-bold descriptive text following a proper shipping name may be used.

Chemical Prefixes

Name	*UN No.*	*Class or division*
1	2	3
Acetone	1090	
Acetoin, see **Acetyl methyl carbinol**		
≠ **Aerosols,** flammable	1950	
Batteries, wet, filled with alkali, electric storage †	2795	
N,N-Dimethylcyclohexylamine	2264	
Ethanol	1170	
Fireworks †	0037	
Flammable liquid, n.o.s.*	1993	
2-Iodobutane	2390	3

Chemical prefixes that appear in bold are part of the proper shipping name, even though they are ignored when putting the DG List in alphabetical order

Singular vs. Plural

Name	UN No.
1	2
Acetone	1090
Acetoin, see **Acetyl methyl carbinol**	
≠ **Aerosols,** flammable	1950
Batteries, wet, filled with alkali, electric storage †	2795
N,N-Dimethylcyclohexylamine	2264
Ethanol	1170
Fireworks †	0037
Flammable liquid, n.o.s.*	1993
Vehicle, flammable liquid powered	3166

Proper shipping names may be used in the singular or plural form despite how they are shown in the list.

"Aerosols" and "Batteries" may also be used as "Aerosol" or "Battery," and "Vehicle" can be used as "Vehicles"

ICAO TI

Aerosols, flammable

Optional part of PSN

IATA DGR

Aerosols, flammable

Required part of PSN

Sometimes the IATA DGR puts non-bold text from the ICAO TI into bold—making it a required part of the Proper Shipping Name. This is an example of a stricter IATA requirement that is not enforceable by law.

Generic and N.O.S. Shipping Names

A material not specifically named in the Dangerous Goods List might be described by three different types of generic or n.o.s. shipping names:

- Generic but well-defined group:

Example: Perfumery products

- Chemical or technical properties:

Example: Alcohols, n.o.s.

- Hazard class:

Example: Flammable liquid, n.o.s.

The shipper selects the name that most accurately describes their product.

ICAO TI Part 2, Intro / 3;1.2.7 / A1, Chap. 2

Column 2 – UN Number

Name	UN No.	Class or division
1	2	3
Acetone	1090	
Acetoin, see Acetyl methyl carbinol		
≠ Aerosols, flammable	1950	
Batteries, wet, filled with alkali, electric storage †	2795	
N,N-Dimethylcyclohexylamine	2264	
Ethanol	1170	
Fireworks †	0037	
Flammable liquid, n.o.s.*	1993	
Isopropyl chloroformate	2407	

- Preceded by "UN" when marked on packages or entered in document ("UN 1203")
- Numbers starting with "8" are ID numbers ("ID 8000")
- See numeric UN# list in Attachment 1

Column 3 – Class/Division

UN No.	Class or division	Subsidiary risk
2	3	4
1090	3	
1950	2.1	
2795	8	
2264	8	3
1170	3	
0037	1.4S	
1993	3	
2407	6.1	3 8

- **Shows hazard class and division if applicable**
- **Class 1 shows compatibility group also**

Column 4 – Subsidiary Risk

Class or division	Subsidiary risk	Labels
3	4	5
2.1		Gas flammable
8		Corrosive
8	3	Corrosive & Liquid flammable
3		Liquid flammable
1.4S		Explosive 1.4
3		Liquid flammable
6.1	3 8	Toxic & Liquid flammable & Corrosive

- **Shows subsidiary hazard classes/divisions—if any.**
- **May show more than one.**

Column 5 - Labels

Sub-sidiary risk	Labels
4	5
	Liquid flammable
	Gas flammable
	Corrosive
3	Corrosive & Liquid flammable
	Liquid flammable
	Explosive 1.4
3 8	Toxic & Liquid flammable & Corrosive

- Shows applicable hazard labels for primary and subsidiary hazards that are required on the outside of the package.
- Might not show every possible label for generic or n.o.s. shipping names with multiple hazards.

Column 6 – State Variations

Labels	State variations	Special provisions
5	6	7
Liquid flammable		A3 A58
Explosive 1.4		
Liquid flammable		
Toxic & Liquid flammable & Corrosive	AU 1 CA 7 GB 3 NL 1 US 3 US 8	A1

- **Refers to State (country) variations found in Attachment 3**
- **May or may not apply to a particular shipment**

Column 7 – Special Provisions

State variations	Special provisions	UN packing group
6	7	8
	A51	
		II
	A3 A58	II III
AU 1 CA 7 GB 3 NL 1 US 3 US 8	A1	I

- **Refers to the special provisions found in Table 3-2 (the white pages immediately following the DGL blue pages)**
- **May or may not apply to a particular shipment**

Special provi-sions	UN packing group	Passenger aircraft	
		Packing instruction	Max. net quantity per package
7	8	9	10
	II	305 Y305	5 L 1 L
		203 Y203	75 kg 30 kg G
	II	808 Y808	1 L 0.5 L
A3 A58	II III	305 Y305 309 Y309	5 L 1 L 60 L 10 L
		135	25 kg
	I II III	302 305 Y305 309 Y309	1 L 5L 1 L 60 L 10 L
A1	I	FORB	IDDEN

Column 8 – UN Packing Group

- **The applicable packing group (PG)**
- **Some materials meet more than one PG depending on mixture/ingredients**
- **Some hazard classes and materials do not have a PG**

UN packing group	Passenger aircraft	
	Packing instruction	Max. net quantity per package
8	9	10
II	305 Y305	5 L 1 L
	203 Y203	75 kg 30 kg G
	800	30 kg G
II	808 Y808	1 L 0.5 L
	135	25 kg
I II III	302 305 Y305 309 Y309	1 L 5L 1 L 60 L 10 L
I	FORB	IDDEN

Columns 9 & 10

Passenger Aircraft:

Packing Instruction & Maximum Net Quantity Per Package

- Col. 9: The packing instruction to be followed (in the yellow pages). May be more than one listed if PG varies or if limited quantity shipments are an option.
- Col. 10: The maximum net quantity of the dangerous goods allowed in the package. Varies by packing instruction.

Passenger aircraft		Cargo aircraft	
Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
9	10	11	12
305 Y305	5 L 1 L	307	60 L
203 Y203	75 kg 30 kg G	203	150 kg
800	30 kg G	800	No limit
808 Y808	1 L 0.5 L	812	30 L
135	25 kg	135	100 kg
302 305 Y305 309 Y309	1 L 5L 1 L 60 L 10 L	303 307 310	30 L 60 L 220 L
FORB	IDDEN	604	2.5 L

Columns 11 & 12

Cargo Aircraft:

Packing Instruction & Maximum Net Quantity Per Package

- Col. 11: The packing instruction to be followed (see yellow pages). May be more than one if PG varies.
- Col. 12: The maximum net quantity of the dangerous goods allowed in the package. Varies by packing instruction.

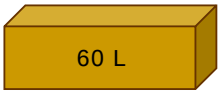
Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft		Cargo aircraft	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12
Acetone	**1090**	**3**		**Liquid flammable**			**II**	**305** **Y305**	**5 L** **1 L**	**307**	**60 L**

How much Acetone is allowed in one package?

Passenger aircraft PI 305

Passenger aircraft --LTD QTY PI Y305

Cargo-only aircraft PI 307



Lesson Review

After completion of this lesson, you should be able to:

- Determine the proper shipping names and UN numbers for Dangerous Goods
- Use the Dangerous Goods List to find:
  - **Proper shipping names and UN numbers**
  - **Hazard classes and divisions**
  - **Labels**
  - **Packing groups**
  - **Special provisions**
  - **Packing instructions**
  - **Net quantities allowed**

Packaging

Objectives

- Identify the difference between "packaging" and a "package"
- Identify the three types of packagings permitted for transport of DG by air
- Identify the packaging requirements and quantity limitations for a given DG material for shipment by passenger aircraft and cargo-only aircraft
- Identify UN packaging codes

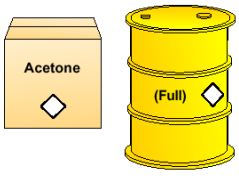
Objectives

- Identify UN package specification markings
- Identify the components of a UN specification marking and determine how it is marked on packagings
- Determine the requirements for packaging under the Limited Quantity exceptions
- Determine the requirements for shipping different dangerous goods in the same package

"Packaging" vs. "Package"

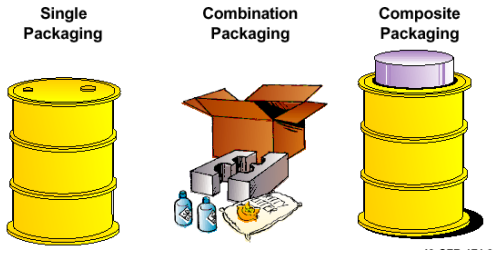
Packaging is all the necessary components which, when assembled and filled, make a package

A package is the packaging, plus its contents



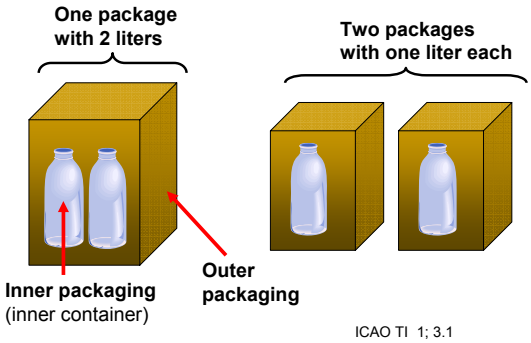
ICAO TI 1; 3.1

Types of Packagings



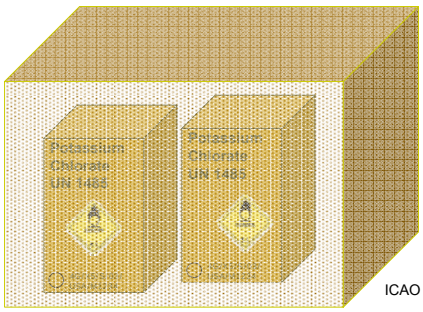
ICAO TI 1; 3.1

Package vs. Inner Packaging



ICAO TI 1; 3.1

Overpack



ICAO TI 1; 3.1

Two packages, together in one overpack

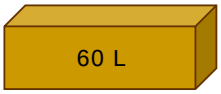
Name	UN No.	Class or division	Subsidiary risk	Labels	State variations	Special provisions	UN packing group	Passenger aircraft		Cargo aircraft	
								Packing instruction	Max. net quantity per package	Packing instruction	Max. net quantity per package
1	2	3	4	5	6	7	8	9	10	11	12
Acetone	**1090**	**3**		**Liquid flammable**			**II**	**305** **Y305**	**5 L** **1 L**	**307**	**60 L**

How much Acetone is allowed in one package?

Passenger aircraft PI 305

Passenger aircraft --LTD QTY PI Y305

Cargo-only aircraft PI 307



305 PACKING INSTRUCTION 305 **305**

The general packaging requirements of Part 4, Chapter 1 must be met.

Single packagings are not permitted.

COMBINATION PACKAGINGS:

Passenger Aircraft Packing Instruction

INNER:

Glass or earthenware (IP.1)	**1 L**
Plastic (IP.2)	**5 L**
Metal (IP.3, IP.3A)	**5 L**
Glass ampoule (IP.8)	**0.5 L**

OUTER:

Boxes	*Drums*	*Jerricans*
aluminium (4B)	**aluminium (1B2)**	**aluminium (3B2)**
fibreboard (4G)	**fibre (1G)**	**plastic (3H2)**
plywood (4D)	**plastic (1H2)**	**steel (3A2)**
reconstituted wood (4F)	**plywood (1D)**	
solid plastic (4H2)	**steel (1A2)**	
steel (4A)		
wooden (4C1, 4C2)		

307 PACKING INSTRUCTION 307 **307**

The general packaging requirements of Part 4, Chapter 1 must be met.

COMBINATION PACKAGINGS:

Cargo Aircraft Packing Instruction

INNER:

Glass or earthenware (IP.1)	**2.5 L**
Plastic (IP.2)	**10 L**
Metal (IP.3, IP.3A)	**10 L**
Glass ampoule (IP.8)	**0.5 L**

Larger quantities permitted

OUTER:

Boxes	*Drums*	*Jerricans*
aluminium (4B)	**aluminium (1B2)**	**aluminium (3B2)**
fibreboard (4G)	**fibre (1G)**	**plastic (3H2)**
plywood (4D)	**plastic (1H2)**	**steel (3A2)**
reconstituted wood (4F)	**plywood (1D)**	
solid plastic (4H2)	**steel (1A2)**	
steel (4A)		
wooden (4C1, 4C2)		

SINGLE PACKAGINGS:

Composite (plastic)—all
Cylinders that meet the requirements of PI 200 are permitted
Drums
aluminium (1B1, 1B2)
plastic (1H1, 1H2)
steel (1A1, 1A2)
Jerricans
plastic (3H1, 3H2)
steel (3A1, 3A2)

Quantity limit for single packagings is the same as the package net quantity limit in the Dangerous Goods List.

UN Packaging Specification Markings

Packaging containing solids or inner receptacles

4G / Y 30 / S / 02 / USA / M1234

Package type and material	PG level	kg: Max. gross weight	Solids or combi-nation	Year of Mfr.	Country	Manufacturer
		Specific gravity	kPa: pressure			

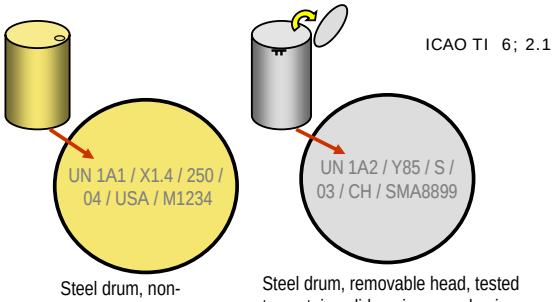
1A1 / Y 1.3 / 150 / 03 / GB / 3006

Single packaging containing liquids

ICAO TI 6; 2.1

UN Packaging Specification Markings - Examples

UN Packaging Specification Markings - Examples

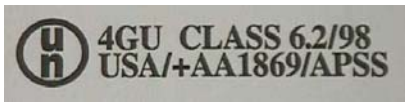


ICAO TI 6; 2.1

Steel drum, non-removable head

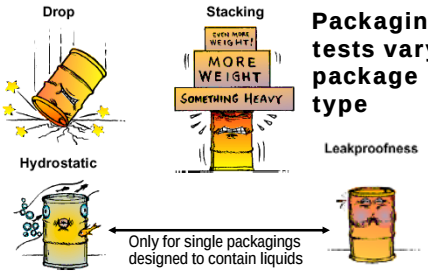
Steel drum, removable head, tested to contain solids or inner packagings

UN Specification Markings – Infectious Substance Package



ICAO TI 6; 2.2 & 6; 6.4.g

Packaging Tests

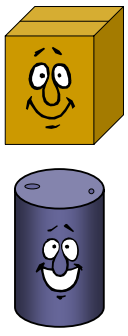


Packaging tests vary by package type

ICAO TI 6; Chap. 4

General Packaging Requirements

- Stand up to vibration, shocks, changes in pressure, temperature, humidity
- Outage/ullage for liquids
- Internal pressure standard for inner receptacles for liquids
- Q value for different dangerous goods in same outer packaging
- Absorbent material/leakproof liner for liquids in combination packaging

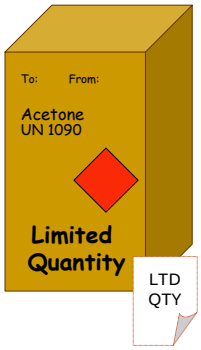


ICAO TI 4; 1.1

Limited Quantities

- See Part 3, Chapter 4
- No UN packaging required
- Must follow "Y" packing instruction
- "LTD QTY" on package and shipping paper
- Marking, Labelling, Documentation rules still apply
- No PG I allowed
- No Cargo-Aircraft-Only allowed

ICAO TI 3;4



Y305 PACKING INSTRUCTION Y305 **Y305**

The requirements Part 3, Chapter 4 must be met.

Single packagings are not permitted.

COMBINATION PACKAGINGS:

Passenger Aircraft Packing Instruction –Limited Quantity

INNER:

Glass or earthenware (IP.1)	**0.5 L**
Plastic (IP.2)	**0.5 L**
Metal (IP.3, IP.3A)	**0.5 L**
Glass ampoule (IP.8)	**0.5 L**

For UN 1106, UN 1125, UN 1154, UN 1158, UN 1160, UN 1162, UN 1214, UN 1235, UN 1289, UN 1296, UN 1297, UN 1815, UN 1922, UN 2266, UN 2353, UN 2359, UN 2379, UN 2383, UN 2386, UN 2399, UN 2401, UN 2535, UN 2733, UN 2924, UN 2945, UN 2985, UN 3274 and 3286, glass or earthenware inner packagings and glass ampoules must be packed with absorbent material in tightly closed metal or rigid plastic receptacles before packing in outer packagings.

OUTER:

Boxes	*Drums*	*Jerricans*
aluminium	**aluminium**	**aluminium**
fibreboard	**fibre**	**plastic**
plywood	**plastic**	**steel**
reconstituted wood	**plywood**	
solid plastic	**steel**	
steel		
wooden		

Y305 PACKING INSTRUCTION Y305 **Y305**

The requirements Part 3, Chapter 4 must be met.

Single packagings are not permitted.

COMBINATION PACKAGINGS:

305 PACKING INSTRUCTION 305 **305**

The general packaging requirements of Part 4, Chapter 1 must be met.

Single packagings are not permitted.

COMBINATION PACKAGINGS:

Y305 PACKING INSTRUCTION Y305 **Y305**

COMBINATION PACKAGINGS:

INNER:

Glass or earthenware (IP.1)	0.5 L
Plastic (IP.2)	0.5 L
Metal (IP.3, IP.3A)	0.5 L
Glass ampoule (IP.8)	0.5 L

Smaller quantities

For UN 1106, UN 1125, UN 1154, UN 1158, UN 1160, UN 1162, UN 1214, UN 1235, UN 1289, UN 1296, UN 1297, UN 1815, UN 1922, UN 2266, UN 2353, UN 2359, UN 2379, UN 2383, UN 2386, UN 2399, UN 2401, UN 2535, UN 2733, UN 2924, UN 2945, UN 2985, UN 3274 and 3286, glass or earthenware inner packagings and glass ampoules must be packed with absorbent material in tightly closed metal or rigid plastic receptacles before packing in outer packagings.

Extra requirements for some DG

305 PACKING INSTRUCTION 305 **305**

COMBINATION PACKAGINGS:

INNER:

Glass or earthenware (IP.1)	1 L
Plastic (IP.2)	5 L
Metal (IP.3, IP.3A)	5 L
Glass ampoule (IP.8)	0.5 L

Y305 PACKING INSTRUCTION Y305 **Y305**

OUTER:

No codes

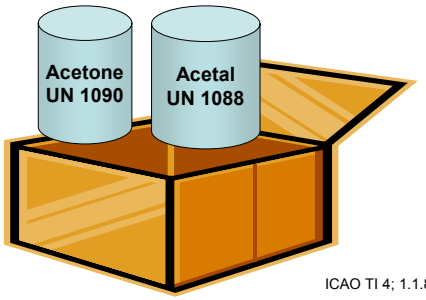
Boxes	*Drums*	*Jerricans*
aluminium	aluminium	aluminium
fibreboard	fibre	plastic
plywood	plastic	steel
reconstituted wood	plywood	
solid plastic	steel	
steel		
wooden		

305 PACKING INSTRUCTION 305 **305**

OUTER:

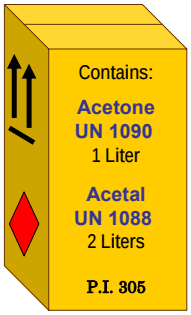
Boxes	*Drums*	*Jerricans*
aluminium (4B)	aluminium (1B2)	aluminium (3B2)
fibreboard (4G)	fibre (1G)	plastic (3H2)
plywood (4D)	plastic (1H2)	steel (3A2)
reconstituted wood (4F)	plywood (1D)	
solid plastic (4H2)	steel (1A2)	
steel (4A)		
wooden (4C1, 4C2)		

Different Dangerous Goods in One Outer Packaging



ICAO TI 4; 1.1.8

The Q Value



Material	Quantity in this package	Quantity allowed per package*	Allowance used
Acetone	1 L	5 L	0.2
Acetal	2 L	5 L	0.4
		Q =	0.6

* This example uses passenger aircraft limits.

ICAO TI 4;1.1.8

Lesson Review

After completion of this lesson you should be able to:

- **Identify the difference between "packaging" and a "package"**
- **Identify the three types of packagings permitted for transportation of DG by air**
- **Identify the packaging requirements and quantity limitations for a given DG material for shipment by passenger aircraft and cargo-only aircraft**
- **Identify UN packaging codes**

Lesson Review

- **Identify UN package specification markings**
- **Identify the components of a UN specification marking and determine how it is marked on packagings**
- **Determine the requirements for packaging under the Limited Quantity exceptions**
- **Determine the requirements for shipping different dangerous goods in the same package**