2 CLASSIFICATION AND PACKAGING OF DANGEROUS GOODS

GACAR § 109 Appendix B

ICAO Doc 9284 – Part 2

2.1 CLASSIFICATION OF DANGEROUS GOODS

Dangerous goods are classified into nine hazard classes and assigned to three packing groups according to degree of danger. Classes relate to hazard type and, packing groups relate to hazard severity within a single class.

Wastes must be transported based on hazard class criteria. Wastes covered by the Basel Convention may be classified as Class 9.

Many Class 1-9 substances are environmentally hazardous without additional labeling.

Classification is made by the appropriate authority or shipper if authorized.

Hazard Classes

1. Class 1 – Explosives
2. Class 2 – Gases
3. Class 3 - Flammable Liquids
4. Class 4 - Flammable Solids, Self-Reactive Substances, Substances Emitting Flammable Gases in Contact with Water
5. Class 5 - Oxidizers and Organic Peroxides
6. Class 6 - Toxic and Infectious Substances
7. Class 7 - Radioactive Material
8. Class 8 – Corrosives
9. Class 9 - Miscellaneous Dangerous Goods

Packing Groups

1. Packing Group I - High Danger
2. Packing Group II - Medium Danger
3. Packing Group III - Low Danger

Criteria for packing groups are provided in Sections 3.3. Dangerous goods must meet performance levels as per their relevant packing group unless excepted.

Articles are not assigned packing groups. Any packaging performance requirements are specified in packing instructions.

2.1.1 Shipper's Responsibility

GACAR § 109.21

ICAO Doc 9284 – Part 5

The shipper's responsibilities include:

1. Identification of all dangerous goods in a consignment.
2. Classification of each item into a Hazard Class and Division.
3. Assignment of a packing group if relevant.

2.1.2 Class 1—Explosives

ICAO Doc 9284 – Part 2 Chapter 1

IATA DGR Section 3.1

Definition:

1. Explosive substances except those too dangerous for transport or where the hazard is appropriate to another class.
2. Explosive articles, except those containing only a small quantity of explosive substances such that accidental ignition or initiation does not cause external projection, fire, smoke, heat, or noise.
3. Articles and substances manufactured with the intent of producing a practical explosive or pyrotechnic effect.

IATA classifies Class 1 DGR into six Hazard Divisions:

1. **Division 1.1** - Mass explosion hazard.
2. **Division 1.2** - Projection hazard without mass explosion.
3. **Division 1.3** - Fire/minor blast/projection hazard, no mass explosion.
4. **Division 1.4** - Minimal hazard with ignition.
5. **Division 1.5** - Very insensitive explosives with mass explosion hazard.
6. **Division 1.6** - Extremely insensitive articles with no mass explosion.

2.1.3 Class 2—Gases

ICAO Doc 9284 – Part 2 – Chapter 2

IATA DGR – Section 3.2

Gases are substances which at 50°C have a vapor pressure greater than 300 kPa or are completely gaseous at 20°C and standard pressure of 101.3 kPa. Transport conditions are:

1. **Compressed gas** - Entire gaseous state at -50°C.
2. **Liquefied gas** - Partially liquid above -50°C (high/low pressure types).
3. **Refrigerated liquefied gas** - Made partially liquid by low temperature.
4. **Dissolved gas** - Dissolved in liquid solvent.
5. **Adsorbed gas** - Adsorbed on porous material.

Class 2 includes compressed gases, liquefied gases, refrigerated gases, dissolved gases, gas mixtures, and articles charged with gas.

Gases are divided into three Divisions:

1. **Division 2.1** - Flammable gases.
2. **Division 2.2** - Non-flammable, non-toxic gases.
3. **Division 2.3** - Toxic gases.

Division is based on primary hazard. Aerosols and cartridges meeting flammability criteria are Division 2.1.

1. Mixtures are classified based on flammability, toxicity, and oxidizing ability.
2. Division 2.3 takes precedence over 2.1 and 2.2. Division 2.1 takes precedence over 2.2.
3. Aerosols are classified based on contents. Division 2.1 if >85% flammable components. Division 2.2 if ≤1% flammable. Otherwise they are classified based on flammability tests.
4. Division 2.3 gases cannot be used as propellant. Toxic/corrosive contents may require subsidiary hazard.
5. Chemically unstable gases are forbidden unless stabilized to prevent dangerous reactions.

2.1.4 Class 3—Flammable Liquids

ICAO Doc 9284 – Part 2 – Chapter 3

IATA DGR – Section 3.3

Class 3 includes:

1. Flammable liquids with flash point ≤60°C (closed cup) or ≤65.6°C (open cup).
2. Liquid desensitized explosives.

Liquids with flash point >35°C may be exempt if they do not sustain combustion as per combustibility tests.

Liquids offered for transport at temperatures ≥ flash point are considered flammable liquids.

Based on flash point and initial boiling point:

1. Packing Group I: Flash point ≤35°C.
2. Packing Group II: Flash point <23°C, initial boiling point >35°C.
3. Packing Group III: Flash point ≥23°C but ≤60°C.

Viscous flammable liquids meeting viscosity and flash point criteria may be Packing Group III.

Elevated temperature flammable liquids are normally forbidden except Packing Group III.

2.1.5 Class 4—Flammable Solids; Substances Liable to Spontaneous Combustion; Substances which, in Contact with Water, Emit Flammable Gases

ICAO Doc 9284 – Part 2 – Chapter 4

IATA DGR – Section 3.4

1. **Division 4.1** - Flammable Solids:
    a. Readily combustible solids, self-reactive substances, solid desensitized explosives, and polymerizing substances.
    b. Readily combustible solids are powders, granules, pastes that can be easily ignited and flames spread rapidly.
    c. Assigned to:
        i. Packing Group II if burning time <45 sec, flame passes wetted zone, and.
        ii. Packing Group III if burning time <45 sec, wetted zone stops flame for ≥4 min.
    d. Metal powders in:
        i. Packing Group II if reaction spreads in ≤5 min, and
        ii. Packing Group III if >5 min but ≤10 min.

2. **Division 4.2** - Substances Liable to Spontaneous Combustion:
    a. Includes pyrophoric and self-heating substances. Ignite on contact with air.
    b. Pyrophoric ignite within 5 minutes. Assigned to Packing Group I.
    c. Self-heating substances ignite based on sample cube test results.
        i. Packing Group II if positive at 25mm,and
        ii. Packing Group III if positive at 100mm but negative at 25mm.
3. **Division 4.3** - Substances Emitting Flammable Gases in Contact with Water:
    a. Substances that emit flammable gases when in contact with water. Assigned to packing group based on reaction rate:
        i. Packing Group I: vigorous reaction, tendency for spontaneous ignition.
        ii. Packing Group II: maximum rate ≥20 L/kg per hour, and
        iii. Packing Group III: maximum rate >1 L/kg per hour.

2.1.6 Class 5—Oxidizing Substances and Organic Peroxides

ICAO Doc 9284 – Part 2 – Chapter 5

IATA DGR – Section 3.5

1. Division 5.1 - Oxidizing Substances

a. Substances that yield oxygen causing or contributing to combustion of other materials.

b. Solids classified based on comparison to standard potassium bromate/cellulose mixtures in burning tests. These are assigned to packing group based on mean burning time or burning rate.

c. Liquids classified based on pressure rise time in closed cell test with cellulose. Assigned packing group based on comparison to standard nitric acid/cellulose mixtures.

2. Division 5.2 - Organic Peroxides

a. Contain the bivalent -O-O- structure and are thermally unstable. Classified into 7 types based on degree of danger.

b. Listed organic peroxides are assigned to generic entries UN 3103 to UN 3120 specifying type, physical state, and temperature control needs.

c. New peroxides are classified based on tests. Mixtures classified based on most dangerous component.

d. Desensitized by dilution with compatible organic/inorganic solids and liquids.

e. Certain types require temperature control based on self-accelerating decomposition temperature (SADT) and effects when heated under confinement.

2.1.7 Class 6—Toxic and Infectious Substances

ICAO Doc 9284 – Part 2 – Chapter 6

IATA DGR – Section 3.6

Division 6.1 - Toxic Substances

These are assigned to packing groups based on LD50 and LC50 toxicity data collecting from animal testing by oral, dermal, and inhalation routes.

1. Packing Group I - Very severe toxicity.
2. Packing Group II - Serious toxicity.
3. Packing Group III - Relatively low toxicity.

Liquids in Packing Group I by vapor inhalation are forbidden on passenger and cargo aircraft.

Division 6.2 - Infectious Substances

1. Category A: Capable of causing permanent disability or life-threatening/fatal disease. These are assigned to UN 2814 or UN 2900.
2. Category B: Does not meet Category A criteria. These are assigned to UN 3373.

Exceptions include non-pathogenic microorganisms, neutralized substances, and environmental samples. Biological products are either licensed for transport or assigned UN 2814, UN 2900, or UN 3373 if infectious. Medical/clinical waste with infectious substances are assigned UN 2814, UN 2900, UN 3291, and UN 3549. Infected live animals are generally not permitted unless there is no other option.

Patient specimens are assigned UN 2814, UN 2900 or UN 3373 unless exempted.

2.1.8 Class 7—Radioactive Material

ICAO Doc 9284 – Part 2 – Chapter 7

IATA DGR – Section 3.7

Material containing radionuclides where the activity concentration and total activity exceed specified values.

This class does not apply to:

1. Radioactive material implanted/incorporated in person or animal for diagnosis/treatment
2. Person contaminated with radioactive material and transported for treatment
3. Radioactive consumer products approved for end users
4. Natural material/ores containing naturally occurring radionuclides below specified activity concentration limits

5. Non-radioactive solid objects with permitted levels of radioactive substance surface contamination

In summary, Class 7 applies to radioactive material transported as cargo that exceeds defined thresholds of radioactivity, with exceptions for implanted/incorporated material, contaminated humans, approved consumer goods, and natural materials below concentration limits.

2.1.9 Class 8—Corrosives

ICAO Doc 9284 – Part 2 – Chapter 8

IATA DGR – Section 3.8

Substances that cause irreversible damage to skin or corrode other materials if leaked.

This class is assigned to packing groups based on exposure time to cause irreversible skin damage or corrosion rate on steel/aluminum.

1. Packing Group I: ≤3 min exposure time.
2. Packing Group II: >3 min, ≤1 hour exposure time.
3. Packing Group III: >1 hour, ≤4 hours exposure time.

For mixtures: They are classified based on testing data, bridging principles, or calculation method considering all corrosive ingredients ≥1%.

Substances are forbidden if chemically unstable and may dangerously decompose or polymerize unless stabilized.

In summary, Class 8 corrosives are assigned to packing groups based on skin corrosion data from testing or bridging principles. Calculation methods can be used for mixtures to determine packing group. Chemically unstable corrosives require stabilization.

2.1.10 Class 9—Miscellaneous Dangerous Goods

ICAO Doc 9284 – Part 2 – Chapter 9

IATA DGR – Section 3.9

This covers dangers not included in other classes.:

1. Aviation regulated solids/liquids that could impair crew duties if spilled.
2. Magnetized materials that can deflect a compass.
3. Elevated temperature substances transported at ≥100°C (liquid) or ≥240°C (solid).
4. Environmentally hazardous substances meeting aquatic toxicity criteria.
5. Genetically modified microorganisms and organisms.
6. Lithium batteries meeting testing and quality requirements.

7. Asbestos materials.
8. Capacitors.
9. Substances evolving flammable vapor.
10. Life-saving appliances.
11. Substances that may form dioxins in a fire.
12. Other specifically listed dangerous goods.

Substances are forbidden if chemically unstable and may dangerously decompose or polymerize unless stabilized.

In summary, Class 9 covers a wide variety of miscellaneous dangerous goods not meeting classifications in other hazard classes.

2.1.11 Classification of Articles/Substances with Multiple Hazards

IATA DGR – Section 3.10

1. For hazards in Classes 3, 4, 8, Divisions 5.1, 6.1, Table 3.10.A determines primary and subsidiary hazards.
2. Primary hazard is the class/division at the intersection of the relevant row and column.
3. Packing group is the most stringent based on the hazards.

Class or Division	Packaging Group	4.2	4.2	4.3	4.3	4.3	5.1	5.1	5.1	6.1 (d)	6.1 (o)	6.1	6.1	8	8	8	8	8	8
		II	III	I	II	III	I	II	III	I	I	II	III	I	I	II	II	III	III
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 (d)	I													8, I	6.1, I	6.1, I	6.1, I	6.1, I	6.1, I
6.1 (o)	I													8, I	6.1, I	6.1, I	6.1, I	6.1, I	6.1, I

6.1 (i)	II													8, I	6.1, I	6.1, II	6.1, II	6.1, II	6.1, II
6.1 (d)	II													8, I	6.1, I	8, II	6.1, II	6.1, II	6.1, II
6.1 (o)	II													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

Table 1 IATA Table 3.10A Precedence of Hazards and Packaging Groups for classes 3,4,8 and Divisions 5.1 and 6.1

(l): = liquid

(s): = solid

(i): = inhalation

(d): = dermal

(o): = oral

(—): = an impossible combination.

(*): Substances of Division 4.1 other than self-reactive substances and solid desensitized explosives and substances of Class 3 other than liquid desensitized explosives.

(**): For pesticides only, the primary hazard must be Division 6.1.

Note: *This table is based on the UN Precedence of Hazards Table.*

Using Table 3.10.A Precedence of Hazards:

1. Locate the relevant row for the first hazard class/division and column for the second hazard class/division.
2. The class/division at the intersection is the primary hazard.
3. The other class/division is the subsidiary hazard.
4. If there are more than two hazards, compare the primary hazard to the next hazard using the table.
5. Continue until all hazards are assigned as primary or subsidiary.
6. The most stringent packing group applicable to the hazards is assigned.
7. The proper shipping name will be the n.o.s. entry for the primary hazard class/division.

Examples:

1. A substance in Class 3 Packing Group I and Division 6.1 Packing Group I - The table shows Class 3 as primary and Division 6.1 as subsidiary. Packing Group I applies in this case. Proper shipping name would be the n.o.s. entry for Class 3 Packing Group I.
2. A substance in Division 5.1 Packing Group II and Division 6.1 Packing Group III - The table shows Division 5.1 as primary and Division 6.1 as subsidiary. Packing Group II applies in this case. Proper shipping name would be the n.o.s. entry for Division 5.1 Packing Group II.
3. A substance in Division 4.1 Packing Group III, Class 8 Packing Group II, and Division 6.1 Packing Group III - Division 4.1 takes precedence over the other two hazards. Class 8 vs Division 6.1 shows Class 8 as primary as per table. So the final classification is Division 4.1 primary, Class 8 subsidiary, Division 6.1 subsidiary. Packing Group II applies. Proper shipping name would be the n.o.s. entry for Division 4.1 Packing Group II.

Exceptions:

1. Classes 1, 2, 7 take precedence.
2. Divisions 5.2, 6.2 take precedence.
3. Certain Division 4.1, 4.2 hazards take precedence
4. Certain toxic gases take precedence.
5. Liquid desensitized explosives take precedence.
6. Class 7 radioactive materials require subsidiary hazard identification.
7. Magnetized materials require additional identification.
8. Infectious substances in Division 6.2 require identification of greatest other hazard.

2.1.12 Transport of Samples for Further Testing

IATA DGR – Section 3.11

1. If hazard class is unknown, assign tentative class, packing group, and UN number based on available information and precedence of hazards.
2. Proper shipping name must include the word "sample" (e.g. Flammable liquid, n.o.s., sample).
3. Limitations:
    a. Not forbidden or restricted per regulations (e.g. Class 1, infectious).
    b. Complies with self-reactive substance/organic peroxide requirements.
    c. Net quantity per package ≤2.5 kg.
    d. Not packed with other goods.

4. Samples of energetic materials may be transported under certain Division 4.1 entries if criteria met, including:
    a. No explosives/pyrotechnic components.
    b. Oxidizer concentration limits if applicable.
    c. Data does not allow more precise classification.
    d. Shipped under applicable packing instruction.

In summary, tentative classification is assigned when hazards are unknown, with restrictions on quantity and other packed goods.

2.2 IDENTIFICATION OF DANGEROUS GOODS

GACAR § 109.113

1. Dangerous goods are assigned a proper shipping name, UN number, and other markings based on hazard classification and composition.
2. The List of Dangerous Goods contains entries for articles/substances commonly shipped by air.
3. For items not specifically listed, the shipper must determine the classification based the most appropriate shipping name.
4. Proper shipping names are selected in this preferred order:
5. Single entry for a well-defined substance
    a. Generic entry for a group of substances.
    b. Specific n.o.s. entry.
    c. General n.o.s. entry.
6. For generic or n.o.s. entries marked with ★, the proper shipping name must be supplemented with technical or chemical group names.
7. The Numerical Cross-Reference Index links UN numbers to proper shipping names.
8. The shipper must consult the appropriate authority if there is doubt whether an unlisted article/substance can be transported by air.

2.3 SEGREGATION OF INCOMPATIBLE GOODS

GACAR § 109.113

Packages with incompatible hazards must be segregated by the minimum distances during loading as per the DGR segregation table.

Hazard Label	1 excl. 1.4S	2.1	2.2, 2.3	3	4.1	4.2	4.3	5.1	5.2	8	9
1 excluding 1.4S	See note 1	x	x	x	x	x	x	x	x	x	x
2.1	x	—	—	—	—	—	—	—	—	—	x
2.2 2.3	x	—	—	—	—	—	—	—	—	—	—
3	x	—	—	—	—	—	—	x	—	—	x
4.1	x	—	—	—	—	—	—	—	—	—	x
4.2	x	—	—	—	—	—	—	x	—	—	—
4.3	x	—	—	—	—	—	—	—	—	x	—
5.1	x	—	—	x	—	x	—	—	—	—	x
5.2	x	—	—	—	—	—	—	—	—	—	—
8	x	—	—	—	—	—	x	—	—	—	—
9	x	x	—	x	x	—	—	x	—	—	—

Table 2 DGR Segregation Table

Segregation must be maintained based on all primary and subsidiary hazards, except for certain specified exceptions. Incompatible goods must also remain segregated during storage, handling, and acceptance.

Note:

1- Explosives of Division 1.4B must not be loaded with other explosives except for Division 1.4S. When loaded on the same aircraft with explosives other than Division 1.4S, Division 1.4B explosives must be loaded into separate unit load devices and when stowed aboard the aircraft, the unit load devices must be separated by other cargo with a minimum separation distance of 2 m. When not loaded in a unit load device Division 1.4B and other explosives must be loaded into different, non-adjacent loading positions and separated by other cargo with a minimum separation distance of 2 m.

2- Packages and overpacks containing UN 3480 - lithium ion batteries prepared in accordance with Section IA or Section IB of PI 965 and packages and overpacks containing UN 3090 - lithium metal batteries prepared in accordance with Section IA or Section IB of PI 968 must not be stowed on an aircraft

next to, or in a position that would allow interaction in the event of damage/fire with packages or overpacks containing dangerous goods which bear a Class 1, other than Division 1.4S, Division 2.1, Class 3, Division 4.1 or Division 5.1 hazard label. To maintain acceptable segregation between packages and overpacks, the segregation requirements shown in Table 9.3.A must be observed. The segregation requirements apply based on all hazard labels applied on the package or overpack, irrespective of whether the hazard is the primary or subsidiary hazard.

2.4 GENERAL REQUIREMENT OF PACKAGING

GACAR § 109.113

IATA DGR – Section 6

For packing purposes, dangerous goods of all classes, other than Classes 1, 2 and 7 and Divisions 5.2 and 6.2, have been divided among three packing groups according to the degree of danger they present. The packing groups have the following meanings:

1. Packing Group I — Substances presenting high danger.
2. Packing Group II — Substances presenting medium danger.
3. Packing Group III — Substances presenting low danger.

Some substances in Class 9 and liquids in Division 5.1 have been assigned to packing groups by experience rather than through application of technical criteria.

The shipper is responsible for ensuring dangerous goods are packed in compliance with regulations. This includes:

1. Using only authorized packaging:
    a. Restricting quantities per package limits.
    b. Properly assembling packaging.
    c. Ensuring no external contamination, and
    d. Meeting all packing responsibilities before handoff to operator
2. Dangerous goods that generally may not be packed in freight containers or unit load devices, with some exceptions.
3. Packages that must be marked to remove previous hazard markings when reused.
4. Overpacks that must contain compatible packages that are properly prepared.
5. Salvage packaging that can only contain one damaged/leaking package with absorbent material. Restrictions apply for certain hazard classes.
6. Some dangerous goods that may be transported in portable tanks with approval.
7. Additional air transport requirements that exist beyond other modes in areas like quantity limits, absorbent material, pressure differential.
8. Packages that are assigned Packing Groups I, II or III indicating danger level. Exceptions for certain Class 9 and Division 5.1 substances.
9. Packaging that must meet performance requirements for the assigned Packing Group.
10. Packages that must be of good quality and closed to prevent leakage and withstand transport conditions.

11. Packaging materials that must be compatible with contents and meet temperature/vibration resistance requirements.
12. Liquids that require sufficient ullage space for expansion.
13. Packages that must withstand minimum internal pressure based on contents.

Note: Packaging is the responsibility of the shipper.

2.5 MARKINGS AND LABELS

IATA DGR Section 7

2.5.1 General

1. The shipper is responsible for ensuring all necessary markings and labels are applied to dangerous goods packages and overpacks according to regulations.
2. There must be sufficient space on the package to properly affix all required marks and labels.

Key marking requirements:

1. The proper shipping name, UN number, and other required information must be marked on packages.
2. Markings must be durable, visible, and able to withstand exposure without reducing legibility.
3. Minimum size requirements apply based on package dimensions.
4. Markings must appear on a background of contrasting color.

Key labeling requirements:

1. Hazard labels must be applied corresponding to the hazard class/division of the goods.
2. Labels must be placed adjacent to markings and comply with size, color, and design requirements.
3. Packages with multiple hazards require subsidiary risk labels.
4. Labels must remain intact under exposure conditions.
5. Arrangement of labels must consider proximity to other hazard labels.

2.5.2 Marking

All marks must be so placed on the packages or overpacks in such a manner that they are not covered or obscured by any part of or attachment to the packaging or any other label or mark. Where marks are applied by means of a label, the label must not be folded or affixed so that parts of the same mark appear on different faces of the package. The required marks must not be located with other package marks that could substantially reduce their effectiveness.

1. All marks must be:
    a. Durable and printed or otherwise marked on, or affixed to, the external surface of the package or overpack.
    b. Readily visible and legible;

c. Able to withstand open weather exposure without a substantial reduction in effectiveness; and

d. Displayed on a background of contrasting color.

e. English must be used in addition to the language, which that may be required by the State of origin.

2. Each package must be marked with:

a. The proper shipping name and UN/ID number as listed in Riyadh Air's regulations.

b. The full name and address of the shipper and consignee.

c. The net or gross weight as applicable, except for single packages, identical multiple package shipments, ID8000, and Class 7.

d. The net weight of dry ice for UN1845.

e. The name and phone of responsible person for Division 6.2 infectious substances.

f. Orientation arrows and handling marks for refrigerated liquefied gases.

g. "Biological Substance Category B" mark for UN3373.

h. Statement for chemical oxygen generators in PBEs per Special Provision A144.

i. Environmentally hazardous substance mark if applicable.

2.5.2.1 Limited Quantities

Packages of dangerous goods shipped under the Limited Quantity provisions must be marked with the Limited Quantities mark.

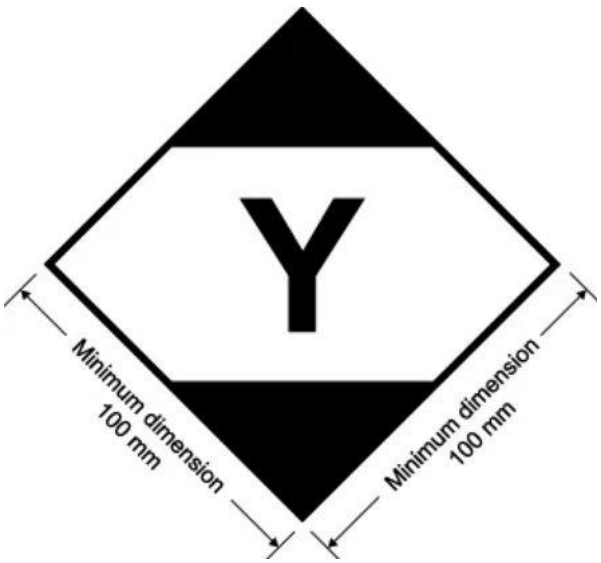


Figure 2 : Limited Quantities Mark

2.5.2.2 Environmentally Hazardous Substances

Packages containing environmentally hazardous substances or mixtures (UN 3077 and UN 3082), must be durably marked with the environmentally hazardous substance mark as shown

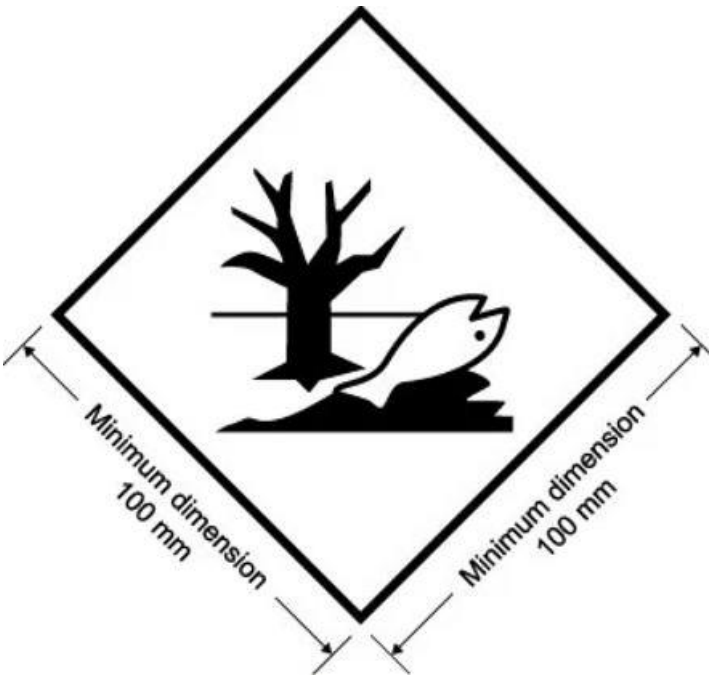


Figure 3 : Environmentally Hazardous Mark

The environmentally hazardous substance mark may also appear on packages containing substances other than UN 3077 and UN 3082 when required by other international or national transport regulations.

2.5.2.3 Lithium Batteries

The mark must indicate:

1. The appropriate UN number preceded by the letters "UN" as follows:
    a. "UN 3090" for lithium metal cells or batteries;
    b. "UN 3480" for lithium ion cells or batteries;
    c. "UN 3091" for lithium metal cells or batteries contained in, or packed with, equipment; or
    d. "UN 3481" for lithium ion cells or batteries contained in, or packed with, equipment.

Where a package contains lithium cells or batteries assigned to different UN numbers, all applicable UN numbers must be indicated on one or more marks.

The UN number(s) indicated on the mark should be at least 12 mm high.

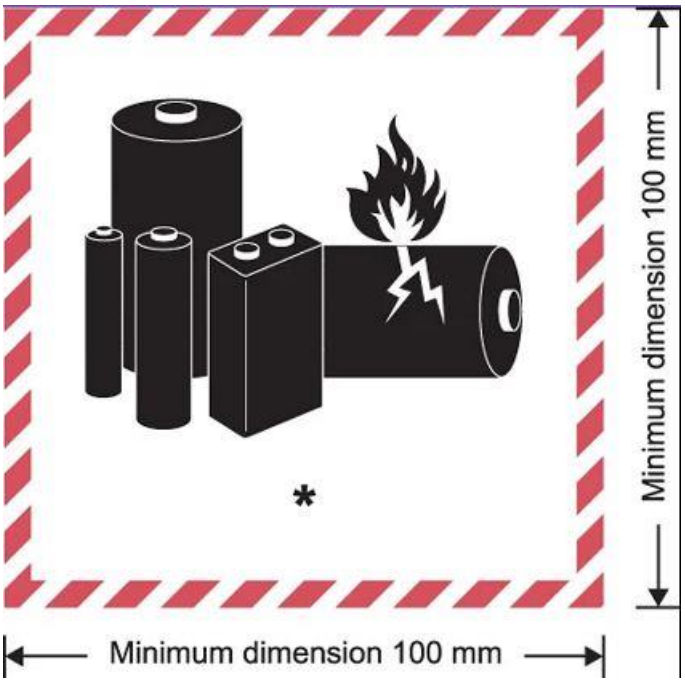


Figure 4: Lithium Batteries Mark

2.5.3 Labelling

1. Riyadh Air must remove/obliterate any irrelevant labels on packages.
2. Only labels meeting RIYADH AIR 's specifications for durability and design can be used.
3. Primary and subsidiary hazard labels must be applied corresponding to the hazard class/division.
4. Labels must have the hazard class or division number displayed.
5. Specific label color and design requirements apply based on hazard class.
6. Hazard text with UN number, hazard description, etc. is permitted if it does not obscure required elements.
7. Labels must meet size, color, and placement specifications.
8. "Cargo Aircraft Only" and other handling labels must be used when required. This is not applicable for Riyadh Air DGR Cargo.
9. Overpacks must have all labels representative of contents visible.
10. Labels must remain affixed and intact during air transport conditions.
11. Packages must have adequate space for all required hazard and handling labels.

Refer to 3.6.1 Hazard Labels for labels.

2.5.4 Hazard Label Specifications

Class	Division(s)	Label	Details
1	1.1 1.2 1.3		Name: **Explosive** Cargo IMP Code: REX, RCX, RGX, as applicable Minimum dimensions: 100 × 100 mm Symbol (exploding bomb): Black Background: Orange (Pantone Color No. 151U)
	1.4		Name: **Explosive** Cargo IMP Code: RXB, RXC, RXD, RXE, RXG, RXS, as applicable Minimum dimensions: 100 × 100 mm Figures: Black Background: Orange (Pantone Color No. 151U)
	1.5		Name: **Explosive** Cargo IMP Code: REX Minimum dimensions: 100 × 100 mm Figures: Black Background: Orange (Pantone Color No. 151U)
	1.6		Name: **Explosive** Cargo IMP Code: REX, RCX, RGX, as applicable Minimum dimensions: 100 × 100 mm Symbol (exploding bomb): Black Background: Orange (Pantone Color No. 151U)
2	2.1		Name: **Flammable Gas** Cargo IMP Code: RFG Minimum dimensions: 100 × 100 mm Symbol (flame): Black or White Background: Red (Pantone Color No. 186U)
	2.2		Name: **Non-flammable, non-toxic Gas** Cargo IMP Code: RNG or RCL for Cryogenic Minimum dimensions: 100 × 100 mm Symbol (gas cylinder): Black or White Background: Green (Pantone Color No. 335U)

	2.3		Name: **Toxic Gas** Cargo IMP Code: RPG Minimum dimensions: 100 × 100 mm Symbol (skull and crossbones): Black Background: White
3			Name: Flammable Liquids Cargo IMP Code: RFL Minimum dimensions: 100 × 100 mm Symbol (flame): Black or White Background: Red (Pantone Color No. 186U)
4	4.1		Name: **Flammable Solid** Cargo IMP Code: RFS Minimum dimensions: 100 × 100 mm Symbol (flame): Black Background: White with seven vertical red stripes (Pantone Color No. 186U)
	4.2		Name: **Spontaneously Combustible** Cargo IMP Code: RSC Minimum dimensions: 100 × 100 mm Symbol (flame): Black Background: Upper half White, lower half Red (Pantone Color No. 186U)
	4.3		Name: **Dangerous When Wet** Cargo IMP Code: RFW Minimum dimensions: 100 × 100 mm Symbol (flame): Black or White Background: Blue (Pantone Color No. 285U)
5	5.1		Name: **Oxidizer** Cargo IMP Code: ROX Minimum dimensions: 100 × 100 mm Symbol (flame over circle): Black Background: Yellow (Pantone Color No. 109U)

	5.2		Name: **Organic Peroxides** Cargo IMP Code: ROP Minimum dimensions: 100 × 100 mm Symbol (flame): Black or White Background: Upper half Red (Pantone Color No. 186U), lower half Yellow (Pantone Colour No. 109U)
6	6.1		Name: **Toxic** Cargo IMP Code: RPB Minimum dimensions: 100 × 100 mm Symbol (skull and crossbones): Black Background: White
	6.2		Name: **Infectious Substance** Cargo IMP Code: RIS Minimum dimensions: 100 × 100 mm For small packages the dimensions may be 50 × 50 mm Symbol (three crescents superimposed on a circle) and inscription: Black Background: White
7	Catergory I		Name: **Radioactive** Cargo Imp Code: RRW Minimum dimensions: 100 × 100 mm Symbol (trefoil): Black Background: White
	Category II		Name: **Radioactive** Cargo Imp Code: RRY Minimum dimensions: 100 × 100 mm Symbol (trefoil): Black Background: Top half Yellow (Pantone Color No. 109U) with White border, bottom half White

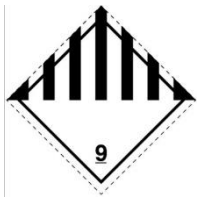
	Category III		Name: **Radioactive** Cargo Imp Code: RRY Minimum dimensions: 100 × 100 mm Symbol (trefoil): Black Background: Top half Yellow (Pantone Color No. 109U) with White border, bottom half White
			Placard for Class 7—Radioactive Materials
8			Name: **Corrosive** Cargo IMP Code: RCM Minimum dimensions: 100 × 100 mm Symbol (liquids spilling from two glass vessels and attacking a hand and a metal): Black Background: Upper half White, lower half Black with White border
9			Name: **Miscellaneous** Cargo IMP Code: RMD or ICE, RSB (polymeric beads and plastics moulding compound Minimum dimensions: 100 × 100 mm Symbol (seven vertical stripes in upper half): Black Background: White
			Name: **Lithium battery** Cargo IMP Code: RBI, RBM, RLI and RLM Minimum dimensions: 100 × 100 mm Symbol (seven vertical black stripes in upper half; battery group, one broken and emitting flame in lower half): black Background: White

Table 3 Hazard Label Specification

2.5.5 Handling Labels

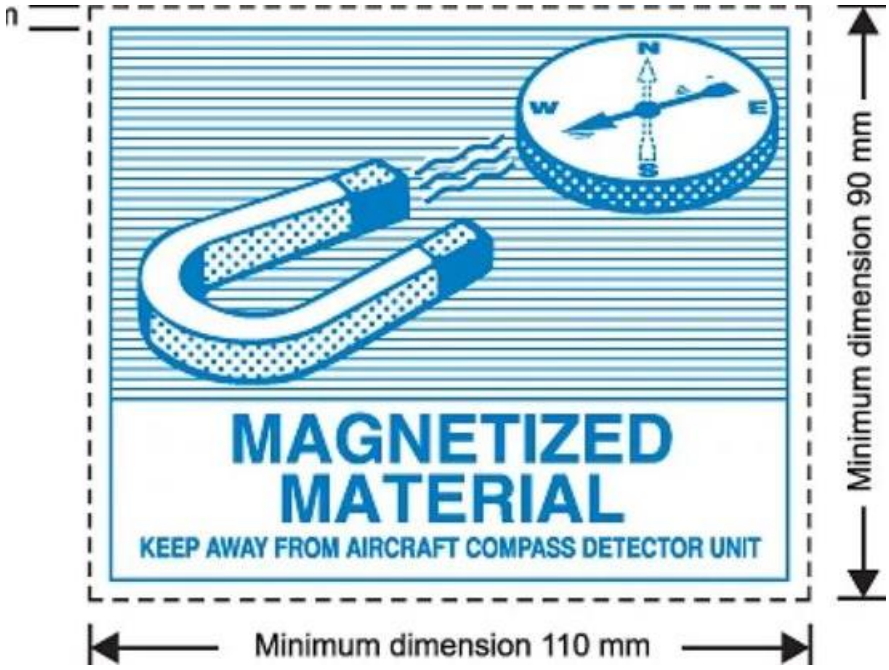


Figure 5 : Class 9—Magnetized Material

Figure 6 : Cargo Aircraft Only

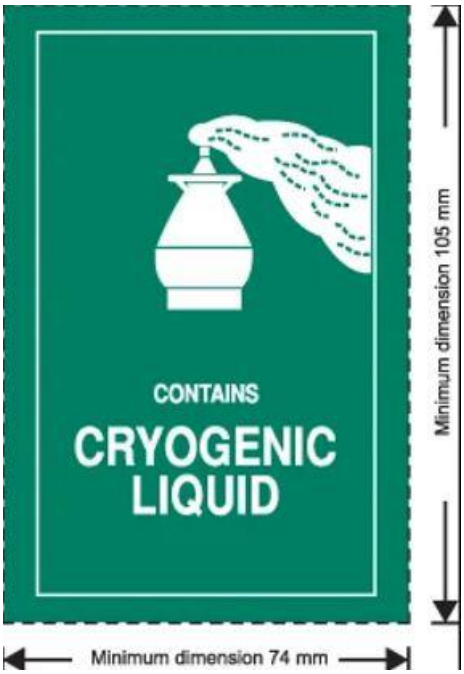


Figure 7 : Cryogenic Liquids

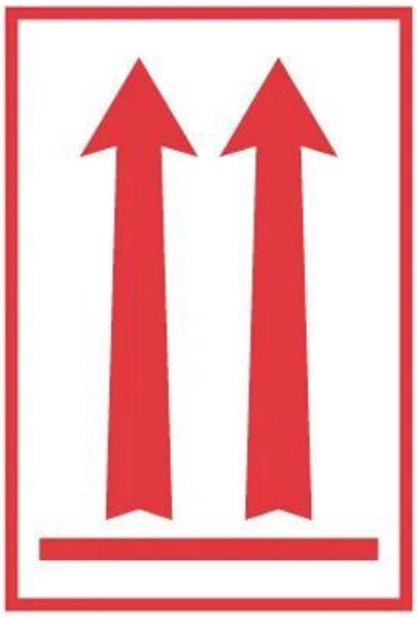


Figure 8 : Package Orientation

Figure 9 :Keep Away From Heat

Figure 10 : Radioactive Material—Excepted Package