

# Classification of Dangerous Cargo

## Dangerous Goods Classes and Divisions

1.1, 1.2, 1.3	EXPLOSIVES		2.3	TOXIC GASES		5.2	New Label, ORGANIC PEROXIDES		7 Cont	FISSILE MATERIAL	
1.4	Substances and articles which present no particular hazard		3	FLAMMABLE LIQUIDS			Old Label (not permissible after 1 January 2011)		8	CORROSIVE SUBSTANCES	
1.5	Very insensitive substances which have a mass explosion hazard		4.1	FLAMMABLE SOLIDS		6.1	TOXIC SUBSTANCES		9	MISCELLANEOUS DANGEROUS SUBSTANCES & ARTICLES	
1.6	Extremely insensitive articles which do not have a mass explosion hazard		4.2	SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION		6.2	INFECTIOUS SUBSTANCES		MIXED CLASSES (for road or rail transport or for storage in Australia)		
2.1	FLAMMABLE GASES		4.3	SUBSTANCES WHICH, IN CONTACT WITH WATER, EMIT FLAMMABLE GASES		7	RADIOACTIVE MATERIAL (Category I)		ELEVATED TEMPERATURE SUBSTANCES		
2.2	NON-FLAMMABLE NON-TOXIC GASES		5.1	OXIDIZING SUBSTANCES			RADIOACTIVE MATERIAL (Category II or III)		ENVIRONMENTALLY HAZARDOUS SUBSTANCES		
2.2 Sub-risk	OXIDISING GAS (Oxygen and Nitrous Oxide - only for road or rail transport or for storage in Australia)										

## **CLASS 1 – EXPLOSIVES**

Explosives are materials or items which have the ability to rapidly conflagrate or detonate as a consequence of chemical reaction.

### **Sub-Divisions**

- Division 1.1: Substances and articles which have a mass explosion hazard
- Division 1.2: Substances and articles which have a projection hazard but not a mass explosion hazard
- Division 1.3: Substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both
- Division 1.4: Substances and articles which present no significant hazard; only a small hazard in the event of ignition or initiation during transport with any effects largely confined to the package
- Division 1.5: Very insensitive substances which have a mass explosion hazard
- Division 1.6: Extremely insensitive articles which do not have a mass explosion hazard

### **Reason for Regulation**

Explosives are capable by chemical reaction of producing gases at temperatures, pressures and speeds as to cause catastrophic damage through force and/or of producing otherwise hazardous amounts of heat, light, sound, gas or smoke.

### **Commonly Transported Explosives**

1. Ammunition/cartridges
2. Fireworks/pyrotechnics
3. Flares
4. Blasting caps / detonators
5. Fuse
6. Primers
7. Explosive charges (blasting, demolition etc)
8. Detonating cord
9. Air bag inflators
10. Igniters
11. Rockets
12. TNT / TNT compositions
13. RDX / RDX compositions
14. PETN / PETN compositions

## CLASS 2 – GASES

Gases are defined by dangerous goods regulations as substances which have a vapour pressure of 300 kPa or greater at 50°C or which are completely gaseous at 20°C at standard atmospheric pressure, and items containing these substances. The class encompasses compressed gases, liquefied gases, dissolved gases, refrigerated liquefied gases, mixtures of one or more gases with one or more vapours of substances of other classes, articles charged with a gas and aerosols.

### Sub-Divisions

- Division 2.1: Flammable gases
- Division 2.2: Non-flammable, non-toxic gases
- Division 2.3: Toxic gases

### Reason for Regulation

Gases are capable of posing serious hazards due to their flammability, potential as asphyxiants, ability to oxidize and/or their toxicity or corrosiveness to humans.

### Commonly Transported Gases

1. Aerosols
2. Compressed air
3. Hydrocarbon gas-powered devices
4. Fire extinguishers
5. Gas cartridges
6. Fertilizer ammoniating solution
7. Insecticide gases
8. Refrigerant gases
9. Lighters
10. Acetylene / Oxyacetylene
11. Carbon dioxide
12. Helium / helium compounds
13. Hydrogen / hydrogen compounds
14. Oxygen / oxygen compounds
15. Nitrogen / nitrogen compounds
16. Natural gas
17. Oil gas
18. Petroleum gases
19. Butane
20. Propane
21. Ethane
22. Methane
23. Dimethyl ether
24. Propene / propylene
25. Ethylene

## CLASS 3 – FLAMMABLE LIQUIDS

Flammable liquids are defined by dangerous goods regulations as liquids, mixtures of liquids or liquids containing solids in solution or suspension which give off a flammable vapour (have a flash point) at temperatures of not more than 60-65°C, liquids offered for transport at temperatures at or above their flash point or substances transported at elevated temperatures in a liquid state and which give off a flammable vapour at a temperature at or below the maximum transport temperature.

### Commonly Transported Flammable Liquids

- Acetone / acetone oils
- Adhesives
- Paints / lacquers / varnishes
- Alcohols
- Perfumery products
- Gasoline / Petrol
- Diesel fuel
- Aviation fuel
- Liquid bio-fuels
- Coal tar / coal tar distillates
- Petroleum crude oil
- Petroleum distillates
- Ethers
- Ethanol
- Benzene
- Butanols
- Dichloropropenes
- Gas oil
- Shale oil
- Heating oil
- Kerosene
- Resins
- Tars
- Turpentine
- Carbamate insecticides
- Organochlorine pesticides
- Organophosphorus pesticides
- Copper based pesticides
- Esters
- Diethyl ether
- Isobutanols
- Isopropyls
- Methanol
- Octanes

### Reason for Regulation

Flammable liquids are capable of posing serious hazards due to their volatility, combustibility and potential in causing or propagating severe conflagrations.

**CLASS 4 – FLAMMABLE SOLIDS;  
SUBSTANCES LIABLE TO SPONTANEOUS COMBUSTION;  
SUBSTANCES WHICH EMIT FLAMMABLE GASES  
WHEN IN CONTACT WITH WATER**

Flammable solids are materials which, under conditions encountered in transport, are readily combustible or may cause or contribute to fire through friction, self-reactive substances which are liable to undergo a strongly exothermic reaction or solid desensitized explosives. Also included are substances which are liable to spontaneous heating under normal transport conditions, or to heating up in contact with air, and are consequently liable to catch fire and substances which emit flammable gases or become spontaneously flammable when in contact with water.

**Sub-Divisions**

- Division 4.1: Flammable solids
- Division 4.2: Substances liable to spontaneous combustion
- Division 4.3: Substances which, in contact with water, emit flammable gases

**Commonly Transported**

1. Alkali metals
2. Metal powders
3. Aluminium phosphide
4. Sodium batteries
5. Sodium cells
6. Firelighters
7. Matches
8. Calcium carbide
9. Camphor
10. Carbon
11. Activated carbon
12. Celluloid
13. Cerium
14. Copra
15. Seed cake
16. Oily cotton waste
17. Desensitized explosives
18. Oily fabrics
19. Oily fibres
20. Ferrocium
21. Iron oxide (spent)
22. Iron sponge/direct-reduced iron (spent)
23. Metaldehyde
24. Naphthalene
25. Nitrocellulose
26. Phosphorus
27. Sulphur

**Reason for Regulation**

Flammable solids are capable of posing serious hazards due to their volatility, combustibility and potential in causing or propagating severe conflagrations.

## CLASS 5 – OXIDIZING SUBSTANCES; ORGANIC PEROXIDES

Oxidizers are defined by dangerous goods regulations as substances which may cause or contribute to combustion, generally by yielding oxygen as a result of a redox chemical reaction. Organic peroxides are substances which may be considered derivatives of hydrogen peroxide where one or both hydrogen atoms of the chemical structure have been replaced by organic radicals.

### Sub-Divisions

- Division 5.1: Oxidizing substances
- Division 5.1: Organic peroxides

### Reason for Regulation

Oxidizers, although not necessarily combustible in themselves, can yield oxygen and in so doing cause or contribute to the combustion of other materials. Organic peroxides are thermally unstable and may exude heat whilst undergoing exothermic autocatalytic decomposition. Additionally, organic peroxides may be liable to explosive decomposition, burn rapidly, be sensitive to impact or friction, react dangerously with other substances or cause damage to eyes.

### Commonly Transported Oxidizers; Organic Peroxides

1. Chemical oxygen generators
2. Ammonium nitrate fertilizers
3. Chlorates
4. Nitrates
5. Nitrites
6. Perchlorates
7. Permanganates
8. Persulphates
9. Aluminium nitrate
10. Ammonium dichromate
11. Ammonium nitrate
12. Ammonium persulphate
13. Calcium hypochlorite
14. Calcium nitrate
15. Calcium peroxide
16. Hydrogen peroxide
17. Magnesium peroxide
18. Lead nitrate
19. Lithium hypochlorite
20. Potassium chlorate
21. Potassium nitrate
22. Potassium chlorate
23. Potassium perchlorate
24. Potassium permanganate
25. Sodium nitrate
26. Sodium persulphate

## CLASS 6 – TOXIC SUBSTANCES; INFECTIOUS SUBSTANCES

Toxic substances are those which are liable either to cause death or serious injury or to harm human health if swallowed, inhaled or by skin contact. Infectious substances are those which are known or can be reasonably expected to contain pathogens. Dangerous goods regulations define pathogens as microorganisms, such as bacteria, viruses, rickettsiae, parasites and fungi, or other agents which can cause disease in humans or animals.

### Sub-Divisions

- Division 6.1: Toxic substances
- Division 6.2: Infectious substances

### Reason for Regulation

Toxic and infectious substances can pose significant risks to human and animal health upon contact.

### Commonly Transported Toxic Substances; Infectious Substances

1. Medical/Biomedical waste
2. Clinical waste
3. Biological cultures / samples / specimens
4. Medical cultures / samples / specimens
5. Tear gas substances
6. Motor fuel anti-knock mixture
7. Dyes
8. Carbamate pesticides
9. Alkaloids
10. Allyls
11. Acids
12. Arsenates
13. Arsenites
14. Cyanides
15. Thiols/mercaptans
16. Cresols
17. Barium compounds
18. Arsenics / arsenic compounds
19. Beryllium/ beryllium compounds
20. Lead compounds
21. Mercury compounds
22. Nicotine / nicotine compounds
23. Selenium compounds
24. Antimony
25. Ammonium metavanadate
26. Adiponitrile
27. Chloroform
28. Dichloromethane
29. Hexachlorophene
30. Phenol
31. Resorcinol



## **CLASS 7 – RADIOACTIVE MATERIAL**

Dangerous goods regulations define radioactive material as any material containing radionuclides where both the activity concentration and the total activity exceeds certain pre-defined values. A radionuclide is an atom with an unstable nucleus and which consequently is subject to radioactive decay.

### **Sub-Divisions**

There are no subdivisions within Class 7, Radioactive Material.

### **Reason for Regulation**

Whilst undergoing radioactive decay radionuclides emit ionizing radiation, which presents potentially severe risks to human health.

### **Commonly Transported Radioactive Material**

1. Radioactive ores
2. Medical isotopes
3. Yellowcake
4. Density gauges
5. Mixed fission products
6. Surface contaminated objects
7. Caesium radionuclides / isotopes
8. Iridium radionuclides / isotopes
9. Americium radionuclides / isotopes
10. Plutonium radionuclides / isotopes
11. Radium radionuclides / isotopes
12. Thorium radionuclides / isotopes
13. Uranium radionuclides / isotopes
14. Depleted uranium / depleted uranium products
15. Uranium hexafluoride
16. Enriched Uranium



## CLASS 8 – CORROSIVES

Corrosives are substances which by chemical action degrade or disintegrate other materials upon contact.

### Sub-Divisions

There are no subdivisions within Class 8, Corrosives.

### Reason for Regulation

Corrosives cause severe damage when in contact with living tissue or, in the case of leakage, damage or destroy surrounding materials.

### Commonly Transported Corrosives

1. Acids/acid solutions
2. Batteries
3. Battery fluid
4. Fuel cell cartridges
5. Dyes
6. Fire extinguisher charges
7. Formaldehyde
8. Flux
9. Paints
10. Alkylphenols
11. Amines
12. Polyamines
13. Sulphides
14. Polysulphides
15. Chlorides
16. Chlorosilanes
17. Bromine
18. Cyclohexylamine
19. Phenol / carbolic acid
20. Hydrofluoric acid
21. Hydrochloric acid
22. Sulfuric acid
23. Nitric acid
24. Sludge acid
25. Hydrogen fluoride
26. Iodine
27. Morpholine

## CLASS 9 – MISCELLANEOUS DANGEROUS GOODS

Miscellaneous dangerous goods are substances and articles which during transport present a danger or hazard not covered by other classes. This class encompasses, but is not limited to, environmentally hazardous substances, substances that are transported at elevated temperatures, miscellaneous articles and substances, genetically modified organisms and micro-organisms and (depending on the method of transport) magnetized materials and aviation regulated substances.

### Sub-Divisions

There are no subdivisions within Class 9, Miscellaneous Dangerous Goods.

### Reason for Regulation

Miscellaneous dangerous goods present a wide array of potential hazards to human health and safety, infrastructure and/ or their means of transport.

### Commonly Transported Miscellaneous Dangerous Goods

1. Dry ice / cardice / solid carbon dioxide
2. Expandable polymeric beads / polystyrene beads
3. Ammonium nitrate fertilizers
4. Blue asbestos / crocidolite
5. Lithium ion batteries
6. Lithium metal batteries
7. Battery powered equipment
8. Battery powered vehicles
9. Fuel cell engines
10. Internal combustion engines
11. Vehicles
12. Magnetized material
13. Dangerous goods in apparatus
14. Dangerous goods in machinery
15. Genetically modified organisms
16. Genetically modified micro-organisms
17. Chemical kits
18. First aid kits
19. Life saving appliances
20. Air bag modules
21. Seatbelt pretensioners
22. Plastics moulding compound
23. Castor bean plant products
24. Polychlorinated biphenyls
25. Polychlorinated terphenyls
26. Dibromodifluoromethane
27. Benzaldehyde