

Dangerous Goods Classifications

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5. Oxidizing Substances
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7. Radioactive Material
8. Corrosives
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CLASS 1: EXPLOSIVES

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

Subclass



Subclass 1.1: Explosives with a mass explosion hazard

Consists of explosives that have a mass explosion hazard. A mass explosion is one which affects almost the entire load instantaneously.



Subclass 1.2: Explosives with a severe projection hazard

Consists of explosives that have a projection hazard but not a mass explosion hazard.



Subclass 1.3: Explosives with a fire

Consists of explosives that have a fire hazard and either a minor blast hazard or a minor projection hazard or both but not a mass explosion hazard.



Subclass 1.4: Minor fire or projection hazard

Consists of explosives that present a minor explosion hazard. The explosive effects are largely confined to the package and no projection of fragments of appreciable size or range is to be expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package.



Subclass 1.5: An insensitive substance with a mass explosion hazard

Consists of very insensitive explosives with a mass explosion hazard (explosion similar to 1.1). This division is comprised of substances which have a mass explosion hazard but are so insensitive that there is very little probability of initiation or of transition from burning to detonation under normal conditions of transport.



Subclass 1.6: Extremely insensitive articles

Consists of extremely insensitive articles which do not have a mass explosive hazard. This division is comprised of articles which contain only extremely insensitive detonating substances and which demonstrate a negligible probability of accidental initiation or propagation.

Reason of 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.

Subclass



Subclass 2.1: Flammable Gas

Gases which ignite on contact with an ignition source, such as acetylene and hydrogen. Flammable gas means any material which is ignitable at 101.3 kPa (14.7 psi) when in a mixture of 13 percent or less by volume with air, or has a flammable range at 101.3 kPa (14.7 psi) with air of at least 12 percent regardless of the lower limit.



Subclass 2.2: Non-Flammable Gases

Gases which are neither flammable nor poisonous. Includes the cryogenic gases/liquids (temperatures of below -100°C) used for cryopreservation and rocket fuels. This division includes compressed gas, liquefied gas, pressurized cryogenic gas, compressed gas in solution, asphyxiant gas and oxidizing gas. A non-flammable, nonpoisonous compressed gas means any material which exerts in the packaging an absolute pressure of 280 kPa (40.6 psia) or greater at 20°C (68°F), and does not meet the definition of Division 2.1 or 2.3.



Subclass 2.3: Poisonous Gases

Gases liable to cause death or serious injury to human health if inhaled. Gas poisonous by inhalation means a material which is a gas at 20°C or less and a pressure of 101.3 kPa (a material which has a boiling point of 20°C or less at 101.3kPa (14.7 psi)) which is known to be so toxic to humans as to pose a hazard to health during transportation, or in the absence of adequate data on human toxicity, is presumed to be toxic to humans because when tested on laboratory animals it has an LC50 value of not more than 5000 ml/m3.

Reason of 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.



A flammable liquid means a liquid which may catch fire easily or any mixture having one or more components with any flash point. As example: acetone, diesel, gasoline, kerosene, oil etc. There is strongly recommended for transportation at or above its flash point in a bulk packaging. There are three main groups of flammable liquid.

Low flash point - liquids with flash point below -18°C

Intermediate flash point - liquids with flash point from -18°C. up to +23°C

High flash point group - liquids with flash point from +23°C

Reason of regulation

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

Commonly Transported Flammable Liquids

- | | |
|-------------------------------------|---------------------------------|
| 1. Acetone / acetone oils | 18. Tars |
| 2. Adhesives | 19. Turpentine |
| 3. Paints / lacquers / varnishes | 20. Carbamate insecticides |
| 4. Alcohols | 21. Organochlorine pesticides |
| 5. Perfumery products | 22. Organophosphorus pesticides |
| 6. Gasoline / Petrol | 23. Copper based pesticides |
| 7. Diesel fuel | 24. Esters |
| 8. Aviation fuel | 25. Ethers |
| 9. Liquid bio-fuels | 26. Ethanol |
| 10. Coal tar / coal tar distillates | 27. Benzene |
| 11. Petroleum crude oil | 28. Butanols |
| 12. Petroleum distillates | 29. Dichloropropenes |
| 13. Gas oil | 30. Diethyl ether |
| 14. Shale oil | 31. Isobutanols |
| 15. Heating oil | 32. Isopropyls |
| 16. Kerosene | 33. Methanol |
| 17. Resins | 34. Octanes |

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.

Subclass



Subclass 4.1: Flammable solids

Solid substances that are easily ignited. Self-reactive materials, which are thermally unstable and that can undergo a strongly exothermic decomposition even without participation of air. Readily combustible solids that can cause a fire through friction and show a burning rate faster than 2.2 mm (0.087 inches) per second, or metal powders that can be ignited and react over the whole length of a sample in 10 minutes or less.



Subclass 4.2: Spontaneously combustible solids

Solid substances that ignite spontaneously. Spontaneously combustible material is a pyrophoric material, which is a liquid or solid that can ignite within five minutes after coming in contact with air or a self-heating material that when in contact with air and without an energy supply is liable to self-heat.



Subclass 4.3: Dangerous when wet

Solid substances that emit a flammable gas when wet. Dangerous when wet material is a material that when it makes contact with water is liable to become spontaneously flammable or give off flammable or toxic gas at a rate greater than 1 L per kilogram of the material per hour.

Reason of regulation

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

Commonly Transported Flammable Solids; Spontaneous Combustibles; Dangerous When Wet Materials

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

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.

Subclass



Subclass 5.1: Oxidizing agent

Oxidizing agent means a material that may, generally by yielding oxygen, cause or enhance the combustion of other materials.



Subclass 5.2: Organic peroxide oxidizing agent

Organic peroxide means any organic compound containing oxygen in the bivalent structure and which may be considered a derivative of hydrogen peroxide, where one or more of the hydrogen atoms have been replaced by organic radicals.

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

CLASS 6: TOXIC AND 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.

Subclass



Subclass 6.1: Poison

Toxic substances which are able to cause death or serious hazard to humans health during transportation.



Subclass 6.2: Biohazard

Infectious Substance material is known to contain or suspected of containing a pathogen. Infectious substances are substances which are known or are reasonably expected to contain pathogens. Pathogens are defined as micro-organisms (including bacteria, viruses, rickettsiae, parasites, fungi) and other agents such as prions, which can cause disease in humans or animals.

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

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.



Radioactive

Radioactive substances comprise substances or a combination of substances which emit ionizing radiation.

Reason of regulation

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

Commonly Transported Radioactive Material

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

CLASS 8: CORROSIVE SUBSTANCES

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



Corrosive

Corrosive materials means a liquid or solid that causes full thickness destruction of human skin at the site of contact within a specified period of time. A liquid that has a severe corrosion rate on steel or aluminum is also a corrosive material.

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

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.



Miscellaneous

A material which presents a hazard during transportation but which does not meet the definition of any other hazard class. This class includes: any material which has an anesthetic, noxious or other similar property which could cause extreme annoyance or discomfort to a flight crew member so as to prevent the correct performance of assigned duties or material for an elevated temperature material, a hazardous substance, a hazardous waste, or a marine pollutant.

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