

## **ANNEXURE-A: CATEGORISATION OF "HAZARDOUS CARGO" INTO 9 CLASSES**

### **1. Class 1. Explosives :**

It comprises of the chemicals that are intrinsically explosive or becomes explosives on deterioration . It should not be handled without expert advice.

### **2. Class 2 . Gases;**

This can not be examined as it poses a hazard as it diffuses over a large volume to exert a flammable, asphyxiating, toxic or oxidizing effect. So its potentially a health hazard and cannot be opened and examined in the open.

### **3. Class 3 - Flammable Liquids**



Flammable liquids are liquids which are capable of being ignited and burned. They may also be mixtures of liquids, containing solids in solution or suspension (eg. paints). Ignition of the flammable liquid and production of fire is the major hazard here. The flammable liquids (Class 3) are considered a higher risk than flammable solids (Class 4) because of the:

- generally higher vapour pressure exhibited by liquid compounds,
- ability of the liquid to flow under gravity and collect in low points or flow into drains and waterways.

**4. Class 4 :** Class 4 dangerous goods are flammable solids, and their major hazard is their flammable nature. Class 4 is divided into three divisions, and the substances within each divisions are assigned to packing group I (highest danger), II (moderate danger), or III (minor danger).

#### *Division 4.1 - Flammable solids*



Flammable solids are solids that, under conditions encountered in transport, are readily combustible or may cause or contribute to fire through friction. They can also be a powder or paste. An added danger can be from toxic combustion products. eg. metal powders, naphthalene.

Self-reactive and related substances are substances that are liable to undergo a strong exothermic reaction. e.g. aliphatic azo- compounds, organic azides.

Desensitized explosives are substances that may explode if not diluted sufficiently. e.g. ammonium picrate, wetted; dinitrophenol, wetted; barium azide, wetted; nitrocellulose with alcohol.

## Division 4.2 - Substances liable to spontaneous combustion



This division is comprised of substances that are liable to spontaneous heating under normal conditions encountered in transport; or heating up in contact with air, and being able to catch fire due to such heating. e.g. white phosphorus.

## Division 4.3- Substances that in contact with water emit flammable gases



These are substances that, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities. e.g. sodium metal.

## Class 5 - Oxidising Substances and Organic Peroxides

Oxidising substances and organic peroxide pose a hazard because of their ability to chemically oxidise matter, including living tissue. Strong oxidisers can greatly enhance the flammability of material with the production of heat, fire, and dangerous reaction products. Class 5 dangerous goods are divided into two divisions, with substances within each sub-class being assigned to packing group I (great danger), II (moderate danger), or III (minor danger).

### *Division 5.1 - Oxidizing Substances*



Although these substances are not necessarily combustible, they may:

- readily liberate oxygen; or
- be the cause of, or contribute to the combustion of, other materials.

Examples of oxidising agents are hydrogen peroxide, copper chlorate and fluorine.

### *Division 5.2 - Organic Peroxides*



Organic peroxides all contain the bivalent -O-O- ( $O_2^{2-}$ ) structure. They are thermally unstable substances, that may undergo exothermic, self-accelerating decomposition and

most substances of this class are combustible. In addition, they may have one or more of the following properties - be liable to:

- explosive decomposition;
- burn rapidly;
- be sensitive to impact or friction;
- react dangerously with other materials; or
- cause damage to the eyes.
- Examples of organic peroxides are dibenzoyl peroxide, peracetic acid and perbenzoic acid.

### **Class 6 – Toxic and Infectious Substances**

- Class 6 dangerous goods are hazardous because of their chemical toxicity or biological infectivity to people, animals or the environment. The words "toxic" and "poisonous" are synonyms. Class 6 is divided into two divisions, with the substances in each division being assigned to packing group I (great danger), II (moderate danger), or III (minor danger).
- *Division 6.1 - Toxic Substances*  
These are substances that if swallowed, inhaled, come into contact with skin are liable to cause death, serious injury, or to harm human health.
- *Division 6.2 - Infectious Substances*



- Infectious substances are materials known, or reasonably expected, to contain pathogens. Pathogens are defined as microorganisms including bacteria, viruses, rickettsia, parasites, fungi, or are genetically modified microorganisms that are known, or reasonably believed, to cause disease in humans or animals. Genetically Modified Microorganisms which do not meet the criteria of an infectious substance should be considered for classification in Class 9.

### **Class 7 - Radioactive Substances**



- Class 7 dangerous goods spontaneously emit ionizing radiation. For packaging and transport requirements, this class is divided into three categories -

### **Class 8 – Corrosives**



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Class 8 dangerous goods are corrosive substances that, by chemical action, will cause severe damage when in contact with living tissue, or in the case of leakage, will damage or destroy other materials. Corrosive substances are assigned to packing group I (great danger), II (moderate danger), or III (minor danger).

### **Class 9 - Miscellaneous Dangerous Goods**



Class 9 dangerous goods are substances and articles that during transport present a danger not covered in other classes. This class includes substances that are transported or offered for transport at temperatures  $\geq 100$  °C in a liquid state, or at temperatures  $\geq 240$  °C in a solid state. Examples of Class 9 dangerous goods – dry ice, strong magnets.

Class 9 dangerous goods are assigned to packing group I (great danger), II (moderate danger), or III (minor danger).

**HAZARDOUS SUBSTANCES** – These are substances included in the Australian Safety and Compensation Council's Hazardous Substance Information System or in federal, state or territory Hazardous Substances legislation. <sup>5</sup> The term applies to a material that has the potential, through being used at work, to harm the health or safety of persons in the workplace.

## **ANNEXURE-B: READING HAZARDOUS MATERIALS PLACARDS:**

Bulk containers transporting hazardous materials are required to be placarded.

Placards are a diamond shaped hazardous material information source for emergency responders, railroad employees and others.



A placard provides the viewer with a variety of information through several different methods.

**Color of the placard:** Red indicates flammable, green indicates nonflammable, yellow indicates oxidizer, blue indicates dangerous when wet, white indicates inhalation hazard and poison, black and white indicates corrosive (acid and caustic), red and white indicates flammable solid or spontaneously combustible, depending on the color pattern on the placard, white and yellow indicates radiation or radioactive, orange indicates explosives, white with black stripes indicates miscellaneous hazardous materials, and there is another red and white placard that says "dangerous" on it.

**Number in the bottom corner of the diamond:** This number refers to the hazard classes as used internationally. There are 9 classes for hazardous materials:

- Class 1 explosives
- Class 2 gases (flammable, nonflammable, inhalation hazard/poison, or oxygen)
- Class 3 liquids that burn (flammable and combustible liquids, based on their flashpoint)
- Class 4 flammable solids, spontaneously combustible, or dangerous when wet materials
- Class 5 oxidizers and organic peroxides
- Class 6 poison/toxic solids and liquids, infectious materials
- Class 7 radioactive (three sub classes)
- Class 8 corrosives (acids and bases)

**Symbol in the upper corner of the diamond:** . A variety of symbols are used to indicate combustion, radiation, oxidizers, compressed gas, destruction of materials and skin by corrosives, an explosion, or skull and cross bones to indicate poisons.

**Four digit United Nations (UN) number:** used for the hazardous material contained in the container. There are hundreds of four digit numbers used, from 1001 (acetylene) to 9279 (hydrogen, absorbed in metal hydride). The number in some cases is specific to a chemical and in other cases reflects a variety of hazardous materials. (For example, 1017 is only used for chlorine, 1005 has five chemical listings, 1993 is used for eight chemical listings and 2810 is used for 36 chemical listings.)

In some cases placards will give the real name of the chemical instead of using the four digit number, or will describe the hazard (flammable, inhalation hazard, radioactive) and not list the chemical name or four digit number.

