INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

NOTES BY:
CAPT. PARVINDER SINGH BHATIA

UPDATED: 01 DEC 2020

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

- **Dangerous Goods** means Dangerous Cargoes carried in packaged form or solid form in bulk and includes harmful substances identified as marine pollutants in the IMDG code.
- Dangerous goods by their inherent nature can cause harm to humans, animals, property or environment.
- Various goods falls into the category of dangerous goods and pose different nature of hazard while being transported such as radioactive radiation, acid burns, explosion, fire, dangerous generation of explosive, corrosive, toxic or flammable gases, depletion of oxygen etc.
- In response to the sinking of RMS Titanic on 14 April 1912 International Convention for the Safety of Life at Sea (SOLAS) was passed in 1914. Chapter VII of SOLAS Convention contains the mandatory provisions governing the carriage of dangerous goods in packaged form or in solid form in bulk.
- A **hazard is** something that poses an immediate or long-term health effects on the environment or people, such as fumes or vapours.
- A **danger is** something that poses an immediate physical or chemical effect, such as an explosion or a fire.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

- **Marine pollutants** or environmentally hazardous substances are materials that can pose a risk to aquatic ecosystems.
- A symbol **P** in the column **HAZARD** identifies Marine Pollutants.
- Marine pollutant is a term mainly used by IMDG code while the term "**environmentally hazardous substances**" are used by other dangerous goods regulations such as IATA (International Air Transport Association).
- **SOLAS and Dangerous Goods**
- **Chapter VII Part A of SOLAS** deals and **covers safety implications** with carriage of dangerous goods in Packaged form by ships and is amplified by the International Maritime Dangerous Goods (IMDG) Code. The carriage of dangerous goods is prohibited except in accordance with the relevant provisions of chapter VII Part A of SOLAS.
- **MARPOL and Dangerous Goods**
- The International Convention for the Prevention of Pollution from Ships, 1973 **(MARPOL), Annex III, covers Pollution aspects** and contains the mandatory provisions for the prevention of pollution by harmful substances carried by sea in packaged form. The carriage of marine pollutants is prohibited except in accordance with the relevant provisions of Annex III of MARPOL.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

- To supplement the principles laid down in the SOLAS and MARPOL Conventions, the IMO developed the International Maritime Dangerous Goods (IMDG) Code.
- The International Maritime Dangerous Goods Code (**IMDG Code**) sets provisions for the safe transport of dangerous goods by sea. The provisions of the code affects Manufacturers, Packers, Shippers, Port Authorities, Terminal Operators, etc.
- SOLAS 1960 brought out Ch VII dedicated for the carriage of Dangerous Goods.
- IMDG was first published by the IMO in 1965.
- As of Jan 2004, the IMDG code has been mandatory.
- **OBJECTIVES:**
- Protect human life.
- Prevent damage to ships and their cargoes.
- Prevent marine pollution.
- Facilitate the free movement of Dangerous goods.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

- **PROVISIONS:**
- The Provisions require that Dangerous Goods are correctly and safely:
- 1. Classified and identified.
- 2. Packed.
- 3. Marked, labeled and Placarded.
- 4. Documented.
- 5. Stowed on board the Vessel.
- 6. Segregated from other goods that may react dangerously .
- In addition, appropriate **emergency response information** must be available and **Security and Training** requirements must be followed.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

- **PURPOSE:**
- The IMDG Code is based on an internationally agreed system which:
- Groups dangerous goods together based on the hazards they present in transport (classification).
- Contains the dangerous goods in packaging's/tanks which are of appropriate strength and which will prevent the goods escaping.
- Uses hazard warning labels and other identifying marks to identify dangerous goods in transport.
- Requires standard documentation to be provided when dangerous goods are being transported.
- Lays down principles for ensuring that dangerous goods which will react dangerously together are kept apart.
- Lays down principles for where to place dangerous goods on board ship to ensure safe transport.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

- **Application and implementation of the Code:**
- The provisions contained in this Code are applicable to all ships to which the International Convention for the Safety of Life at Sea, 1974 **(SOLAS 74),** as amended, applies and which are carrying dangerous goods as defined in **regulation 1 of part A of chapter VII of that Convention.**
- **Chapter VII -Carriage of Dangerous Goods - Part A - Carriage of Dangerous Goods in Packaged Form:**
- **Regulation 2 - Application**
- 1. Unless expressly provided otherwise, this part applies to the carriage of dangerous goods in packaged form in all ships to which the present regulations apply and in cargo ships of less than 500 gross tonnage.
- 2. The provisions of this part do not apply to ships' stores and equipment.
- 3. The carriage of dangerous goods in packaged form is prohibited except in accordance with the provisions of this chapter.
- 4. To supplement the provisions of this part, each Contracting Government shall issue detailed instructions on emergency response and medical first aid relevant to incidents involving dangerous goods in packaged form, taking into account the guidelines developed by the Organization.
- **Regulation 3 - Requirements for the carriage of dangerous goods**
- The carriage of dangerous goods in packaged form shall comply with the relevant provisions of the IMDG Code.
- **MARPOL ANNEX III REQUIREMENTS: All ships, irrespective of type and size, carrying substances, material or articles identified in this Code as marine pollutants are subject to the provisions of this Code.**

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

- **Updating the IMDG Code:**
- **The IMDG Code is evolving and is updated every two years to take account of:**
- New dangerous goods which have to be included.
- New technology and methods of working with or handling dangerous goods.
- Safety concerns which arise as a result of experience.
- From 1st January 2010 onwards as per IMDG Code it is mandatory that all Shore-based personnel engaged in transport of dangerous goods by sea be trained in the contents of dangerous goods provisions commensurate with their responsibilities. **Chapter 1.3** of IMDG Code details the requirements of training.
- Every two years the 2-volume publication is updated and amended to reflect **biennial** (every other year) revisions in the UN Recommendations on the Transport of Dangerous Goods.
- **The IMDG Code, 2018 Edition (Amendment 39-18) comes into force on 1 January 2020 for two years and may be applied voluntarily as from 1 January 2019.**
- The IMDG Code, 2016 Edition (Amendment 38-16) came into force on 1 January 2018 for two years.

Amendment Cycle of the IMDG Code

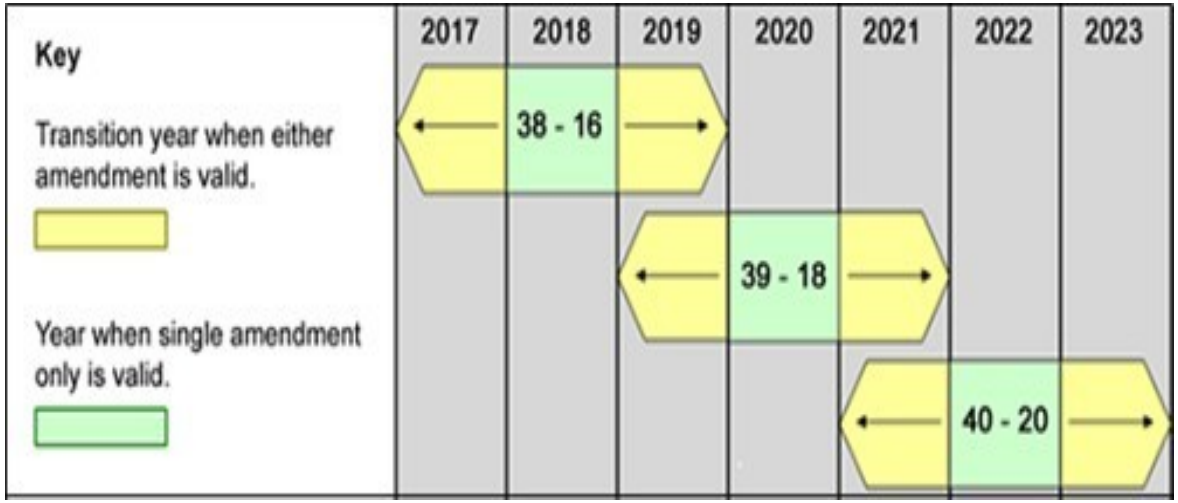
- In January of the yellow years, a new Amendment is published and can be used immediately, subject to the timing of National Competent Authority adoption.
- Also, during the yellow years, the preceding (coming before) Amendment can also be used, so it is an overlap period and are known as Transition years.

In the Green years only the current Amendment can be used.

The General principle is:

Each Amendment is valid for three years.

There are alternating years for implementation.



Layout/Contents of the IMDG Code

- The Code comprises 7 parts.
- It is presented in two Volumes.
- Volume 1 and Volume 2.
- The Code also contains a **Supplement.**
- **Volume 1 (Parts 1-2 & 4-7 of the Code) comprises:**
- Includes most of the detailed instructions for safely preparing and transporting dangerous goods by sea:
- Part 1: General provisions, definitions and training.
- Part 2: Classification.
- Part 4: Packing and Tank Provisions.
- Part 5: Consignment Procedures.
- Part 6: Construction and Testing of Packaging's, Intermediate Bulk Containers (IBCs), Large Packaging's, Portable Tanks, Multiple Element Gas Containers (MEGCs) and Road Tank Vehicles.
- Part 7: Requirements Concerning Transport Operations.

Layout/Contents of the IMDG Code

- **Volume 2:**
- Part 3: Dangerous Goods List (DGL), Special Provisions and Exceptions (Limited and Excepted Quantities).
- Appendix A: List of Generic and N.O.S (**Not Otherwise Specified)**. Proper Shipping Names **(PSN).**
- Appendix B: Glossary of terms Alphabetical Index .
- There is also an IMDG Supplement to this biennial's (every other year) publication.
- **The Supplement contains the following texts related to the Code:**
- Emergency Response Procedures for Ships Carrying Dangerous Goods.
- Medical First Aid Guide.
- Reporting Procedures.
- IMO/ILO/ECE (Economic Commission for Europe) Guidelines for Packing Cargo Transport Units.
- Safe Use of Pesticides in Ships.
- International Code for the Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on Board Ships.

CLASSIFICATION CATEGORY ACCORDING TO HAZARD

- Substances (including mixtures and solutions) and articles subject to the provisions of this Code are assigned to one of the classes 1–9 according to the hazard or the most predominant of the hazards they present.
- **The numerical order of the classes and divisions is not that of the degree of danger.**
- Some of these classes are subdivided into divisions.
- These classes or divisions are as listed below:
- **Class 1: Explosives**
- Division 1.1: substances and articles which have a mass explosion hazard.
- Example: UN 0034, BOMBS, with bursting charge.
- Division 1.2: substances and articles which have a projection hazard but not a mass explosion hazard.
- Example: UN 0295, ROCKETS with bursting charge
- Division 1.3: substances and articles which have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but not a mass explosion hazard.
- Example: UN 0186, ROCKET MOTORS.

CLASSIFICATION CATEGORY ACCORDING TO HAZARD

- **Class 1: Explosives (Cont'd)**
- Division 1.4: substances and articles which present no significant hazard.
- Example: UN 0012, CARTRIDGES, SMALL ARMS.
- Division 1.5: very insensitive substances which have a mass explosion hazard.
- Example: UN 0332, EXPLOSIVES, BLASTING.
- Division 1.6: extremely insensitive articles which do not have a mass explosion hazard. Example: UN 0486, ARTICLES, EXPLOSIVE, EXTREMELY INSENSITIVE.
- **NOTES FOR ORALS:**
- **The explosives category includes any items or materials that can rapidly detonate as the result of a chemical reaction.**
- **This classification is broken down into six sub-divisions and includes things like fireworks, ammunition, rockets, explosive charges, airbag inflators. (The inflator is a device inside the airbag that contains a propellant that inflates the airbag in the event of a collision).**

CLASSIFICATION CATEGORY ACCORDING TO HAZARD

- **Class 2: Gases**
- Class 2.1: Flammable gases. Example: UN 1978, PROPANE.
- Class 2.2: Nonflammable, Nontoxic gases. Example: UN 1013, CARBON DIOXIDE.
- Class 2.3: Toxic gases. Example: UN 2199, PHOSPHINE.
- **NOTES FOR ORALS:**
- **Class 2: Gases**
- **The classification is broken down into three sub-divisions that include several common items like aerosols, compressed cases, fire extinguishers, gas cartridges, natural gas and propane.**
- **Class 3: Flammable liquids -** Example: UN 1203, GASOLINE.
- **NOTES FOR ORALS:**
- **Class 3: Flammable Liquids**
- **Common examples include many adhesives, paints, alcohol, diesel fuel, gasoline, acetone and kerosene.**

CLASSIFICATION CATEGORY ACCORDING TO HAZARD

- **Class 4: Flammable solids; substances liable to spontaneous combustion; substances which, in contact with water, emit flammable gases**
- Class 4.1: flammable solids, self-reactive substances and solid desensitized explosives.
- Examples: UN 1331, MATCHES
- Class 4.2: substances liable to spontaneous combustion.
- Example: UN 1381, PHOSPHORUS
- Class 4.3: substances which, in contact with water, emit flammable gases.
- Example: UN 1428, SODIUM
- **NOTES FOR ORALS:**
- **Class 4: Flammable Solids**
- **This class includes materials that are readily combustible under conditions that are common during transport.**
- **This category is broken down into three sub-divisions.**
- **Commonly transported flammable solids include matches, metal powders, sodium batteries and activated carbon.**

CLASSIFICATION CATEGORY ACCORDING TO HAZARD

- **Class 5: Oxidizing substances and Organic peroxides**
- Class 5.1: Oxidizing substances.
- Example: UN 2067, AMMONIUM NITRATE BASED FERTILIZER.
- Class 5.2: Organic peroxides.
- Example: UN 3109, ORGANIC PEROXIDE TYPE F.
- **NOTES FOR ORALS:**
- **Class 5: Oxidizing Substances, Organic Peroxides**
- **Oxidizers are substances that may contribute to or cause combustion by yielding (give away) oxygen as the result of a chemical reaction.**
- **Organic peroxides are substances that may qualify as hydrogen peroxide where organic radicals have replaced one or both of the hydrogen atoms in the chemical structure.**
- **Chemical oxygen generators, nitrates, nitrites, ammonium nitrate fertilizers and sodium nitrate are a few common examples of this type of hazardous material.**

CLASSIFICATION CATEGORY ACCORDING TO HAZARD

- **Class 6: Toxic and infectious substances**
- Class 6.1: Toxic substances.
- Example: UN 1558, ARSENIC
- Class 6.2: Infectious substances.
- Example: UN 2814, INFECTIOUS SUBSTANCE, AFFECTING HUMANS
- **NOTES FOR ORALS:**
- **Class 6: Toxic Substances and Infectious Substances**
- **Toxic substances include any substances that could cause serious injury, harm or death to a human if inhaled, swallowed or allowed to come into contact with skin.**
- **Infectious substances are materials that are known to or likely to contain pathogens such as viruses, bacteria, parasites, fungi and other microorganisms that can cause disease in humans and animals.**
- **Examples include medical and biomedical waste, biological cultures, tear gas, dyes, acids, cyanides, arsenic, nicotine and chloroform.**

CLASSIFICATION CATEGORY ACCORDING TO HAZARD

- **Class 7: Radioactive material**
- Example: UN 2977, URANIUM HEXAFLUORIDE.
- **NOTES FOR ORALS:**
- **Class 7: Radioactive Material**
- **These materials emit ionizing radiation, which is extremely dangerous to human health.**
- **Medical isotopes, radioactive ores, depleted uranium and density gauges are a few of the most commonly transported radioactive materials.**
- **Class 8: Corrosive substances**
- Example: UN 1789, HYDROCHLORIC ACID.
- **NOTES FOR ORALS:**
- **Class 8: Corrosives**
- **Corrosives damage surrounding materials if they leak while in transit, and they can cause severe damage to living tissue.**
- **Examples include acids and acid solutions, batteries, dyes, paints and flux (Cleaning agent like Zinc Chloride).**

CLASSIFICATION CATEGORY ACCORDING TO HAZARD

- **Class 9: Miscellaneous dangerous substances and articles**
- **NOTES FOR ORALS:**
- **Class 9: Miscellaneous Hazardous Materials**
- **Some hazardous materials do not fall into any of the first eight categories.**
- **In these situations, they are classified as "miscellaneous hazardous materials," a class that includes environmentally hazardous substances, substances that are transported at high temperatures and magnetized materials.**
- **A few common examples include dry ice, lithium-ion batteries, vehicles, first-aid kits, life-saving appliances and fuel cell engines.**
- **i. Lithium metal batteries are Primary batteries (non rechargeable) that have lithium as an anode. Used in watches, calculators, etc.**
- **ii. Lithium ion batteries are Secondary batteries (rechargeable) that have lithium as an anode. Used in mobile phones, laptops, etc.**
- **Substances which, on inhalation as fine dust, may endanger health e.g. ASBESTOS.**

Subsidiary Risk

- Many dangerous goods present the hazards of **more than one Class or Division.**
- Such goods are assigned to a Class according to their **Primary hazard**.
- The **other hazard or hazards** are referred to as Subsidiary Risks.
- Examples:
- **Methanol** is a highly flammable liquid that is also toxic.
- It meets the classification criteria for both Class 3 (Flammable) and Division 6.1 (Toxic).
- As its flammability is its primary hazard, Methanol is assigned to Class 3.
- It is also shown in the Dangerous Goods Code as having a Subsidiary Risk of 6.1 to cover its toxicity hazard.
- **Nitric Acid**, Red, Fuming is corrosive, a strong oxidising agent and toxic.
- It meets the classification criteria for Classes 8, 5.1 and 6.1.
- As its corrosivity, is its primary hazard, Nitric Acid, Red, Fuming is assigned to Class 8.
- However, it is also allocated Subsidiary Risks of 5.1 and 6.1 to cover the other hazards.

UN NUMBERS AND PROPER SHIPPING NAMES

- A United Nations Number – also called a UN number or UN ID – is a four digit code.
- Dangerous goods are assigned to UN Numbers and Proper Shipping Names according to their hazard classification and their composition.
- Dangerous goods commonly transported are listed in the Dangerous Goods List. Where an article or substance is specifically listed by name, it should be identified in transport by the Proper Shipping Name in the Dangerous Goods List. For dangerous goods not specifically listed by name, “generic” or (N.O.S) – “not otherwise specified” entries are provided to identify the article or substance in transport.
- Each entry in the Dangerous Goods List is assigned a UN Number. This list also contains relevant information for each entry, such as hazard class, subsidiary risk(s) (if any), packing group (where assigned), packing and tank transport provisions, EmS, segregation and stowage, properties and observations, etc.
- Information on the special measures to be taken when a certain dangerous cargo is handled.
- Additionally, attached relevant extracts from the IMDG code in particular all the emergencies that could arise with the handling of the cargo. Also the emergency clean-up measures as well as the first aid requirement as per the EmS (Emergency Schedule of the IMDG) and MFAG.
- Any special precautions mention as per the Dangerous List should be extracted. Compatibility risks should be ascertained.

Shrink Packaging

•**Shrink Packaging or Bundle Wrapping** is a packaging process in where a group of products is wrapped in shrinkable plastic film which, after exposing to hot air, holds the products firmly together for transport, as a sales unit or for ease of inventory management.

•Most bottles, cans, etc. are ideal for shrink wrapping.

•The shrink wrapping process consists of 3 steps:

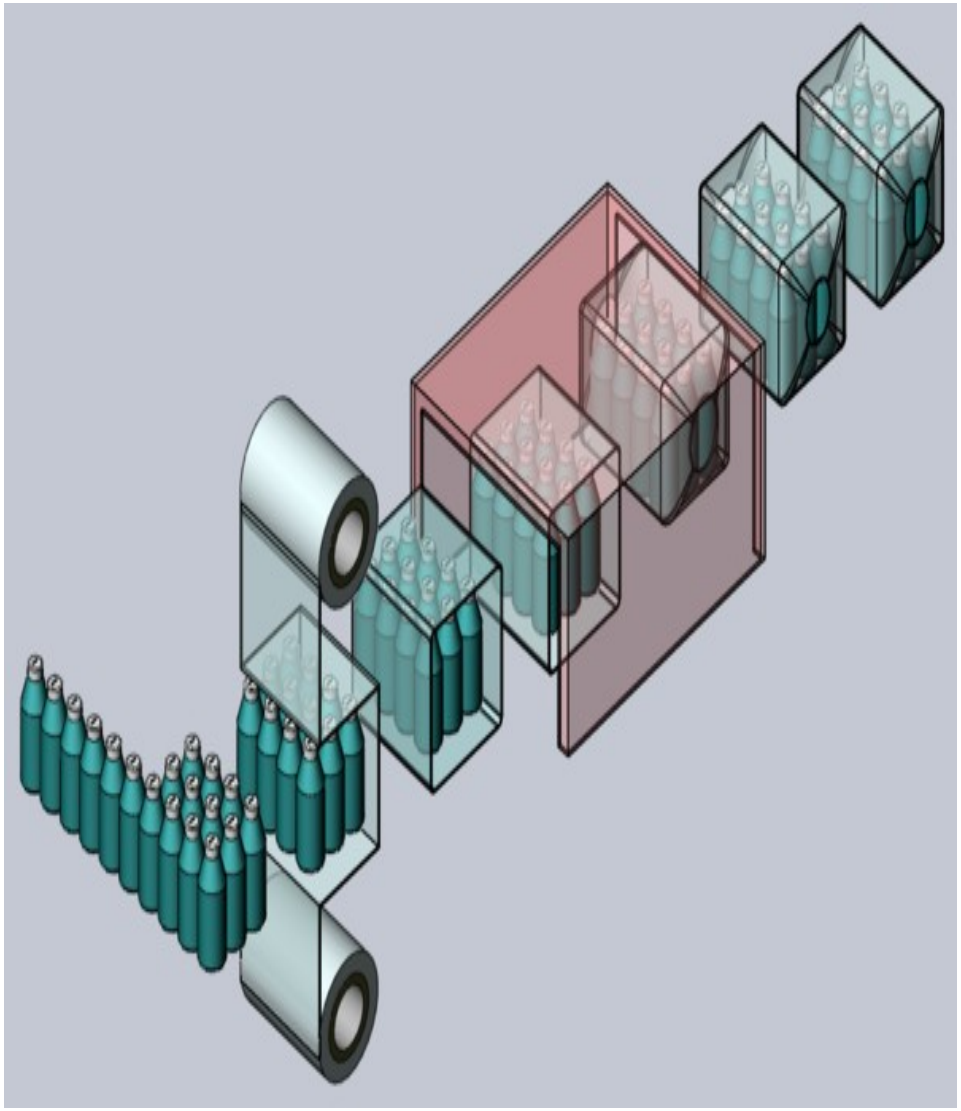
•1. Product grouping: The products are arranged into a group (e.g. 3×2 bottles to form a 6-pack).

•2. Bundle forming: A sheet of shrink film is wrapped around the products forming a **bundle.**

•3. Heat shrinking: The bundle passes through a heated zone of the **shrink tunnel**, where re-circulated hot air causes the film to shrink and conform the shape of enclosed products. Once outside, the pack is cooled by forced air to tighten the film forming semi rigid pack ready for stacking on pallet.

•**Advantages:**

Low cost, water resistant, easier and much cheaper to automate in comparison to tray or case packing, Product is visible, can be seen through the film (unlike cardboard) and leaking mostly contained to single pack, not damaging full pallet.



OVERPACK LABEL

- Overpacks are enclosures used by shippers to contain one or more packages of dangerous goods to form a single handling unit.
- This makes handling and stowage more convenient during transport.
- Overpacks usually take the shape of several crates or boxes that have been secured to a pallet and shrink-wrapped/strapped, but they can also be single receptacles, such as a gas canister, placed into another protective outer box or other packaging.
- **Overpacks** must be marked with the word 'Overpack' or an Overpack label.
- IMDG labelling requirements for overpacks include the following (unless the labels and marks representative of all the dangerous goods contained within the overpack are visible):
- The proper Shipping Name (PSN) and UN Number (preceded by the letters 'UN') and warning diamond class for each substance contained within the overpack.
- Marked with the word 'OVERPACK' or an overpack label.
- Orientation arrows on two opposite sides.
- The Marine Pollutant marks, when in accordance where necessary.

PACKING GROUP

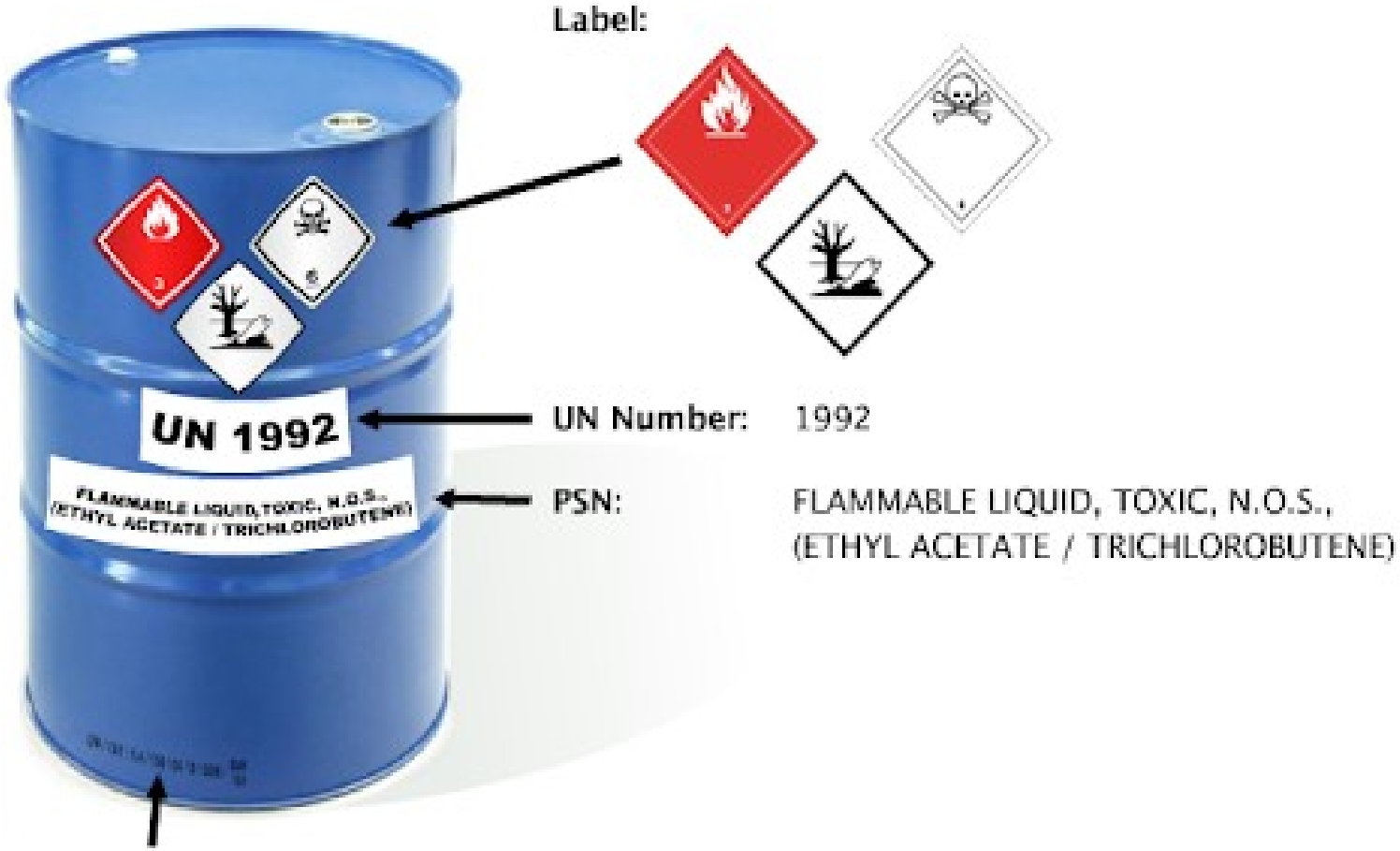
- **Packing Group:**
- Classified under column 5 of dangerous goods list.
- Dangerous goods are assigned into 3 packing groups (also known as **UN Packing Group**) in accordance with **the degree of danger** they present:
- **Packing Group I:** High danger.
- **Packing Group II:** Medium danger.
- **Packing Group III**: Low danger.
- The packaging requirements for dangerous goods assigned to UN packing group I are much higher than the dangerous goods assigned to packing group II and III.
- All class 1 dangerous goods (explosives) are assigned to packing group II.
- **Importance of UN Packing Group:**
- UN packing group can help you find qualified packages more quickly.
- The packing group also determines the degree of protective packaging required.
- Packages and containers for dangerous goods that have passed rigorous performance testing usually bear UN specification marks.
- **NOTES: Article is a product which contains a dangerous substance. Lead acid battery is an article which contains dangerous substance of sulphuric acid. Grenade is an article which contains dangerous substance of explosive powder.**

Marking and Labeling

- Dangerous goods packages must be marked and labeled before they are assigned for shipment.
- **Marking**: Shown on the packaging and mainly refer to UN number, proper shipping names, UN specification marks and other markings if applicable (i.e. orientation arrows, environmental hazardous substances mark.
- **USES:** Offer special handling instructions and assist emergency responders.
- **Labeling**: Mainly means mainly Class symbols (and handling labels) displayed on small means of packages (usually less than 450 liters).
- **USES:** Offer special handling instructions, assist emergency responders and assist carriers decide where to place packages.

1. Orientation label (optional)
2. Primary class label
3. Standardized UN certification (according to standard)
4. Shipping name
5. UN number
6. Subsidiary class label

MARKING AND LABELING OF DRUMS



Placarding

- **Enlarged labels (placards)** and marks and signs shall be affixed to the exterior surfaces of a cargo transport unit to provide a warning that the contents of the unit are dangerous goods and present risks, unless the labels and/or marks affixed to the packages are clearly visible from the exterior of the cargo transport unit.
- The methods of placarding and marking on cargo transport units shall be such that this information will still be identifiable on cargo transport units surviving **at least three months immersion in the sea**.
- Placards shall be displayed on a background of contrasting colour, or shall have either a dotted or solid outer boundary line.
- **Placarding requirements:**

1. A freight container, semi-trailer or portable tank: one on each side and one on each end of the unit.
2. A railway wagon: at least on each side.
3. Any other cargo transport unit: at least on both sides and on the back of the unit.

USES: Assist emergency responders.

Placard for radioactive material of Class 7

(No.7D)
Symbol (trefoil): black; Background: upper half yellow with white border, lower half white;
The lower half shall show the word "RADIOACTIVE" or alternatively, the appropriate UN Number, and the figure "7" in the bottom corner.

PLACARD STICKERS

STOWAGE

- **Stowage: (Dangerous Goods List column 16a)**
- Means the proper placement of dangerous goods on board a ship in order to ensure safety and environmental protection during transport.
- Stowage on deck means stowage on the weather deck.
- Stowage under deck means any stowage that is not on the weather deck.
- **Stowage categories for class 1:**
- There are 5 stowage categories from **01 to 05**, reference “on deck in closed cargo transport unit or under deck” which includes cargo ships and passenger ships.
- **Stowage categories for classes 2 to 9:**
- There are 5 stowage categories from **A to E**, reference “on deck or under deck”.
- **ABE** – DECK/UNDERDECK.
- **CD**-DECK.
- **STOWAGE CODES** – 29 CODES (SW1, SW2 ……..SW29)
- **HANDLING CODES** – 4 CODES (H1 TO H4).
- **Special stowage provisions:**
- Stowage of empty uncleaned packaging, including IBCs and large packaging.
- Stowage of marine pollutants.
- Stowage of limited quantities and excepted quantities.

Stowage categories for Explosives (Class 1) – Details on next slide

Stowage Categories	On Deck or Under Deck	Cargo Ships (up to 12 passengers)	Passenger Ships
01	On Deck	Allowed in closed cargo transport unit	Allowed in in closed cargo transport unit
01	Under Deck	Allowed	Allowed
02	On Deck	Allowed in closed cargo transport unit	Allowed in in closed cargo transport unit
02	Under Deck	Allowed	Allowed in in closed cargo transport unit as per 7.1.4.4.5 IMDG Code (36-12)
03	On Deck	Allowed in closed cargo transport unit	Prohibited except if as per 7.1.4.4.5 of 5 IMDG Code (36-12)
03	Under Deck	Allowed	
04	On Deck	Allowed in closed cargo transport unit	Prohibited except if as per 7.1.4.4.5 of IMDG Code (36-12)
04	Under Deck	Allowed in closed cargo transport unit	
05	On Deck	Allowed in closed cargo transport unit	Prohibited except if as per 7.1.4.4.5 of IMDG Code (36-12)
05	Under Deck	Prohibited	

Stowage categories

- **Stowage categories for class 1:**
- Dangerous goods of class 1 other than division 1.4 compatibility group S, packed in limited quantities shall be stowed as indicated in column 16 of the Dangerous Goods List in accordance with one of the categories specified below.
- **Stowage category 01 :**
- Cargo ships (up to 12 passengers) - On deck in closed cargo transport unit or under deck.
- Passenger ships - On deck in closed cargo transport unit or under deck.
- **Stowage category 02:**
- Cargo ships (up to 12 passengers) - On deck in closed cargo transport unit or under deck.
- Passenger ships -On deck in closed cargo transport unit or under deck in closed cargo transport unit in accordance with 7.1.4.4.5.
- **Stowage category 03:**
- Cargo ships (up to 12 passengers) - On deck in closed cargo transport unit or under deck.
- Passenger ships Prohibited except if in accordance with 7.1.4.4.5.
- **Stowage category 04:**
- Cargo ships (up to 12 passengers) - On deck in closed cargo transport unit or under deck in closed cargo transport unit.
- Passenger ships Prohibited except if in accordance with 7.1.4.4.5.
- **Stowage category 05:**
- Cargo ships (up to 12 passengers) - On deck only in closed cargo transport unit.
- Passenger ships Prohibited except if in accordance with 7.1.4.4.5.

Stowage categories for classes 2 to 9: Details on next slide

Stowage category A	
Cargo ships	ON DECK OR UNDER DECK
Passenger ships	ON DECK OR UNDER DECK
Stowage category B	
Cargo ships	ON DECK OR UNDER DECK
Passenger ships	ON DECK ONLY
Stowage category C	
Cargo ships	ON DECK ONLY
Passenger ships	ON DECK ONLY
Stowage category D	
Cargo ships	ON DECK ONLY
Passenger ships	PROHIBITED
Stowage category E	
Cargo ships	ON DECK OR UNDER DECK
Passenger ships	PROHIBITED

Stowage categories for classes 2 to 9

- Dangerous goods of classes 2 to 9 and division 1.4 compatibility group S, packed in limited quantities shall be stowed as indicated in column 16 of the Dangerous Goods List in accordance with one of the categories specified below:
- **Stowage category A**
- Cargo ships or passenger ships carrying a number of passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number } ON DECK OR UNDER DECK.
- Other passenger ships in which the limiting number of passengers transported is exceeded } ON DECK OR UNDER DECK.
- **Stowage category B**
- Cargo ships or passenger ships carrying a number of passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number } ON DECK OR UNDER DECK.
- Other passenger ships in which the limiting number of passengers transported is exceeded } ON DECK ONLY.

Stowage categories

- **Stowage categories for classes 2 to 9: (Cont'd)**
- **Stowage category C**
- Cargo ships or passenger ships carrying a number of passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number } ON DECK ONLY.
- Other passenger ships in which the limiting number of passengers transported is exceeded } ON DECK ONLY.
- **Stowage category D**
- Cargo ships or passenger ships carrying a number of passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number } ON DECK ONLY.
- Other passenger ships in which the limiting number of passengers transported is exceeded } PROHIBITED.
- **Stowage category E**
- Cargo ships or passenger ships carrying a number of passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number } ON DECK OR UNDER DECK.
- Other passenger ships in which the limiting number of passengers transported is exceeded } PROHIBITED.

STOWAGE - IMDG Code

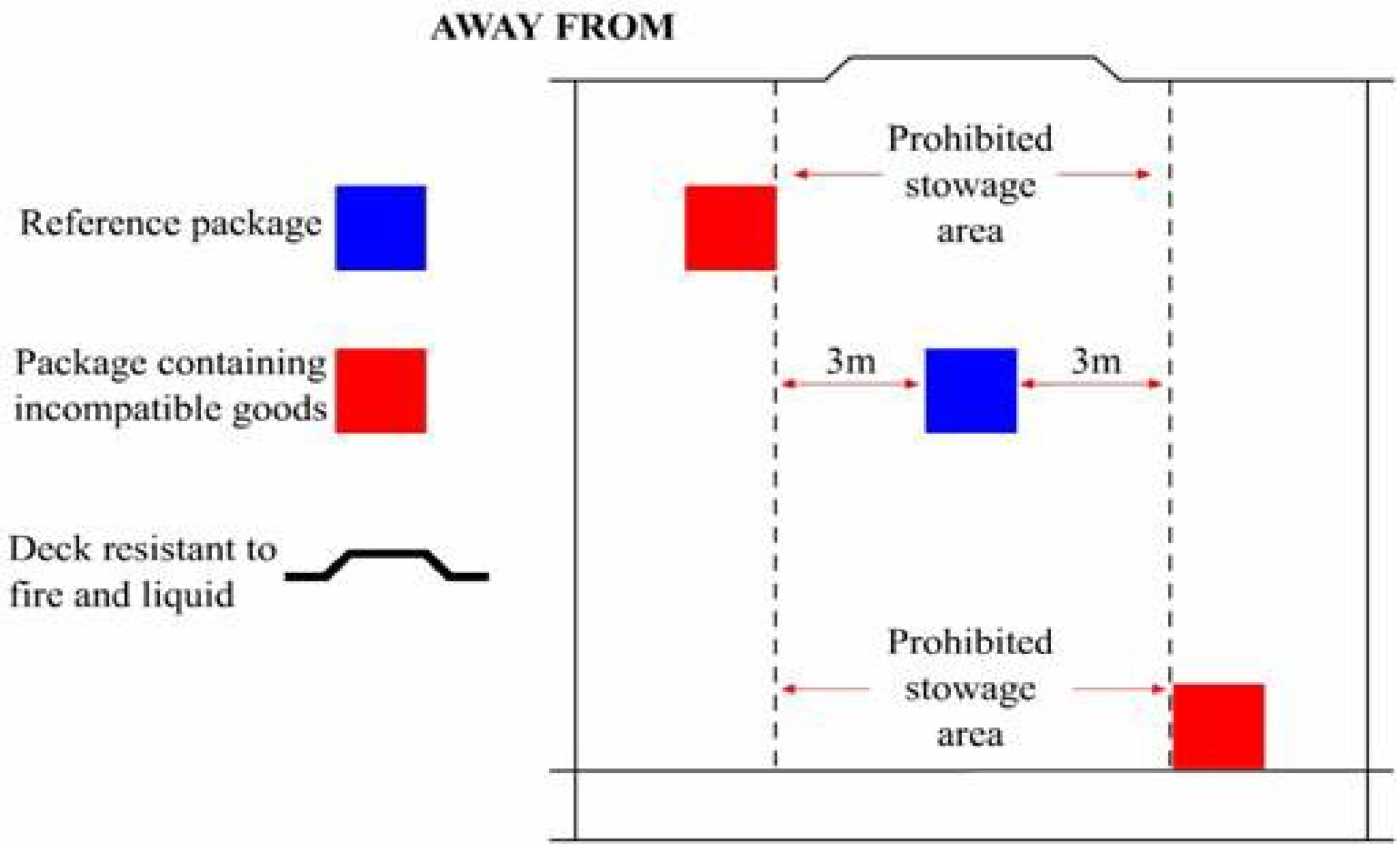
- **On Deck only stowage is always prescribed for cases where:**
- Constant supervision is required; or
- Accessibility is particularly required; or
- There is a substantial risk of formation of explosive gas mixtures, development of highly toxic vapours, or unobserved corrosion of the ship.
- **Dangerous goods when permitted to be loaded under deck by IMDG Code will additionally require mechanical ventilation for the cargo hold.**
- Examples:
- Class 2.1: flammable gases.
- Class 3: Flammable Liquids with a flash point of less than 23°C.
- Class 4.3: substances which, in contact with water, emit flammable gases.
- **Explanation by example:**
- UN 2076 Class 6.1 CRESOLS, LIQUID, stowage category in column 16 of dangerous goods list is Category B.
- Substances, Materials or Articles assigned with stowage Category B can be loaded on deck or under deck on a cargo ship but on a passenger ship where limiting number of passengers are exceeded Category B must be loaded on deck only.

SEGREGATION

- **Segregation: (Dangerous Goods List column 16b)**
- Segregation is the process of separating two or more substances or articles which are considered mutually incompatible when their packing or stowage together may result in undue hazards in case of leakage or spillage, or any other accident.
- Segregation is obtained by maintaining certain distances between incompatible dangerous goods or by requiring the presence of one or more steel bulkheads or decks between them, or a combination thereof. Intervening spaces between such dangerous goods may be filled with other cargo compatible with the dangerous substances or articles.
- **Segregation Codes:** 75 codes (SG1 to SG75).
- **Segregation Groups** (1-18 groups). Based on similar chemical properties.
- **Segregation terms:**
  .1 “Away from”.
  .2 “Separated from”.
  .3 “Separated by a complete compartment or hold from”.
  .4 “Separated longitudinally by an intervening complete compartment or hold from”.
- **Additional segregation provisions are required for:**
- Consigning operations concerning the packing and use of cargo transport units (CTUs) and related
- Provisions.
- Stowage and segregation on containerships.
- Stowage and segregation on roll-on/roll-off ships.
- Stowage and segregation on general cargo ships.
- Ship borne barges on barge-carrying ships.

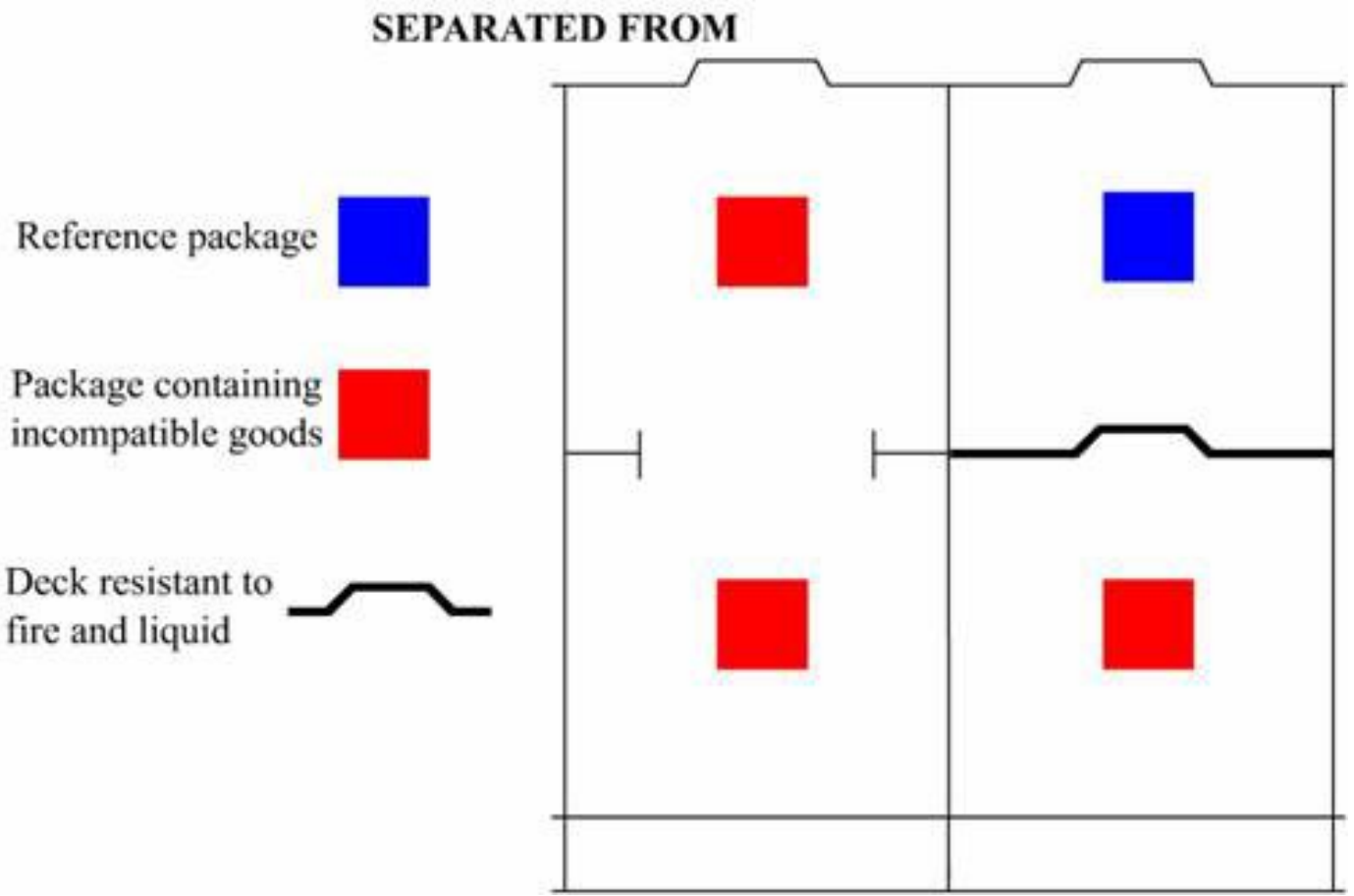
Segregation (Packages) - Away from

Effectively segregated so that the incompatible goods cannot interact dangerously in the event of an accident but may be transported in the same compartment or hold or on deck, provided a **minimum horizontal separation of 3 metres, projected vertically**, is obtained.



Segregation (Packages) - Separated from

In different compartments or holds when stowed under deck. Provided the intervening deck is **resistant to fire and liquid**, a vertical separation i.e. in different compartments, may be accepted as equivalent to this segregation. For on deck stowage, this segregation means a separation by a **distance of at least 6 metres horizontally.**

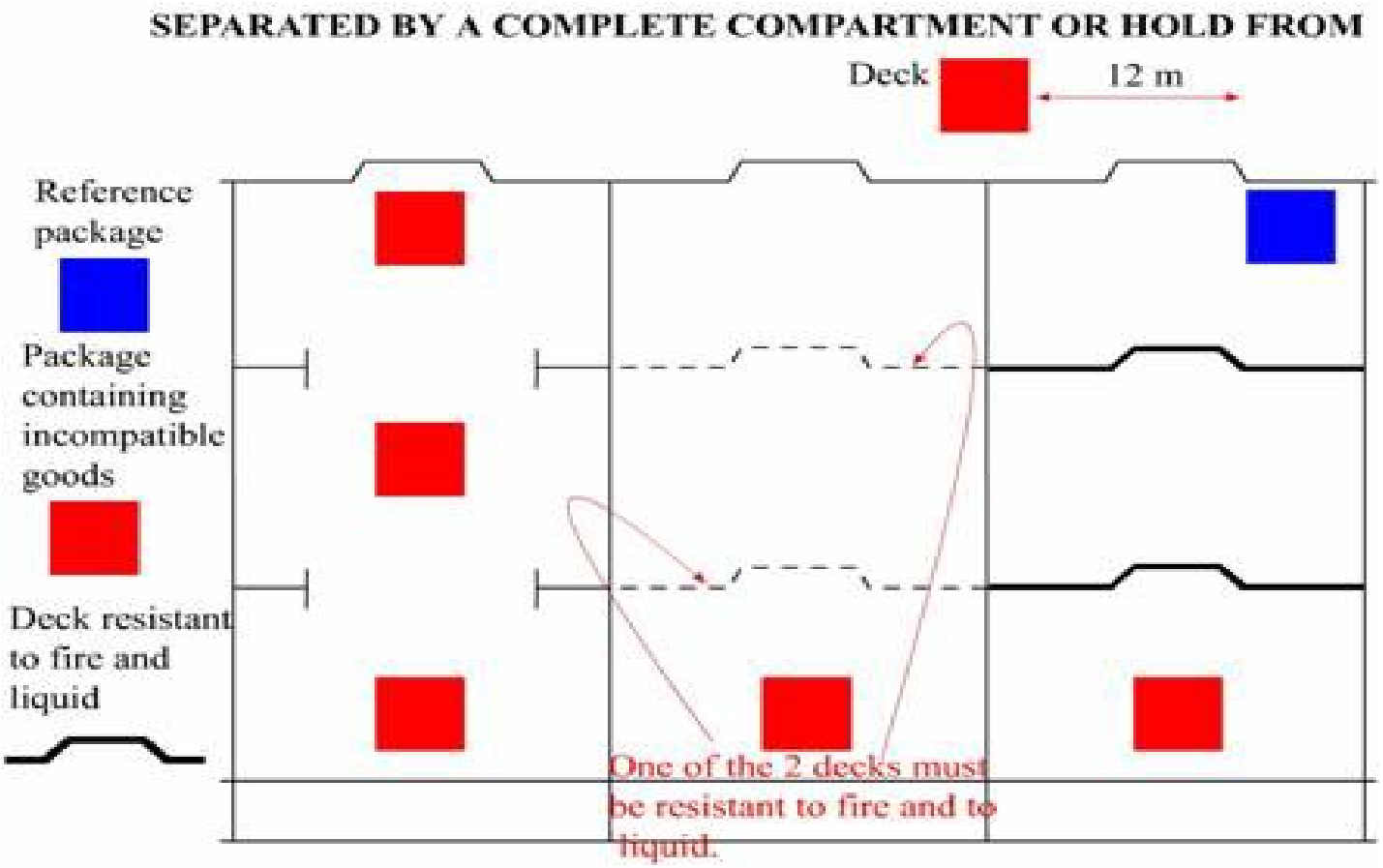


Segregation (Packages) - Separated by a complete compartment or hold from

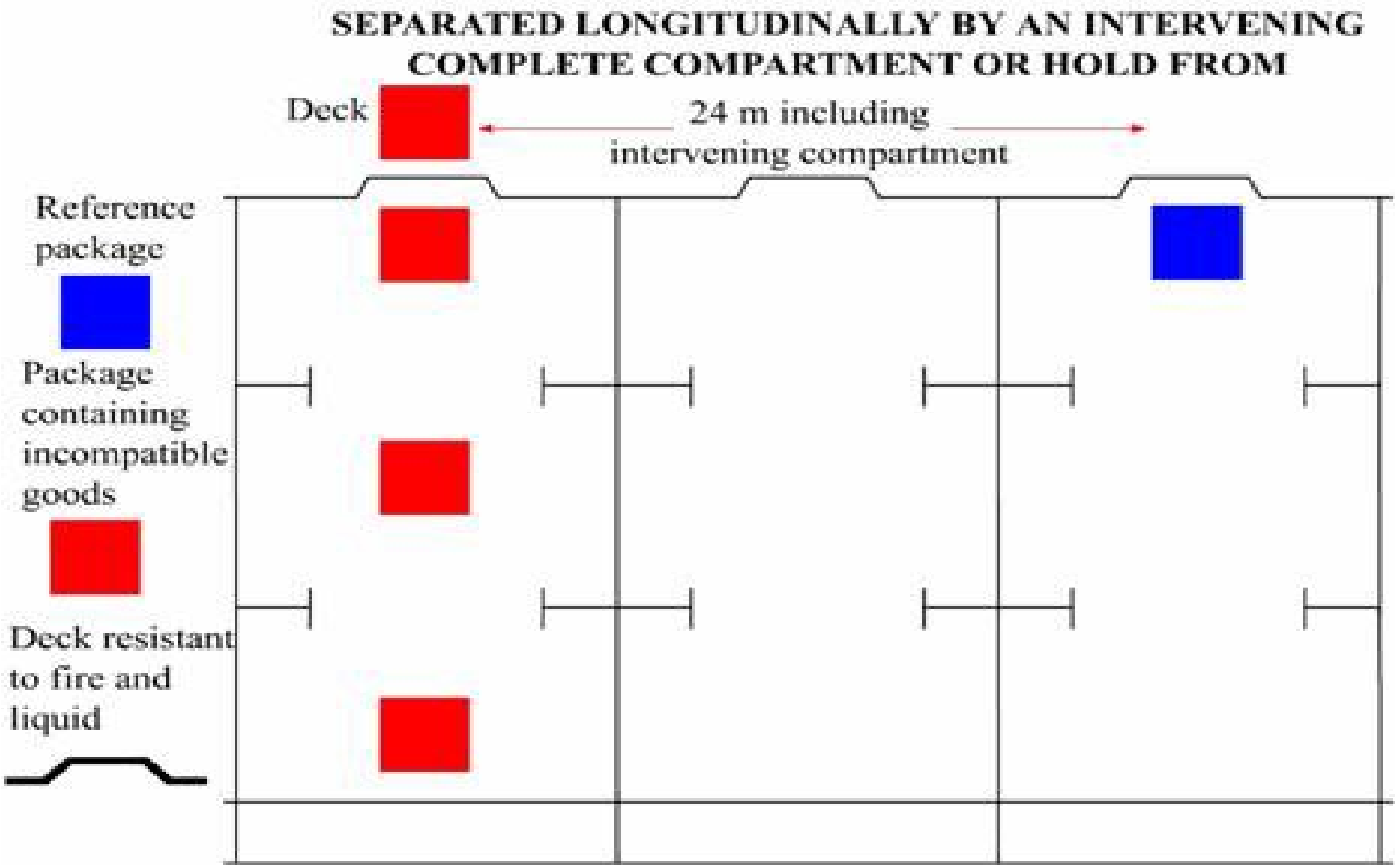
Either a vertical or a horizontal separation. If the intervening decks are not resistant to fire and liquid, then only a longitudinal separation, i.e. by an intervening complete compartment or hold, is acceptable.

For on deck stowage, this segregation means a separation by a distance of at least 12 metres horizontally. The same distance has to be applied if one package is stowed on deck and the other one in an upper compartment.

Note: One of the two decks must be resistant to fire and to liquid.



Segregation (Packages) - Separated longitudinally by an intervening complete compartment or hold from Vertical separation alone does not meet this requirement**. Between a package under deck and one on deck, a minimum distance of 24 metres, including a complete compartment, must be maintained longitudinally.** For on deck stowage, this segregation means a separation by a distance of at least 24 metres longitudinally.



Class		1.1 1.2 1.5	1.3 1.6	1.4	2.1	2.2	2.3	3	4.1	4.2	4.3	5.1	5.2	6.1	6.2	7	8	9
Explosives	1.1 /1.2 /1.5	*	*	*	4	2	2	4	4	4	4	4	4	2	4	2	4	X
Explosives	1.3 / 1.6	*	*	*	4	2	2	4	3	3	4	4	4	2	4	2	2	X
Explosives	1.4	*	*	*	2	1	1	2	2	2	2	2	2	X	4	2	2	X
Flammable gases	2.1	4	4	2	X	X	X	2	1	2	2	2	2	X	4	2	1	X
Non-toxic, non-flammable gases	2.2	2	2	1	X	X	X	1	X	1	X	X	1	X	2	1	X	X
Toxic gases	2.3	2	2	1	X	X	X	2	X	2	X	X	2	X	2	1	X	X
Flammable liquids	3	4	4	2	2	1	2	X	X	2	2	2	2	X	3	2	X	X
Flammable solids**	4.1	4	3	2	1	X	X	X	X	1	X	1	2	X	3	2	1	X
Substances liable to spontaneous combustion	4.2	4	3	2	2	1	2	2	1	X	1	2	2	1	3	2	1	X
with water, emit flammable gases	4.3	4	4	2	2	X	X	2	X	1	X	2	2	X	2	2	1	X
Oxidizing substances (agents)	5.1	4	4	2	2	X	X	2	1	2	2	X	2	1	3	1	2	X
Organic peroxides	5.2	4	4	2	2	1	2	2	2	2	2	2	X	1	3	2	2	X
Toxic substances	6.1	2	2	X	X	X	X	X	X	1	X	1	1	X	1	X	X	X
Infectious substances	6.2	4	4	4	4	2	2	3	3	3	2	3	3	1	X	3	3	X
Radioactive material	7	2	2	2	2	1	1	2	2	2	2	1	2	X	3	X	2	X
Corrosive substances	8	4	2	2	1	X	X	X	1	1	1	2	2	X	3	2	X	X
Miscellaneous dangerous substances and articles	9	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Procedure to use the IMDG Segregation Table

- If you ship different dangerous goods in a cargo transport unit (CTU) by vessel, you must meet separation requirements for incompatible materials provided in the International Maritime Dangerous Goods (IMDG) Code.
- The segregation table provided in IMDG Code 7.2.4 **(see previous slide)** identifies general requirements for separation between hazard classes and divisions.
- **The numbers in the segregation table represent:**
- 1 - away from.
- 2 - separated from.
- 3 - separated by a complete compartment or hold.
- 4 - separated longitudinally by an intervening complete compartment or hold.
- X - consult the Dangerous Goods List (DGL) to identify any specific segregation provisions.
- * **Refer IMDG Code: (It is only for Class 1).**
- 7.2.7.1 for segregation provisions between Class 1 substances and articles.
- 7.2.7.2 Segregation from goods of other classes.

Procedure to use the IMDG Segregation Table (Cont'd)

- To use the segregation table, locate the hazard class or division of your first material along one axis and locate the hazard class or division of your second material along the other axis.
- Follow the row and column to their point of intersection to identify the number or symbol that represents how to segregate these materials.
- For example, if you ship Class 3 flammable liquids with Class 7 radioactive material, the **number 2 "separated from"** located at the intersection of the row and column identifies these materials must be separated from each other in your shipment.
- The segregation table provides general segregation information.
- Since the properties of substances, materials, or articles within each hazard class may vary greatly, when you make segregation decisions, consult the Dangerous Goods List (DGL) in IMDG Code 3.2 and take into consideration the subsidiary risks of the materials.

COMPATIBILITY GROUPS

- Goods of class 1 (Division 1.1 to 1.6) are considered to be "compatible" if they can be safely stowed or transported together without significantly increasing either the probability of an accident or, for a given quantity, the magnitude of the effects of such an accident.
- Each division in Class 1 is further assigned a compatibility group code. The compatibility code consists of one letter (A–H, J–L, N, or S) that is positioned after the division number (e.g., 1.1A, 1.2C, 1.4S) and refers to the transportation and storage controls necessary to prevent potential hazards.
- To check whether two explosives are compatible to be stored/transported together the transport regulation has a segregation table as shown.

Compatibility group	A	B	C	D	E	F	G	H	J	K	L	N	S
A	X												
B		X											X
C			X	X[6]	X[6]		X[1]					X[4]	X
D			X[6]	X	X[6]		X[1]					X[4]	X
E			X[6]	X[6]	X		X[1]					X[4]	X
F						X							X
G			X[1]	X[1]	X[1]		X						X
J									X				X
K										X			X
L											X[2]		
N			X[4]	X[4]	X[4]							X[3]	X[5]
S		X	X	X	X	X	X	X	X	X		X[5]	X

COMPATIBILITY GROUPS

- "X" indicates that goods of the corresponding compatibility groups may be stowed in the same compartment, magazine, cargo transport unit or vehicle.
- 1 Explosive articles in compatibility group G (other than fireworks and those requiring special stowage) may be stowed with explosive articles of compatibility groups C, D and E provided no explosive substances are transported in the same compartment, magazine, cargo transport unit or vehicle.
- 2 A consignment of one type in compatibility group L shall only be stowed with a consignment of the same type within compatibility group L.

Compatibility group	A	B	C	D	E	F	G	H	J	K	L	N	S
A	X												
B		X											X
C			X	X^6	X^6		X^1					X^4	X
D			X^6	X	X^6		X^1					X^4	X
E			X^6	X^6	X		X^1					X^4	X
F						X							X
G			X^1	X^1	X^1		X						X
J									X				X
K										X			X
L											X^2		
N			X^4	X^4	X^4							X^3	X^5
S		X	X	X	X	X	X	X	X	X		X^5	X

COMPATIBILITY GROUPS

- 3 Different types of articles of Division 1.6, compatibility group N, may only be transported together when it is proven that there is no additional risk of sympathetic detonation between the articles. Otherwise they shall be treated as Division 1.1.
- 4 When articles of compatibility group N are transported with articles or substances of compatibility groups C, D or E, the goods of compatibility group N shall be treated as compatibility group D.
- 5 When articles of compatibility group N are transported together with articles or substances of compatibility group S, the entire load shall be treated as compatibility group N.

Compatibility group	A	B	C	D	E	F	G	H	J	K	L	N	S
A	X												
B		X											X
C			X	X[6]	X[6]		X[1]					X[4]	X
D			X[6]	X	X[6]		X[1]					X[4]	X
E			X[6]	X[6]	X		X[1]					X[4]	X
F						X							X
G			X[1]	X[1]	X[1]		X						X
J									X				X
K										X			X
L											X[2]		
N			X[4]	X[4]	X[4]							X[3]	X[5]
S		X	X	X	X	X	X	X	X	X		X[5]	X

COMPATIBILITY GROUPS

- 6 Any combination of articles in compatibility groups C, D and E shall be treated as compatibility group E. Any combination of substances in compatibility groups C and D shall be treated as the most appropriate compatibility group shown in 2.1.2.3 of IMDG Code, taking into account the predominant characteristics of the combined load.
- This overall classification code shall be displayed on any label or placard placed on a unit load or cargo transport unit as prescribed in 5.2.2.2.2 of IMDG Code.

Compatibility group	A	B	C	D	E	F	G	H	J	K	L	N	S
A	X												
B		X											X
C			X	X[6]	X[6]		X[1]					X[4]	X
D			X[6]	X	X[6]		X[1]					X[4]	X
E			X[6]	X[6]	X		X[1]					X[4]	X
F						X							X
G			X[1]	X[1]	X[1]		X						X
J									X				X
K										X			X
L											X[2]		
N			X[4]	X[4]	X[4]							X[3]	X[5]
S		X	X	X	X	X	X	X	X	X		X[5]	X

COMPATIBILITY GROUPS

- **Example compatibility check:**
- With the above table check segregation requirement between below two explosives

UN 0161 Class 1.3C, POWDER, SMOKELESS

UN 0191 Class 1.4G, SIGNAL DEVICES, HAND.

- Segregation between compatibility letters C and G shows X1 and as per note X1 explosive articles of group G (UN 0191 in this case) may be stowed with explosive articles of group C, D and E provided no explosive substances are loaded in the same container, UN 0161 is a substance hence cannot be loaded with UN 0191.

Compatibility group	A	B	C	D	E	F	G	H	J	K	L	N	S
A	X												
B		X											X
C			X	X^6	X^6		X^1					X^4	X
D			X^6	X	X^6		X^1					X^4	X
E			X^6	X^6	X		X^1					X^4	X
F						X							X
G			X^1	X^1	X^1		X						X
J									X				X
K										X			X
L											X^2		
N			X^4	X^4	X^4							X^3	X^5
S		X	X	X	X	X	X	X	X	X		X^5	X

DANGEROUS GOODS PACKED IN LIMITED QUANTITIES

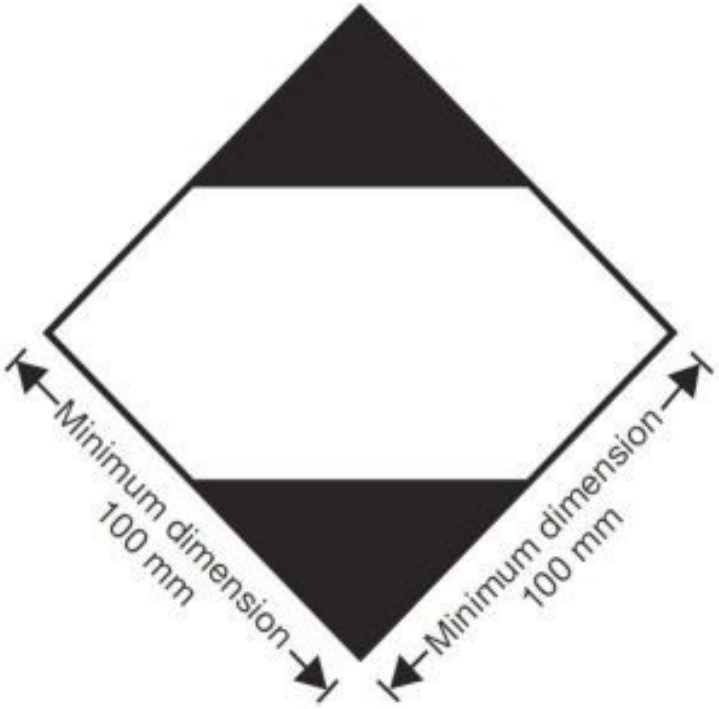
- **Dangerous Goods permitted in limited quantities:** Entries having quantities other than "0" in column **7a of dangerous goods list** in chapter 3.2.
- **Dangerous Goods not permitted in limited quantities:** Entries with quantity "0" (Zero) in column 7a of dangerous goods list in chapter 3.2.
- **Packing:** Only combination packing - inner packagings placed in suitable outer packagings. Articles do not require inner packaging. Corrosive liquids of class 8 PG II (Packaging Group II) glass, porcelain or stoneware inner packagings must be enclosed in a compatible and **rigid intermediate packaging**.
- **Quantity – Inner packaging:** The applicable quantity limit for the inner packaging or article is specified for each substance in column 7a of the Dangerous Goods List of chapter 3.2.
- **Quantity – Outer packaging:** Shrink-wrapped or stretch-wrapped trays: Total gross mass of the package must **not exceed 20 kg**. (Articles of class 1.4S not permitted in shrink-wrap/stretch-wrap trays).
- Other packaging: Total gross mass of the package must **not exceed 30 kg**.
- **Segregation:**
- **Chapter 7.2 (General segregation provisions)** is not applicable for packagings containing dangerous goods in limited quantities or in relation to other dangerous goods.

DANGEROUS GOODS PACKED IN LIMITED QUANTITIES

- **Stowage:**
- Dangerous goods packed in limited quantity are allocated stowage category A.
- The other stowage provisions indicated in column (16) of the Dangerous Goods List are not applicable.
- **NOTES FOR REFERENCE: Stowage category A**
- **Cargo ships or passenger ships carrying a number of passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number } ON DECK OR UNDER DECK.**
- **Other passenger ships in which the limiting number of passengers transported is exceeded } ON DECK OR UNDER DECK.**

Marking and placarding of package in Limited quantities

- The marking shall be readily visible, legible and able to withstand open weather exposure without a substantial reduction in effectiveness.
- The top and bottom portions and the surrounding line shall be black.
- The centre area shall be white or a suitable contrasting background.
- The minimum dimensions shall be 100 mm × 100 mm and the minimum width of line forming the diamond shall be 2 mm.
- **If the size of the package so requires, the dimension may be reduced, to be not less than 50 mm × 50 mm provided the marking remains clearly visible.**



Mark for packages containing limited quantities

LIMITED QUANTITIES

DANGEROUS GOODS PACKED IN EXCEPTED QUANTITIES

- Dangerous goods may be shipped in excepted quantities which allows exemptions for very small packages (less than 30 gms or 30 litres) for inner packaging (retail perfumes, cosmetics, medicines, etc).
- **Dangerous goods of high hazard (Packing group I) cannot be shipped in excepted quantities.**
- **Chapter 3.5** provides the provisions applicable to the transport of dangerous goods of certain classes packed in Excepted quantities.
- These are shown in **column 7b** of the Dangerous Goods List by means of an alphanumeric code from E0 to E5.
- These codes signify the maximum quantities in the inner and outer packing for that DG to be carried under excepted quantity.

Code	Maximum net quantity per inner packaging (in grams for solids and ml for liquids and gases)	Maximum net quantity per outer packaging (in grams for solids and ml for liquids and gases, or sum of grams and ml in the case of mixed packing)
E0	Not permitted as Excepted Quantity	
E1	30	1000
E2	30	500
E3	30	300
E4	1	500
E5	1	300

DANGEROUS GOODS PACKED IN EXCEPTED QUANTITIES

- Though it is much cheaper to have 200 kgs or 500 kgs of DG to be packed in one packing than to pack in smaller packs as per limited or exempted quantity but the shipper uses the provisions of limited or excepted quantity because IMDG code grants exemptions to some of the requirements if the goods are packed in limited quantity or excepted quantity.
- **For example, the segregation requirements as per IMDG are not applicable to the Dangerous Goods packed as per limited or excepted quantity.**

Code	Maximum net quantity per inner packaging (in grams for solids and ml for liquids and gases)	Maximum net quantity per outer packaging (in grams for solids and ml for liquids and gases, or sum of grams and ml in the case of mixed packing)
E0	Not permitted as Excepted Quantity	
E1	30	1000
E2	30	500
E3	30	300
E4	1	500
E5	1	300

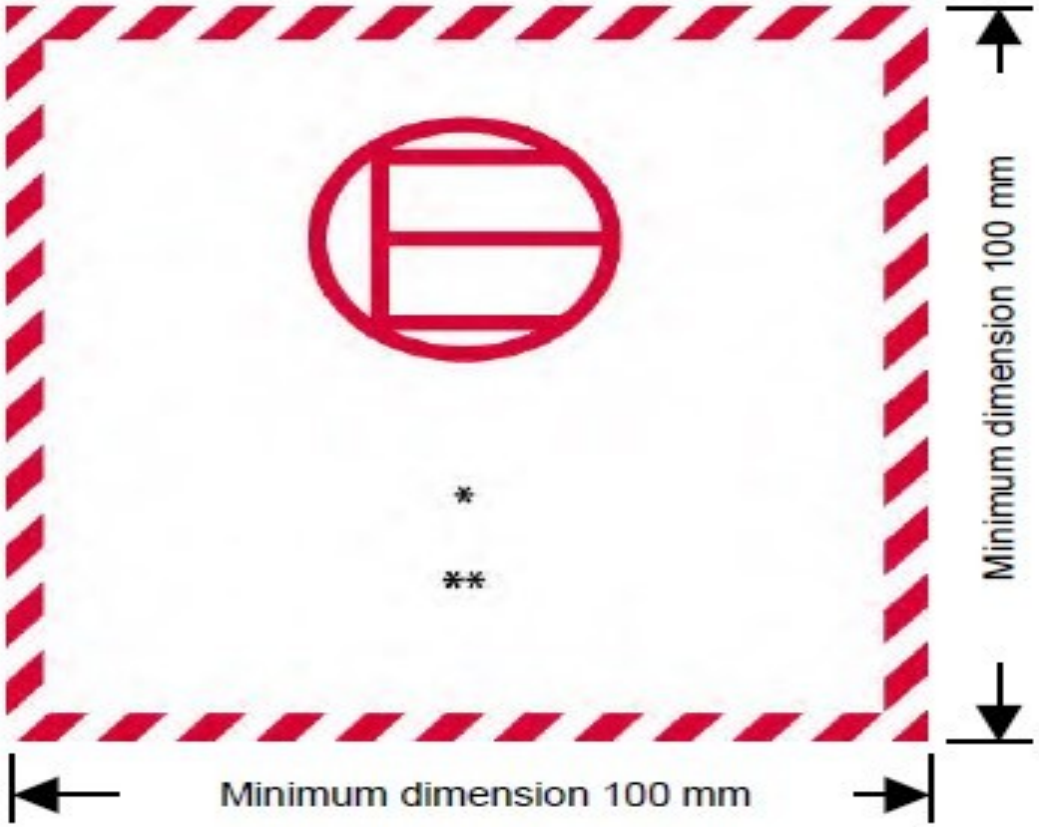
DANGEROUS GOODS PACKED IN EXCEPTED QUANTITIES

- **Packagings:**
- There shall be an inner packaging and each inner packaging shall be constructed of plastic (when used for liquid dangerous goods it shall have a thickness of not less than 0.2 mm), or of glass, porcelain, stoneware, earthenware or metal and the closure of each inner packaging shall be held securely in place with wire, tape or other positive means. Any receptacle having a neck with moulded screw threads shall have a leak proof threaded-type cap. The closure shall be resistant to the contents.
- Each inner packaging shall be securely packed in an intermediate packaging with cushioning material in such a way that, under normal conditions of transport, they cannot break, be punctured or leak their contents. The intermediate packaging shall completely contain the contents in case of breakage or leakage, regardless of package orientation. For liquid dangerous goods, the intermediate packaging shall contain sufficient absorbent material to absorb the entire contents of the inner packaging. In such cases, the absorbent material may be the cushioning material.
- The intermediate packaging shall be securely packed in a strong, rigid outer packaging (wooden, fibre board or other equally strong material).

EXCEPTED QUANTITIES

Placarding and marking of packages in Excepted quantities

- Packages shall be durably and legibly marked.
- Hatching and symbol of the same colour, black or red, on white or suitable contrasting background.
- * The class, or, when assigned, the division number(s), shall be shown in this location.
- ** The name of the consignor or of the consignee shall be shown in this location if not shown elsewhere on the package.
- The dimensions of the mark shall be a minimum of 100 mm × 100 mm.
- An **over pack** containing dangerous goods in excepted quantities shall display the markings required as above, unless such markings on packages within the over pack are clearly visible.



Excepted quantities mark


3
SERPAC Srl
Via Tiepolo 24
20090 SEGRATE (MI) - ITALY
SERPAC

DANGEROUS GOODS PACKED IN EXCEPTED QUANTITIES

- **Maximum number of packages in any cargo transport unit:**
- The number of packages containing dangerous goods packed in excepted quantities in any cargo transport unit **shall not exceed 1000.**
- **Documentation:**
- In addition to the provisions for documentation specified in chapter 5.4, the words "dangerous goods in excepted quantities" and the number of packages shall be included on the dangerous goods declaration together with the description of the shipment.
- **Stowage:**
- Dangerous goods packed in excepted quantity are allocated stowage category A.
- The other stowage provisions indicated in column (16) of the Dangerous Goods List are not applicable.
- **Segregation:**
- The segregation provisions of chapters 7.2 to 7.7, including the segregation provisions in column (16) of the Dangerous Goods List, are not applicable for packagings containing dangerous goods packed in excepted quantities or in relation to other dangerous goods.
- **NOTES FOR REFERENCE: Stowage category A**
- **Cargo ships or passenger ships carrying a number of passengers limited to not more than 25 or to 1 passenger per 3 m of overall length, whichever is the greater number } ON DECK OR UNDER DECK.**
- **Other passenger ships in which the limiting number of passengers transported is exceeded } ON DECK OR UNDER DECK.**

Intermediate Bulk Container (IBC)

- An intermediate bulk container (or IBC) is a pallet mounted, industrial grade reusable container that is used for storing and transporting bulk liquids and powders.
- The three broad types of IBCs in use today can be categorized under rigid, folding and flexible.
- The term ‘intermediate’ comes from the volume that intermediate bulk containers carry, which sits in between that of tanks and drums.
- The two most common volumes of the rigid IBC are 275 gallons and 330 gallons.
- In the case of cube shaped rigid IBCs, the inner containers are often made from a plastic such as polyethylene. They are also available in other materials such as aluminum or galvanized iron.
- The rigid outer container or cage is usually made from galvanized tubular steel or iron.
- There is a tap or valve at the base where a hose can be attached to allow easy transfer of contents into smaller containers for easy packaging.

IMDG Code - SUPPLEMENT

- The International Maritime Dangerous Goods Code relates to the safe carriage of dangerous goods by sea, but does not include all details of procedures for packing of dangerous goods or actions to take in the event of an emergency or accident involving personnel who handle goods at sea.
- These aspects are covered by the publications that are associated with the IMDG Code, which are included in this Supplement.
- The IMDG Supplement is a biennial's (every other year) publication.
- **The Supplement includes:**
- **EmS guide - Emergency response procedures for carrying dangerous goods.**
- **MFAG - Texts of the Medical First Aid Guide.**
- **Reporting procedures for incidents involving dangerous goods, harmful substances and/or marine pollutants.**
- the IMO/ILO/UNECE (**UNECE: UN Economic Commission for Europe – To handle Economic Cooperation of Member States**) Guidelines for packing of cargo transport units.
- Safe use of Pesticides in ships, in CTU's and cargo holds.
- The International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on board Ships.
- An appendix of relevant IMO resolutions and circulars.

- **Medical First Aid Guide for Use in Accidents Involving Dangerous Goods (MFAG):**
- Information on medical first aid is provided in the IMO/WHO/ILO Medical First Aid Guide (MFAG) for use in accidents Involving dangerous Goods.
- The Guide is reproduced in the Supplement of the IMDG Code.
- It is intended to provide advice necessary for initial management of chemical poisoning and diagnosis within the limits of the facilities available at sea.
- The MFAG itself gives general information about the particular toxic effects likely to be encountered.
- The treatment recommended in this Guide is specified in the appropriate tables (20 tables) and more comprehensive in the appropriate sections of the Appendices.
- Accidental ingestion of toxic substances during voyage is rare. The guide does not cover ingestion by intention.
- Information on the treatment of illnesses which are of a general nature and not predominantly concerned with chemical poisoning may be found in the ILO/IMO/WHO **International Medical Guide for Ships (IMGS).**

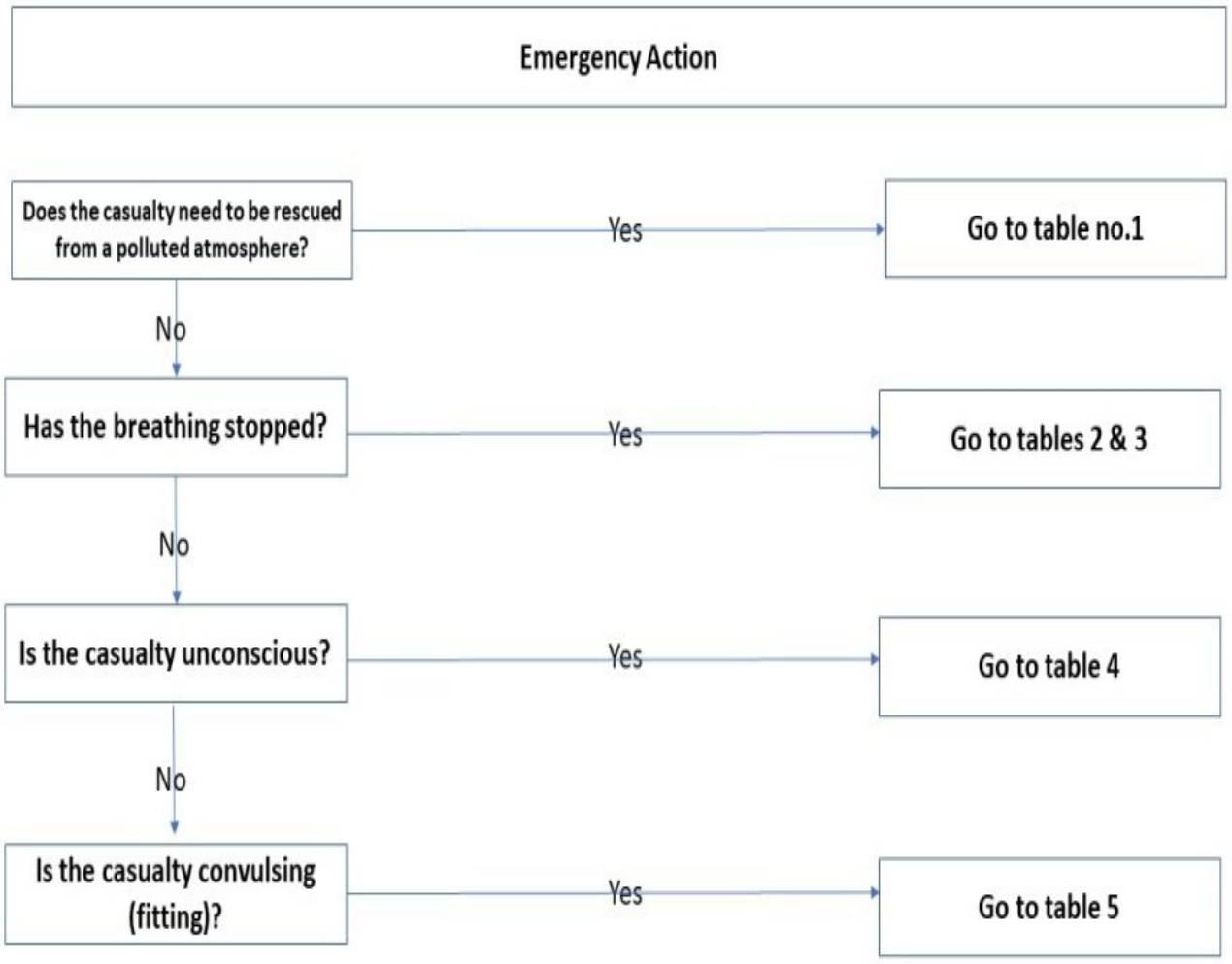
Procedures to use MFAG

- **MFAG is divided into sections which are grouped to facilitate a three-step approach**.
- The treatment recommended in this Guide is specified in the appropriate tables (20 tables).
- Examples: Table 1: Rescue and Appendix 1 details about Rescue procedures.
- Similarly, Table 2: CPR (Cardio Pulmonary Resuscitation) and Appendix 2 details about CPR procedures.
- There are 15 appendix.
- **Appendix 15** – List of additional medicines and equipment to be carried on board ships carrying dangerous goods.

Step 1:	**Emergency Action and diagnosis**	**Start here!**
Step 2:	**Tables**	**The Tables give brief instructions for special circumstances.**
Step 3:	**Appendices**	**The Appendices provide comprehensive information, a list of medicines/drugs, and a list of chemicals referred to in the tables.**

Procedures to use MFAG (Cont'd)

- MFAG in the supplement of IMDG Code has a **flowchart guiding the users for actions to be taken** depending on the **symptoms of the person exposed to dangerous goods and the situation**.
- This can only be **used by trained ships' crew** who can also avail **Radio Medical Advice** from shore doctors.



- **Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS) Guide:**
- The purpose of Emergency Schedules (EmS) Guide is to provide guidance on Emergency Response Procedures for Ships Carrying Dangerous Goods including the Emergency Schedules (EmS) to be followed in case of incidents involving dangerous substances, materials or articles, or harmful substances (marine pollutants), regulated under the International Maritime Dangerous Goods Code (IMDG Code).
- This Guide is intended to assist ship owners, ship operators and other parties concerned with developing such emergency response procedures, **which should be integrated into the ship's contingency plan.**
- **IMDG CODE VOL 1 – Section 7.9.3 gives Contact information for the main designated national competent authorities.**
- In the event of a fire or spillage incident, **initial actions** should be carried out in accordance with the **shipboard emergency plan**.
- Emergency response procedures should take into account the formation of other dangerous substances that may result from the reaction between the contents of a consignment and the environment in the event of an accident.

- **Procedure for information on specific measures for fighting fires and dealing with spillage of different types of dangerous goods:**
- EmS tables are published in **Supplement** to IMDG Code.
- EmS means 'Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS Guide) and EmS codes are assigned to each UN Number in **column 15** of Dangerous Goods List in IMDG Code chapter 3.2.
- EmS CODES (Fire and Spill) can be taken from the **Dangerous cargo list under column 15 or from the Emergency schedule index**: UN number vs EmS table in index of IMDG Code Supplement.
- EmS is two part codes first for fire starting with letter "F" and second for spillage starting with letter "S".
- Fire schedule codes are from F-A to F-J (10 tables) and spillage schedule codes are from S-A to S-Z (26 tables).
- **NOTES:**
- **Copious quantities of water:**
- **Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS Guide) states in its various schedules to use "copious quantities of water" for firefighting and handling spillage of dangerous goods.**
- **"Copious quantities of water" means total quantities of water provided for optimal fire-fighting using four jets of water, as required by SOLAS regulation II-2/4.**

Fire Schedules

F- **A** GENERAL FIRE SCHEDULE

F- **B** EXPLOSIVE SUBSTANCES AND ARTICLES

F- **C** NON-FLAMMABLE GASES

F- **D** FLAMMABLE GASES

F- **E** NON-WATER REACTIVE FLAMMABLE LIQUIDS

F- **F** TEMPERATURE CONTROLLED SELF-REACTIVES AND ORGANIC PEROXIDES

F- **G** WATER REACTIVE SUBSTANCES

F- **H** OXIDIZING SUBSTANCES WITH EXPLOSIVE POTENTIAL

F- **I** RADIOACTIVE MATERIAL

F- **J** NON-TEMPERATURE CONTROLLED SELF-REACTIVES AND ORGANIC PEROXIDES

Emergency Response Procedures for Ships Carrying Dangerous Goods

- **Fire Emergency on board ship:**
- Cargo : UN **1339** PHOSPHORUS HEPTASULPHIDE Class **4.1**
- Stowage: Category **B** (On or Under Deck)
- EmS : **F-G, S-G**
- If a container carrying above goods is burning, identify the UN Number and look at the EmS and find the fire schedule published in the Supplement to IMDG Code.
- **Table for F-G (Water reactive substances) on next slide.**
- "**Copious quantities of water**" means total quantities of water provided for optimal fire-fighting using **four jets of water**, as required by SOLAS regulation II-2/4.
- **Special cases – Example Magnesium Powder fire**
- When there is a special case for a particular substance the EmS code will be **underlined** in column 15 of dangerous goods list in chapter 3.2 of IMDG Code.
- For example, UN 1418 EmS is **F-G, S-O.**
- In the above table of F-G the special case for UN 1418 says "LITHIUM, non-pyrophoric and MAGNESIUM POWDER require the use of dry Lithium chloride or dry sodium chloride or graphite powder to extinguish the fire. Do NOT use water or foam."

FIRE SCHEDULE Golf

F – G

WATER REACTIVE SUBSTANCES

General comments		In a fire, exposed cargoes may explode or their containment may rupture. Fight fire from a protected position from as far away as possible. Use of copious quantities of water at once is recommended to cool down the heat radiation of the fire and to cool down heated cargo nearby. Only as a secondary effect, water will start or intensify burning of that material. Do not use small quantities of water – this will react strongly.
Cargo on fire on deck	**Packages**	Do not use water or foam, smother with dry inert powdered material or let fire burn. If not practicable, cool nearby cargo with copious quantities of water, although burning of cargo could intensify for a short period of time. Do not spray small quantities of water onto the fire. Use copious quantities of water only.
	Cargo Transport Units	If the fire is not igniting nearby cargoes, let the fire burn. Otherwise, cool the burning transport unit with copious quantities of water. Try to avoid getting water into the container.
Cargo on fire under deck		Stop ventilation and close hatches. The fixed gas fire-extinguishing system should be used. If this is not available: Do not use water onto the material in enclosed spaces under deck. With open hatches, cool nearby cargo with copious quantities of water, although the fire could intensify for a short period of time. Do not spray small quantities of water onto the fire, use copious quantities of water.
Cargo exposed to fire		If practicable, remove or jettison packages which are likely to be involved in the fire. Otherwise, cool using water.
Special cases: UN **1415**, UN **1418**		*LITHIUM, non-pyrophoric* and *MAGNESIUM POWDER* require the use of dry Lithium chloride or dry sodium chloride or graphite powder to extinguish the fire. Do NOT use water or foam.

Spillage Schedules

S - A TOXIC SUBSTANCES
S - B CORROSIVE SUBSTANCES
S - C FLAMMABLE, CORROSIVE LIQUIDS
S - D FLAMMABLE LIQUIDS
S - E FLAMMABLE LIQUIDS, FLOATING ON WATER
S - F WATER SOLUBLE MARINE POLLUTANTS
S - G FLAMMABLE SOLIDS AND SELF-REACTIVE SUBSTANCES
S - H FLAMMABLE SOLIDS (MOLTEN MATERIAL)
S - I FLAMMABLE SOLIDS (REPACKING POSSIBLE)
S - J WETTED EXPLOSIVES AND CERTAIN SELF-HEATING SUBSTANCES
S - K TEMPERATURE-CONTROLLED SELF-REACTIVE SUBSTANCES
S - L SPONTANEOUSLY COMBUSTIBLE, WATER-REACTIVE MATERIAL
S - M HAZARD OF SPONTANEOUS IGNITION
S - N SUBSTANCES REACTING VIGOROUSLY WITH WATER
S - O SUBSTANCES DANGEROUS WHEN WET (NON-COLLECTABLE ARTICLES)
S - P SUBSTANCES DANGEROUS WHEN WET (COLLECTABLE ARTICLES)
S - Q OXIDIZING SUBSTANCES
S - R ORGANIC PEROXIDES
S - S RADIOACTIVE MATERIAL
S - T DANGEROUS GOODS WITH BIOHAZARD
S - U GASES (FLAMMABLE, TOXIC OR CORROSIVE)
S - V GASES (NON-FLAMMABLE, NON-TOXIC)
S - W OXIDIZING GASES
S - X EXPLOSIVE ITEMS AND ARTICLES
S - Y EXPLOSIVE CHEMICALS
S - Z TOXIC EXPLOSIVES

Spillage Emergency

- **Spillage Emergency on board ship:**
- **Cargo:**

UN **1339** PHOSPHORUS HEPTASULPHIDE
Class **4.1.**

- **Stowage:** Category **B**

(On or Under Deck).

- **EmS : F-G, S-G**

SPILLAGE SCHEDULE Golf

S – G

FLAMMABLE SOLIDS AND SELF-REACTIVE SUBSTANCES

General comments		Wear suitable protective clothing and self-contained breathing apparatus. Avoid all sources of ignition (e.g. naked lights, unprotected light bulbs, electric handtools, friction). Wear non-sparking footwear. Stop leak if practicable.
Spillage on deck	**Packages (small spillage)**	Wash overboard with copious quantities of water. Keep clear of effluent.
	Cargo Transport Units (large spillage)	
Spillage under deck	**Packages (small spillage)**	Do not enter space without self-contained breathing apparatus. Check atmosphere before entering (toxicity and explosion hazard). Collect and contain spillage if practicable. Dispose overboard. Collect spillage using soft brushes and plastic trays.
	Cargo Transport Units (large spillage)	Provide adequate ventilation. Do not enter space without self-contained breathing apparatus. Check atmosphere before entering (toxicity and explosion hazard). Collect and contain spillage if practicable. Dispose overboard. Collect spillage using soft brushes and plastic trays.
Special cases:		None.

Dangerous goods manifest or stowage plan

- **Dangerous goods manifest or stowage plan:**

- **Reference:** SOLAS 1974, regulations VII/4.2 and MARPOL Annex III, regulation 4.
- Each ship carrying dangerous goods in packaged form shall have a special list or manifest setting forth, in accordance with the classification set out in the IMDG Code, the dangerous goods on board and the location thereof.
- A detailed stowage plan, which identifies by class and sets out the location of all dangerous goods on board, may be used in place of such a special list or manifest.
- A copy of one of these documents shall be made available before departure to the person or organization designated by the Port State authority.

- **IMDG Dangerous Cargo Manifest:**
- 1.1 Name of ship.
- 1.2 IMO number.
- 1.3 Call sign.
- 1.4 Voyage number.
- 2. Flag State of ship.
- 3. Port of loading.
- 4. Port of discharge.
- 5. Stowage Position.
- 6. Reference Number.
- 7. Marks & Numbers: - Freight container Identification No(s). - Vehicle registration No(s).
- 8. UN Number.
- 9. Proper Shipping Name/(Technical Specifications).
- 10. Class/ (Subsidiary Risk(s)).
- 11. Packing Group.
- 12. Additional Information/Marine Pollutant/Flash point/etc.
- 13. Number and kind of packages.
- 14. Mass (kg) or Volume (L).
- 15.EmS.
- 16. Shipping Agent.
- 16.1 Place and date.
- Signature of Agent.

DANGEROUS GOODS MANIFEST

(IMO FALForm 7)

(As required by SOLAS 74, chapter VII, regulations 4.2and 7-2.2, MARPOL, Annex III, regulation 4.2 and chapter 5.4, paragraph 5.4.3.1 of the IMDG Code)

										Page Number
1.1 Name of ship			1.2 IMO number			1.3 Call sign				
1.4 Voyage number		2. Flag State of ship			3. Port of loading			4. Port of discharge		
5.Stowage Position	6. Reference Number	7. Marks & Numbers - Freight container Identification No(s) - Vehicle registration No(s).	8. UN Number	9. Proper Shipping Name/(Technical Specifications)	10. Class/ (Subsidiary Risk(s))	11. Packing Group	12. Additional Information/Marine Pollutant/Flash point/etc.	13. Number and kind of packages	14. Mass (kg) or Volume (L)	15.EmS
16. Shipping Agent										
16.1 Place and date										
Signature of Agent										

UN No.	Proper shipping name (PSN)	Class or division	Subsidiary hazard(s)	Packing group	Special provisions	Limited and excepted quantity provisions		Packing		IBC		Portable tanks and bulk containers			EmS	Stowage and handling	Segregation	Properties and observations	UN No.
						Limited quantities	Excepted quantities	Instructions	Provisions	Instructions	Provisions	Tank instructions	Provisions						
(1)	(2) 3.1.2	(3) 2.0	(4) 2.0	(5) 2.0.1.3	(6) 3.3	(7a) 3.4	(7b) 3.5	(8) 4.1.4	(9) 4.1.4	(10) 4.1.4	(11) 4.1.4	(12)	(13) 4.2.5 4.3	(14) 4.2.5	(15) 5.4.3.2 7.8	(16a) 7.1 7.3–7.7	(16b) 7.2–7.7	(17)	(18)
1259	NICKEL CARBONYL	6.1	3 P	I	–	0	E0	P601	–	–	–	–	–	–	F-E, S-D	Category D SW2	SG63	Colourless or yellow, volatile, flammable liquid. Flashpoint: below –20°C c.c. Oxidizes in air and explodes at a temperature of 60°C. Lower explosive limit: 2.0%. Immiscible with water. Highly toxic if swallowed, by skin contact or by inhalation.	1259
1261	NITROMETHANE	3	–	II	26	1 L	E0	P001	–	–	–	–	–	–	F-E, S-D	Category A	–	Colourless liquid. Flashpoint: 35°C c.c. Explosive limits: 7.1% to 63%. Miscible with water. Fire and explosion hazard if package is ruptured.	1261
1262	OCTANES	3	– P	II	–	1 L	E2	P001	–	IBC02	–	–	T4	TP2	F-E, S-E	Category B	–	Colourless liquids. Explosive limits: 1% to 6.5%. ISOOCTANE: flashpoint –12°C c.c. *n*-OCTANE: flashpoint 13°C c.c. Immiscible with water.	1262
1263	PAINT (including paint, lacquer, enamel, stain, shellac, varnish, polish, liquid filler and liquid lacquer base) or PAINT RELATED MATERIAL (including paint thinning or	3	–	I	163 367	500 mL	E3	P001	–	–	–	–	T11	TP1 TP8 TP27	F-E, S-E	Category E	–	Miscibility with water depends upon the composition.	1263

Change to Entries, as compared to previous version of IMDG Code

1. Unique Number for the Dangerous Goods

2. Proper Shipping Name

3. IMDG Class / Subdivision

4. Additional Hazards / Marine Pollutant Indicator

5. Packing Group : Cat I, Cat II or Cat III

7a. Max qty allowed in Inner Package

7b. Max Qty allowed in overall Package

8 / 9. Packing Instructions

10 / 11. Types of IBC allowed for Transport

UN No.	Proper shipping name (PSN)	Class or division	Subsidiary hazard(s)	Packing group	Special provisions	Limited and excepted quantity provisions		Packing		IBC	
						Limited quantities	Excepted quantities	Instructions	Provisions	Instructions	Provisions
(1)	(2) 3.1.2	(3) 2.0	(4) 2.0	(5) 2.0.1.3	(6) 3.3	(7a) 3.4	(7b) 3.5	(8) 4.1.4	(9) 4.1.4	(10) 4.1.4	(11) 4.1.4
1259	NICKEL CARBONYL	6.1	3 P	I	–	0	E0	P601	–	–	–

IMDG Code Part 3
Dangerous Cargo List

12 / 13 / 14. Instructions for Portable Tanks

15. Emergency Schedule Table Indicator

16a. Stowage & Handling Code

16b. Segregation Code of DG

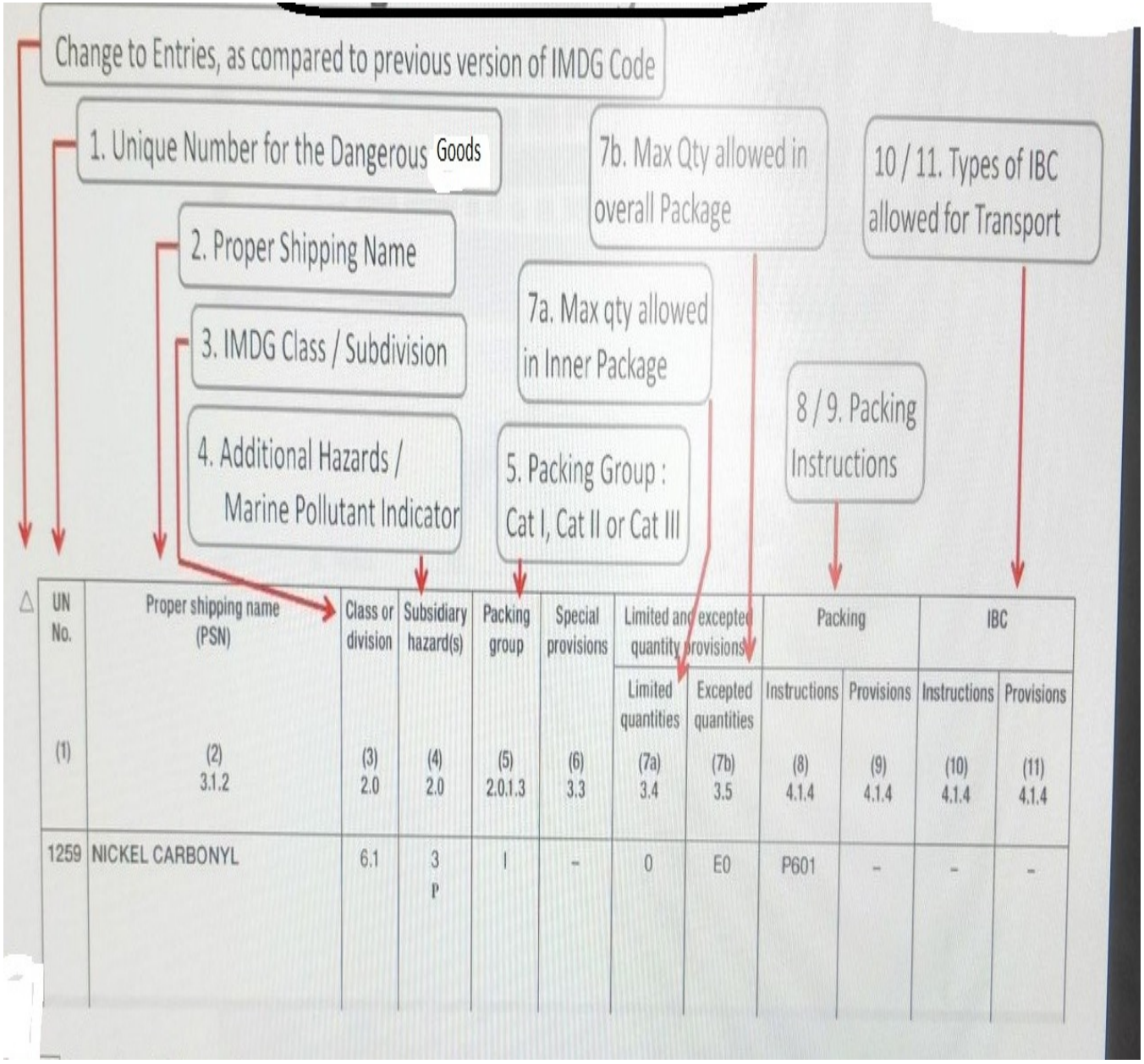
17. Peculiar Properties of DG Cargo

18. Unique Number for the Dangerous Cargo

Portable tanks and bulk containers			EmS	Stowage and handling	Segregation	Properties and observations	UN No.
	Tank instructions	Provisions					
(12)	(13) 4.2.5 4.3	(14) 4.2.5	(15) 5.4.3.2 7.8	(16a) 7.1 7.3–7.7	(16b) 7.2–7.7	(17)	(18)
–	–	–	F-E, S-D	Category D SW2	SG63	Colourless or yellow, volatile, flammable liquid. Flashpoint: below –20°C c.c. Oxidizes in air and explodes at a temperature of 60°C. Lower explosive limit: 2.0%. Immiscible with water. Highly toxic if swallowed, by skin contact or by inhalation.	1259

DANGEROUS GOODS LIST

- **Vol 2- Dangerous Cargo list (DGL) comprises of Part 3 of IMDG which lists out comprehensive properties of each identified dangerous goods.**
- **The Dangerous Goods List is divided into 18 columns as follows:**
- **Column 1 – UN Number**
- Contains the United Nations Number assigned by the United Nations Committee of Experts on the Transport of Dangerous Goods (UN List).
- **Column 2 – Proper Shipping Name (PSN)**
- Contains the Proper Shipping Names in upper case characters which may have to be followed by additional descriptive text in lower-case characters.
- **Column 3 – Class or Division**
- Contains the class and in the case of class 1, the division and compatibility group.



UN No.	Proper shipping name (PSN)	Class or division	Subsidiary hazard(s)	Packing group	Special provisions	Limited and excepted quantity provisions		Packing		IBC	
						Limited quantities	Excepted quantities	Instructions	Provisions	Instructions	Provisions
(1)	(2) 3.1.2	(3) 2.0	(4) 2.0	(5) 2.0.1.3	(6) 3.3	(7a) 3.4	(7b) 3.5	(8) 4.1.4	(9) 4.1.4	(10) 4.1.4	(11) 4.1.4
1259	NICKEL CARBONYL	6.1	3 P	I	-	0	E0	P601	-	-	-

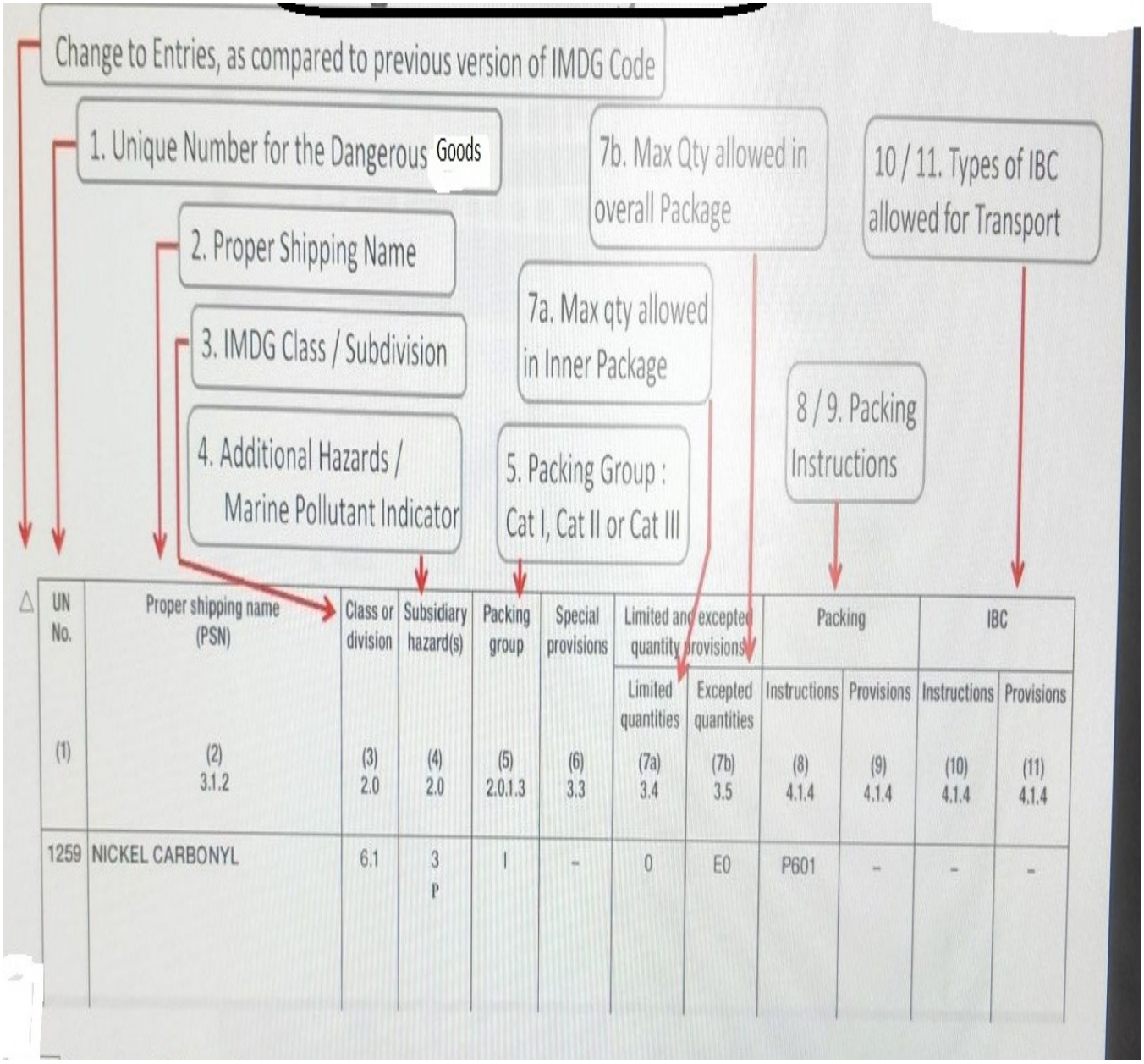
DANGEROUS GOODS LIST

- **Column 4 – Subsidiary Hazard(s)**

Contains the class number(s) of any subsidiary Hazard(s). This column also identifies dangerous goods as a marine pollutant as follows: P Marine pollutant.

- **Column 5 – Packing Group**

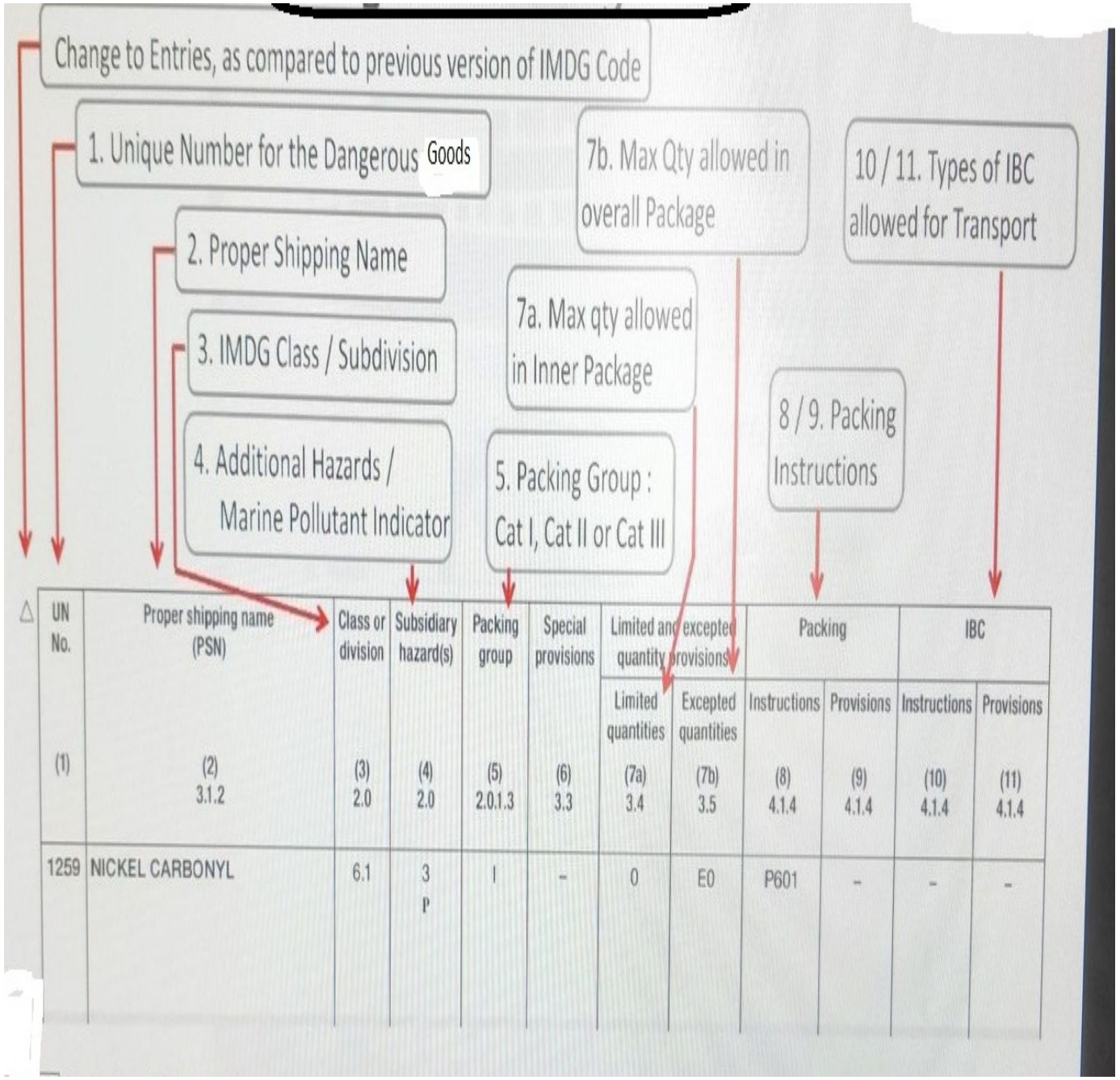
Contains the packing group number (i.e. I, II or III) where assigned to the substance or article. If more than one packing group is indicated for the entry, the packing group of the substance or formulation to be transported shall be determined, based on its properties, through application of the hazard grouping criteria.



UN No.	Proper shipping name (PSN)	Class or division	Subsidiary hazard(s)	Packing group	Special provisions	Limited and excepted quantity provisions		Packing		IBC	
						Limited quantities	Excepted quantities	Instructions	Provisions	Instructions	Provisions
(1)	(2) 3.1.2	(3) 2.0	(4) 2.0	(5) 2.0.1.3	(6) 3.3	(7a) 3.4	(7b) 3.5	(8) 4.1.4	(9) 4.1.4	(10) 4.1.4	(11) 4.1.4
1259	NICKEL CARBONYL	6.1	3 P	I	-	0	E0	P601	-	-	-

DANGEROUS GOODS LIST

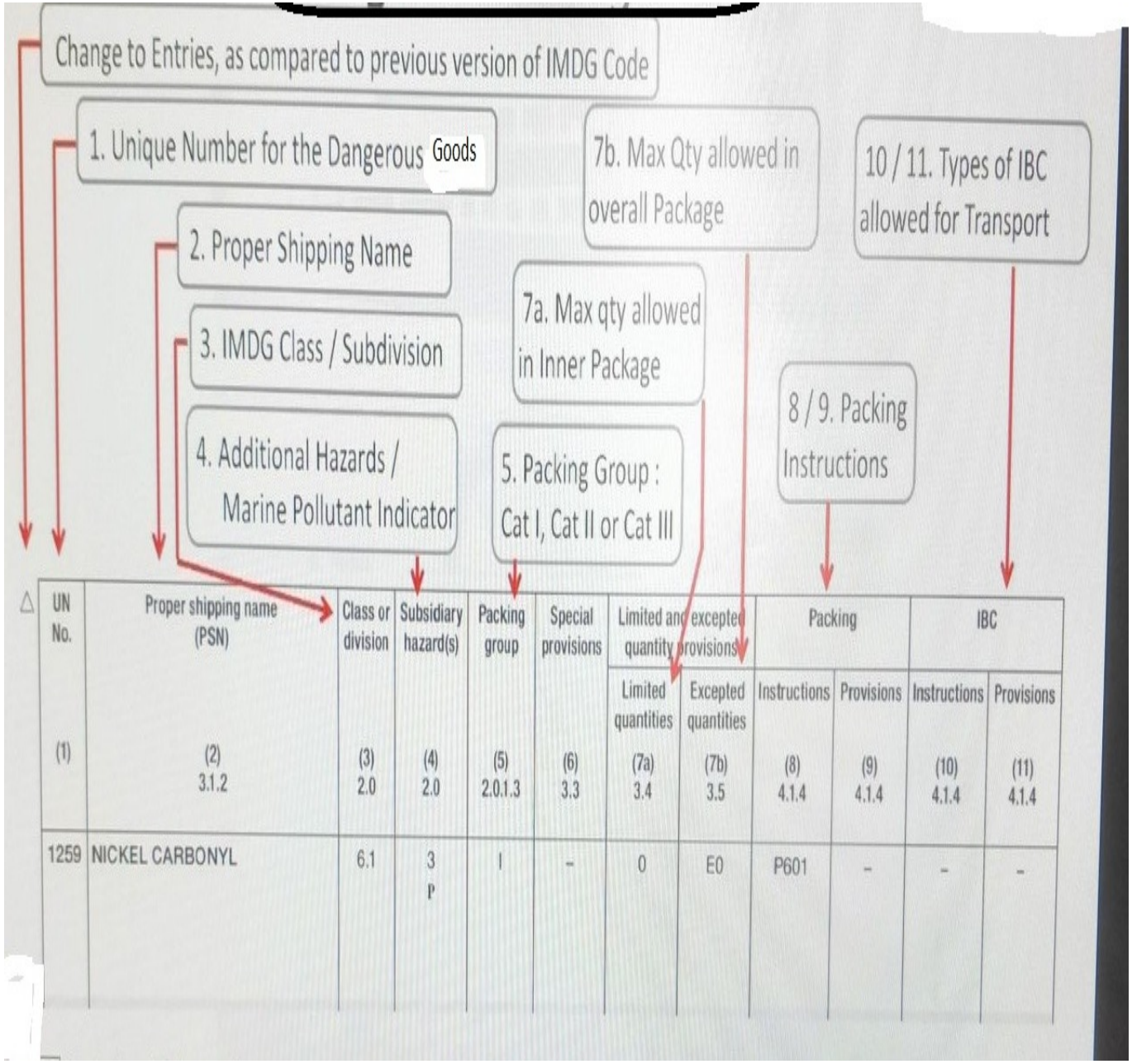
- **Column 6 – Special Provisions**
- Contains a number referring to any special provision(s) indicated in chapter 3.3. The special provision numbers specific to the sea mode start from 900.
- **Note:** When a special provision is no longer needed, this special provision is deleted but the special provision number is not allocated again, in order not to confuse the users of this Code. For this reason, **some of the numbers are missing**.
- **Column 7a – Limited Quantities**
- Provides the maximum quantity per inner packaging.
- **Column 7b -** Excepted quantities
- This column provides an alpha-numeric code described in sub-section 3.5.1.2 which indicates the maximum quantity per inner and outer packaging.
- Example: **E0**- Not permitted as Excepted Quantity.



UN No.	Proper shipping name (PSN)	Class or division	Subsidiary hazard(s)	Packing group	Special provisions	Limited and excepted quantity provisions		Packing		IBC	
						Limited quantities	Excepted quantities	Instructions	Provisions	Instructions	Provisions
(1)	(2) 3.1.2	(3) 2.0	(4) 2.0	(5) 2.0.1.3	(6) 3.3	(7a) 3.4	(7b) 3.5	(8) 4.1.4	(9) 4.1.4	(10) 4.1.4	(11) 4.1.4
1259	NICKEL CARBONYL	6.1	3 P	I	–	0	E0	P601	–	–	–

DANGEROUS GOODS LIST

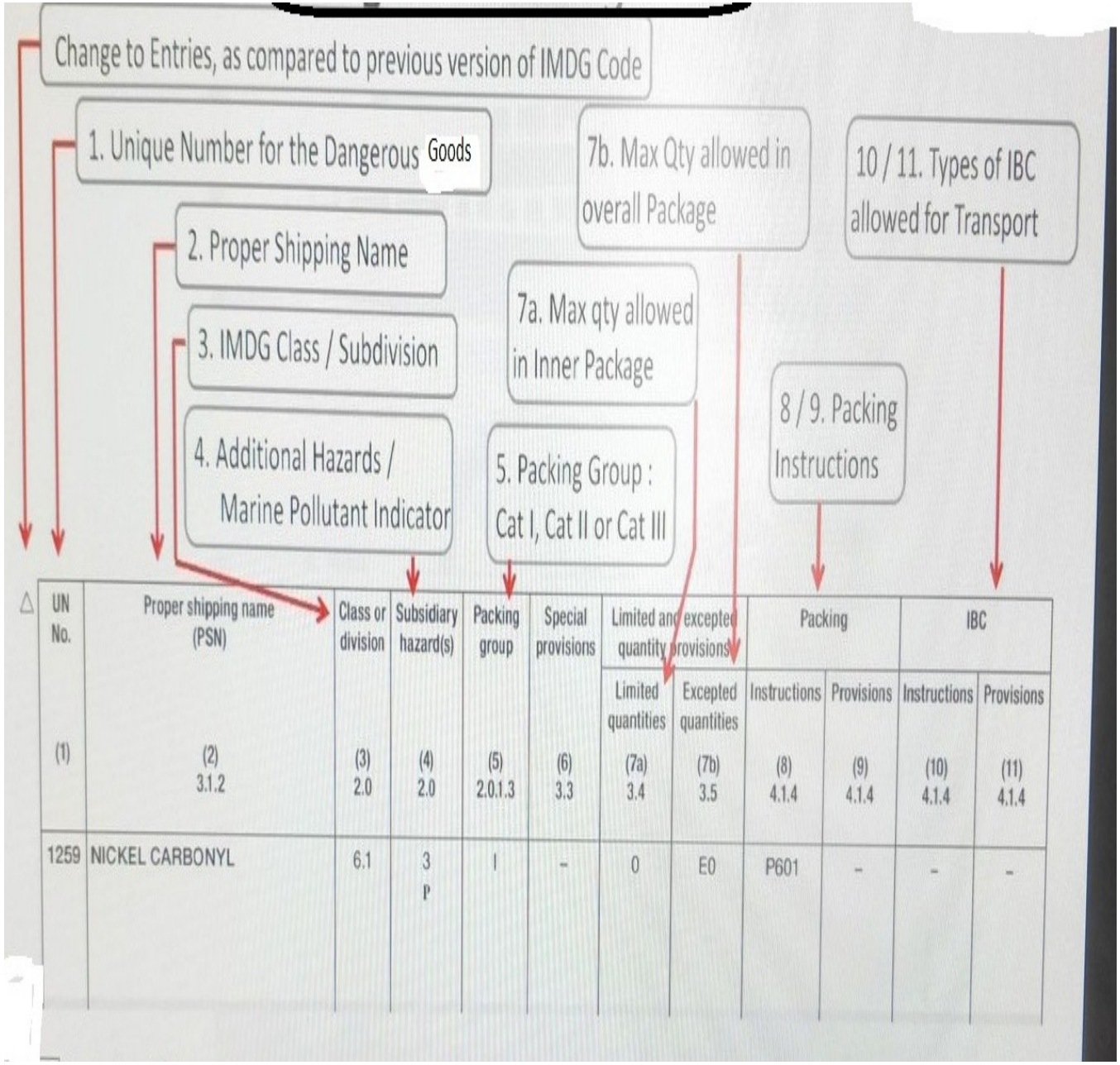
- **Column 8 – Packing Instructions**
- This column contains alpha-numeric codes.
- A code including the letter "P" refers to packing instructions and letters "LP" refers to packing instructions for the use of large packaging's.
- When a code including the letter(s) "P" or "LP" is not provided, it means that the substance is not allowed in that type of packaging.
- **Column 9 – Special Packing Provisions**
- This column contains alpha-numeric codes.
- Letters "PP" refers to a special packing provision applicable to the use of a packing instruction bearing the Code "P" and letter "L" refers to a special packing provision applicable to a packing instruction bearing the code "LP".



UN No.	Proper shipping name (PSN)	Class or division	Subsidiary hazard(s)	Packing group	Special provisions	Limited and excepted quantity provisions		Packing		IBC	
						Limited quantities	Excepted quantities	Instructions	Provisions	Instructions	Provisions
(1)	(2) 3.1.2	(3) 2.0	(4) 2.0	(5) 2.0.1.3	(6) 3.3	(7a) 3.4	(7b) 3.5	(8) 4.1.4	(9) 4.1.4	(10) 4.1.4	(11) 4.1.4
1259	NICKEL CARBONYL	6.1	3 P	I	-	0	E0	P601	-	-	-

DANGEROUS GOODS LIST

- **Column 10 – IBC (Intermediate Bulk Containers) Packing Instructions**
- This column contains alpha-numeric codes.
- A code including the letters “IBC” refers to packing instructions for the use of IBCs described in chapter 6.5.
- When a code is not provided, it means the substance is not authorized in IBC.
- **Column 11 – IBC Special Provisions**
- This column contains an alpha-numeric code, including the letter “B”, which refers to special packing provisions applicable to the use of packing instructions bearing the code “IBC” in 4.1.4.2.

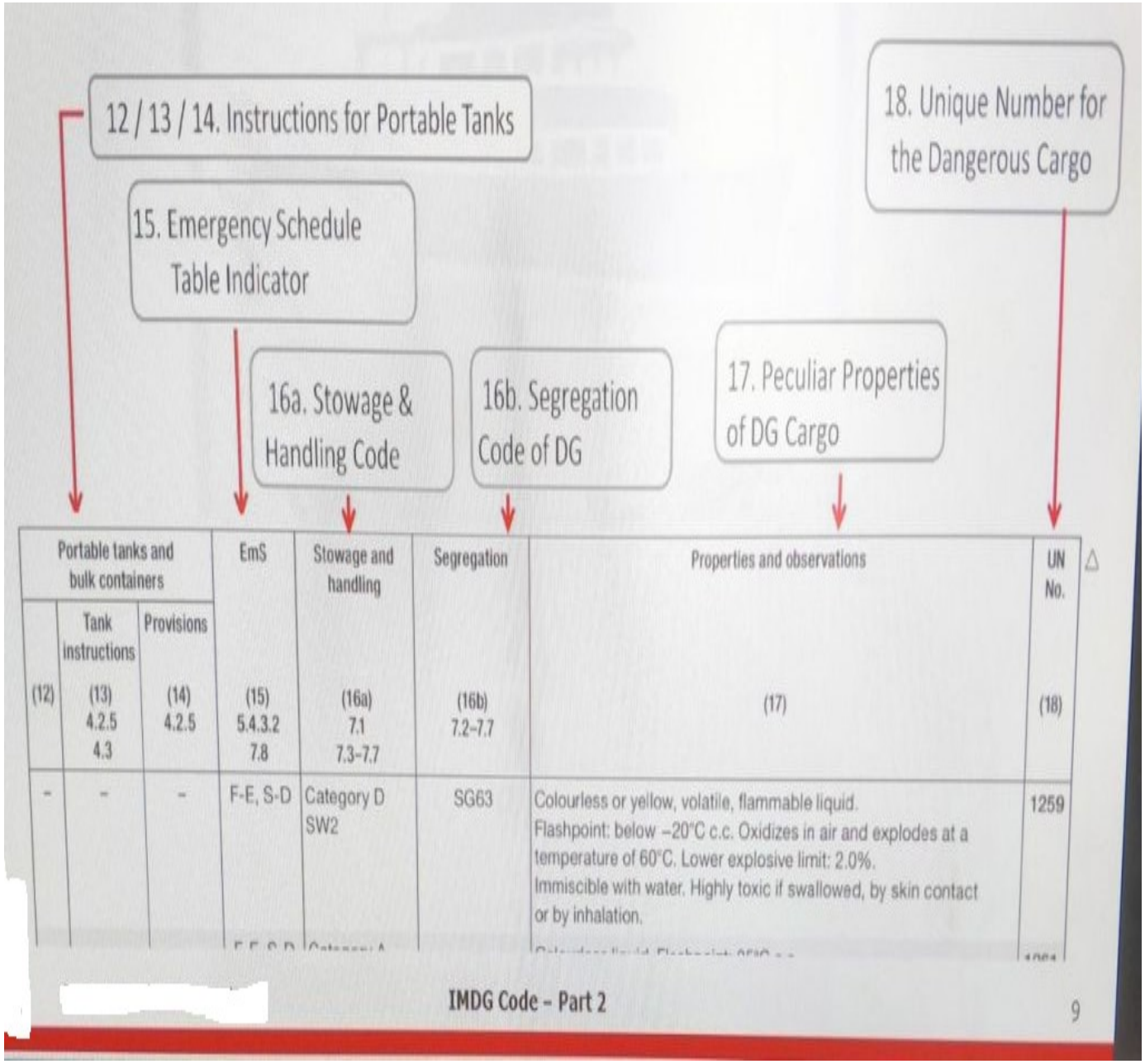


UN No.	Proper shipping name (PSN)	Class or division	Subsidiary hazard(s)	Packing group	Special provisions	Limited and excepted quantity provisions		Packing		IBC	
						Limited quantities	Excepted quantities	Instructions	Provisions	Instructions	Provisions
(1)	(2) 3.1.2	(3) 2.0	(4) 2.0	(5) 2.0.1.3	(6) 3.3	(7a) 3.4	(7b) 3.5	(8) 4.1.4	(9) 4.1.4	(10) 4.1.4	(11) 4.1.4
1259	NICKEL CARBONYL	6.1	3 P	I	-	0	E0	P601	-	-	-

DANGEROUS GOODS LIST

- **Column 12 - [Reserved].**
- **Column 13 – UN Tank and Bulk Container Instructions**
- This column contains T codes (see 4.2.5.2.6) applicable to the transport of dangerous goods in portable tanks and road tank vehicles.
- When a T code is not provided in this column, it means that the dangerous goods are not authorized for transport in tanks unless specifically approved by the competent authority.
- A code including the letters BK refers to type of bulk containers.
- The gases authorized for transport in MEGCs are indicated in the column “MEGC” (Multiple-element gas containers).
- **Column 14 – Tank Special Provisions**
- Contains TP notes (see 4.2.5.3) applicable to the transport of dangerous goods in portable tanks and road tank vehicles.

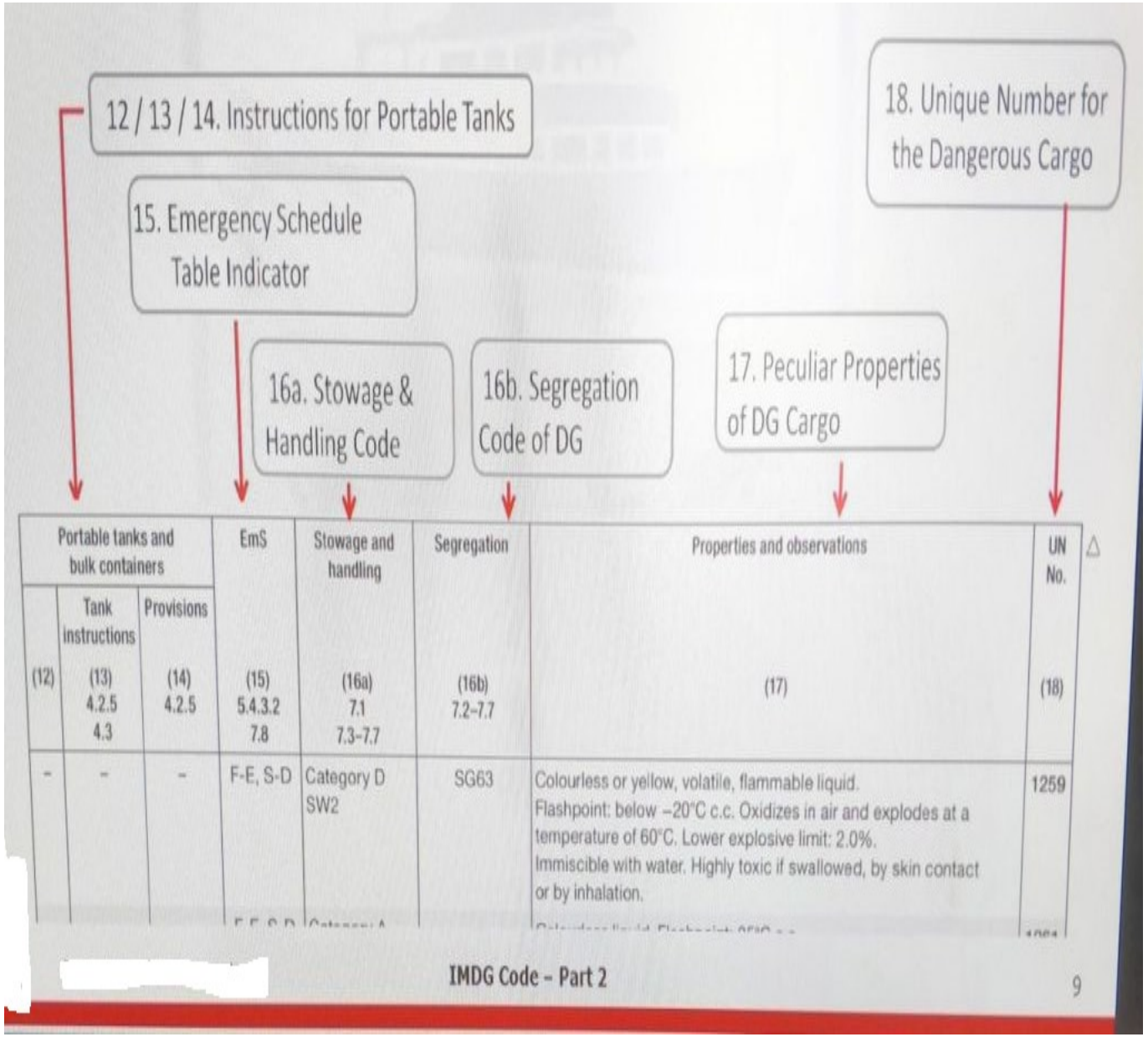
The TP notes specified in this column apply to the portable tanks specified in both columns 12 and 13.



Portable tanks and bulk containers			EmS	Stowage and handling	Segregation	Properties and observations	UN No.
	Tank instructions	Provisions					
(12)	(13) 4.2.5 4.3	(14) 4.2.5	(15) 5.4.3.2 7.8	(16a) 7.1 7.3-7.7	(16b) 7.2-7.7	(17)	(18)
-	-	-	F-E, S-D	Category D SW2	SG63	Colourless or yellow, volatile, flammable liquid. Flashpoint: below –20°C c.c. Oxidizes in air and explodes at a temperature of 60°C. Lower explosive limit: 2.0%. Immiscible with water. Highly toxic if swallowed, by skin contact or by inhalation.	1259

DANGEROUS GOODS LIST

- **Column 15 – EmS**
- Refers to the relevant emergency schedules for FIRE and SPILLAGE in 'The EmS Guide – Emergency Response Procedures for Ships Carrying Dangerous Goods'.
- The first EmS code refers to the relevant Fire Schedule (e.g., Fire Schedule Alfa "F-A" General Fire Schedule).
- The second EmS code refers to the relevant Spillage Schedule (e.g., Spillage Schedule Alfa "S-A" Toxic Substances).
- Underlined EmS codes (special cases) indicate a substance, material or article for which additional advice is given in the emergency response procedures.



Portable tanks and bulk containers			EmS	Stowage and handling	Segregation	Properties and observations	UN No.
(12)	(13) Tank instructions 4.2.5 4.3	(14) Provisions 4.2.5	(15) 5.4.3.2 7.8	(16a) 7.1 7.3–7.7	(16b) 7.2–7.7	(17)	(18)
-	-	-	F-E, S-D	Category D SW2	SG63	Colourless or yellow, volatile, flammable liquid. Flashpoint: below –20°C c.c. Oxidizes in air and explodes at a temperature of 60°C. Lower explosive limit: 2.0%. Immiscible with water. Highly toxic if swallowed, by skin contact or by inhalation.	1259

DANGEROUS GOODS LIST

- **Column 16 – Stowage and Segregation**

Contains the stowage and segregation provisions as prescribed in part 7.

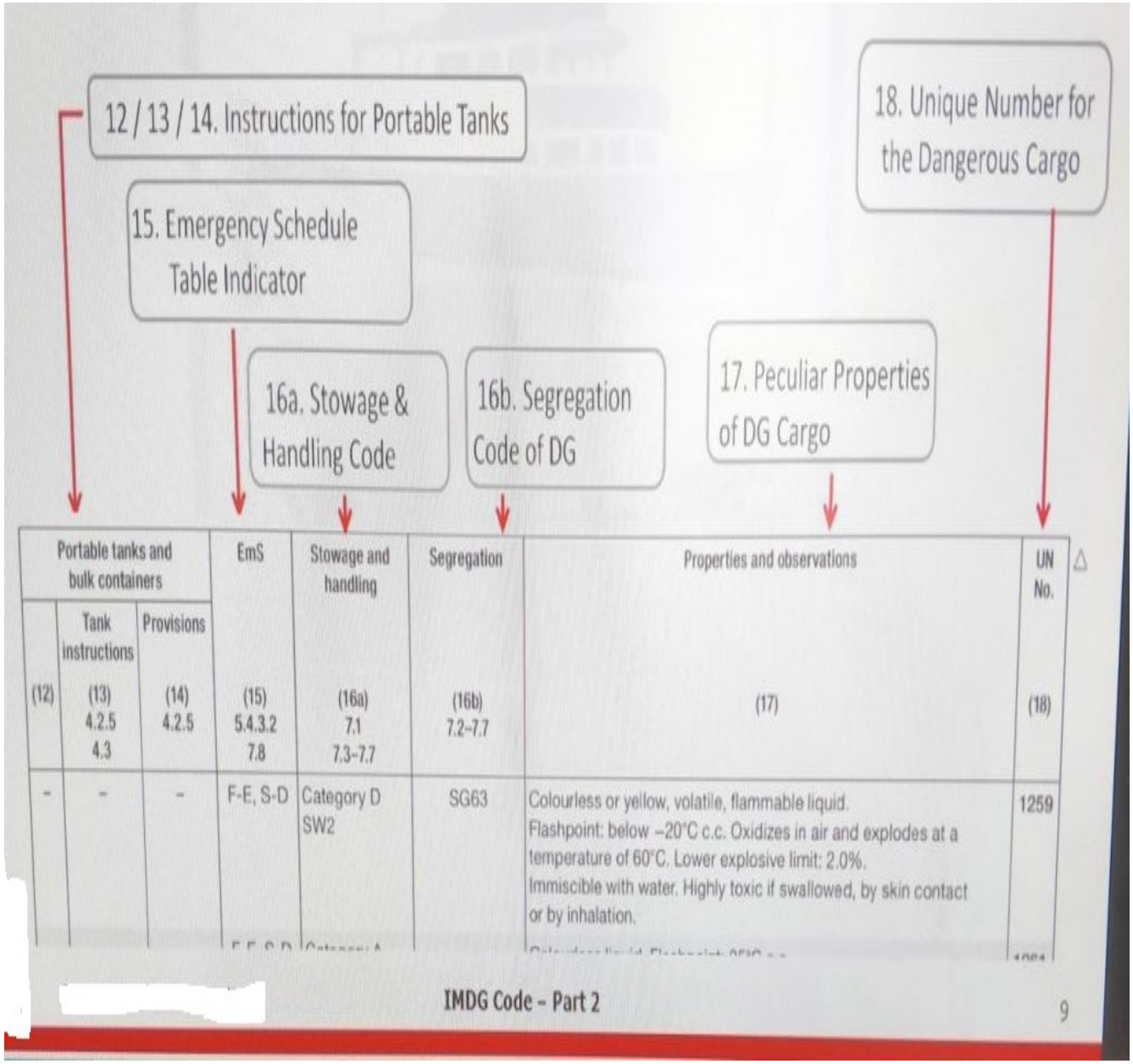
- **Column 17 – Properties and Observations**

Contains properties and observations on the dangerous goods listed.

MSDS must be provided by Manufacturer.

- **Column 18 – UN Number**

Contains the United Nations Number assigned to a dangerous good by the United Nations Committee of Experts on the Transport of Dangerous Goods (UN List).



IMDG CODE - DOCUMENTATION

- **1. DOCUMENT OF COMPLIANCE:**
- Ship's carrying dangerous goods in packaged form need according to SOLAS II-2/19 and Chapter VII – Carriage of dangerous goods , a document of Compliance issued by the Flag state administration.
- **2. Validity:**
- Cargo ship: Not more than 5 years and should not be extended beyond the expiry date of the valid Cargo Ship Safety Construction Certificate.
- Passenger ship: One year and should not be extended beyond the expiry date of the valid Passenger Ship Safety Certificate.
- **3. DOC certifies:**
- a. That the construction and equipment of the ship is found to comply with the provisions of Regulation II-2/54 of SOLAS 74 as amended and,
- b. That the ship is suitable for the carriage of those classes of dangerous goods as specified in the appended schedules to the certificate.
- 4. Schedule 1 of a DOC contains a small plan of the ship's stowage spaces and a table showing the classes of dangerous goods suitable for stowage in each category of space.
- 5. Schedule 2 lists the special requirements, as required by the fire protection regulations in force when the certificate was issued, for the ship to carry dangerous goods.

Document of Compliance

- **Ships which require this Document of Compliance are:**
- Passenger ships and to cargo ships constructed on or after 1 July 2002.
- **For:**
- 1. A Passenger ship constructed on or after 1 September 1984 but before 1 July 2002; or
- 2. A cargo ship of 500 gross tons or over constructed on or after 1 September 1984 but before 1 July 2002; or
- 3. A cargo ship of less than 500 gross tons constructed on or after 1 February 1992 but before 1 July 2002, the requirements of regulation II-2/54 of SOLAS, 1974, as amended by resolutions.
- For cargo ships of less than 500 gross tons constructed on or after 1 September 1984 and before 1 February 1992, it is recommended that Contracting Governments extend such application to these cargo ships as far as possible.

Document of Compliance

- **Dangerous goods that do not require a Document of compliance:**
- Class 6.2 Infectious substances.
- Class 7 Radioactive substances.
- Carriage of dangerous goods in Limited Quantities.
- **Information contained on the Document of Compliance for Ships Carrying Dangerous Goods in Packaged or Dry Bulk Form:**
- Name of ship.
- Distinctive number or letters.
- Port of registry.
- Ship type.
- IMO Number (if applicable).
- A simple layout of ship indicating the location of the cargo spaces.
- A table of the dangerous goods approved for carriage and their stowage locations.
- List of equipment according to the provisions of SOLAS Regulation II-2/19.
- Endorsement pages of Annual and Intermediate Surveys.

IMO Shipper's Declaration Form

- IMO Shipper's Declaration is the form used to describe hazardous materials in a container or shipping on a vessel. The IMO shippers declaration form is mandatory for shipments of dangerous goods by sea under the International Maritime Organization regulations.
- The shipper must certify that the contents are fully and accurately described by proper shipping name, are classified, packed, marked and labeled, and are in all respects in the proper condition for transport according to the applicable regulations.
- **CONTENTS OF DECLARATION FORM:**
- **1 Shipper/Consignor/Sender**
- Fill up full address of the shipper
- **2 Transport document number**
- This box is for booking number issued by Carrier
- **3 Page 1 of pages**
- Here page number must be entered consecutively. Example if the DGD has only 1 page then entre as Page 1 of 1 Pages. If the DGD has 3 pages then on first sheet entre Page 1 of 3 pages, on second page entre page 2 of 3 pages and on third page entre page 3 of 3 pages. Numbering pages consecutively is mandatory and important to identify exact missing page, if any, during transport.

IMO Shipper's Declaration Form

- **CONTENTS OF DECLARATION FORM: (Cont'd)**
- **4 Shipper's reference**
- This box is for entering shipper's on reference number, such as his own booking number.
- **5 Freight forwarder's reference**
- If freight forwarder has their own booking number it can be entered here.
- **6 Consignee**
- Here we must entre full address of the consignee
- **7 Carrier (to be completed by the carrier)**
- This box will be filled by carrier with their name. Example: MOL, MSC etc.
- **8 This shipment is within the limitations prescribed for: (Delete non-applicable)**
- This section is applicable only for air transport hence can be ignored for ocean transport
- **9 Additional handling information**
- In this box shipper can fill in any additional handling requirement. It can be preferring under deck stowage or away from heat etc. However, carrier will stow the box only according to IMDG Code requirement for stowage and carrier's own in-house rule.
- **10 Vessel/flight No. and date**
- Fill in here vessel's name and date. Date can be either the date of preparing the DGD or the date of handing over DGD to the first carrier.

IMO Shipper's Declaration Form

- **CONTENTS OF DECLARATION FORM: (Cont'd)**
- **11 Port/place of loading**
- First port of loading to be filled here
- **12 Port/place of discharge**
- Last port of discharge to be filled here
- **13 Destination**
- Final destination to be filled here.
- **Box 14**
- **Description of Dangerous Goods must only be entered in below sequence without any change.**
- 1. the UN number preceded by the letters "UN".
- 2. the proper shipping name, including the technical name enclosed in parenthesis, when special provision 274 or 318 is assigned in column 6.
- 3. the primary hazard class or, when assigned, the division of the goods, including, for class 1, the compatibility group letter. The words "Class" or "Division" may be included preceding the primary hazard class or division numbers.
- 4. subsidiary hazard class or division number(s) corresponding to the subsidiary risk label(s) required to be applied, when assigned, shall be entered following the primary hazard class or division and shall be enclosed in parenthesis. The words "Class" or "Division" may be included preceding the subsidiary hazard class or division numbers.
- 5. where assigned, the packing group for the substance or article, which may be preceded by "PG" (e.g."PG II").

IMO Shipper's Declaration Form

- **CONTENTS OF DECLARATION FORM: (Cont'd)**
- **15 Container identification No./ vehicle registration No.**
- Entre the container number here
- **16 Seal number(s)**
- Entre the seal number here
- **17 Container/vehicle size & type**
- Entre the size and type of container here
- **18 Tare mass (kg)**
- Empty container or empty tank weight to be entered here
- **19 Total gross mass (including tare) (kg)**
- This box must be filled with total weight of cargo + weight of dunnage + empty container weight.
- **20 Name of company**
- This is the box where the details of the company who packs the container need to be filled in. Packer of the container may be the shipper himself of a consolidator. The container packing certificate is not required for tanks.
- **21 RECEIVING ORGANISATION RECEIPT**
- Receiver to fill in this box as acknowledgement

IMO Shipper's Declaration Form

- **CONTENTS OF DECLARATION FORM: (Cont'd)**
- **22 Name of company (OF SHIPPER PREPARING THIS NOTE).**
- Here fill in the shipper's details.
- If the DGD is prepared electronically then the signature may be replaced with by the name(s) (in capitals) of the person authorized to sign.
- Shippers who sign the DGD is undertaking the declaration written just below box 7 which reads
- **I hereby declare that the contents of this consignment are fully and accurately described below by the proper shipping name, and are classified, packaged, marked and labelled/placarded and are in all respects in proper condition for transport according to the applicable international and national governmental regulations.**
- **NOTE:**
- **For details: Refer to chapter 5.4 of IMDG Code**

SHIPPER RESPONSIBILITIES

- **The shipper must:**
- Classify and declare (dangerous goods declaration) the goods in compliance with the IMDG Code.
- Package the goods in compliance with the IMDG Code.
- Label the items/packages with the proper shipping name, UN number, hazard labels and, when appropriate, a marine pollutant label.
- Certify that the goods are correctly packaged and labelled and that the goods are suitable for transportation by sea.
- Ensure that incompatible goods are not stowed in the same transport unit.
- Issue a stowage certificate when stowing in a container or hold.
- The shipper must also ensure that the packaging:
- Is sturdily made and is in good condition.
- Is designed so any internal surfaces the contents may come into contact with, are not dangerously affected by the substance being transported.
- Is able to withstand the normal risks that are involved in handling and in transportation by sea.
- As a minimum, is in compliance with the stipulations of the IMDG code.

CARRIER RESPONSIBILITIES

- **The Carrier is responsible:**
- For the seaworthiness of the ship.
- Ensuring possession of valid Document of Compliance.
- Obtaining information on the Dangerous goods:
- Documentation, marking and labeling packaging, Dangerous goods manifest.
- Undertaking segregation of goods in compliance with the IMDG code.
- For the care of goods.
- For the stowage.
- For making the holds and all other parts of the ship in which goods are carried, fit and safe for their reception, carriage and preservation.
- To deliver the goods safely and take responsibility arising from any loss or damage to cargo because of lack of diligence.
- To deliver goods at an agreed place.
- To deliver goods in time.
- To deliver to the proper Receiver.
- To ensure that the crew has received the necessary training.
- To ensure that the necessary emergency equipment is on board.

Fumigated Cargo Transport Units (UN 3359)

- A fumigated unit is a closed cargo transport unit packed with cargo that is under fumigation.
- Fumigated cargo transport units (UN 3359) containing no other dangerous goods are not subject to any provisions of this Code other than those of this section.
- Fumigation is done by introducing solid or liquid materials that produce gases that are highly toxic (commonly Phosphine) or asphyxiant, then sealing the container. The result is a cargo transport unit that is highly dangerous to enter, and potentially dangerous to load below deck in certain types of ship because of the risk of toxic gas escaping from the containers and injuring crew in occupied parts of the ship.
- It is imperative that Shippers notify the shipping line of any cargo transport unit to be shipped under fumigation and Ships need to be aware of which containers.
- Failure to declare fumigated units is a breach of the IMDG Code.

Fumigated Cargo Transport Units (UN 3359)

•**Marking and placarding:**

•A fumigated cargo transport unit shall be marked with a warning mark, affixed at each access point in a location where it will be easily seen by persons opening or entering the cargo transport unit.

•This mark shall remain on the cargo transport unit until the following provisions are met:

•(a) The fumigated cargo transport unit has been ventilated to remove harmful concentrations of fumigant gas and

•(b) The fumigated goods or materials have been unloaded.

•The fumigation warning mark shall be rectangular and shall not be less than 300 mm wide and 250 mm high. The markings shall be in black print on a white background with lettering not less than 25 mm high.

•If the fumigated cargo transport unit has been completely ventilated either by opening the doors of the unit or by mechanical ventilation after fumigation, the date of ventilation shall be marked on the fumigation warning mark.

•When the fumigated cargo transport unit has been ventilated and unloaded, the fumigation warning mark shall be removed.

Documentation for Fumigated Cargo Transport Units (UN 3359)

- **Documents associated with the transport of cargo transport units that have been fumigated and have not been completely ventilated before transport shall include the following information:**
- 1. UN 3359, fumigated cargo transport unit, 9, or UN 3359, fumigated cargo transport unit, class 9.
- 2. The date and time of fumigation.
- 3. The type and amount of the fumigant used.
- The transport document may be in any form, provided it contains the above information required. This information shall be easy to identify, legible and durable.
- Instructions for disposal of any residual fumigant including fumigation devices (if used) shall be provided.
- **A document is not required** when the fumigated cargo transport unit has been completely ventilated and the date of ventilation has been marked on the warning mark.

Loading Fumigated Cargo Transport Units

- **Because of the seriousness of the hazards arising from fumigated units, the IMDG Code has instructions for the ship, that are summarised below:**
- The Master shall be informed prior to loading any fumigated unit.
- Fumigated cargo transport units shall be carried on ships in accordance with the IMDG Code provisions for UN 3359 and MSC.1/Circ.1361 Revised recommendations of the safe use of pesticides in ships.
- Fumigated units shall not be allowed onboard until sufficient period of time has elapsed to allow a uniform concentration of gas throughout the cargo in it. This period will vary according to the type of fumigant and nature of the cargo.
- When fumigated units are stowed under deck, equipment for detecting fumigant gas(es) shall be carried on the ship with instructions for their use.

IMDG CODE 2018 EDITION Incorporating amendment 39-18

- **Summary:**
- There are many changes to the 2018 edition of the International Maritime Dangerous Goods Code (IMDG Code). **The significant changes are outlined below**:
- Throughout the text ‘risk’ now reads ‘hazard’ and ‘risks’ reads ‘hazards’.
- There is a new **paragraph 2.0.6**, Classification of articles as articles containing dangerous goods N.O.S.
- A new entry was added to the table in paragraph 2.4.2.3.2.3 for **Class 4**.
- New entries for 3109, 3116, 3119 were added to the table in paragraph 2.5.3.2.4 for **Class 5.2**.
- **Chapter 2.8**, Classification of corrosives, has been overhauled.
- There is clarification in **paragraph 3.1.2.2** that only the more applicable PSN be used when there are several distinct ones under one UN Number.

IMDG CODE 2018 EDITION Incorporating amendment 39-18

- **Summary: (Cont'd)**
- The stowage categories for several **class 1** entries have been amended.
- There have been several updates in **chapter 4.2** to existing packing instructions and a few new packing instructions added
- There is a new IMO type 9 tank added for road gas elements vehicles for the transport of compressed gases of **class 2**.
- In **chapter 5.2**, paragraph 5.2.2.2, the specimen labels are now presented in a landscape table.
- **Chapter 5.3** is now extended to cover bulk containers.
- **Part 6** has several minor changes to some of the chapters.
- There is a new table added to **paragraph 7.2.6.3**, which provides segregation exemptions for organic peroxides UN numbers 3101 to 3120 with sub-risks that clash with other organic peroxides.
- **Section 7.3.7** is restructured to merge the amendments to the Model Regulations and the existing text.

IMDG CODE 2018 EDITION Incorporating amendment 39-18

- **Summary: (Cont'd)**
- **New segregation group codes:**
- Eighteen new segregation groups are identified (see paragraph 3.1.4.4)
- Section 7.2.8 has been updated to reflect the new segregation group codes.
- SG1 has been amended and new segregation codes SG76, SG77 and SG78 added.
- **Updates to the Dangerous Goods List (DGL):**
- There are new entries TOXIC SOLID, FLAMMABLE, INORGANIC, N.O.S. (UN 3535) and LITHIUM BATTERIES INSTALLED IN CARGO TRANSPORT UNIT (UN 3536).
- There are new entries UN numbers 3537 to 3548 covering 'ARTICLES CONTAINING DANGEROUS GOODS'.
- The eighteen new segregation groups have now been coded and included in column 16b of the DGL (note: if a substance belongs to a segregation group (as identified in paragraph 3.1.4.4) it is now identified in the DGL, column 16b, by inclusion of the 'SGG' code. The intention is to make the identification of belonging to a segregation group more easily recognizable directly from the DGL).
- The heading in column 4 of the DGL now reads 'subsidiary hazard(s)'.
- Many substances in the DGL have now been assigned SG35, SG36 and/or SG49 (stow separated from acids/alkalis/cyanides)
- **The EmS guide has been updated and revised to reflect new assignments in column 15 of the DGL.**

EMERGENCY PROCEDURES FOR DANGEROUS GOODS SPILLAGE

- After fire, Spillage of dangerous goods is most hazardous situation out at sea. Certain dangerous goods when spilled may lead to fire and other extreme hazards jeopardizing safety of vessel and her crew.
- If spillage is observed from any **container,** ship staff should immediately ascertain the properties of the goods involved and necessary precautions before initiating spillage control operations. Flammable liquids and flammable gas when leaked can result in fire/explosion causing grievous injury to crew and damage to ship.
- The magnitude of effect from spillage depends on amount spilled and the properties of cargo also whether spillage has occurred on deck or under deck.
- The importance of training of crew and their familiarity with contingency plan plays a vital role when dealing with spillage. Regular drills and exercises must involve the cargoes being carried during the voyage.
- Most important aspect while dealing with dangerous goods spillage, whether on deck or under deck is safety of the emergency personnel.
- Every vessel must have chemical protective suits, self-contained breathing apparatus and firefighter's outfits according to Chapter II-2 of SOLAS convention.

EMERGENCY PROCEDURES FOR DANGEROUS GOODS SPILLAGE

- **Four steps to spillage response:**
- 1. Identification.
- 2. Rescue.
- 3. Isolation.
- 4. Response.
- **1. Identification of The Dangerous Goods Involved:**
- SOLAS regulation VII/5 requires a special list, manifest or stowage plan setting forth the dangerous goods on board and the location thereof. This list or manifest will contain four-digit UN Number and other details of the goods including the container no. and stowage position.
- Identify UN Number of the spilled goods from column 8 of dangerous goods manifest, and EmS (**Emergency Response Procedures for Ships Carrying Dangerous Goods (EmS Guide))** schedule from column 15 for fire and spillage response.
- For more information about the goods vessel can ask their respective office to provide safety data sheets, contact professional responders or manufacturer of the goods.

EMERGENCY PROCEDURES FOR DANGEROUS GOODS SPILLAGE

- **2. Rescue:**
- Utmost priority is safety of the personnel. When a spillage is noticed first action should be to find and rescue any victim affected by the spillage this may also involve rescuing persons from confined spaces and or elevated places.
- **3. Isolation:**
- Isolation can be achieved by limiting the number of personnel who may get exposed to the spilled cargo. One of the way to achieve this is roping or taping off dangerous area, sealing off ventilation, air conditioning which can stop penetration of dangerous vapours into the living and working spaces. Mater can alter the course of the vessel to keep the vapours away.
- **4. Response:**
- Response to spillage should be in accordance with spillage schedule in EmS guide. Prior to dealing with spillage or during spillage control vessel may seek advice from shore.
  Specialist advise may be sought from (as applicable):
- Designated persons Ashore.
- Emergency information centres (such as CHEMTREC in the USA).
- Port State Authorities.
- Coastguard.
- Manufacturer of the products.

GENERAL GUIDELINES FOR SPILLAGE

- 1. Think of safety first.
- 2. Avoid any contact with dangerous substances. Do not walk through spilled liquids or dust (solids).
- 3. Keep away from vapours or gases.
- 4. Sound Emergency alarm.
- 5. Keep the bridge and living quarters up wind if possible.
- 6. Wear full protective clothing resistant to chemical attack and self-contained breathing apparatus.
- 7. Locate stowage position of leaking cargo.
- 8. Identify cargo.
- 9. Obtain UN Numbers and the EmS SPILLAGE SCHEDULE of dangerous goods involved.
- 10. Consider which measures of the EmS SPILLAGE SCHEDULE are applicable and should be followed.
- 11. Be prepared to use the Medical First Aid Guide (MFAG).
- 12. Contact the Designated Person Ashore for assistance to obtain expert advice on dangerous goods emergency response measures.

DANGEROUS GOODS

- **General information prior loading/ discharging:**
- All the relevant data regarding the dangerous goods that would be loaded, these would include:
- Copy of the Shipper Declaration regarding cargo.
- Classification of the Dangerous Goods.
- Quantity to be loaded.
- Proposed stowage.
- Type of packages.
- Shipping name – that is the correct technical name.
- Segregation required from other cargo as well as from other Dangerous Goods.
- MFAG and EmS requirement for the safe handling of the cargo.
- Any fire hazard as per IMDG.
- Any temperature/ wetness restriction for the loading of the cargo.

DANGEROUS GOODS

- **General Precautions that should be taken during the handling of Dangerous goods:**
- The carriage, stowage and discharge of dangerous goods involves several risks associated with each different class of cargo.
- **As a general rule, the following recommendations should always apply before attending to the specific needs of each class.**
- Dangerous goods should be stowed safely and appropriately according to the nature of the goods. Incompatible goods must be segregated from one another.
- Goods which give off dangerous vapours shall be stowed in a well-ventilated space or on deck.
- Where flammable liquids or gases are carried, special precautions are to be taken where necessary against fire or explosion.
- Substances which are liable to spontaneous combustion or heating shall not be carried, unless adequate precautions have been taken to prevent the outbreak of fire.

DANGEROUS GOODS

- **General fire precautions to be taken when carrying dangerous goods:**
- Keep combustible material away from ignition source.
- Protect a flammable substance by adequate packing.
- Reject damaged or leaking packages.
- Stow packages protected from accidental damage or heating.
- Segregate packages from substances liable to start or spread fire.
- Where appropriate and practicable, stow dangerous goods in an accessible position so that packages in the vicinity of a fire may be protected.
- Enforce prohibition of smoking in dangerous areas and display clearly recognizable ‘NO SMOKING’ notices or signs.
- The dangers from short-circuits, earth leakage or sparking will be apparent. Lighting and power cables and fittings should be maintained in good condition.

Stowage of Goods of Class 1 on Passenger ships

- **Explosive Article** means an article containing one or more explosive or pyrotechnic substances.
- **Explosive Substance** means a solid or liquid substance (or a mixture of substances) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surroundings.
- **IMDG - 7.1.4.4.5 Stowage of goods of Class 1 on Passenger ships:**
- IMDG - 7.1.4.4.5.1 - Goods in division 1.4, compatibility group S, may be transported **in any amount** on passenger ships.
- No other goods of class 1 may be transported on Passenger ships except:
- 1. Goods in compatibility groups C, D and E and articles in compatibility group G, if the total net explosive mass does not exceed 10 kg per ship and if they are transported in closed cargo transport units on deck or under deck.
- 2. Articles in compatibility group B, if the total net explosive mass does not exceed 10 kg per ship and if they are transported on deck only in closed cargo transport units.

EXPLOSIVE MATERIALS

- There are three classes of explosive materials.
- These classes, together with the description of explosive materials comprising each class, are as follows:
- **High Explosives -** Explosive materials which can be caused to detonate by means of a blasting cap when unconfined, (for example, dynamite, emulsions, water gels, flash powders, and bulk solutes).
- **Low Explosives -** Explosive materials which can be caused to deflagrate (to burn rapidly, with intense heat and dazzling light) when confined, (for example, black powder, safety fuses, ignitor cords, fuse lighters, and “special fireworks”.
- **Blasting Agents -** For example, ammonium nitrate-fuel oil and certain water gels.

MAGAZINES

- **For stowage of class 1**
- The following types of stowage are referred to in **column 16 of the Dangerous Goods List**.
- **Closed cargo transport unit:**
- It means a unit which fully encloses the contents by permanent structures and can be secured to the ship's structure and includes a magazine.
- Cargo transport units with fabric sides or tops are not closed cargo transport units.
- Where this stowage is specified, stowage in small compartments such as deck-houses and mast lockers are acceptable alternatives.
- The floor of any closed cargo transport unit or compartment shall be either constructed of wood, close-boarded or arranged that goods are stowed on sparred gratings, wooden pallets or dunnage.
- Provided that the necessary additional specifications are met, a closed cargo transport unit may be used for type "A" or "C" class 1 stowage or as a magazine.
- **Magazine means** a closed cargo transport unit or a compartment in the ship designed to protect certain goods of class 1 from damage by other cargo during loading /unloading and adverse weather conditions when in transit, and to prevent unauthorized access. It can be a fixed structure, container, vehicle or a portable magazine.
- **Generic or "not otherwise specified" (N.O.S.) names:**
  For explosives of Class 1, the dangerous goods description may be supplemented by additional descriptive text to indicate commercial or military names.
- Technical and chemical group names shall be entered in brackets immediately following the Proper Shipping Name.

MAGAZINES

- **Magazine Stowage**
- **General:**
- Magazine stowage is subdivided in to 3 different types designated by the letters A, B and C.
- A Magazine may be a fixed structure on ship, a closed Freight container or a Portable magazine.
- Freight container and Portable magazine must be properly secured in position.
- Magazines may be positioned in any part of the vessel conforming to the general stowage conditions for Class1 (Explosives), except magazines which are fixed structures must be constructed in a location in which, their doors, if fitted, are easily accessible.
- Magazine stowage is required for all explosive substances except “explosive substances, n.o.s” in compatibility groups G, L or S.
- Magazine stowage type “A” is given to those substances which shall be kept clear of steelwork.
- All other Explosive substances must be given Magazine stowage type B, except those in compatibility group A for which Magazine stowage type C is prescribed.
- Magazine stowage type B is required for Charges Propelling for Cannon.
- Magazine stowage type C is required for Detonators.

MAGAZINES

- **Magazine Stowage**
- **1. Magazine stowage type "A":**
- This form of stowage guards against friction between any spilled contents from packages and the sides of magazines or the ship's sides and bulkheads.
- The materials must be stowed in a Magazine which is tightly sheathed with wood on its inner sides and floor.
- When utilized as part of the structure of the space, the ship's sides and bulkheads shall be clean and free from rust or scale and shall be protected by battening or sweat boards spaced not more than 150 mm apart.
- All stanchions and other unprotected ironwork shall be similarly clean and battened.
- The underside of the deck above the Magazine must be clean and free of rust and scale, but need not be battened.
- The top of the stow shall be at least 30 cm (12 inches) from the roof or deck head.
- When in the square of a cargo space, loading shall not take place from the top.
- When other goods of class 1 are stowed in the unit or space with goods requiring **magazine stowage type "A",** it is essential to ensure that their packagings have no exposed external parts made of ferrous metal or aluminium alloy.

MAGAZINES

- **Magazine Stowage**
- **2. Magazine stowage type "B":**
- **It is same as Magazine stowage type A except for:**
- i. The floor need not be tightly sheathed with wood but must be protected by wooden pallets or dunnage.
- ii. Battening of the vessel's sides, bulk heads and stanchions is not required.
- A compartment may be used for Magazine stowage type B with out a Magazine structure provided that:
- i. The Class 1 (explosive) materials are stowed on wooden gratings, pallets or dunnage directly on the deck and not on the cargo.
- ii. Other cargo stowed in the same compartment is not readily combustible material.
- iii. The position of the stowage is such that there is direct access to the hatchway.
- **3. Magazine stowage type "C":**
- Means a closed cargo transport unit positioned as near as practicable to the centre line of the ship. It shall not be positioned closer to the ship's side than a distance equal to one eighth of the beam or 2.5 m, whichever is the lesser.

Safe stowage and carriage of Class 1 - Explosives

- **INTRODUCTION:**
- This covers diverse hazards ranging from safety class ammunition to those which have a mass explosion risk.
- This class is usually subject to stringent legislation and Port rules.
- Explosives can only be carried in conjunction with the regulations stipulated in the Code.
- When explosives are to be handled, unnecessary persons should not be allowed nearby. **The cargo should be loaded last and discharged first.**
- Detonators should be stowed away from explosives. All necessary measures should be taken to prevent any movement of the cargo during the voyage. Ventilation may be necessary, while all electrical circuits around the cargo must be isolated.
- Fire fighting appliances should be permanently rigged. If possible, the cargo should be stowed as far away from the accommodation as possible.
- Explosives (except ammunition) which present a serious risk must be stowed in a magazine, which must be securely closed when at sea. Such explosives must be segregated from detonators.
- Electrical apparatus and cables in any compartment in which explosives are carried must be designed and used so as to minimise the risk of fire or explosion.

Safe stowage and carriage of Class 1 - Explosives

- **General precautions for loading and unloading Explosives on board:**
- **1. Artificial lighting:**
- Electric lights, except arc lights, are the only form of artificial lighting permitted when loading and unloading Class 1 (explosive) materials.
- **2. Radio and Radar:**
- Ensure that all sources of electromagnetic radiation such as radio and radar transmitters are de-energized by opening the main switches controlling the sources and tagging them to warn that the devices are not to be energized until loading or unloading has ceased.
- **3. Bunkering:**
- Vessels may not be bunkered with the hatches open.
- **4. Defective packages:**
- No leaking, broken, or otherwise defective package, including packages which have been adversely affected by moisture, may be accepted for shipment.
- No explosive material, which for any reason has deteriorated or undergone a change of condition that increases the hazard attendant upon its conveyance or handling, may be moved in the port area.
- **5. Protection against weather:**
- Any person loading or unloading shall take adequate measures to prevent these packages from becoming wet.

Safe stowage and carriage of Class 1 - Explosives

- **General precautions for loading and unloading Explosives on board: (Continued)**
- **6. Security:**
- A responsible person must be present at all times when the hatches are open.
- No unauthorized person may be permitted to access spaces in which Class 1 (explosive) materials are stowed.
- Magazines (name given to an enclosure to prevent cargo from damage by any other cargo during loading and unloading) must be secured against unauthorized entry when loading has been completed, or when loading or unloading is stopped.
- Packages containing Class 1 (explosive) materials may not be opened on board ship.
- **7. Fire precautions and firefighting:**
- (a) Matches, lighters, fire, and other ignition sources are prohibited on and near any vessel except in places designated by the Master.
- (b) A fire hose of sufficient length to reach every part of the loading area with an effective stream of water must be laid and connected to the water main, ready for immediate use.
- (c) No repair work may be carried out in a cargo space containing Class 1 (explosive) materials. No welding, burning, cutting, or riveting operations involving the use of fire, flame, spark, or arc-producing equipment may be conducted on board.
- (d) Each compartment, including a closed vehicle deck space, which contains Class 1 (explosive) materials must be provided with a fixed fire extinguishing system. Each adjacent cargo compartment either must be protected by a fixed fire extinguishing installation or must be accessible for firefighting operations.
- (e) A vessel must have two sets of breathing apparatus and a power-operated fire pump, which, together with its source of power and sea connections, must be located outside the machinery space.

Safe stowage and carriage of Class 1 - Explosives

- **Responsibility of Duty Officer: (TO INCLUDE GENERAL PRECAUTIONS)**
- i) Prior to commencement of the loading/unloading, to ensure that all Crew engaged in the handling of Class 1 dangerous goods receive information about the presence of Class 1 dangerous goods, hazards inherent in the goods and applicable safety precautions to be taken.
- ii) To ensure that personnel will be provided with appropriate protective clothing and equipment and that these are properly used as appropriate.
- iii) To supervise generally the handling (including the loading and unloading onto and from ships and vehicles) and the transport of explosives at the designated berth.
- iv) To ensure generally the safety and security, as respects explosives, of persons and property.
- v) To ensure that explosives being held are secure from loss or theft.
- vi) To ensure compliance with the explosive limits and minimum separation distances, where applicable.
- vii) To ensure that the handling (including the loading and unloading onto and from ships and vehicles) shall only take place with the express permission of the appropriate Shore Authority.
- ix) To ensure that a protected area on the ship is free from rubbish or waste or flammable materials.
- x) To ensure that all personnel not essential to the loading/unloading of explosives shall be excluded from the protected area where explosives are being handled while the explosives are being loaded/unloaded from the vessel and/or vehicle.

Safe stowage and carriage of Class 1 - Explosives

- **Responsibility of Duty Officer: (Cont'd)**
- xi) To ensure that no explosives cargoes shall be handled during thunderstorms nor should unprotected cargoes which react dangerously or deteriorate when in contact with water, be handled during rain.
- xii) To ensure that the handling of explosives, once commenced, shall proceed without delay or interruption, except during an electrical storm. Operations shall be suspended during the storm and not resumed until it has passed.
- xiii) To ensure that records are kept of all explosives loaded or unloaded and that such records are handed to the Cargo Interests for safekeeping on completion.
- xiv) To ensure that there are no intoxicated persons in the vicinity of the cargo operations.
- xv) Cease loading / unloading operations immediately and report the occurrence to the Master of the Ship in cases where explosives on a ship or at the designated berth fall into the dock water or are lost, or are suspected of having been stolen.
- xvi) Immediately inform Master where a package or container containing explosives breaks open or explosives escape from their package or container on a ship.
- xvii) Ensure adequate fire extinguishing equipment available for immediate use in any part of the vessel at all times.
- xviii) Ensure no hot work (i.e. use of any drilling, cutting, grinding, welding or burning equipment likely to cause sparks, heat or flame) on or near the vessel.
- xix) Ensure Smoking in the work place is prohibited and notices are displayed at all times.
- xx) Ensure the vessel displays Flag B (Red flag) by day and in the hours of darkness an all-round red light.

EXPLOSIVES – PASSENGER SHIPS

- **Chapter 7.1 – Section 7.1.4.4.5 Stowage on passenger ships:**
- 7.1.4.4.5.1: Goods in Class 1 - division 1.4, compatibility group S, may be transported **in any amount** on passenger ships.
- Division 1.4: Substances and articles which present no significant hazard.
- Examples: Signal flares, tracers for ammunition, certain types of fireworks, weapon cartridges, and distress signals.
- No other explosives may be transported on Passenger ships except any one of the following:
- Explosive articles for life-saving purposes listed in the Dangerous Goods List, if the total net explosives mass of such articles does not exceed 50 kg per ship or
- Goods in compatibility groups C, D and E, if the net explosives mass does not exceed 10 kg per ship or
- Articles in compatibility group G other than those requiring special stowage, if the total net explosives mass does not exceed 10 kg per ship or
- Articles in compatibility group B, if the total net explosives mass does not exceed 10 kg per ship.

General Precautions to be taken during handling

- **Class 2 Flammable gases:**
- Gases: According to their properties or psychological effects, which may vary widely, gases may be explosive, inflammable, poisonous, corrosive or oxidising substances or may possess two or more of these properties simultaneously.
- Some gases are chemically and psychologically inert. Such gases as well as other gases may be regarded as non-toxic but may be suffocating in high concentrations.
- Some gases have narcotic effects or may evolve into poisonous gases when involved in a fire when pressure build-up may cause them to explode.
- Some substances are liable to alter under transport conditions, to combine or react themselves so as to cause dangerous liberation of heat or gas, resulting in pressure on the receptacle. These substances should not be transported unless they are properly inhibited or stabilised.

General Precautions to be taken during handling

- **Class 3 Flammable liquids:**
- The danger associated with inflammable liquids is the escape of inflammable vapours (some of which could be toxic) prone to substances having a low flash point which are naturally volatile.
- The vapour could mix with air leading to an explosion or catch fire through becoming ignited by a spark or flame.
- **Precautions:**
- These substances should be stowed away from naked lights, fires or any source of heat and packaging should serve to protect the contents against external source of ignition.
- The flammable substances could be miscible or immiscible with water, a point to note when fire fighting.
- **Class 4.1 Flammable solids:**
- Solids that readily ignite: some may explode unless kept in a saturated condition with water or some other liquid might make the substance become dangerous. Keep away from any source of ignition.
- **Class 4.2 Flammable material liable to spontaneous combustion:**
- They can either be solids or liquids. Such substances should be carefully watched for any rise in temperature.
- Those which ignite immediately in contact with air are especially dangerous.
- Vegetable fibre should be kept free from contamination by oil or water. This should not be loaded as self-heating may commence some days or weeks later.

General Precautions to be taken during handling

- **Class 4.3: substances which, in contact with water, emit flammable gases:**
- These are substances which, when in contact with water, emit flammable gases.
- All substances in this class must be kept dry.
- In some cases the gases may be toxic.
- Some of these are liable to spontaneous ignition due to heat liberation by the reaction.
- The characteristics of each substance in this class should be closely studied and no cargo likely to interact packed in the same compartment or container.
- **Class 5.1 Oxidising substances:**
- These substances are not combustible on their own but possess the ability of making combustible material burn easily.
- Upon burning oxygen is given off, thus increasing the intensity of the fire.
- Mixing some oxidising substances with combustible material can create a highly flammable mixture, capable of being ignited by friction alone.
- Toxic gases could be released if oxidising substances are allowed to react with some acids.

General Precautions to be taken during handling

- **Class 5.2 Organic peroxides:**
- Organic peroxides are both oxidising agents and inflammable and will burn readily, sometimes with explosive force. All may decompose with heat and, in general, are the most unstable of substances.
- Some evolve oxygen naturally and are packed in receptacles which are provided with a means of ventilation. Carriage of such substances may require temperature control.
- **Class 6 Poisonous substances:**
- Poisonous substances are liable to cause death or serious injury to human health if swallowed, inhaled or by skin contact.
- Nearly all toxic substances give off toxic gases when involved in a fire.
- BA sets and protective clothing should be readily available in case of damage to packages.
- **Class 7 Radioactive substances:**
- The care and handling of radioactive substances varies widely.
- Very stringent precautions are taken to ensure the safe packaging of radioactive substances and these are all within internationally agreed standards.
- Careful study of all ports regulations and documentation of goods in this class is of the highest importance.
- Crew should seek guidance through consulting the appropriate statutory regulations, or the authorities concerned, whenever necessary.

General Precautions to be taken during handling

- **Class 8 Corrosives:**
- Some solids or liquids, namely corrosives, when in their original state have the ability to damage living tissue.
- The escape of such substances is sufficiently volatile to evolve vapour irritating to the nose and eyes.
- A few substances may produce toxic gases when decomposed by high temperatures.
- In addition, poisoning may result if corrosives are swallowed or if vapour is inhaled. Some of them may even penetrate the skin.
- All have a more or less destructive effect on materials such as metals and textiles.
- **Class 9 Miscellaneous:**
- Miscellaneous dangerous substances are a class which contains substances which, although dangerous, have not been allocated to any other class.
- It includes substances which cannot be brought under any of the more precisely defined classes because they offer a particular danger which cannot be properly covered by the regulations for the other classes or which present a relatively low transportation hazard. It should not be automatically assumed that substances in this class are ‘less hazardous’.

MSA ACT 1958 – DANGEROUS GOODS

- **MSA ACT 1958 SECTION 331 FOR THE CARRIAGE OF DANGEROUS GOODS IN PACKAGED FORM ON INDIAN SHIPS:**
- (1) The Central Government may make rules for regulating in the interests of safety the carriage of dangerous goods in ships.
- (2) In particular and without prejudice to the generality of the foregoing power, such rules may provide for the classification, packing, labelling and marking of such goods or any class of such goods, stowing of such goods (whether with or without other cargo) including plans for stowing, the fixing of the maximum quantity of any such class of goods which may be carried in different ships or classes of ships, and such other matters relating to dangerous goods as required to be provided for implementing the provisions of the Safety Convention.
- (3) The Owner, Master or Agent of a ship carrying or intending to carry any dangerous goods as cargo and about to make a voyage from a port in India shall furnish in advance the prescribed particulars of the ship and the cargo to such Authority as may be prescribed for the purpose.
- (4) A Surveyor may inspect the ship for the purpose of securing that any rules under this section are complied with.
- (5) If any of the rules made in pursuance of this section is not complied with in relation to any ship, the ship shall be deemed for the purpose of this Part to be an unsafe ship.
- (6) This section shall apply, in the same manner as it applies to Indian ships, to ships other than Indian ships while they are within any port in India or are embarking or disembarking passengers or are loading or discharging cargo or fuel within Indian jurisdiction.

SOLAS 74/78– DANGEROUS GOODS

- **Chapter VII - Carriage of Dangerous Goods - Part A - Carriage of Dangerous Goods in Packaged Form:**
- **Regulation 1 – Definitions:**
- 1 IMDG Code means the International Maritime Dangerous Goods (IMDG) Code adopted by the Maritime Safety Committee of the Organization by resolution MSC.122(75).
- 2 Dangerous goods mean the substances, materials and articles covered by the IMDG Code.
- 3 Packaged form means the form of containment specified in the IMDG Code.
- **Regulation 2 – Application:**
- 1. Unless expressly provided otherwise, this part applies to the carriage of dangerous goods in packaged form in all ships to which the present regulations apply and in cargo ships of less than 500 gross tonnage.
- 2. The provisions of this part do not apply to ships' stores and equipment.
- 3. The carriage of dangerous goods in packaged form is prohibited except in accordance with the provisions of this chapter.
- 4 To supplement the provisions of this part, each Contracting Government shall issue, or cause to be issued, detailed instructions on emergency response and medical first aid relevant to incidents involving dangerous goods in packaged form, taking into account the guidelines developed by the Organization.

SOLAS 74/78– DANGEROUS GOODS

- **Chapter VII - Carriage of Dangerous Goods - Part A - Carriage of Dangerous Goods in Packaged Form: (Cont'd)**
- **Regulation 3 - Requirements for the carriage of dangerous goods:**
- The carriage of dangerous goods in packaged form shall comply with the relevant provisions of the IMDG Code.
- **Regulation 4 – Documents:**
- 1. Transport information relating to the carriage of dangerous goods in packaged form and the container/vehicle packing certificate shall be in accordance with the relevant provisions of the IMDG Code and shall be made available to the person or organization designated by the port State authority.
- 2. Each ship carrying dangerous goods in packaged form shall have a special list, manifest or stowage plan setting forth, in accordance with the relevant provisions of the IMDG Code, the dangerous goods on board and the location thereof. A copy of one of these documents shall be made available before departure to the person or organization designated by the Port State Authority.

SOLAS 74/78– DANGEROUS GOODS

- **Chapter VII - Carriage of Dangerous Goods - Part A - Carriage of Dangerous Goods in Packaged Form: (Cont'd)**
- **Regulation 5 - Cargo Securing Manual:**
- Cargo, cargo units and cargo transport units, shall be loaded, stowed and secured throughout the voyage in accordance with the Cargo Securing Manual approved by the Administration. The Cargo Securing Manual shall be drawn up to a standard at least equivalent to the guidelines developed by the Organization.
- **Regulation 6 - Reporting of incidents involving dangerous goods:**
- 1. When an incident takes place involving the loss or likely loss overboard of dangerous goods in packaged form into the sea, the Master, or other person having charge of the ship, shall report the particulars of such an incident without delay and to the fullest extent possible to the nearest coastal State. The report shall be drawn up based on general principles and guidelines developed by the Organization.
- 2. In the event of the ship referred to in paragraph 1 being abandoned, or in the event of a report from such a ship being incomplete or unobtainable, the company, as defined in regulation IX/1.2, shall, to the fullest extent possible, assume the obligations placed upon the Master by this regulation.

FAL CONVENTION

- The main objective of the IMO's **Convention** on Facilitation of International Maritime Traffic (**FAL Convention**), adopted in 1965, is to achieve the most efficient maritime transport as possible, looking for smooth transit in ports of ships, cargo and passengers.
- The FAL Convention has been in force since 1967 but is kept continually amended and updated by Governments at the FAL Committee of IMO – which usually meets once a year at IMO's London Headquarters.
- The FAL Convention includes in its Standard 2.1 a list of documents which public authorities can demand of a ship and recommends the maximum information and number of copies which should be required.
- IMO developed Standardized Forms for seven of these documents (updated FAL Forms are effective since 1 January 2018):
- IMO General Declaration (FAL form 1)
- Cargo Declaration (FAL form 2)
- Ship's Stores Declaration (FAL form 3)
- Crew's Effects Declaration (FAL form 4)
- Crew List (FAL form 5)
- Passenger List (FAL form 6)
- **Dangerous Goods (FAL form 7)**

ORALS - Q & A

- **Q. How durable must be dangerous goods labels on packages and placards on containers? Should it be just durable to complete the intended voyage? Or for a month or two?**
- IMDG Code states “The method of affixing the label(s) or applying stencil(s) of label(s) on packages containing dangerous goods shall be such that the label(s) or stencil(s) will still be identifiable on packages surviving at least three months’ immersion in the sea.”
- However British Standard BS 5609:1986 “Specification for printed pressure-sensitive, adhesive-coated labels for marine use, including requirements for label base material” meets this requirement.
- **Q. What is Orange Book?**
- The **UN Orange Book** means the UN Recommendations on the Transport of Dangerous Goods Model Regulations, a guidance document developed by the United Nations to harmonize dangerous goods transport regulations.
- Most of dangerous goods regulations such as IMDG Code, IATA and other national regulations are developed based on the UN Orange Book.
- **Q. On what basis is Amendment 39-18 named?**
- It means: Amendment 39 of The IMDG Code, 2018 Edition.

ORALS :Q & A

- **Q1. Are Dangerous goods useful?**
- A1. Yes. Many dangerous goods are essential in the manufacture of other products such as cars, plastics, electronics and pharmaceuticals on which progress and world trade depends.
- **Q2. Is IMDG Code applicable to Tankers?**
- A2. In segment “DGS” (Dangerous Goods Safety), the only International **Code** referred to, is the **IMDG Code**, which in fact is **applicable** to dangerous goods in packaged form only. **Oil Tankers** carrying crude oil or mineral oil products are subject to MARPOL Annex I. **Gas Tankers** are subject to the IGC Code.