Sustainable Human Resource Development in logistics services for ASEAN Member States



Dangerous Goods Handling

International Maritime Dangerous Goods Code (IMDG Code)

Mr. Chalermsak Karnchanawarin

IMDG Code

Objectives:

- This chapter will cover the basic understanding on the applicable transport regulation by **Sea (International Maritime Dangerous Goods Code : IMDG Code)**
- The **History, Principles and Layout** of IMDG Code will be explained.
- It covers **Basic Hazard Classification and Hazard Communication** under IMDG Code.
- The core element of the IMDG Code will be explained on how to read the information in **Dangerous Goods List (DGL)**

IMDG Code

Objectives:

- The **Training Requirements** under IMDG Code will be explained.
- The example of how to **use IMDG Code** will also be demonstrated.

IMDG Code

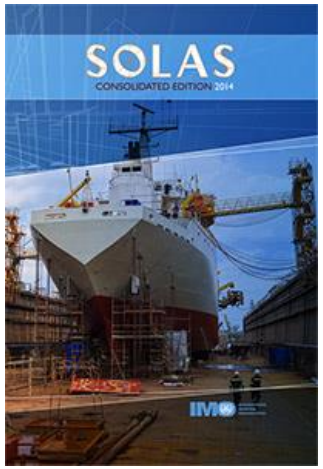
Presentation Outline

- International Legal Framework
- IMDG Code
- Principles and Layout of IMDG Code
- IMDG Code Classification System
  - The 9 Classes of Dangerous Goods
  - UN Number & Proper Shipping Names
  - Hazard Labels
- Understanding the Dangerous Goods List (DGL)
- Training Requirements
- Using IMDG Code

The International Legal Framework

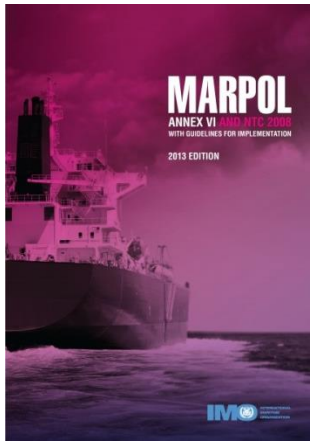
The International Maritime Organization (IMO) is a United Nations specialized agency which has developed international legislation dealing with two key issues for the maritime industry:

- The safety of life at sea
- Prevention of pollution from ships



The IMO has developed two international conventions to address these two issues

- The SOLAS Convention (covering safety of life at sea)
- The MARPOL Convention (covering pollution prevention)



The International Legal Framework

To supplement the principles laid down in the **SOLAS and MARPOL Conventions**, the IMO developed the International Maritime Dangerous Goods (IMDG) Code

- The IMDG Code contains detailed technical specifications to enable dangerous goods to be transported safely by sea
- The IMDG Code became mandatory in international law on 1st January 2004

The objective of IMDG Code is to:-

- Enhance the safe transport of dangerous goods
- Protect the marine environment
- Facilitate the free unrestricted movement of dangerous goods

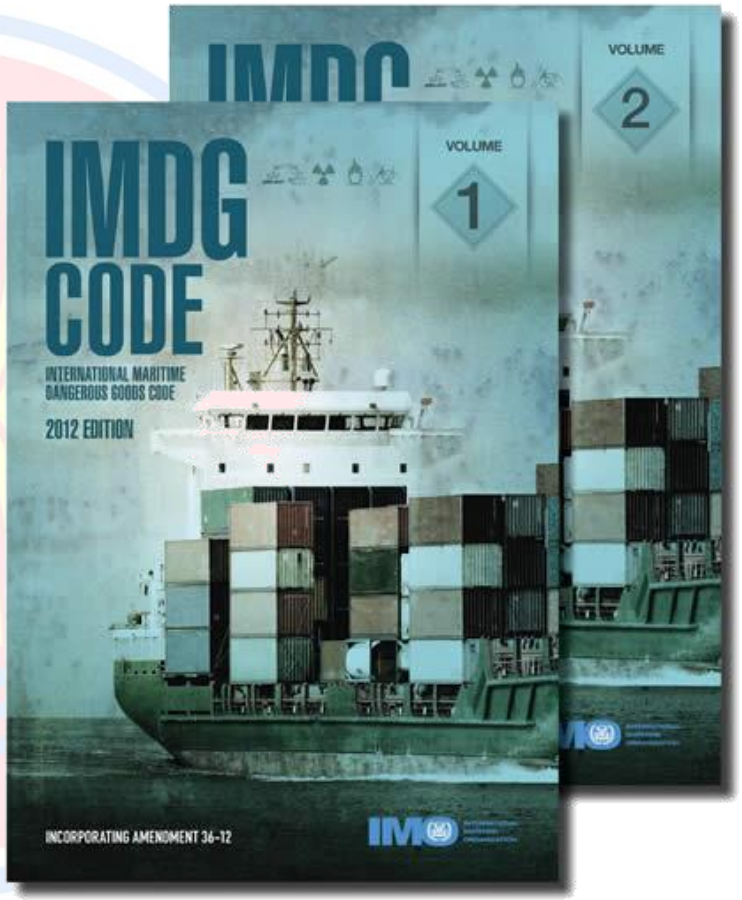
IMDG Code

International Maritime Dangerous Goods Code

IMDG Code

"Amendment 36-12"

Issued year: 2013



Principles of IMDG Code

- groups dangerous goods together based on the hazards they present in transport **(classification);**
- contains the dangerous goods in packagings/tanks which are of appropriate strength and which will prevent the goods escaping **(proper packaging)**;
- uses hazard warning labels and other identifying marks to identify dangerous goods in transport **(communication)**;
- requires standard documentation to be provided when dangerous goods are being transported **(documentation)**;

Principles of IMDG Code

- lays down principles for ensuring that those dangerous goods which will react dangerously together are kept apart **(segregation)**;
- lays down principles for where to place dangerous goods on board ship to ensure safe transport **(stowage)**;
- provides emergency response advice for dangerous goods involved in a fire or spillage on board ship **(emergency response)**.

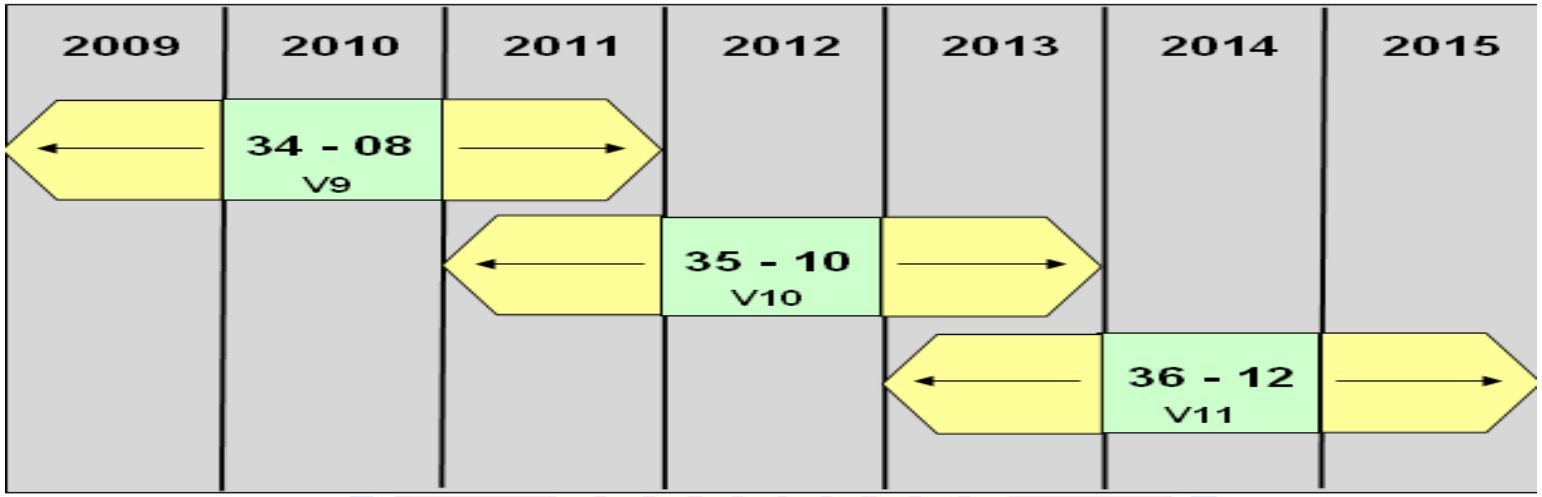
Principles of IMDG Code

Updating IMDG Code

The IMDG Code is an international regulation which is continuously evolving and is updated every two years to take account of:

- new dangerous goods which have to be included;
- new technology and new methods of working with/handling dangerous goods
- safety concerns which arise as a result of human experience.
- each version of the Code is given an Amendment Number to signify how many times it has been updated. This number appears at the bottom of each page together with the year of amendment.
- current Amendment 36-12 must be used.

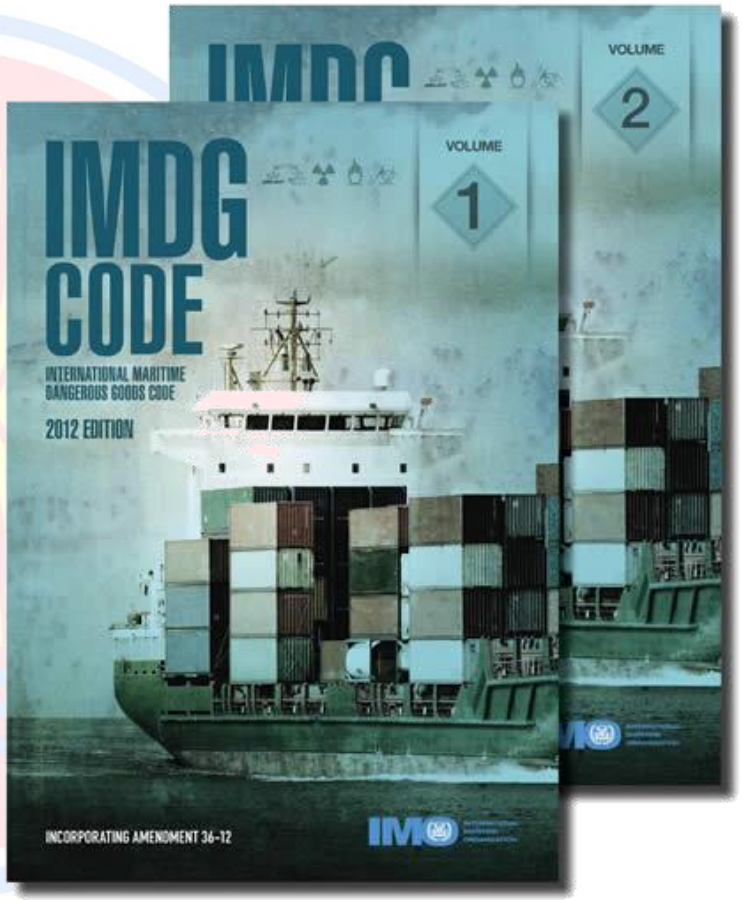
Principles of IMDG Code



- Each Amendment is valid for up to three years.
- There are alternating years for implementation.
- 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.
- During the **yellow years**, the preceding Amendment can also be used, so it is a transition year.
- In the **green years**, only the current Amendment may be used.

Layout of IMDG Code

- The code is composed of 7 parts
- The code is presented in two books, volume 1 and volume 2
- It is necessary to use both books to obtain the required information when shipping dangerous goods by sea.
- The code also contains a supplement



Layout of IMDG Code

Volume 1 (Part 1-2, 4-7 of the Code) contains the following:

- **Part 1:** General provisions, definitions and training
- **Part 2:** Classification
- **Part 4:** Packing and Tank Provision
- **Part 5:** Consignment Procedures
- **Part 6:** Construction and Testing of Packaging, Intermediate Bulk Containers (IBCs), Large Packaging, Portable Tanks, Multiple-Element Gas Containers (MEGC'S) and Road Tank Vehicles
- **Part 7:** Requirements Concerning Transport Operations

Layout of IMDG Code

Volume 2 (Part 3 and the Appendices) contains the following:

- **Part 3:** Dangerous Goods List (DGL) and Limited Quantities Exceptions
- The DGL is the central core of the IMDG Code and presents information on the transport requirements for all dangerous goods in a coded form [Insert graphic].
- **Appendix A:** List of Generic and N.O.S. Proper Shipping Names
- **Appendix B:** Glossary of terms
- **Alphabetical Index**

Layout of IMDG Code

The Supplement contains the following texts related to the Code:

- Emergency Response Procedures for Ships Carrying Dangerous Goods ;
- Medical First Aid Guide (MFAG);
- Reporting Procedures;
- IMO/ILO/ECE Guidelines for Packing Cargo Transport Units;
- Safe Use of Pesticides in Ships
- International Code for the Carriage of Packaged Irradiate Nuclear Fuel, Plutonium and High-Level Radioactive Wastes on board ships.

IMDG Code Classification System

The purpose of the IMDG Code's classification system is:

- to distinguish between goods which are considered to be **dangerous for transport** and those which are not
- to **identify the dangers** which are presented by dangerous goods in transport
- to ensure that the correct measures are taken to enable these goods to be **transported safely without risk** to persons or property (both within the port and on the ship).

Dangerous goods are classified into one of **9 classes** which all have differing properties. The way in which different classes of dangerous goods are handled in transport will depend upon these properties and the hazards presented and effects

- the **type of packing** that can be used
- what classes of dangerous goods can be transported together in freight containers,
- where the **goods can be stored within the port and on the ship**

The 9 Classes of Dangerous Goods

- Class 1 Explosives
- Class 2 Gases
- Class 3 Flammable liquids
- Class 4 Flammable solids
- Class 5 Oxidizing substances and organic peroxides
- Class 6 Toxic and infectious substances
- Class 7 Radioactive material
- Class 8 Corrosive substances
- Class 9 Miscellaneous dangerous substances and articles

These **9 hazard classes** have been established internationally by a United Nations (UN) committee to ensure that all modes of transport (road, rail, air and sea) classify dangerous goods in the same way.

UN Number & Proper Shipping Names

Within each of the 9 hazard classes dangerous goods are uniquely identified by two pieces of information:

- **A four-digit number known as the UN Number** which is preceded by the letters UN.
- The corresponding **Proper Shipping Name (PSN).**

For example, kerosene is identified in the IMDG Code by its UN Number UN 1223 and the PSN Kerosene.

Together the UN Number and PSN uniquely identify dangerous goods to:

- enable rapid and precise identification during transport to ensure the correct handling, stowage, segregation etc, and
- in the event of an emergency, ensure that the correct procedures are followed.

Hazard Labels

Each of the hazard classes are also identified by labels:

Understanding the Dangerous Goods List (DGL)

- The DGL is presented across 2 pages of the IMDG Code and is divided into **18 columns** for each individual dangerous good listed.
- Much of the information contained in the **DGL is coded** to make it easier to present in a table.
- The DGL is arranged in **UN Number order**; column 1 and column 18 contains the UN Number.
- To look up an entry, you just need the UN Number.
- However, dangerous goods can also be searched using the **PSN**.
- Therefore, if you do not have the UN Number but have the PSN, you can find its associated UN Number by looking at the **alphabetical index** at the back of Volume 2.

Understanding the Dangerous Goods List (DGL)

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 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.

Column 4 – Subsidiary Risk(s)
Contains the class number(s) of any subsidiary risk(s). This column also identifies if dangerous goods are marine pollutants by showing the letter 'P':

Understanding the Dangerous Goods List (DGL)

Column 5 – Packing Group
Contains the packing group number (i.e. I, II or III) where assigned to the substance or article.

Column 6 – Special Provisions
Contains a number referring to any special provision(s) indicated in chapter 3.3.

Column 7a – Limited Quantities
Provides the maximum quantity per inner packaging.

Column 7b – Excepted Quantities
Provides a code which can be referenced to determine the maximum quantity per inner and outer packaging.

Understanding the Dangerous Goods List (DGL)

Column 8 – Packing Instructions
Contains packing instructions for the transport of substances and articles.

Column 9 – Special Packing Provisions
Contains special packing provisions.

Column 10 – IBC Packing Instructions
Contains IBC instructions which indicate the type of IBC that can be used for the transport.

Column 11 – IBC Special Provisions
Refers to special packing provisions applicable to the use of packing instructions bearing the code 'IBC' in 4.1.4.2.

Understanding the Dangerous Goods List (DGL)

Column 12 – IMO Tank Instructions

This column is no longer used but used to apply to IMO portable tanks and road tank vehicles.

Column 13 – UN Tank and Bulk Container Instructions

Contains T codes (see 4.2.5.2.6) applicable to the transport of dangerous goods in portable tanks and road tank vehicles.

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 road tank vehicles.

Understanding the Dangerous Goods List (DGL)

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'.

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.

Column 18 – UN Number

Contains the United Nations Number for ease of reference across both pages of the printed book.

Training Requirements

In the 2002 edition of the IMDG Code, training was introduced for the first time.

The IMO Member Governments recognized that the safe transport of dangerous goods by sea is dependent upon the appreciation, by all persons involved, of the risks involved and on a detailed understanding of the IMDG Code requirements.

The training requirements became mandatory with Amendment 34-08.

Training Requirements

These training requirements highlight the need for all shore-based personnel involved in the shipment of dangerous goods to receive training commensurate with their responsibilities. The IMDG Code defines shore-based personnel as those who:

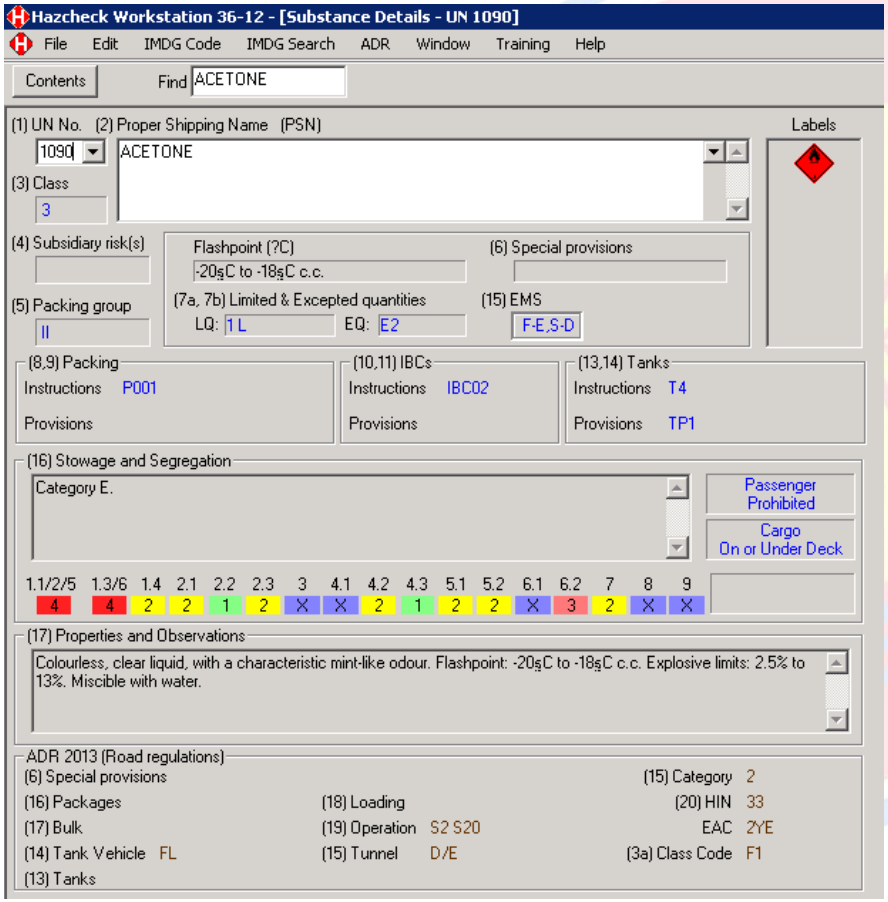
- Classify dangerous goods and identify PSNs
- Pack dangerous goods
- Mark, label or placard dangerous goods
- Load/unload CTUS
- Prepare transport documents for dangerous goods
- Offer dangerous goods for transport
- Accept dangerous goods for transport
- Handle dangerous goods in transport

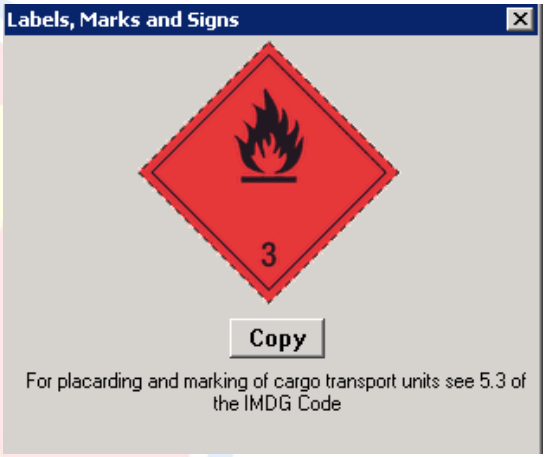
Training Requirements

These training requirements highlight the need for all shore-based personnel involved in the shipment of dangerous goods to receive training commensurate with their responsibilities. The IMDG Code defines shore-based personnel as those who:

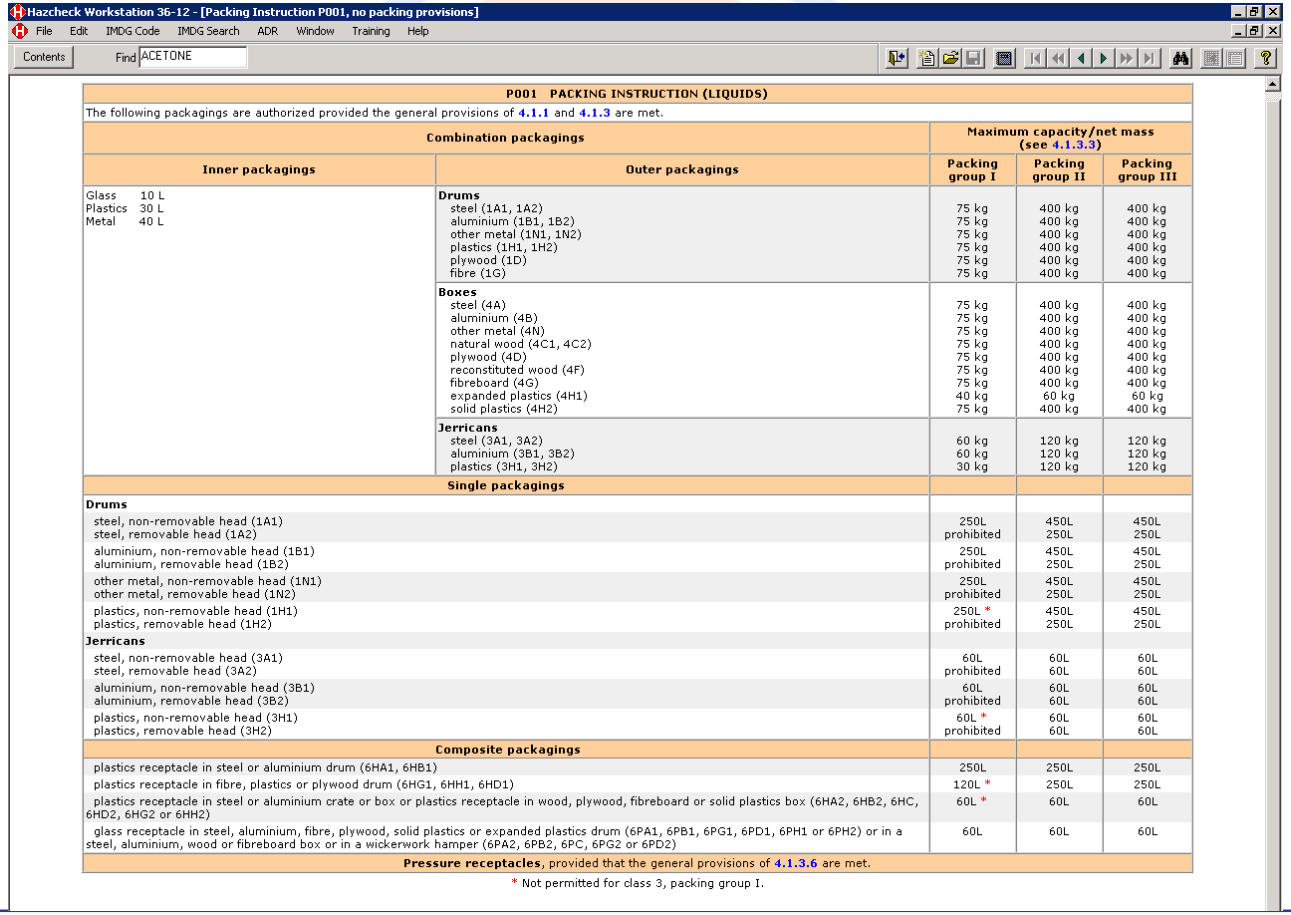
- Prepare dangerous goods loading/stowage plans
- Load/unload dangerous goods into/ from ships
- Carry dangerous goods in transport
- Enforce, survey or inspect for compliance with applicable rules and regulations

Using IMDG Code – Acetone / UN 1090





Using IMDG Code – Packing Instructions



Hazcheck Workstation 36-12 - [Packing Instruction P001, no packing provisions]

File Edit IMDG Code IMDG Search ADR Window Training Help

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P001 PACKING INSTRUCTION (LIQUIDS)

The following packagings are authorized provided the general provisions of 4.1.1 and 4.1.3 are met.

Combination packagings		Maximum capacity/net mass (see 4.1.3.3)		
Inner packagings	**Outer packagings**	**Packing group I**	**Packing group II**	**Packing group III**
Glass 10 L Plastics 30 L Metal 40 L	**Drums**			
	steel (1A1, 1A2)	75 kg	400 kg	400 kg
	aluminium (1B1, 1B2)	75 kg	400 kg	400 kg
	other metal (1N1, 1N2)	75 kg	400 kg	400 kg
	plastics (1H1, 1H2)	75 kg	400 kg	400 kg
	plywood (1D)	75 kg	400 kg	400 kg
	fibre (1G)	75 kg	400 kg	400 kg
	Boxes			
	steel (4A)	75 kg	400 kg	400 kg
	aluminium (4B)	75 kg	400 kg	400 kg
	other metal (4N)	75 kg	400 kg	400 kg
	natural wood (4C1, 4C2)	75 kg	400 kg	400 kg
	plywood (4D)	75 kg	400 kg	400 kg
	reconstituted wood (4F)	75 kg	400 kg	400 kg
	fibreboard (4G)	75 kg	400 kg	400 kg
	expanded plastics (4H1)	40 kg	60 kg	60 kg
	solid plastics (4H2)	75 kg	400 kg	400 kg
	Jerricans			
	steel (3A1, 3A2)	60 kg	120 kg	120 kg
	aluminium (3B1, 3B2)	60 kg	120 kg	120 kg
	plastics (3H1, 3H2)	30 kg	120 kg	120 kg
Single packagings				
Drums				
steel, non-removable head (1A1) steel, removable head (1A2)		250L prohibited	450L 250L	450L 250L
aluminium, non-removable head (1B1) aluminium, removable head (1B2)		250L prohibited	450L 250L	450L 250L
other metal, non-removable head (1N1) other metal, removable head (1N2)		250L prohibited	450L 250L	450L 250L
plastics, non-removable head (1H1) plastics, removable head (1H2)		250L * prohibited	450L 250L	450L 250L
Jerricans				
steel, non-removable head (3A1) steel, removable head (3A2)		60L prohibited	60L 60L	60L 60L
aluminium, non-removable head (3B1) aluminium, removable head (3B2)		60L prohibited	60L 60L	60L 60L
plastics, non-removable head (3H1) plastics, removable head (3H2)		60L * prohibited	60L 60L	60L 60L
Composite packagings				
plastics receptacle in steel or aluminium drum (6HA1, 6HB1)		250L	250L	250L
plastics receptacle in fibre, plastics or plywood drum (6HG1, 6HH1, 6HD1)		120L *	250L	250L
plastics receptacle in steel or aluminium crate or box or plastics receptacle in wood, plywood, fibreboard or solid plastics box (6HA2, 6HB2, 6HC, 6HD2, 6HG2 or 6HH2)		60L *	60L	60L
glass receptacle in steel, aluminium, fibre, plywood, solid plastics or expanded plastics drum (6PA1, 6PB1, 6PG1, 6PD1, 6PH1 or 6PH2) or in a steel, aluminium, wood or fibreboard box or in a wickerwork hamper (6PA2, 6PB2, 6PC, 6PG2 or 6PD2)		60L	60L	60L
Pressure receptacles, provided that the general provisions of 4.1.3.6 are met.				

* Not permitted for class 3, packing group I.

Using IMDG Code – IBC & Tanks Instructions

Hazcheck Workstation 36-12 - [IBC Instruction IBC02, no packing provisions]

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IBC02 PACKING INSTRUCTION
The following IBCs are authorized, provided the general provisions of 4.1.1, 4.1.2 and 4.1.3 are met: (1) Metal (31A, 31B and 31N); (2) Rigid plastics (31H1 and 31H2); (3) Composite (31HZ1).

Hazcheck Workstation 36-12 - [Tank Instruction T4, Provisions TP1]

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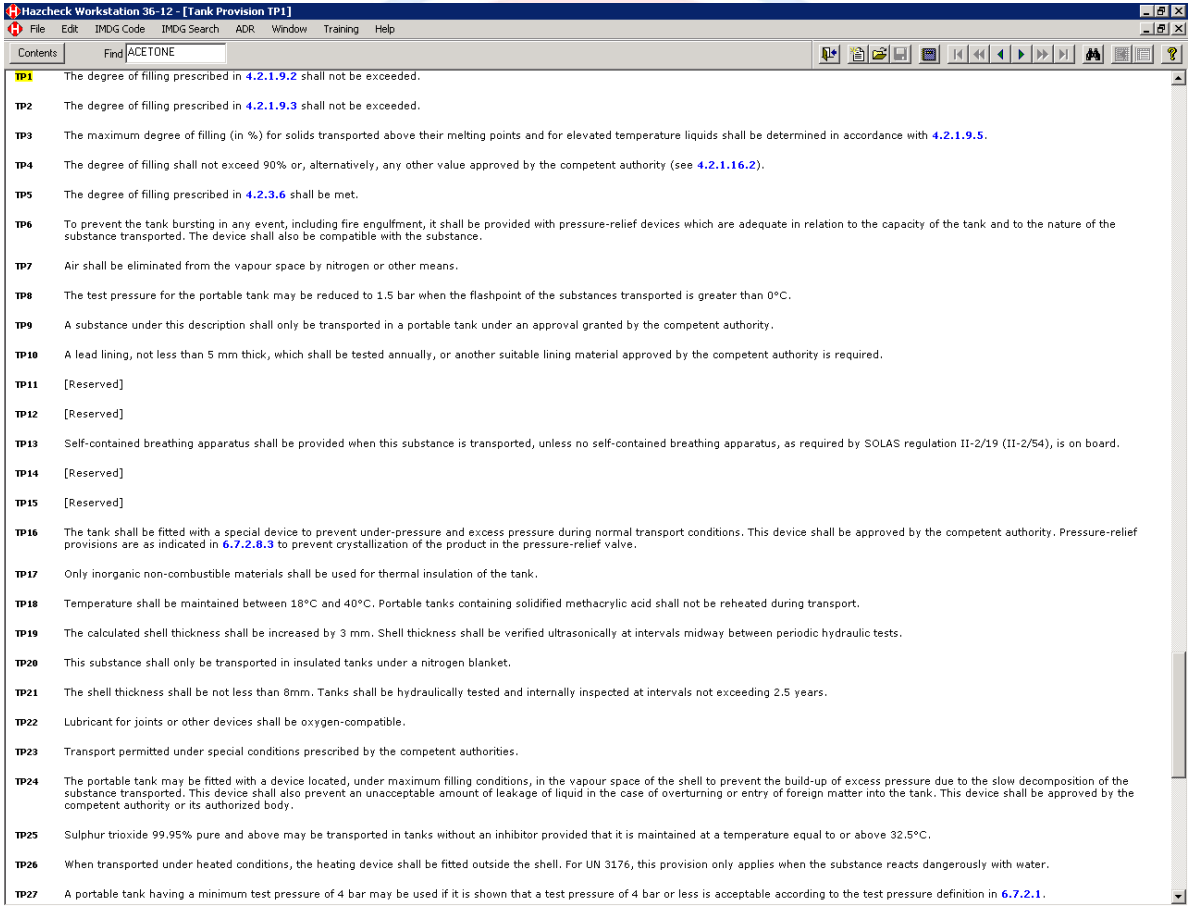
T4 PORTABLE TANK INSTRUCTION	
The general provisions of 6.7.2 shall be met.	
Minimum test pressure	2.65 bar
Minimum shell thickness (reference steel)	5 mm for tanks up to 1.80 m diameter and for larger tanks carrying solids of packing group II or III; 6 mm otherwise.
Pressure-relief provisions	Normal.
Bottom opening provisions	3 shut-off devices required.
Alternatives permitted - T5, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22	

Special packing provisions	
TP1	The degree of filling prescribed in 4.2.1.9.2 shall not be exceeded.

Using IMDG Code – Tanks Provisions



Using IMDG Code – Fire Schedule

Hazcheck Workstation 36-12 - [Emergency Schedule F-E]

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FIRE SCHEDULE Echo

F - E
NON-WATER-REACTIVE FLAMMABLE LIQUIDS

General comments		Cargoes in tanks exposed to heat may explode suddenly in or after a fire situation by a *Boiling Liquid-Expanding Vapour Explosion* (BLEVE). Keep tanks cool with copious quantities of water. Fight fire from a protected position from as far away as possible. Stop leakage or close open valve if practicable. Flames may be invisible.
Cargo on fire on deck	**Packages**	Create water spray from as many hoses as possible.
	Cargo Transport Units	Cool burning transport units and nearby cargo exposed to the fire with copious quantities of water.
Cargo on fire under deck		Stop ventilation and close hatches. Use cargo space fixed fire-extinguishing system. If this is not available, create water spray using copious quantities of water.
Cargo exposed to fire		If practicable, remove or jettison packages which are likely to be involved in the fire. Otherwise, keep cool for several hours using water.
Special cases: **UN 1162, UN 1250, UN 1298, UN 1717, UN 2985**		Cargoes will create hydrochloric acid in contact with water: stay away from effluent.

Using IMDG Code – Spillage Schedule

Hazcheck Workstation 36-12 - [Emergency Schedule S-D]

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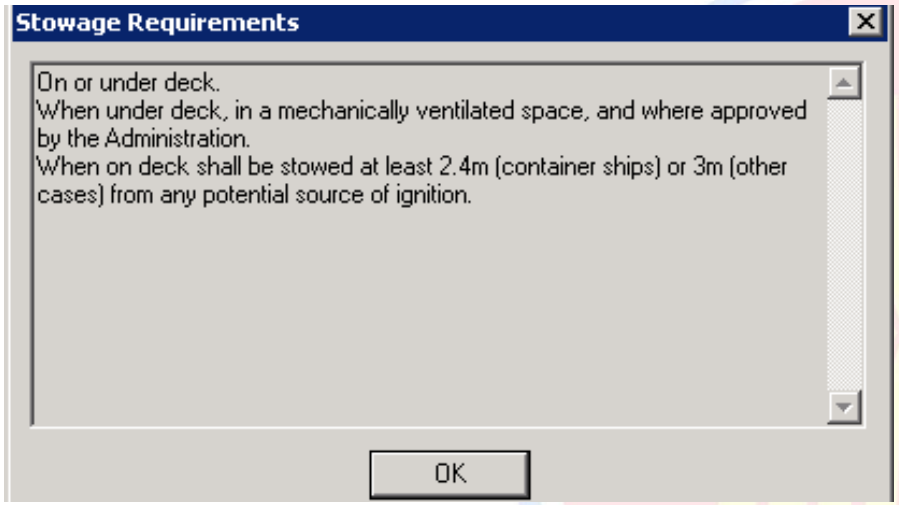
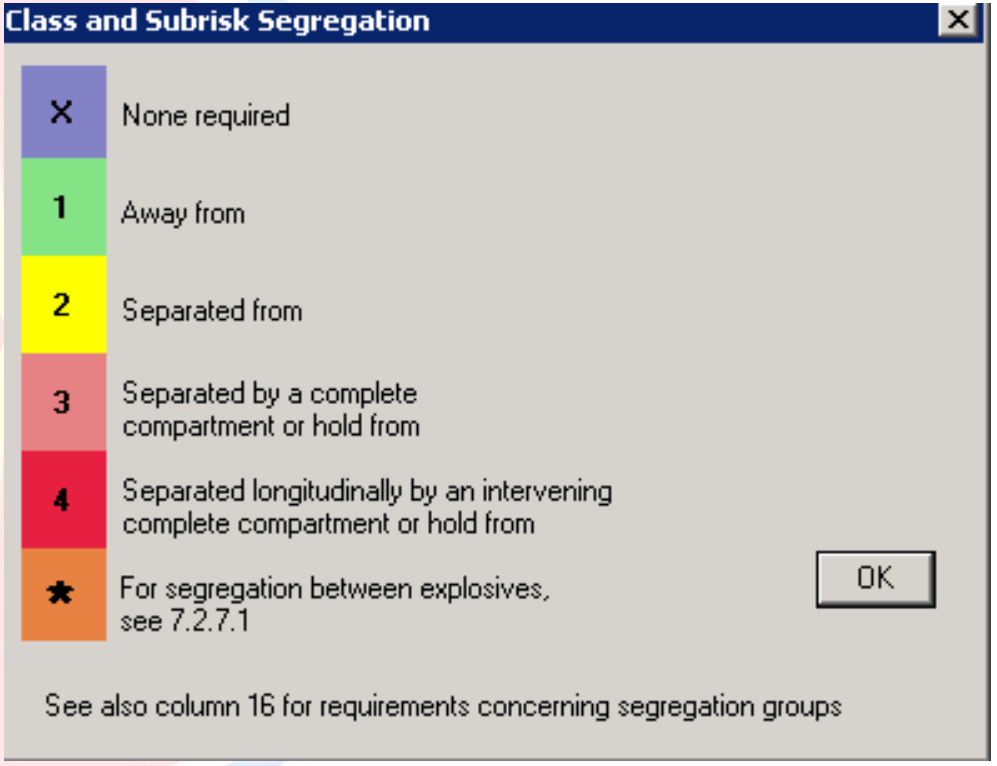
SPILLAGE SCHEDULE Delta

S - D
FLAMMABLE LIQUIDS

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). Stop leak if practicable. Avoid contact, even when wearing protective clothing. Spillage may evolve flammable vapours. Contaminated clothing must be washed off with water and then removed.
Spillage on deck	**Packages (small spillage)**	Wash overboard with copious quantities of water. Do not direct water jet straight onto the spillage. Keep clear of effluent. Clean the area thoroughly.
	Cargo Transport Units (large spillage)	Keep bridge and living quarters up wind. Wash overboard with copious quantities of water. Do not direct water jet straight onto the spillage. Keep clear of effluent. Clean the area thoroughly.
Spillage under deck	**Packages (small spillage)**	Shut off all possible sources of ignition in the space. Provide adequate ventilation. Do not enter space without self-contained breathing apparatus. Check atmosphere before entering (toxicity and explosion hazard). If the atmosphere cannot be checked, do not enter. Let vapours evaporate, keep clear. Provide good ventilation of the space. Use water-spray on effluent in hold to avoid ignition of flammable vapours. Wash down to the bottom of the hold. Pump overboard.
	Cargo Transport Units (large spillage)	Keep bridge and living quarters upwind. Protect crew and living quarters against corrosive or toxic vapours by using water-spray to drive vapours away. Do not enter space. Keep clear. Radio for expert ADVICE. After hazard evaluation by experts, you may proceed. Provide adequate ventilation. Do not enter space without self-contained breathing apparatus. Check atmosphere before entering (toxicity and explosion hazard). If atmosphere can not be checked, do not enter. Let vapour evaporate, keep clear. Where a ventilation system is used, particular attention should be taken in order to prevent toxic vapours or fumes entering occupied areas of the vessel, e.g. living quarters, machinery spaces, working areas. Provide good ventilation of the space. Use water spray on effluent in the space to avoid ignition of flammable vapours. Wash down to the bottom of the hold. Use copious quantities of water. Pump overboard.
Special cases:		
Marine Pollutant Mark		Report incident according to MARPOL reporting requirements.
UN 2749		Self-ignition of spilt material is possible.
UN 3359		This is a cargo transport unit under fumigation. When opened it will be ventilated. However, experience has shown that toxic fumigants will stay within packaging material and in non-ventilated areas. Obtain information about the fumigation agent.

Using IMDG Code – Stowage & Segregation





Using IMDG Code – Load Validation

Hazcheck Workstation 36-12 - [Load - Closed unit - Cargo Ship]

File Edit IMDG Code IMDG Search ADR Window Training Help

Contents Find ACETONE

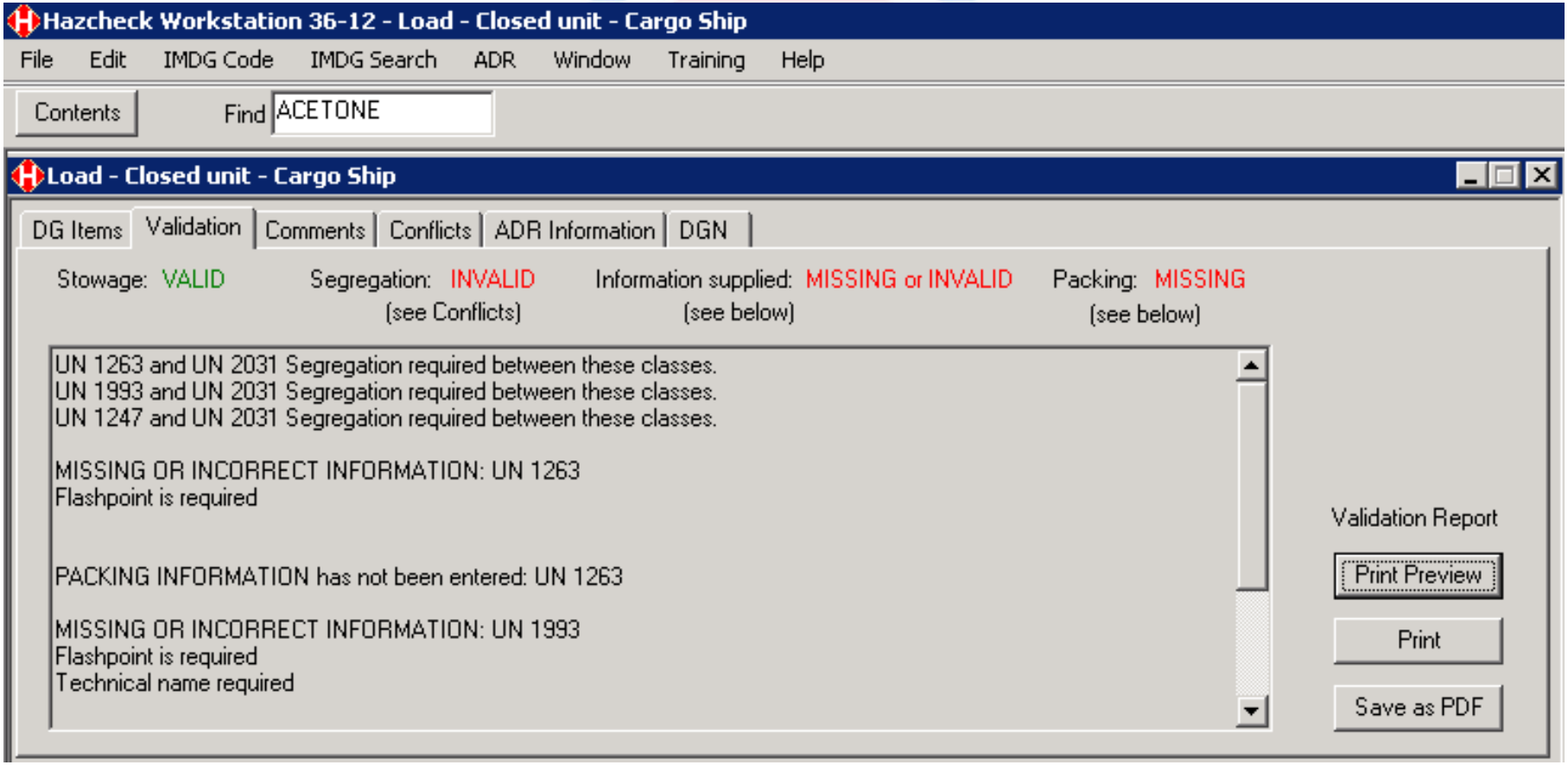
DG Items | Validation | Comments | Conflicts | ADR Information | DGN

Sailing type: Cargo Unit type: Closed Notes:

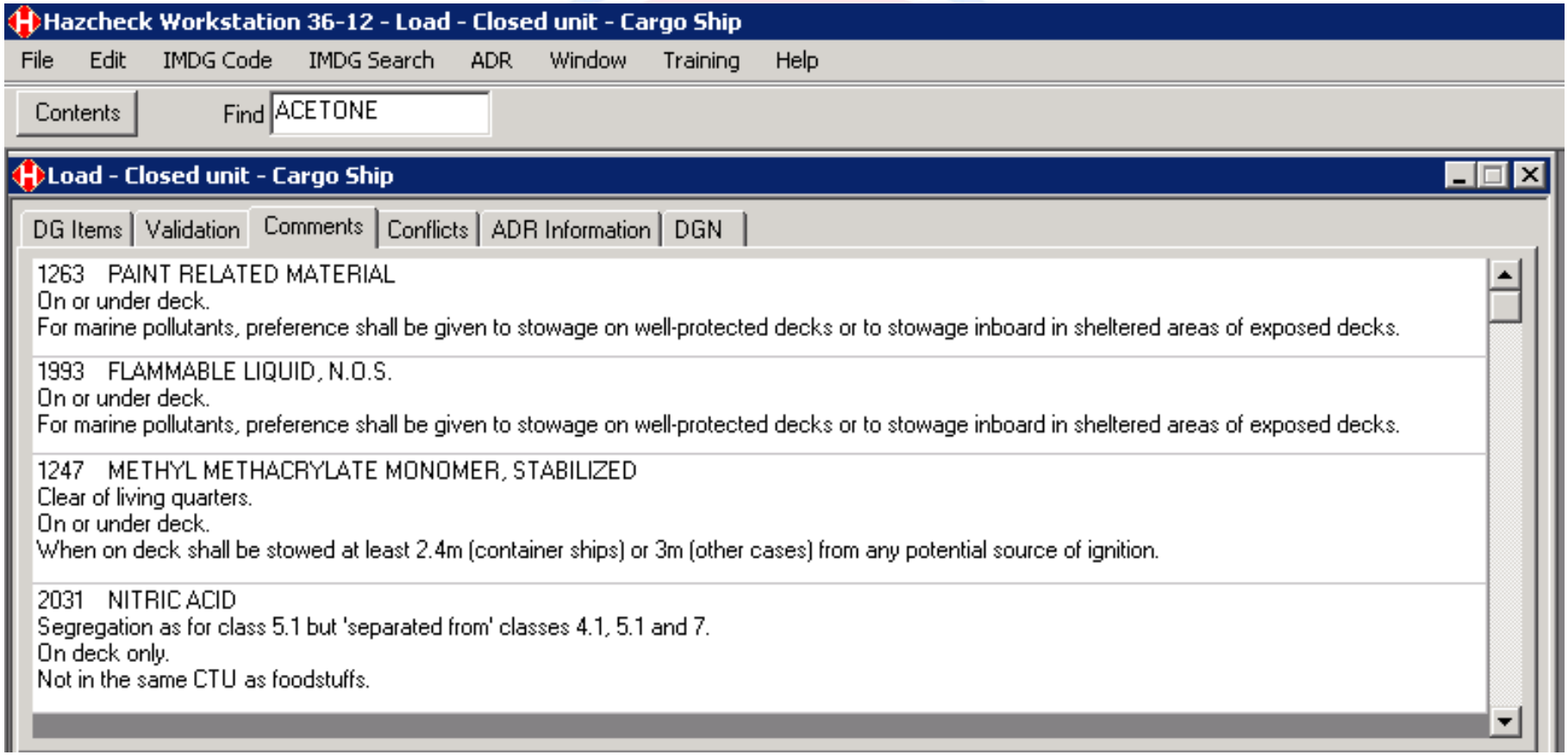
IEO	UN No	Substance	Class	Sub. Risk	PG	MP	F/P (°C)	Special Provisions	Conflicts	Packing Data
I	1263	PAINT RELATED MATERIAL	3		III			163 223 955	1	Enter
I	1993	FLAMMABLE LIQUID, N.O.S.	3		III			223 274 955	1	Enter
I	1247	METHYL METHACRYLATE MONOMER, STABILIZED	3		II		8 C c.c.		1	Enter
I	2031	NITRIC ACID	8	5.1	I				3	Enter

Load does not comply - see validation

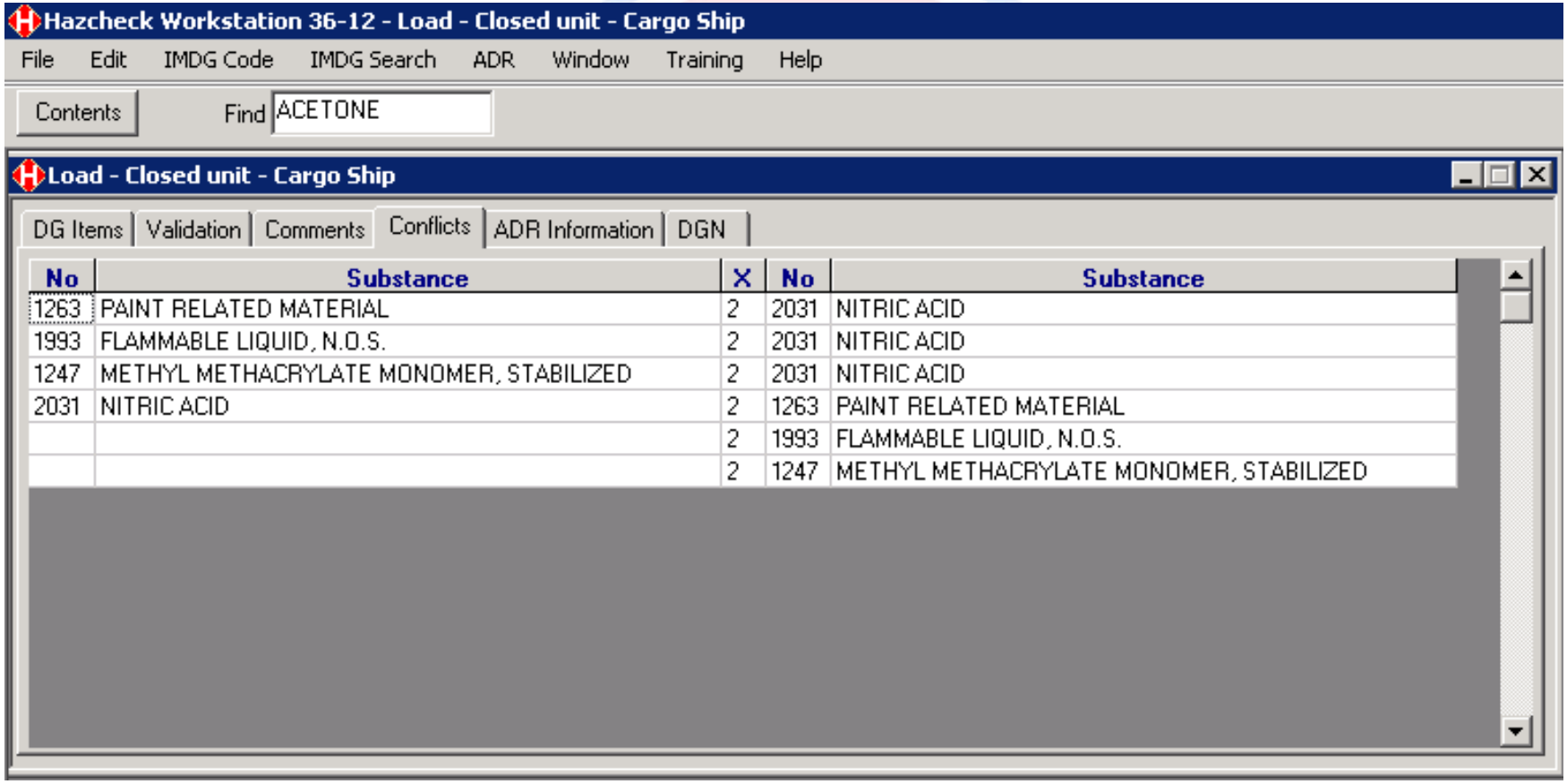
Using IMDG Code – Load Validation



Using IMDG Code – Load Validation



Using IMDG Code – Load Validation



No	Substance	X	No	Substance
1263	PAINT RELATED MATERIAL	2	2031	NITRIC ACID
1993	FLAMMABLE LIQUID, N.O.S.	2	2031	NITRIC ACID
1247	METHYL METHACRYLATE MONOMER, STABILIZED	2	2031	NITRIC ACID
2031	NITRIC ACID	2	1263	PAINT RELATED MATERIAL
		2	1993	FLAMMABLE LIQUID, N.O.S.
		2	1247	METHYL METHACRYLATE MONOMER, STABILIZED



Dangerous Goods Handling

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