Dangerous Goods Storage and Handling Manual
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NATIONWIDE TRAINING PTY LTD
13 Collingwood Street
Osborne Park WA 6017
Phone: (08) 9445 7766
Fax: (08) 9445 7756
Email: info@nationwidetraining.com.au
Web: www.nationwidetraining.com.au

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Scope and Purpose

The scope and purpose of the Dangerous Goods Storage and handling Manual and course, is to give information that is aligned to the transport and logistics industry, to ensure learners have the appropriate knowledge and skills to perform their duties and responsibilities in a safe, efficient, accurate and professional manner. This applies when involved with consigning and storage of dangerous goods/hazardous substances.

The course covers areas of the Australian Dangerous Goods Code as well as the Storage & Handling Code and relevant Regulations.

There is a brief coverage on Globally Harmonised System to give you the knowledge to better understand how you will be affected in your role in relation to this.

It important to note, that in order to complete your role to meet all legislative requirements, you MUST endeavor to take the knowledge imparted from this course and continue to read and research current trends and changes. This involves obtaining current Codes of Practices associated with Dangerous Goods Storage & Handling.
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MODULE ONE

DANGEROUS GOODS
HISTORY & LEGISLATION
DANGEROUS GOODS HISTORY & LEGISLATION

History
Dangerous goods were originally put into 9 Classes by the United Nations in 1953 as it was realised that dangerous substances were being transported around the world with very little control.

The United Nations (UN) developed 9 Classes of dangerous goods from explosives (Class 1) to miscellaneous (Class 9) and each Class has its own particular label or labels (primary hazard diamonds). Some Classes are also further divided into Divisions.

Legislation
Legislation/Codes required to ensure you are able to perform your role successfully are as follows:

Codes:
- Australian Code for the Transport of Dangerous Goods by Road & Rail
- IMDG Code
- IATA/ICAO Codes
- Storage and Handling of Dangerous Goods Code of Practice

Legislation:
- Dangerous Goods Safety Act 2004
- Dangerous Goods Safety (Storage and Handling of Non-explosives) Regulations 2007
- Dangerous Goods Safety (Major Hazard Facilities) Regulations 2007
- Dangerous Goods Safety (Road and Rail Transport of Non-explosives) Regulations 2007
- Dangerous Goods Safety (Explosives) Regulations 2007

Please note throughout the Australian Dangerous Goods Code that they will reference that not all areas will be covered by that code. In such cases, you are required to look up entries in the relevant codes, for example for sea transport International Maritime Dangerous Goods (IMDG) Code.
MODULE TWO

CLASSIFICATION & PACKING GROUPS
RECOGNITION OF DANGEROUS GOODS

Dangerous goods can be identified by their distinctive diamond-shaped Class labels. There are **nine Classes** of dangerous goods. Some of them are also sub-divided into **Divisions**.

The Class label shows the **primary hazard** of the substance. Additional Class labels may need to be shown for **subsidiary hazards**. The wording on the labels identifies the risks involved.

<table>
<thead>
<tr>
<th>LABEL</th>
<th>CLASS / DIVISION</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Explosives" /></td>
<td>Class 1</td>
<td>Explosives</td>
</tr>
<tr>
<td><img src="image" alt="Flammable gases" /></td>
<td>Division 2.1</td>
<td>Flammable gases</td>
</tr>
<tr>
<td><img src="image" alt="Non-flammable, non-toxic gas" /></td>
<td>Division 2.2</td>
<td>Non-flammable, non-toxic gas</td>
</tr>
<tr>
<td><img src="image" alt="Toxic gases" /></td>
<td>Division 2.3</td>
<td>Toxic gases</td>
</tr>
<tr>
<td><img src="image" alt="Flammable liquids" /></td>
<td>Class 3</td>
<td>Flammable liquids</td>
</tr>
<tr>
<td><img src="image" alt="Flammable solids" /></td>
<td>Division 4.1</td>
<td>Flammable solids</td>
</tr>
<tr>
<td><img src="image" alt="Spontaneously combustible" /></td>
<td>Division 4.2</td>
<td>Spontaneously combustible</td>
</tr>
<tr>
<td><img src="image" alt="Dangerous when wet" /></td>
<td>Division 4.3</td>
<td>Dangerous when wet</td>
</tr>
<tr>
<td><img src="image" alt="Oxidising substances" /></td>
<td>Division 5.1</td>
<td>Oxidising substances</td>
</tr>
<tr>
<td><img src="image" alt="Organic peroxides" /></td>
<td>Division 5.2</td>
<td>Organic peroxides</td>
</tr>
<tr>
<td><img src="image" alt="Toxic substances" /></td>
<td>Division 6.1</td>
<td>Toxic substances</td>
</tr>
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<td><img src="image" alt="Infectious substances" /></td>
<td>Division 6.2</td>
<td>Infectious substances</td>
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<td><img src="image" alt="Radioactive material" /></td>
<td>Class 7</td>
<td>Radioactive material</td>
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<tr>
<td><img src="image" alt="Corrosive substances" /></td>
<td>Class 8</td>
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</tr>
<tr>
<td><img src="image" alt="Miscellaneous dangerous substances and articles" /></td>
<td>Class 9</td>
<td>Miscellaneous dangerous substances and articles</td>
</tr>
</tbody>
</table>
CLASS/DIVISION DEFINITIONS

Class 1 – Explosives

- **Division 1.1 to Division 1.6** (Six divisions)
  
  This includes fireworks, flares, ammunition, demolition charges, blasting preparations

Class 2 – Gases

Compressed, liquified or dissolved under pressure

- **Division 2.1 Flammable gases**
  
  *i.e. LPG, acetylene, hydrogen*

- **Division 2.2 Non-flammable, non-toxic gases**
  
  *i.e. helium, oxygen, carbon dioxide*

- **Division 2.3 Toxic gases**
  
  *i.e. chlorine, carbon monoxide*

Class 3 – Flammable liquids

*i.e. petrol, paint, methylated spirits*

Class 4 – Other flammable substances

- **Division 4.1 Flammable solids**
  
  *i.e. hexamine, sulfur, camphor*

- **Division 4.2 Spontaneously combustible substances**
  
  *i.e. phosphorus, xanthates, sodium hydrosulfide*

- **Division 4.3 Goods that react dangerously with water**
  
  *i.e. calcium carbide, zinc ash & dust, sodium metal*

Class 5 – Oxidizing substances and organic peroxides

- **Division 5.1 Oxidizing agent**
  
  *i.e. ammonium nitrate emulsion, hydrogen peroxide*

- **Division 5.2 Organic peroxides**
  
  *i.e. MEKP, diacetone alcohol peroxides*
Class 6 – Toxic and infectious substances
- Division 6.1 Toxic substances
  i.e. cyanides, toluene diisocyanate
- Division 6.2 Infectious substances
  i.e. chemical waste, biological substance

Class 7 – Radioactive substances
i.e. monazite, krypton-85, technetium-99

Class 8 – Corrosive substances
i.e. sulfuric acid, sodium hydroxide, hydrochloric acid

Class 9 – Miscellaneous dangerous goods
i.e. bitumen, dry-ice, expandable polystyrene beads

Mixed Class
A vehicle transporting more than one Class of dangerous goods
i.e. mixed loads, which falls within the scope of placard quantities
is required to have displayed on the front and rear of the vehicle a
mixed Class diamond.
PACKING GROUPS (PGs) (ADG 2.0.1.3)

Dangerous goods other than Classes 1, 2 and 7, Divisions 5.2 and 6.2 and some self-reactive substances of Division 4.1, for packaging purposes, have been placed into three categories depending on the degree of danger they present. This can also determine the standard of packaging.

<table>
<thead>
<tr>
<th>Packing group I</th>
<th>High danger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Packing group II</td>
<td>Medium danger</td>
</tr>
<tr>
<td>Packing group III</td>
<td>Low danger</td>
</tr>
</tbody>
</table>

Some UN Numbers in ADG Code, share more than one Packing Group. It is important to note that the Safety Data Sheet under section 14 Transport Information, outlines which Packing Group is associated to the proportion of chemical they have added to the particular product.

Safety Data Sheets will be explained in more detail further on in the course.
MODULE THREE

DANGEROUS GOODS LISTS, SPECIAL PROVISIONS, PACKAGING INSTRUCTIONS & REQUIREMENTS
PROPER SHIPPING NAME *(ADG 3.1.2)*

The proper shipping name is the name given to dangerous goods that must be identified on documents as required by the Australian Dangerous Goods Code.

By definition, the proper shipping name does not imply the technical name of dangerous goods.

**DANGEROUS GOODS LIST *(ADG 3.2)***

The Dangerous Goods List in chapter 3.2.3 of the Australian Dangerous Goods Code is divided into 11 columns to describe the dangerous goods:

<table>
<thead>
<tr>
<th>COLUMN</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>UN No.</td>
</tr>
<tr>
<td>2</td>
<td>Name and Description (Proper Shipping Name)</td>
</tr>
<tr>
<td>3</td>
<td>Class or Division</td>
</tr>
<tr>
<td>4</td>
<td>Subsidiary Risk</td>
</tr>
<tr>
<td>5</td>
<td>Packing Group</td>
</tr>
<tr>
<td>6</td>
<td>Special Provisions</td>
</tr>
<tr>
<td>7</td>
<td>Limited Quantities</td>
</tr>
<tr>
<td>8</td>
<td>Packing Instruction</td>
</tr>
<tr>
<td>9</td>
<td>Special Packing Provisions</td>
</tr>
<tr>
<td>10</td>
<td>Portable Tank &amp; Bulk Containers Instructions</td>
</tr>
<tr>
<td>11</td>
<td>Portable Tank &amp; Bulk Containers Special Provisions</td>
</tr>
</tbody>
</table>

This list was derived from the Dangerous Goods List of UN15 and is arranged in UN number order.

**SPECIAL PROVISIONS *(ADG 3.3.2)***

- **UN Special Provisions**

Special provisions (SP) for dangerous goods are mentioned in column 6 of the Dangerous Goods List. Where special provisions are indicated, it generally means that a special provision is relevant to a substance or article.

Special provisions (SP) can be found in numerical order in volume 1 of the ADG Code.

- **Australian Special Provisions *(ADG 3.3.3)***

The Special Provisions in this Section 3.3.3 are peculiar to this Code and are therefore not applicable to international transport, or to air or sea transport within Australia.
For example: UN 3077 ENVIRONMENTALLY HAZARDOUS SUBSTANCE, SOLID, N.O.S.

AU01 Environmentally Hazardous Substances meeting the descriptions of UN 3077 or UN 3082 are not subject to this Code when transported by road or rail in;

(a) Packagings that do not incorporate a receptacle exceeding 500 kg(L); or

(b) IBCs.

LIST OF PACKING INSTRUCTIONS (ADG 4.1.4)

- The packing instructions outlined in column 8 of the DG listing, give a number for example, P001. If there are Special Packing Provisions as per Column 9 of the DG Listing, i.e. PP1, they MUST be read. There are over 900 Packaging instructions.

- IBC & Large Packaging (LP) Instructions MUST also be looked at prior to transporting the product on a vehicle. (ADG 4.1.4.1)

- For example: IBC08 authorises certain IBCs that can be used. Special Packing Provisions MUST be looked at as some substances cannot be transported in anything other than Closed Cargo Transport Units if not in a Metal or Rigid plastic IBC. (ADG 4.1.4.2)

- Portable tank instructions and Portable tank & bulk containers/special provisions in Columns 10 & 11 in the DG Listing MUST also be looked at; if to be transported in these vessel types.

Packaging Requirements Part 4 ADG Code

Suitability – Constructed and closed to prevent leakage
Compatibility – Packaging should be compatible with the DG goods it contains
Ullage – Sufficient ullage space to provide for expansion of liquids.
Inner package – Must be in outer package to protect from breakage, puncture or leakage.
Strong – Enough to withstand shocks during loading and transport.
Compatibility – Inner package that contain incompatible DG’s must not be in the same outer package.
Condition – Certified (unless exempt), free from corrosion, contamination or damage.
Empty packaging – That contained DG’s and has not been cleaned, must be treated as filled packages.
MODULE FOUR

GHS MARKINGS & INFORMATION
GLOBALLY HARMONISED SYSTEM

GHS Background

Developed by the United Nations to give a formal structure globally, of how to manage chemicals within the workplace.
A process was developed to standardise and harmonise chemical classification and labelling.
This Guidance is intended for manufacturers and importers of substances, mixtures and articles who have a duty under the Work Health and Safety (WHS) Act and Regulations to classify them. It may also be useful for suppliers, persons undertaking business and undertakings, workers and other persons involved with hazardous chemicals.

Introduction to GHS

The GHS includes harmonised criteria for the classification of:

- Physical hazards (e.g. flammable liquids);
- Health hazards (e.g. carcinogens); and
- Environmental hazards (e.g. aquatic toxicity).

Implementation of GHS

After 31 December 2016 all workplace chemicals must be classified according to the GHS and labels and SDS must be in accordance with the GHS as implemented under the WHS Regulations.

Duties in relation to Classification

Hazard classification is used to identify hazardous properties of a substance or if mixtures are used.

Follow 3 steps:
1. Identify relevant data of the hazards, substance and mixtures
2. Review data to confirm the above hazards
3. Make a decision on whether the substance or mixture will be classified as a hazardous substance or mixture

A manufacturer or supplier Must:

- Determine whether a substance, mixture or article is a hazardous chemical
- Ensure the hazardous chemical is correctly classified, prepare and provide safety data sheets
- Ensure the hazardous chemical is correctly labelled
- Amend safety data sheets every 5 years
Comparison of old classification systems verses New

New GHS Pictograms

<table>
<thead>
<tr>
<th>Pictogram</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploding bomb</td>
<td>Explosives</td>
</tr>
<tr>
<td>Gas cylinder</td>
<td>Gases under pressure</td>
</tr>
<tr>
<td>Environment</td>
<td>Environmental hazard</td>
</tr>
<tr>
<td>Flame over circle</td>
<td>Oxidisers</td>
</tr>
<tr>
<td>Exclamation mark</td>
<td>Harmful/Irritant to ozone layer</td>
</tr>
<tr>
<td>Skull and crossbones</td>
<td>Acute toxicity</td>
</tr>
<tr>
<td>Health hazard</td>
<td>Severe health hazards</td>
</tr>
</tbody>
</table>

Hazard Warning Symbols

- Old: 7 orange / black 'hazard symbols'

<table>
<thead>
<tr>
<th>Hazard Class</th>
<th>Pictogram</th>
</tr>
</thead>
<tbody>
<tr>
<td>Explosive</td>
<td><img src="image1" alt="Explosive Pictogram" /></td>
</tr>
<tr>
<td>Highly/Extremely flammable</td>
<td><img src="image2" alt="Highly/Extremely flammable Pictogram" /></td>
</tr>
<tr>
<td>Oxidising</td>
<td><img src="image3" alt="Oxidising Pictogram" /></td>
</tr>
<tr>
<td>Corrosive</td>
<td><img src="image4" alt="Corrosive Pictogram" /></td>
</tr>
<tr>
<td>Toxic/Very Toxic</td>
<td><img src="image5" alt="Toxic/Very Toxic Pictogram" /></td>
</tr>
<tr>
<td>Harmful/Irritant</td>
<td><img src="image6" alt="Harmful/Irritant Pictogram" /></td>
</tr>
<tr>
<td>Dangerous for the environment</td>
<td><img src="image7" alt="Dangerous for the environment Pictogram" /></td>
</tr>
</tbody>
</table>

Note that current SDS still show under Classification under the Approved Criteria [NOHSC: 1008 (2004)]

The following Letters are seen on SDS meaning:

- Risk Phrases=R followed by a number
- Flammable=F
- Danger Oxidizing=O
- Safety Phrase=S
- Harmful=Zn
- Toxic=T
- Corrosive=C
- Irritant=Xi
- Dangerous for the Environment=N

GHS Hazard Classes

GHS breaks down Hazard Classes into 3 groups:

- Physical Hazard
- Health Hazard
- Environmental Hazard
Signal Words

Signal words are used to indicate the relative level of severity of a hazard. The GHS uses ‘DANGER’ and ‘WARNING’ as signal words. ‘DANGER’ is used for a more severe or significant hazard, while ‘WARNING’ is used for the less severe hazards.

Only one signal word should be present on any one label. If the signal word ‘DANGER’ applies, then the signal word ‘WARNING’ should not appear on the label.

Signal words should be represented in **bold** and uppercase text.

Labels: Signal Word

These are words used to indicate the severity of the hazard and alert employees to the potential hazard.

Only 2 signal words will appear:
- “DANGER” (more severe hazard)
- “WARNING” (less severe hazard)

Not all labels will have a signal word. Some chemicals are not hazardous enough to require that a signal word appear on the label.
MODULE FIVE

MARKING AND LABELLING OF DANGEROUS GOODS
MARKING AND LABELLING OF PACKAGES (ADG 5.2.1)

With the exception of very small items (sections 3.4 and 7.3), packages should be marked with:

- The proper shipping name
- The UN number
- Class label and if necessary, a subsidiary risk label
- Name and address in Australia of the manufacturer or consignor (or their agent)
- Any special or orientation markings as required.

Aerosols will be marked and transported as Class 2 and any subsidiary risk applicable in accordance with AS 2278.1. (ADG 5.2.1.8)

All marks required by as above:
(a) Must be readily visible and legible;
(b) Must be able to withstand open weather exposure without a substantial reduction in effectiveness;
(c) Must be displayed on a background of contrasting colour on the external surface of the package; and
(d) Must not be located with other package marks that could substantially reduce their effectiveness.
Labelling of OVERPACK (UN18 – Previously known as Unit Load) (*ADG 5.1.2*)

- Marked as an **OVERPACK**, all packages to be marked with proper shipping name, UN number & Class label clearly visible for each item.

- If black plastic wrap is used on an overpack, individual Class Labels MUST be placed on the outside of the overpack of the products inside.

- Except for limited quantities, packages containing dangerous goods which are incompatible may not be transported together in an overpack.

---

Access points for forklift

All packages to be marked with the outer package markings being visible.
MODULE SIX

REQUIREMENTS FOR THE CONSTRUCTION AND TESTING OF PACKAGING
CODES FOR DESIGNATED TYPES OF PACKAGES \( (ADG\ 6.1.2) \)

The Code consists of:
(a) An Arabic numeral indicating the kind of packaging, e.g. drum, jerrican, etc., followed by:
(b) A capital letter(s) in Latin characters indicating the nature of the material, e.g. steel, wood, etc., followed where necessary by:
(c) An Arabic numeral indicating the category of packaging within the kind to which the packaging belongs.

**Example** \( (ADG\ 6.1.4.1) \): Steel Drums will either be marked as 1A1 or 1A2

\[
\begin{array}{ll}
1 & = \text{Drum} \\
A & = \text{Steel} \\
1 & = \text{Non-removal head}
\end{array}
\]

UN APPROVAL MARKING \( (ADG\ 6.1.3) \)

The responsibility for using the correct type of packaging and labelling lies with the consignor (sender of the goods). However, the driver is required to have knowledge and be able to interpret and understand the reasons why correct packaging and labelling must be used.

All UN approved packages will be marked with the UN symbol.

\[
\text{UN SYMBOL}
\]

All packing group I substances must be in UN approved packages.

Packing group II and III substances over 5 kg/L must also be in UN approved packages, unless exempt.

**For package marking purposes a capital letter is used rather than a Roman numeral.** \( (ADG\ 6.1.3.1) \)

e.g.

\[
\begin{align*}
\text{X} & - \text{signifies a package approved for packing groups I, II & III} \\
\text{Y} & - \text{signifies a package approved for packing groups II & III only} \\
\text{Z} & - \text{signifies a package approved for packing group III only}
\end{align*}
\]
Example: UN 4G/X/30/S/91USA/BS 809

4 = Box
G = Fibreboard
X = Packing group I, II & III
30 = Density of container/Maximum kg/L
S = Solids only
91 = Year of manufacture
USA = Country of manufacture
BS 809 = Company product Code

INTERMEDIATE BULK CONTAINERS (ADG 6.5)

An IBC (Intermediate Bulk Container) (large packaging) is a container for solids or liquids of packing groups II or III, up to a maximum of 3000 kg/L designed for mechanical handling and all resistant to normal stresses in transport.

IBCs must be resistant to or adequately protected from deterioration due to the external environment.

Every metal, rigid plastics and composite IBCs must be inspected to the satisfaction of the competent authority:
(a) Before it is put into service (including after remanufactured), and thereafter at intervals not exceeding five years, with regard to: (i) conformity to design type including marks; (ii) internal and external condition; (iii) proper functioning of service equipment.
MODULE SEVEN

DANGEROUS GOODS
SEGREGATION ROAD TRANSPORT
### SEGREGATION TABLE FOR ROAD TRANSPORT (TABLE 9.1)

The Dangerous Goods Safety (Road and Rail Transport of Non-explosives) Regulations 2007 advises under Part 9 – Segregation the following:

#### 130. Application of Part

(1) This Part applies to —

(a) The transport of a placard load; or

(b) The transport of a load that contains dangerous goods but that is not a placard load if the load contains dangerous goods of UN Division 2.3 or UN Class 6 or 8, or dangerous goods that have a Subsidiary Risk of 6.1 or 8 that are being, or are to be, transported with food or food packaging.

Table 9.1 also applies to a SINGLE VEHICLE and includes any Sub-risk to the Main Class

<table>
<thead>
<tr>
<th>CLASS / DIVISION</th>
<th>1</th>
<th>2.1</th>
<th>2.2</th>
<th>2.3</th>
<th>3</th>
<th>4.1</th>
<th>4.2</th>
<th>4.3</th>
<th>5.1</th>
<th>5.2</th>
<th>6</th>
<th>7 (7)</th>
<th>8</th>
<th>9</th>
<th>Food &amp; Food empties</th>
<th>Fire risk substances</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Explosives</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td>(1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Flammable gas</td>
<td>(1)</td>
<td>0</td>
<td>0(3)</td>
<td>0</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.2 Non-flammable gas</td>
<td>(1)</td>
<td>0(3)</td>
<td>0</td>
<td>0(4)</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.3 Toxic gas</td>
<td>(1)</td>
<td>0</td>
<td>0</td>
<td>0(4)</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N(8)</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Flammable liquid</td>
<td>(1)</td>
<td>0(2)</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>N(6)</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.1 Flammable solid</td>
<td>(1)</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.2 Spontaneously combustible</td>
<td>(1)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3 Dangerous when wet</td>
<td>(1)</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.1 Oxidising agent</td>
<td>(1)</td>
<td>N</td>
<td>0</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>0(6)</td>
<td>N</td>
<td>0(5)</td>
<td>N</td>
<td>0(5)</td>
<td>0</td>
<td>N</td>
</tr>
<tr>
<td>5.2 Organic peroxide</td>
<td>(1)</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>0</td>
<td>0(5)</td>
<td>N</td>
<td>0(5)</td>
<td>0</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td>6 Toxic/Infectious substances</td>
<td>(1)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0(5)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0(5)</td>
<td>0(5)</td>
<td>0</td>
<td>0</td>
<td>0(6)</td>
<td>0</td>
<td>N(8)</td>
<td>0</td>
</tr>
<tr>
<td>7 Radioactive material</td>
<td>(1)</td>
<td>N</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>0</td>
<td>N</td>
<td>0</td>
<td>N(8)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>8 Corrosive substances</td>
<td>(1)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>0(6)</td>
<td>N</td>
<td>0(6)</td>
<td>0</td>
<td>N(8)</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>9 Miscellaneous dangerous goods</td>
<td>(1)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0(5)</td>
<td>0(5)</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**
- 0 Means compatible unless a numbered exemption applies.
- N Means incompatible unless a numbered exemption applies.
Exceptions (see Table 9.1):
(1) Explosives are incompatible in transport with all other dangerous goods in all quantities except as provided in the Australian Explosives Code or, for Division 1.4S, where 9.1.2.2.2 applies.
(2) Division 2.1 and Class 3 are incompatible in transport if both are in tanks or other receptacles with a capacity individually exceeding 500 L.
(3) Division 2.1 is incompatible in transport with gases of Division 2.2 that have a subsidiary risk 5.1 except when all are packed in cylinders or pressure drums not exceeding 500 L capacity.
(4) Division 2.3 is incompatible in transport with gases of Division 2.2 that have a subsidiary risk 5.1 except when all are packed in cylinders or pressure drums not exceeding 500 L capacity.
(5) Class 5 is incompatible with those Class 6 or Class 9 materials that are fire-risk substances.
(6) Some specific examples of these Classes or Divisions are incompatible – see Table 9.2.
(7) See the Code of Practice for the Safe Transport of Radioactive Substances regarding the compatibility of Class 7 with undeveloped photographic film, personnel and mail.
(8) Food and food packagings are incompatible with these classes in all quantities, except where 9.1.2.3 applies.

9.2.1.1 The segregation requirements of this chapter apply only to placard loads of dangerous goods, except:
(a) where, in the explanatory text at the foot of Table 9.1, it is indicated that particular goods are incompatible in all quantities.

Food and Food Packagings (ADG 9.1.2.3)
Food ingredients that are Class 8 are not to be considered to be incompatible with other food or food packaging, despite the entry in the dangerous goods segregation table 9.1, where it is indicated that Class 8 is incompatible with food or food packaging.

Classes incompatible with Food or Food Packaging
The following Classes/Division are incompatible with food or food packaging unless the above section of the ADG Code applies:
- Division 2.3
- Class 6
- Class 7
- Class 8
### TABLE 9.2 SPECIFIC EXAMPLES OF INCOMPATIBLE GOODS

<table>
<thead>
<tr>
<th>Dangerous Goods or Group of Dangerous Goods</th>
<th>Incompatible with</th>
<th>Dangerous Goods or Group of Dangerous Goods</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ammonium nitrate</td>
<td></td>
<td>Tetranitromethane</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dichloroisocyanuric acid</td>
</tr>
<tr>
<td></td>
<td>Tetranitromethane</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Dichloroisocyanuric acid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Trichloroisocyanuric acid</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Any</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chlorate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chlorite</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hypochlorite</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Chloroisocyanurate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>O</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Inorganic nitrite</td>
<td></td>
</tr>
<tr>
<td>Calcium hypochlorite (Dry or Hydrated) and its mixtures</td>
<td>Incompatible with</td>
<td>Ammonium nitrate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dichloroisocyanuric acid</td>
</tr>
<tr>
<td></td>
<td>Class 6</td>
<td>Nitromethane</td>
</tr>
<tr>
<td></td>
<td>Nitromethane</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Concentrated strong acids</td>
<td>Concentrated strong alkalis</td>
</tr>
<tr>
<td></td>
<td>Concentrated strong acids</td>
<td></td>
</tr>
<tr>
<td>Cyanide compounds</td>
<td>Incompatible with</td>
<td>Acids</td>
</tr>
</tbody>
</table>

9.2.1.3 Dangerous goods must not be transported on the same road vehicle or train with incompatible goods unless the dangerous goods and the incompatible goods:
(a) Are segregated in accordance with this chapter; or
(b) Are otherwise allowed under this Code to be transported together.

9.2.1.4 An overpack, a large packaging or a segregation device must not contain dangerous goods which are incompatible with one another, except where all the dangerous goods are packed as limited quantities in accordance with Chapter 3.4, in which case 3.4.5 applies.

9.2.1.5 A cargo transport unit must not contain dangerous goods which are incompatible with each other unless segregated in accordance with Section 9.2.2.

(a) Incompatible dangerous goods must be segregated from one another so as to effectively minimise risk in the event of accidental leakage or spillage or any other accident.
(b) Whenever dangerous goods are stowed together, the most stringent segregation provisions for any of the goods must be applied.
(c) Dangerous goods packages required to bear a subsidiary risk label, the segregation appropriate to the subsidiary hazard must be applied when it is more stringent than that required by the primary hazard.
SEGREGATION METHODS

Separate Road Vehicles
Dangerous goods are carried on one vehicle and the incompatible goods on another - Either on combination vehicles or separate vehicles. (B Double for example)

Separate Freight Containers
The dangerous goods or the incompatible goods are carried in a closed freight container with rigid sides and ends.

Packaging for Segregation
- Packaging for Segregation must be approved for that purpose by the competent authority; and
- Has three levels of containment, comprising of:
  i. An inner package; and
  ii. A leak proof intermediate package; and
  iii. An outer packaging.
- Has been tested in accordance with chapter 6.1.5 (PG I packaging)
- Must be marked with “approved packaging for segregation”
- Packing Group I dangerous goods must comply with ADG 9.2.2.4.2.

Large Packaging
Dangerous goods are segregated if they are packed in a large packaging to a packing instruction in chapter 4.1, ADG Code.
Segregation Devices
Dangerous goods of packing group II and III can be segregated from incompatible goods in accordance with this Code by means of a segregation device, which meets the requirements of chapter 6.11.

SPECIAL SEGREGATION PROVISIONS

Table 9.3 Restricted Loads on Certain Vehicles

<table>
<thead>
<tr>
<th>Row No.</th>
<th>Goods A</th>
<th>Receptacle Size</th>
<th>Goods B</th>
<th>Receptacle Size</th>
<th>Restriction Road</th>
<th>Restriction Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Any dangerous goods of Class 5 or Subsidiary Risk 5.1</td>
<td>&gt; 500 kg(L)</td>
<td>Any dangerous goods of Class or Subsidiary Risk 3, or Combustible Liquid</td>
<td>&gt; 500 L</td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>2.</td>
<td>Any dangerous goods of Division or Subsidiary Risk 2.1</td>
<td>&gt; 500 L</td>
<td>Any dangerous goods of Class or Subsidiary Risk 3, 4 or 5</td>
<td>&gt; 500 kg(L)</td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>3.</td>
<td>Ammonium Nitrate of any Division in any form (including UN 0222, 1942, 2067, 2071, 2426 or 3375)</td>
<td>&gt; 500 L</td>
<td>Any sensitising or initiating agent</td>
<td>Any</td>
<td>a</td>
<td>b</td>
</tr>
<tr>
<td>4.</td>
<td>UN 3414 Sodium Cyanide Solution of Division 6.1</td>
<td>&gt; 500 L</td>
<td>UN 2014, 2015 or 2984 Hydrogen Peroxide of Division 5.1</td>
<td>Any</td>
<td>Any</td>
<td>a</td>
</tr>
<tr>
<td>5.</td>
<td>Any Cyanide of Division 6.1</td>
<td>Any</td>
<td>Any Acid of Class 8</td>
<td>Any</td>
<td>c</td>
<td>d</td>
</tr>
<tr>
<td>6.</td>
<td>Any Cyanide of Division 6.1</td>
<td>&gt; 500 kg(L)</td>
<td>Any Acid of Class 8</td>
<td>&gt; 500 L</td>
<td>c</td>
<td>e</td>
</tr>
<tr>
<td>7.</td>
<td>Any placard load of Explosives</td>
<td>Any</td>
<td>Any other placard load</td>
<td>Any</td>
<td>f</td>
<td>g</td>
</tr>
</tbody>
</table>

Restrictions (see Table 9.3)

a. (Road) Dangerous goods mentioned in the column headed Goods A must not be transported on any road vehicle at the same time as goods described as Goods B in the same numbered row of this table, even if the Goods A and Goods B are in different freight containers, bulk containers, portable tanks or different vehicles making up a combination vehicle.

b. (Road) A placard load on a road vehicle, including a combination vehicle, must not include at the same time, Cyanides of Division 6.1 and Acids of Class 8, in any quantity, even if they are in separate cargo transport units or on different vehicles making up a combination vehicle, unless Packagings for Segregation are used in accordance with 9.2.2.4.

# Except where this substance is transported in a Packaging for Segregation in accordance with 9.2.2.4.
SEGREGATION DEVICES – TYPE 1

Must meet the requirements of Chapter 6.11
- Maximum capacity 450 L
- Rigid, substantial construction, liquid tight, permanently attached lid with two suitable closing devices
- Fixed to vehicle, not to lifted to or from the vehicle whilst containing dangerous goods
- Not to be used for Packing Group 1 unless approved

SEGREGATION DEVICES – TYPE 2

Must meet the requirements of Chapter 6.11
- Must not exceed 3000 L in capacity
- must be of suitable design, construction
- Must be approved
- The segregation device must be designed for safe mechanical handling when fully loaded
MODULE EIGHT

DANGEROUS GOODS
SEGREGATION STORAGE & HANDLING
### STORAGE SEGREGATION CHART

<table>
<thead>
<tr>
<th>CLASS</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>COMPRESSED GASES</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.1 Flammable</td>
<td>Compatible</td>
<td>KEEP APART</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>KEEP APART</td>
</tr>
<tr>
<td>2.2 Non-flammable/ non-toxic</td>
<td>KEEP APART</td>
<td>Compatible</td>
<td>KEEP APART</td>
<td>Segregation may be necessary</td>
<td>Segregation may be necessary</td>
<td>Segregation may be necessary</td>
<td>KEEP APART</td>
</tr>
<tr>
<td><strong>FLAMMABLE LIQUIDS</strong> (and Combustible liquids)</td>
<td>Segregate from</td>
<td>KEEP APART</td>
<td>Compatible</td>
<td>KEEP APART</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
</tr>
<tr>
<td><strong>FLAMMABLE SOLIDS</strong></td>
<td>Segregate from</td>
<td>Segregation may be necessary</td>
<td>KEEP APART</td>
<td>Compatible</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
</tr>
<tr>
<td>4.1 Flammable solids</td>
<td>Segregate from</td>
<td>KEEP APART</td>
<td>Compatible</td>
<td>Segregation may be necessary</td>
<td>Segregation may be necessary</td>
<td>Segregation may be necessary</td>
<td>Segregate from</td>
</tr>
<tr>
<td>4.2 Spontaneously combustible</td>
<td>Segregate from</td>
<td>KEEP APART</td>
<td>Compatible</td>
<td>Segregation may be necessary</td>
<td>Segregation may be necessary</td>
<td>Segregation may be necessary</td>
<td>Segregate from</td>
</tr>
<tr>
<td>4.3 Dangerous when wet</td>
<td>Segregate from</td>
<td>Segregation may be necessary</td>
<td>KEEP APART</td>
<td>Compatible</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
</tr>
<tr>
<td><strong>OXIDIZING SUBSTANCES</strong></td>
<td>Segregate from</td>
<td>Segregation may be necessary</td>
<td>KEEP APART</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
</tr>
<tr>
<td>5.1 Oxidizing agents</td>
<td>Segregate from</td>
<td>Segregation may be necessary</td>
<td>KEEP APART</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
</tr>
<tr>
<td>5.2 Organic peroxides</td>
<td>Segregate from</td>
<td>Segregation may be necessary</td>
<td>KEEP APART</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
</tr>
<tr>
<td><strong>TOXIC SUBSTANCES</strong></td>
<td>KEEP APART</td>
<td>Segregation may be necessary</td>
<td>KEEP APART</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
</tr>
<tr>
<td><strong>CORROSIVE SUBSTANCES</strong></td>
<td>KEEP APART</td>
<td>Segregation may be necessary</td>
<td>KEEP APART</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
<td>Segregate from</td>
</tr>
</tbody>
</table>
STORAGE SEGREGATION GUIDE

LEGEND:

Compatible

Dangerous goods of the same Class should be compatible; consult SAFETY DATA SHEET (SDS) or suppliers about requirements for individual substances.

* 

Dangerous goods of the same Class could be incompatible or react dangerously. Consult the SDS or suppliers about requirements for individual substances.

Segregation may be necessary

Segregation of these Classes may be necessary. Consult the SDS or the supplier.

KEEP APART

Dangerous goods of these Classes should be kept apart by at least 3m. Consult the SDS or the supplier.

Segregate from

These combinations of dangerous goods should be segregated by at least 5m and kept in separate compounds or building compartments.

ISOLATE

This requirement applies to organic peroxides, for which dedicated stores or storage cabinets are recommended. Adequate separation from other buildings and boundaries is required.

Notes:
1) In all cases, the SDS or supplier of the goods should be consulted.
2) The segregation of dangerous goods of Division 1.4S may be necessary. Consult the SDS or the supplier of the goods.
3) Combustible liquids shall be segregated in the same manner as flammable liquids of Class 3.
4) Dangerous goods of Class 9 should be segregated in accordance with SDS.
5) If the dangerous goods have a Sub-risk of another Class, then the segregation requirements for the Sub-risk need to be determined and the more stringent segregation requirements applied.
6) Where smoke detectors are to be stored, their supplier should be consulted and any specific storage and handling recommendations followed.
MODULE NINE

DANGEROUS GOODS
TRANSPORT
DOCUMENTATION &
EMERGENCY PROCEDURE
GUIDES
TRANSPORT DOCUMENTATION (ADG 11.1)

The person who offers dangerous goods for transport by road and/or rail must supply transport documents that will describe and identify the dangerous goods.

Form of Transport Document (ADG 11.1.1)

- May be in any form, provided that it contains all the required information.
- Dangerous goods listed with non-dangerous goods on one document – the dangerous goods must be listed first.
- The document may consist of more than one page, provided they are consecutively numbered.
- Information on the document must be printed legibly in English, easy to identify and durable.
- The contents of transport documentation may be transmitted to the prime contractor or driver by electronic data interchange, but documentation must be carried in the vehicle in hard copy form.

Content (ADG 11.1.2)

Dangerous goods documentation must contain:
- The consignor’s name and telephone number

Dangerous Goods Description (ADG 11.1.2.2.1)

A description of the dangerous goods to be transported. Describe the goods in the following manner:
- a) UN number
- b) Proper shipping name (or other name)
- c) Class or Division
- d) Sub-risk (if applicable)
- e) Packing group (if any)
- f) Description of each type of package (i.e. drum, IBC)
- g) Number of packages, receptacles of each type
- h) Aggregate quantity

The UN number, name, Class or Division, Sub-risk and the packing group must always appear before other information on the documents. Even if there are no Sub-risks or Packing Groups applicable to the UN Number, the field MUST appear and either NIL or N/A MUST be placed in the document.
Example Transport Document

**DESCRIPTION**

<table>
<thead>
<tr>
<th>UN number</th>
<th>Proper shipping name</th>
<th>Class/Div number</th>
<th>Subsidiary risk number</th>
<th>Packing group</th>
<th>Size of container</th>
<th>Number of container</th>
<th>Aggregate net quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1251</td>
<td>Methyl Vinyl Ketone</td>
<td>6.1</td>
<td>3, 8</td>
<td>I</td>
<td>20L</td>
<td>1</td>
<td>20 L</td>
</tr>
<tr>
<td>1223</td>
<td>Kerosene</td>
<td>3</td>
<td>N / A</td>
<td>III</td>
<td>200L Drums</td>
<td>2</td>
<td>400 L</td>
</tr>
<tr>
<td>2353</td>
<td>Butyryl Chloride</td>
<td>3</td>
<td>8</td>
<td>II</td>
<td>200L Drums</td>
<td>2</td>
<td>400 L</td>
</tr>
</tbody>
</table>

**Road Transport Documentation (ADG 11.1.4)**

- Transport documentation must be carried in the cabin of each road vehicle transporting dangerous goods.

- Every road vehicle transporting a placard load of dangerous goods must be fitted with an emergency information holder.

- Every road vehicle transporting less than a placard load of dangerous goods must carry the documentation:
  - (a) In any emergency information holder fitted in the cabin of the vehicle; or
  - (b) Where no emergency information holder is fitted, elsewhere in the cabin in a prominent location.

- The documentation must not be in a sealed envelope, or be otherwise kept in a way that would prevent it from being able to be read by the driver, while it is in the vehicle.

**Emergency Information Holder is:**

- A holder of a suitable size and shape to carry emergency information and transport documentation; and

- Marked with the words “EMERGENCY PROCEDURE GUIDES” or “EMERGENCY INFORMATION” in red letters at least 10 mm high on a white background.
PLACEMENT OF EMERGENCY INFORMATION HOLDER

- On the inside of a door of the cabin; or
- Immediately adjacent to a door of the cabin; or if the construction of the vehicle does not allow it inside or adjacent to the door, elsewhere in the cabin provided that a notice fixed to the inside of the driver’s door will indicate the location of the holder.
- If located elsewhere, must be visible and accessible

Initial Emergency Response Guide HB76 or Emergency Procedure Guide

Empty Containers

Transport documents are required for nominally empty containers, but instead of the required information it is only necessary to print “Empty Dangerous Goods Drums”, “Dangerous Goods Residue” or “Return Dangerous Goods Packages”.
MODULE TEN

PLACARDING REQUIREMENTS
FOR ROAD TRANSPORT
## MINIMUM PLACARDING QUANTITIES FOR VEHICLES TRANSPORTING DANGEROUS GOODS

### Table 5.3: Placard Load (Minimum Quantities)

A placard load is defined as a load in a cargo transport unit, as defined in 1.2.1, with either:

<table>
<thead>
<tr>
<th>Dangerous Goods in Cargo Transport Unit</th>
<th>Placard Load Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Any dangerous goods in a receptacle (other than an article) with a:</td>
<td>One or more such receptacles (i.e. one or more placardable units)</td>
</tr>
<tr>
<td>• capacity &gt; 500 L; or</td>
<td></td>
</tr>
<tr>
<td>• net mass &gt; 500 kg</td>
<td></td>
</tr>
<tr>
<td>(b) Any quantity of:</td>
<td>Aggregate quantity of all dangerous goods in the cargo transport unit ≥ 250 kg(L)</td>
</tr>
<tr>
<td>• Division 2.1 (except Aerosols); or</td>
<td></td>
</tr>
<tr>
<td>• Division 2.3; or</td>
<td></td>
</tr>
<tr>
<td>• Packing group I of any Class or Division</td>
<td></td>
</tr>
<tr>
<td>(c) Division 6.2 Category A</td>
<td>All quantities</td>
</tr>
<tr>
<td>(d) Division 6.2 (other than Category A)</td>
<td>≥ 10 kg(L)</td>
</tr>
<tr>
<td>(e) Limited quantities dangerous goods and/or domestic consumer commodities (defined as 1.2.1) - See Note 5</td>
<td>≥ 2,000kg(L)</td>
</tr>
<tr>
<td>(f) Loads where (a – e) do not apply</td>
<td>Aggregate quantity of dangerous goods ≥ 1,000 kg(L) - unless the load is:</td>
</tr>
<tr>
<td>(i) a Fumigated Unit (UN 3359 – see Note 3),</td>
<td></td>
</tr>
</tbody>
</table>

### Table notes:

**NOTE 1:** For placarding quantities of Class 1, see the Australian Explosives Code.

**NOTE 2:** For placarding quantities of Class 7, see the Codes of Practice for the Safe Transport of Radioactive Substances.

**NOTE 3:** A Fumigated Unit (UN 3359) complying with Chapter 5.5 that does not contain any other dangerous goods is not a placard load, and should not be included in the aggregate quantity of dangerous goods when determining a placard load.

**NOTE 4:** For land transport wholly within Australia, this Code requires placards to be displayed on cargo transport units if they contain a placard load, as determined from Table 5.3. It should be noted that cargo transport units containing lesser quantities may need to be placarded in accordance with the IMDG Code before they are acceptable for transport by sea, even within Australian waters.

**NOTE 5:** When transporting a load of limited quantities dangerous goods and/or domestic consumer commodities (defined in 1.2.1) with other dangerous goods the applicable placard load quantity applies to the most stringent requirement.
Placarding Road Vehicles

ROAD VEHICLE OR COMBINATION TRANSPORTING PACKAGED DANGEROUS GOODS ONLY REQUIRE DIAMONDS ONLY

ROAD TANK VEHICLE OR COMBINATION TRANSPORTING DANGEROUS GOODS IN BULK REQUIRE EMERGENCY INFORMATION PANELS
IMDG Intermodal Dangerous Goods

The requirements of this sub-section 5.3.2.1 of the ADG Code do not apply to consignments of dangerous goods being transported only by road or rail within Australia.

It is included here for the information of exporters or those intending to transport dangerous goods domestically by sea or air, and to assist in interpreting placarding and marking of containers arriving by sea or air.

If you were to consign this for Road Transport, you would need to use the ADG Code for Road & Rail and follow all relevant areas of the Code.

All placarding would have to be in line with Placarding Road Vehicles Section 5.3.6 of the ADG Code.
MODULE ELEVEN

DANGEROUS GOODS STORAGE REQUIREMENTS
LICENSING REQUIREMENTS

Does the quantity of dangerous goods I have require licensing?
Information extracted from the Storage & Handling Regulations:

Calculating Quantity of Dangerous Goods
All dangerous goods present, including those in packages, bulk storage, process vessels, pipelines and equipment, must be taken into account when calculating the quantity of dangerous goods on site.

The calculation used to determine the quantity depends on the type of dangerous goods and how they are contained.

Packaged dangerous goods
- Gases – total capacity of the container (see note below)
- Liquids – capacity of the container
- All other packaged dangerous goods – mass in kilograms of the goods in the container

Bulk dangerous goods
- Gases – total capacity of the container (see note below)
- Liquids – design capacity of the container
- Uncontained solid dangerous goods – undivided mass in kilograms
- All other bulk dangerous goods – mass in kilograms that the container is designed to hold

Dangerous goods in storage or handling system other than a container
- Gases and liquids – capacity of the storage or handling system
- Solid dangerous goods – mass of the goods in the system

Articles or things
- Dangerous goods that are articles or things – net quantity of that part of the articles or things that in itself comprises dangerous goods

Note: For Multi Element Gas Containers (MEGCs), capacity is determined as the sum of capacities of all manifolded cylinders.

See Calculation table example on Page 40-41 of the manual

When does a site require licensing?

**Manifest quantity**, in relation to dangerous goods, means a quantity of those dangerous goods greater than the quantity specified in relation to those goods in the column headed “Manifest quantity” in Schedule 1.

Once a site reaches Manifest Quantities of Dangerous/Hazardous Goods (See Schedule 1 of the Regulation on the next page), the site MUST be licensed.
Licensing for the Storage of Dangerous Goods

Schedule 1 – Quantities of Dangerous Goods

A site must be licensed if dangerous goods are stored or handled at a site in quantities that exceed the manifest quantities below:

**Manifest Quantities of Dangerous Goods**

<table>
<thead>
<tr>
<th>Item</th>
<th>Description of dangerous goods</th>
<th>Packing group</th>
<th>Placarding quantity</th>
<th>Manifest quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Division 2.1 except aerosols</td>
<td>N/A</td>
<td>500 L</td>
<td>5000 L</td>
</tr>
<tr>
<td>2</td>
<td>Division 2.2 except aerosols</td>
<td>N/A</td>
<td>1000 L</td>
<td>10000 L</td>
</tr>
<tr>
<td>3</td>
<td>Division 2.3</td>
<td>N/A</td>
<td>50 L</td>
<td>500 L</td>
</tr>
<tr>
<td>4</td>
<td>Division 2.1 &amp; 2.2 aerosols</td>
<td>N/A</td>
<td>5000 L</td>
<td>10000 L</td>
</tr>
<tr>
<td>5</td>
<td>Any one of Class 3, Division 4.1, 4.2, or 4.3, Division 5.1 or 5.2, Division 6.1, Class 8 or Class 9, or any combination of those classes or divisions</td>
<td>I</td>
<td>50 kg/L</td>
<td>500 kg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>II and III (aggregate)</td>
<td>1000 kg/L</td>
<td>10000 kg/L</td>
</tr>
<tr>
<td></td>
<td></td>
<td>I, II, III (aggregate) where quantity of goods in packing group I does not exceed 50 kg or L</td>
<td>1000 kg/L</td>
<td>10000 kg/L</td>
</tr>
<tr>
<td>6</td>
<td>Goods too dangerous to transport</td>
<td>N/A</td>
<td>5 kg/L</td>
<td>50 kg/L</td>
</tr>
<tr>
<td>7</td>
<td>Combustible liquids with fire risk dangerous goods</td>
<td>N/A</td>
<td>1000 L</td>
<td>10000 L</td>
</tr>
<tr>
<td>8</td>
<td>Other combustible Liquids</td>
<td>N/A</td>
<td>10000 L</td>
<td>100000 L</td>
</tr>
</tbody>
</table>

Note: These quantities are extracted from schedule 1 of the MHF (Major Hazard Facilities) Regulations.

Note: For the purpose of item 5 in the table:

- All Type B Division 4.1 self-reactive substances that do not have a packing group assigned to them are to be taken to be assigned to packing group I;
- All Type C to F Division 4.1 self-reactive substances that do not have a packing group assigned to them are to be taken to be assigned to packing group II;
- All Type B Division 5.2 organic peroxides that do not have a packing group assigned to them are to be taken to be assigned to packing group I;
- All Type C to F Division 5.2 organic peroxides that do not have a packing group assigned to them are to be taken to be assigned to packing group II;
- Class 9 dangerous goods that do not have a packing group assigned to them are to be taken to be assigned to packing group III; and
- All other articles and things that do not have a packing group assigned to them are to be taken to be assigned to packing group II.
Calculation of Quantity on a Dangerous Goods Site

In the following example, the dangerous goods listed in the table are present on site.

The first step is determining the quantities of dangerous goods in the various Classes and Divisions. These quantities are then compared with the manifest quantities in Schedule 1 of the Storage and Handling Regulations.

The combination of dangerous goods must also be considered:
- The manifest quantity of a dangerous good may be decreased because of increased risk. In the following example, the manifest quantity for the diesel is 10,000 L as there are other fire-risk dangerous goods present of Division 2.1, Class 3 and Division 5.1 (See item 7).
- Schedule 1 also applies a manifest quantity to the aggregate quantity of Class 3, Divisions 4.1, 4.2, 4.3, 5.1, 5.2, 6.1 and Class 8. In the following example, this requires an aggregate quantity to be calculated for Class 3, Division 5.1 and Class 8.

Unless an exemption applies, dangerous goods present in amounts above the manifest quantities are subject to licensing.

Colour coding used in following example.

<table>
<thead>
<tr>
<th>Division or Class of dangerous goods</th>
<th>Total quantity of Division or Class equals or is less than manifest quantity</th>
<th>Total quantity of Division or Class exceeds the manifest quantity</th>
<th>Manifest Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Division 2.1</td>
<td>4 x cylinders of acetylene (water capacity of each cylinder ~ 50 L) 200 L</td>
<td>870 L</td>
<td>1620 L</td>
</tr>
<tr>
<td></td>
<td>5 x 45 kg LPG cylinders (water capacity of each cylinder ~ 110 L) 550 L</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>1 x multi-element gas container of compressed hydrogen (water capacity of entire MEGC ~ 870 L) 870 L</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total Division 2.1</strong> 1620 L</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Manifest quantity</strong> 5000 L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division 2.2/Subrisk 5.1</td>
<td>2 x multi-element gas container of compressed oxygen (water capacity of entire MEGC ~ 730 L) 1460 L</td>
<td></td>
<td>1460 L</td>
</tr>
<tr>
<td></td>
<td><strong>Total Division 2.2/5.1</strong> 1460 L</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Manifest quantity</strong> 10000 L</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Division 2.3</td>
<td>An ammonia refrigeration system comprising:</td>
<td></td>
<td>1240 L</td>
</tr>
<tr>
<td></td>
<td>Receiver 800 L</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Piping, accumulator, heat exchangers and other system components 440 L</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total Division 2.3</strong> 1240 L</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Manifest quantity</strong> 500 L</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Class 3

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 x 200 litre drums of petrol [Class 3, packing group II]</td>
<td>800 L</td>
</tr>
<tr>
<td>2 x 200 litre drums of kerosene [Class 3, packing group III]</td>
<td>400 L</td>
</tr>
<tr>
<td>A solvent [Class 3, packing group III] recovery unit comprising:</td>
<td></td>
</tr>
<tr>
<td>Filter unit</td>
<td>200 L</td>
</tr>
<tr>
<td>Boiling vessel</td>
<td>2500 L</td>
</tr>
<tr>
<td>Pipework</td>
<td>40 L</td>
</tr>
<tr>
<td>Receiver</td>
<td>2000 L</td>
</tr>
<tr>
<td><strong>Total Class 3</strong></td>
<td><strong>5940 L</strong></td>
</tr>
</tbody>
</table>

### Division 5.1

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>300 L of 18% hydrogen peroxide solution in mechanised cleaning equipment [Division 5.1, packing group III]</td>
<td>300 L</td>
</tr>
<tr>
<td><strong>Total Division 5.1</strong></td>
<td><strong>300 L</strong></td>
</tr>
</tbody>
</table>

### Class 8

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 x 25 kg bags of caustic soda (sodium hydroxide) [Class 8, packing II]</td>
<td>1000 kg</td>
</tr>
<tr>
<td>1 x 2000 litre tank of 32% hydrochloric acid [Class 8, packing group II]</td>
<td>2000 L</td>
</tr>
<tr>
<td>1 x 1500 litre tank of 9% sodium hypochlorite solution [Class 8, packing group III]</td>
<td>1500 L</td>
</tr>
<tr>
<td><strong>Total Class 8</strong></td>
<td><strong>4500 kg or L</strong></td>
</tr>
</tbody>
</table>

### C1 combustible liquid (in presence of other fire-risk dangerous goods)

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 x 12000 litre diesel tank</td>
<td>12000 L</td>
</tr>
<tr>
<td><strong>Total C1 combustible liquid</strong></td>
<td><strong>12000 L</strong></td>
</tr>
</tbody>
</table>

### Aggregate of Classes and Divisions

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Aggregate of Class 3, Division 5.1 and Class 8</strong></td>
<td><strong>10740 kg or L</strong></td>
</tr>
</tbody>
</table>

**Manifest quantity:** 10000 L
When is licensing not required?

**Multiple Set-Manifest Quantity**
Licensing is not required, despite having quantities of dangerous goods in excess of the manifest quantity, if:
- The dangerous goods are stored in more than one area in the site; and
- The quantity of dangerous goods stored in each area is less than the manifest quantity; and
- Each area is located outdoors or in a separate building dedicated to storage or handling of the dangerous goods; and
- Each such area is separated from every other such area by a distance sufficient to ensure that a dangerous goods incident in one area cannot cause a dangerous goods incident in another area.

**Storage for up to Six Months of up to Three Times the Manifest Quantity**
Licensing is not required, despite having quantities of dangerous goods in excess of the manifest quantity, if:
- Dangerous goods are stored or handled at the site for not more than six months; and
- Dangerous goods are not manufactured or processed at the site; and
- The quantity of dangerous goods does not exceed three times the manifest quantity; and
- The site is not a major hazard facility; and
- The operator of the site has undertaken a risk assessment; and
- The operator of the site has notified the Chief Officer in writing (using the notification of temporary storage or handling of dangerous goods form) of the intention to store or handle the dangerous goods at the site; and
- The operator of the site complies with any directions given by the Chief Officer in relation to the storage and handling of the dangerous goods.

**Rural Dangerous Goods Locations**
Rural dangerous goods location is specifically excluded from the definition of a dangerous goods site, hence such locations do not require licensing under the Storage and Handling Regulations.

A rural dangerous goods location is defined as a location:
- Outside the limits of the metropolitan area, as defined in the planning and development Act 2005 section 4(1), and is not within a town site, as defined in the Land Administration Act 1997 section 3(1); and
- Of an area of 5 hectares or larger; and
- Used for agricultural, horticultural, floricultural, aquacultural or pastoral purposes; and
- Where the dangerous goods stored or handled on the site are not for sale, and are for use on the site in the primary production activities listed above.

Although these locations are not required to be licensed, storage and handling in these locations must comply with relevant requirements in Storage and Handling Regulations (Regulations 123-133).
Dangerous Goods in Transit Exemption
You do not require the site to be licensed if the goods are not stored for more than 5 consecutive days. But you must still comply with storage regulations Bunding etc.

NOTE: This exemption is for licensing requirements only. All the rules for storage, segregation, signage separation distances from office buildings and boundary fences must be followed.

Safety Date Sheets (SDS)

Previously known as a Material Safety Data Sheet (MSDS), is a document that gives technical information of a chemical. There are 16 Sections to an SDS:

1. Identification
2. Hazard(s) identification
3. Composition/information on ingredients
4. First-aid measures
5. Fire-fighting measures
6. Accidental release measures
7. Handling and Storage
8. Exposure controls/personal protection
9. Physical and chemical properties
10. Stability and reactivity
11. Toxicological information
12. Ecological Information
13. Disposal considerations
14. Transport information
15. Regulatory information
16. Other information

It is good practice to review the label information of a hazardous chemical at the same time as the safety data sheet (SDS) is updated. SDSs are updated:

- When any new information about the hazardous chemical is known or received to ensure the SDS contains correct, current information at least once every five years

A manufacturer or importer must ensure that a SDS for the dangerous goods/hazardous substance is prepared before the goods are supplied to another person.

It is a legal requirement that anyone storing or handling Dangerous Goods/Hazardous Substances, make available to everyone a SDS in an accessible location to review at any time. Also they MUST be reviewed every 5 years or if there is a change to the product being stored.

Let’s now look through a SDS in detail.
**Risk Assessment**

The operator of a dangerous goods site, at which more than the manifest quantity of dangerous goods are stored, must ensure that a risk assessment is made of the dangerous goods stored or handled at the site and that a record is kept of the assessment.

### Hierarchy of Risk Control Measures for Dangerous Goods Storage and Handling

<table>
<thead>
<tr>
<th>Hierarchy of control measures</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Eliminating the risk</strong></td>
<td>Use a non-harmful substance instead of dangerous goods</td>
</tr>
<tr>
<td><strong>Substituting the system of work, substance or plant for something less hazardous</strong></td>
<td>Change the type of dangerous goods kept on site</td>
</tr>
<tr>
<td></td>
<td>Reduce the quantities of dangerous goods kept on site</td>
</tr>
<tr>
<td><strong>Isolating the hazard</strong></td>
<td>Introduce a restricted work area</td>
</tr>
<tr>
<td></td>
<td>Enclose the system</td>
</tr>
<tr>
<td></td>
<td>Separate goods from other hazards</td>
</tr>
<tr>
<td></td>
<td>Segregate incompatible substances</td>
</tr>
<tr>
<td><strong>Introducing engineering controls</strong></td>
<td>Forced ventilation to remove fumes</td>
</tr>
<tr>
<td></td>
<td>Spill containment</td>
</tr>
<tr>
<td></td>
<td>Impact protection</td>
</tr>
<tr>
<td></td>
<td>Use flameproof or intrinsically safe electrical equipment in hazardous areas</td>
</tr>
<tr>
<td></td>
<td>Safety relief valves</td>
</tr>
<tr>
<td></td>
<td>Overfill protection</td>
</tr>
<tr>
<td></td>
<td>Control stability of dangerous goods</td>
</tr>
<tr>
<td><strong>Administrative controls</strong></td>
<td>Modify the system of work, such as changing the times at which certain tasks are done</td>
</tr>
<tr>
<td></td>
<td>Use placards or hazard warning signs</td>
</tr>
<tr>
<td></td>
<td>Specific training and work instructions</td>
</tr>
<tr>
<td><strong>Personal protective equipment (PPE) and safety equipment</strong></td>
<td>Firefighting equipment</td>
</tr>
<tr>
<td></td>
<td>Safety showers</td>
</tr>
<tr>
<td></td>
<td>Spills clean-up</td>
</tr>
<tr>
<td></td>
<td>Appropriate PPE for dealing with any spills. Respirator, eye protection, gloves, chemically resistant clothing etc.</td>
</tr>
</tbody>
</table>
REQUIREMENTS OF TRANSFERRING DANGEROUS GOODS

An operator of a dangerous goods site must ensure that while dangerous goods at the site are being transferred from one storage or handling system to another, all reasonably practicable measures are taken to —

(a) Avoid spillage or overflow of the dangerous goods; and
(b) Where relevant, minimise any static electricity; and
(c) Minimise any dust, mist or vapour generation; and
(d) Ensure that any transfer fittings on the storage; or
(e) Where relevant, avoid ignition sources.

An operator of a dangerous goods site must ensure that any ignition source in a hazardous area within the site is eliminated or, if this is not reasonably practicable, the risk arising from the ignition source is controlled.

Containing Dangerous Goods/Hazardous Substance Spills

A person conducting a business or undertaking must take all reasonable practicable measures to ensure a spill containment system be in the workplace.

A system must be in place to describe how to contain, clean up and dispose of spills or leaks. Further hazard of introducing incompatible chemicals that could cause fire, explosion etc. must be eliminated.

Containers containing spills must not be left open.

For large quantities of hazardous chemicals, bunding may be required. Bunding should be designed and constructed in accordance with relevant Australian Standards.
SCHEDULE 4 – PLACARDING REQUIREMENTS FROM REGULATIONS

What is Placarding?

Placards are signs or notices designed primarily to:

i. Alert the public and emergency services to the presence of stored dangerous goods;

ii. Display information about the type of dangerous goods being stored and the appropriate early emergency action in the event of an accident.

There are four types of placards.

Entrance to Premises
This placard is an outer warning placard typically located at the entrances to premises for DFES.

Package Stores – Composite
The following placard indicates the Classes of dangerous goods store, in accordance with Dangerous Goods Safety (Storage and Handling of Non-explosive) Regulations 2007 Schedule 4.

![Placard Example](image)

Figure 3 – Form and dimensions of a placard for storage of packaged dangerous goods.

Bulk Storage Placards
These placards give precise information on the goods within a tank or bulk store and is displayed —
On every container in which the goods are stored in bulk; and at the entrance to any building in which the goods are stored in bulk, whether in a container or not; and
On or adjacent to every place outside a building where the goods are stored in bulk but not in a container.

Where quantities in a receptacle exceed 500kg/L regardless of exceeding placard quantity in Schedule 1, these placards MUST be displayed on or adjacent to a bulk container or storage area.

Note: Emergency information panels as specified in the ADG Code may be used as bulk store placards.
Underground Tanks
This placard indicates the presence of underground tank(s) for flammable liquids. For products other than flammable liquids a bulk storage placard complements this type of placard.

General Requirements for Package Depots Storing of Dangerous Goods
The storage of dangerous goods in packages is controlled by Dangerous Goods Regulations. In addition these regulation reference:

- AS1940 for flammable and combustible liquids (Class 3);
- AS1596 for LP Gas (Class 2.1); and
- AS2927 for chlorine gas (Class 2.3).

The regulations require consideration of other items, which may not be covered by the Australian Standards, such as licensing, placarding and emergency planning.

External or Outdoor Storage

An external or outdoor storage area that is without walls (other than bund walls), whether roofed or not. See above.
External or Attached Storage

An external store that is an enclosed building either free standing or attached to another building. See above.

Internal Storage

A storage depot that is located within a building that is used for some other purpose. See above.
Internal type cabinets shown above are designed to meet Australian Standards.

Shelving/cupboards should be constructed of chemically resistant materials. Must provide a lip at the front of the shelf.

The base has a Bunded area that should contain no containers to allow the Bunding to fill effectively in the event of a spill or leak.

**Bunding/Secondary Containment**

Where required, this usually takes the form of bunding. Any uncontrolled release of dangerous goods must be contained by some means. Usually this containment is in the form of a bund wall but it may also be by drainage to a collection pit.

The usual requirement for licensed storages also applies to unlicensed storages if secondary containment is required.

- Is designed to contain spills of liquids.
- Package stores may use portable bunding.

Materials for bunding can be:

- Concrete kerbing, brick or concrete walls, steel angles or raised earthen walls.
- Bunding needs to hold additional capacity of rainwater and run off.
SCHEDULE 3 – MANIFEST AND DANGEROUS GOODS SITE PLAN
REGULATIONS

The manifest must contain —
- The name of the operator of the dangerous goods site
- The address of the dangerous goods site
- The date when the manifest was prepared or last revised
- The manifest must contain contact information for at least 2 people who can be contacted in an emergency
- Each packing group of each class or division of dangerous goods that has packing groups
- Each class or division of dangerous goods that does not have packing groups
- Combustible liquids & each type of good too dangerous to be transported.

The site plan must contain —
- The name of the operator of the dangerous goods site
- The address of the dangerous goods site
- The date when the dangerous goods site plan was prepared or last revised
- Specify the scale to which the plan is drawn
- Be accurate and show the site’s boundaries
- The containers and other forms of storage of dangerous goods in bulk
- The storage locations for packaged dangerous goods and dangerous goods in IBCs
- The storage locations where dangerous goods are manufactured or processed

Show the location of —
- The main entrance and the other points of entry to the site
- Essential site services, including fire services and isolation points for fuel, gas, water and power
- The manifest
- All drains on the site
- Describe the nature of the occupancy of adjoining sites or site
- Show the direction of north
Housekeeping

- When working in any environment, good Housekeeping is essential.
- Especially with Dangerous/Hazardous Goods due to the dangers present.
- Keep all clutter and trip hazards away
- Clean all spills immediately and contain them.
- Wear appropriate PPE to do so.

Site Policies and Procedures

It is crucial that as well as following Legislation, you follow your company Site Specific Policies & Procedures.

Every site can vary, so as a result you MUST undergo a Site induction which covers as a minimum:

- Know what safety alarms sound like in the event of an emergency
- What evacuation procedures and where Muster points are
- Where First Aid stations and Safety showers are located
- Where Fire Fighting equipment is located
- What Personal Protective Equipment is required
- Know what forms of communication can be used onsite.
Operating Load Shifting Equipment

When operating machinery such as Forklift Trucks, it is a legal requirement to have a High Risk Work Licence (HRWL).

From time to time, you may be required to operate a piece of machinery you are unfamiliar with. It is essential under Duty of Care, that you are trained and signed off to use any piece of machinery dependant on your site Policies & Procedures.

Emergency Plan

When storing manifest quantities (licensed site) of Dangerous Goods the neighboring properties must be made aware of:
- What your alarm for evacuating the area sounds like; and
- Where the muster point/s are.
- DFES must have information available for all quantities of Dangerous Goods stored on site in the event of an emergency situation.
MODULE TWELVE

FIREFIGHTING AND PERSONAL PROTECTIVE EQUIPMENT
FIRE TETRAHEDRON

It is considered that for fire to occur certain factors are necessary, these are:

- **HEAT**
- **OXYGEN** (usually air or some other supporter i.e. oxidising agents)
- **FUEL** (a combustible substance)
- **CHEMICAL REACTION**

In order to extinguish the fire it will be necessary to limit one or more of these factors. The methods of extinguishing fire may therefore be classified conveniently under the headings of:

- Starvation - or the limitation of fuel
- Smothering - or the limitation of oxygen
- Cooling - or the limitation of temperature
- Stopping the chemical reaction
TYPES OF FIRES

Class “A” Fire  i.e. wood, paper, fabric, etc.

The most effective extinguishing agent is generally water in the form of a course or fine spray.
Before using a water extinguisher, ensure that there are no sources of electricity nearby. 
Aim the extinguisher onto the base of the fire.

Class “B” Fire  i.e. flammable liquids or liquefiable flammable solids

REMEMBER! Flammable liquids may be divided into TWO groups
Those that are miscible i.e. alcohol
Those that are immiscible i.e. petrol

Depending on the above, the extinguishers would include:
- Water spray
- Foam
- Carbon dioxide
- Dry chemical powder

Generally, the most appropriate extinguishing agents for Class “B” fires are foam or dry powder.

Class “C” Fire
These fires involve gases in liquid or vapour form, ie methane, butane, acetylene, hydrogen, foam or dry chemical powders can be used to control these fires. Water in the form of a spray can be used to cool other cylinders.

Class “D” Fire
These fires involve combustible metals. Special purpose extinguishers should be used although a safe alternative could be dry sand.

Class “E” Fire
Fires involving electricity or electronic machines. Water based extinguishers should not be used.

Class “F” Fire
Fires involving cooking oil or fat.

ACTION ON DISCOVERING A FIRE

In general firefighting should be left to the emergency services. However, do try and tackle a small fire if safe to do so.

If it proves necessary to tackle a fire you should:
   a) Raise the ALARM – send someone to call the emergency services if possible
   b) Keep people away from the fire site
USE OF EXTINGUISHERS

If the dry chemical powder extinguisher in a confined space – beware. Once the fire is extinguished allow time for the fumes to exhaust themselves as inhaling them could be harmful.

<table>
<thead>
<tr>
<th>WATER</th>
<th>FOAM</th>
<th>POWDER</th>
<th>CO₂</th>
<th>AQUALOY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Class A</td>
<td>Class B</td>
<td>Most Types of Fires</td>
<td>Small Electrical Fires</td>
<td>Class F Fires</td>
</tr>
<tr>
<td>Combustible Material</td>
<td>Flammable Liquid Fires</td>
<td>Combustible Material</td>
<td>Red with Black Stripe</td>
<td>Red with Beige Stripe</td>
</tr>
<tr>
<td>All Red</td>
<td>Red with Blue Stripe</td>
<td>Red with White Stripe</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Maintenance**

The licensee of premises where dangerous goods are stored is required by regulations to:

- Maintain all appliances and extinguishers to the appropriate Australian Standard
- Have all equipment and alarm systems properly inspected, tested and maintained annually
- Ensure that any defective equipment is immediately repaired
- Check the Gauge is correct
- Check Date Tags and pull pins are correctly fitted

Extinguishers provided at storage facilities must be appropriate for the conditions with which they are intended to be used.

Extinguishers can be rationalised between depots so that a smaller number of centrally located units are provided rather than a larger number, distributed to each depot in strict accordance with the regulations.

**Environmental Protection**

Provision must be made to control water run-off in the event of an emergency involving fire.
Detection Systems

In some tank installations, a gas detection system should be installed to detect the leak of dangerous goods. Examples of this are bulk chlorine and un-odorised LPG installations.

FIRE PROTECTION EQUIPMENT

The regulations require that the licensee of premises provide fire protection equipment which is appropriate for the types of dangerous goods stored.

- Maintain all applicable equipment and extinguishers to the standard prescribed in the Australian Standard AS 1851

HAZARD IDENTIFICATION

An early step is to identify the inherent chemical and physical hazards of a dangerous good. This can be achieved by studying the manufacturer’s Safety Data Sheet (SDS) for the substance and consulting with suitably knowledgeable persons.

As a quick guide, table 1 shows the main types of intrinsic hazard associated with various dangerous goods Classes and Divisions.

It is most important that all relevant hazards are identified. A hazard is any activity, procedure, plant, process, substance, situation or circumstance that could be the cause of an accident or incident.

*Hazard applies to some Class 9 goods

RESPIRATORY PROTECTION

It is a requirement under the regulations that respiratory protection equipment must be available while storing certain Classes of dangerous goods, goods that could give off toxic gases either directly by way of spillage or are mixed with other dangerous goods, and subsequently create the same effect. To prevent inhalation protective clothing must be worn and equipment used. Information on whether respiratory protection equipment is required can be gained from the Safety Data Sheet (SDS).
Hazards

If one or more of the following is present then a breathing hazard exists:

**Deficiency in Oxygen**
**Vapour or Gas Contamination**
**Particle or Dust Contamination**

**Respiratory Protection**

**Canister of Cartridge Type**
This type of protection is used by the means of a full-face or half-mask respirator. The Canister or Cartridge can afford protection but this is dependent only on the substance being stored due to its toxicity. Reference to the Safety Data Sheet must be made prior to selection of the respiratory equipment and canister/cartridge to be used.

Unlike self-contained breathing apparatus, respirators DO NOT supply oxygen and therefore they are not suitable for use in confined spaces.

Any equipment used must be in good condition and well maintained. Any dates signifying recommended shelf-life must be adhered to. The filter elements have a “use by date”.

**Personal Protective Equipment (PPE)**

Personal Protective Equipment (PPE) is clothing or equipment designed to protect the wearer (employee, students, contractors or visitors) against workplace hazards. PPE should only be considered when the hazard cannot be eliminated or where the risk cannot be controlled using other methods from the hierarchy of controls (Substitution, Isolation, Engineering, Administration and PPE). PPE is the least effective control measure because the hazards and risks are still present. There are also issues of proper fit and design for different individuals. PPE can sometimes be awkward, uncomfortable and limiting, which may make workers less likely to use such equipment.
Self-contained Breathing Apparatus

Self-contained breathing apparatus has its own integral supply of air and will protect against any level of contamination or oxygen deficiency. The duration that this apparatus can be used is determined not only by the capacity of the cylinder, but also such factors as the physical condition of the wearer and the work rate involved. Maximum duration is also assisted by a good facial fit where the facial seal does not allow air to escape.

Breathing apparatus must comply with Australian Standard AS1715/1716 and it is the owner and the prime contractor’s responsibility to ensure that any person who may be called to use this apparatus is fully trained in its fitting and operation.

Important note:
PPE is different for each Dangerous Good/Hazardous Substance. It is important to always refer to the SDS to find out exactly what PPE is required.
MODULE THIRTEEN

HAZCHEM EMERGENCY ACTION CODE
EMERGENCY ACTION CODE GUIDE (ADG Fig B3 Appendix C)

The Hazchem Code provides a quick and simple guide on what action needs to be taken in the event of an emergency. It is invaluable to the emergency services and prioritises the actions to be taken.

When transporting dangerous goods the Code can be found on EIPs (Emergency Information Panels), on the product EPGs (Emergency Procedure Guides) and on some packages.

**Interpretation (ADG Appendix C)**

The number indicates the suitable equipment for firefighting and where appropriate for diluting a spillage as follows:

1. Coarse water spray
2. Fine water spray
3. Foam
4. Dry agent
   - Alcohol resistant foam

The first letter indicates as below:

<table>
<thead>
<tr>
<th>Letter</th>
<th>Risk of violent reaction or explosion</th>
<th>Recommended Personal Protective Equipment</th>
<th>Appropriate measures</th>
</tr>
</thead>
<tbody>
<tr>
<td>P</td>
<td>Yes</td>
<td>LTS (Liquid tight chemical protective clothing with breathing apparatus)</td>
<td>Dilute</td>
</tr>
<tr>
<td>R</td>
<td>No</td>
<td>Breathing apparatus and full fire kit</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td>Yes</td>
<td>Breathing apparatus and full fire kit</td>
<td></td>
</tr>
<tr>
<td>T</td>
<td>No</td>
<td>LTS (Liquid tight chemical protective clothing with breathing apparatus)</td>
<td>Contain</td>
</tr>
<tr>
<td>W</td>
<td>Yes</td>
<td>Breathing apparatus and full fire kit</td>
<td></td>
</tr>
<tr>
<td>X</td>
<td>No</td>
<td>Liquid tight chemical protective clothing with breathing apparatus</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>Yes</td>
<td>Breathing apparatus and full fire kit</td>
<td></td>
</tr>
<tr>
<td>Z</td>
<td>No</td>
<td>Liquid tight chemical protective clothing with breathing apparatus</td>
<td></td>
</tr>
</tbody>
</table>

- Where the letter “E” follows the appropriate Hazchem letter the evacuation of people from the neighbourhood of an incident should be considered.
- Where breathing apparatus is indicated protective gloves shall be worn.
"Dilute" indicates the substance may be diluted with large quantities of water. Whereas "dilute" originally allowed the diluted substance to be washed away this is no longer accepted practice for environmental reasons. Wherever practicable, diluted substances should be contained and prevented from entering water courses and drains.

"Contain" indicates the need to prevent any spillage from entering drains and watercourses.

MULTILOADS EMERGENCY HAZCHEM CODE (ADG Appendix C Page 691)

<table>
<thead>
<tr>
<th>UN NO.</th>
<th>MULTILoad</th>
<th>COMPOSITE HAZCHEM CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

IN AN EMERGENCY DIAL 000, POLICE OR FIRE BRIGADE

SPECIALIST ADVICE: NATIONWIDE TRAINING (08) 9445 7766

Table C2.7.2.1: Code chart for determination of emergency action codes for multi-loads

<table>
<thead>
<tr>
<th>P</th>
<th>R</th>
<th>S</th>
<th>T</th>
<th>W</th>
<th>X</th>
<th>Y</th>
<th>Z</th>
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</thead>
<tbody>
<tr>
<td>P</td>
<td>P</td>
<td>P</td>
<td>P</td>
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<td>W</td>
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<td>R</td>
<td>P</td>
<td>R</td>
<td>P</td>
<td>R</td>
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<td>S</td>
<td>P</td>
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<td>T</td>
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<td>Y</td>
<td>Z</td>
<td>W</td>
<td>X</td>
<td>Y</td>
</tr>
</tbody>
</table>

To determine the combined Hazchem Code for more than one bulk receptacle on or within a vehicle: s

a) The number forming the first character is the highest number occurring. For example if you had a 1 and a 2 in your two separate Hazchem Code, you use the number 2.
b) If one of the multi-load Hazchem is a 2 or a 3 and has a bullet in one of the Hazchem codes for alcohol resistance, you **must** include the bullet. If one of the loads has a 4 in the Hazchem **do not** include the bullet.

c) If there are different letters compare the first letter horizontally and the second letter vertically where the two intersect this is the appropriate Hazchem letter. If there are additional letters follow the same criteria.

d) If the letter ‘E’ appears on any of the Hazchem Codes, ‘E’ must be the last character.

**DEFINITIONS**

**ADG Code** means the *Australian Code for the Transport of Dangerous Goods by Road & Rail, 7.5 edition, 2017.*

**Bulk**, in relation to dangerous goods, means an undivided quantity of dangerous goods exceeding 500 kg, or dangerous goods in a container that has a capacity greater than 500 L or is designed to hold more than 500 kg.

**Class or Division** means the Class or Division assigned to dangerous goods under the ADG code, subject to Regulation 8 of the Storage and Handling Regulations.

In relation to dangerous goods, **handling** includes to manufacture, process, pack, use, sell, supply, carry (including by pipeline), and treat dangerous goods, including their destruction or disposal.

**Intermediate Bulk Containers (IBCs)** are typically containers of 250 to 3,000 L capacity designed for the transport of dangerous goods (other than gases) and for mechanical handling.

**Manifest Quantity** means a quantity of those dangerous goods greater than the quantity specified in relation to those goods in the column headed ‘Manifest Quantity’ in Schedule 1 of the Storage and Handling Regulations.

**Multiple Element Gas Containers (MEGCs)** are units containing a battery of elements (e.g. gas cylinders) linked by manifold and mounted on a frame. They are also known as manifold cylinder packs.

**Package** means a container for dangerous goods or C1 combustible liquids with a capacity of not more than 500 L or 500 kg.

**Packing Group** is the grading of danger within a Class or Division according to the relative hazard presented by the material. It is represented by the roman numerals, where ‘I’ = high danger, ‘II’ = medium danger, or ‘III’ = low danger.

**Proper Shipping Name** means the name assigned to the dangerous goods site is a document that, in relation to the site as it exists or will exist, at the relevant time:
- Identifies all hazards relating to dangerous goods at the site;
- For each hazard, assess:
  i. The probability of the hazard causing a dangerous goods incident; and
ii. The nature of the harm to people, property and the environment that would result from the occurrence of that incident;

- For each hazard, identifies the risk control measures;
- In relation to each judgement required above, explains the methods used to make the judgement and the reasons for the judgement; and
- Has been prepared in a form acceptable to the Chief Officer.

The introduction of the new Work Health and Safety Act and Regulations 2011 have changed the definitions of:

- **Employer** to PCBU (A ‘person conducting a business or undertaking’)
- **Employee** to Worker
- **OHS or OSH** to WHS (Work Health and Safety)

Use of these terms may be interchangeably in this document. Wherever possible, the terms as per the WHS legislation have been applied.
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