



Dangerous Goods Report

Horsley Drive Business Park - CFC

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Confidential Applicant

Prepared by

Riskcon Engineering Pty Ltd
Unit 19/5 Pyrmont Bridge Road
Camperdown, NSW 2050
www.riskcon-eng.com
ABN 74 626 753 820

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Quality Management

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A	9 January 2020	Draft issued for comment	Jason Costa	Renton Parker
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Executive Summary

Background

A Confidential Applicant (CA) has proposed to develop a new automated warehouse within Horsley Drive Business Park to be located on Cowpasture Road in Wetherill Park, NSW 2164. The warehouse will store the suite of products typically available in the CA's business for the purposes of filling online orders for home delivery. Several of the product lines stored will contain materials classified as Dangerous Goods (DGs). These products are subject to the Work Health and Safety Regulation NSW 2017 (Ref. [1]) which requires the risks associated with the storage and handling of the goods to be conducted in a manner that minimises the risk. The acceptable minimum level of risk assessment is compliance with an applicable DG standard.

FDC Construction & Fitout Pty Ltd (FDC), on behalf of the CA, has commissioned Riskcon Engineering Pty Ltd (Riskcon) to prepare a DG assessment of the facility to ensure compliance with the applicable DG standards and thus the Regulation. This document represents the assessment of the DG storages at the warehouse to be located at Horsley Drive Business Park, NSW.

Conclusions

A review of the classes, quantities and locations of DGs stored at the CA warehouse was conducted to assess the compliance with the Work Health and Safety Regulations 2017 and the relevant Australia Standards for storage of DGs at the site.

The storage locations were assessed according to the standard applicable to the classes of DGs stored and the relevant design requirements to comply with the standard detailed. Based on this review, it is concluded that should the aforementioned design requirements be incorporated into the DG storages they will comply with the standards; hence, comply with the Regulations.

Recommendations

The following recommendations have been made for the facility:

- A Dangerous Goods Register, indicating the type of chemical, any notations that may be required from the risk assessment and the Safety Data Sheet for the chemical.
- A Dangerous Goods manifest indicating quantities of DGs stored.
- A Dangerous goods notification to the Regulator.
- Placards and Signage as shown in **Figure 5-1** to be affixed to the site entrance and **Figure 5-2** and **Figure 5-3** to be affixed at the entrances to the warehouse.
- A risk assessment of the Dangerous Goods storage and handling areas.
- An Emergency Response Plan and Emergency Services Information Booklet.
- A hazardous area classification per AS/NZS 60079.10:2009.
- A hazardous area dossier (if electrical equipment is located within the zone).

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Abbreviations

Abbreviation	Description
AQR	Aggregate Quantity Ratio
AS	Automated System
BCA	Building Code of Australia
CA	Confidential Applicant
CBD	Central Business District
DGs	Dangerous Goods
ESFR	Early Suppression, Fast Response
FDC	FDC Fitout & Construction Pty Ltd
MHF	Major Hazard Facility
WHS	Work Health and Safety

1.0 Introduction

1.1 Background

A Confidential Applicant (CA) has proposed to develop a new automated warehouse within Horsley Drive Business Park to be located on Cowpasture Road in Wetherill Park, NSW 2164. The warehouse will store the suite of products typically available in the CA's business for the purposes of filling online orders for home delivery. Several of the product lines stored will contain materials classified as Dangerous Goods (DGs). These products are subject to the Work Health and Safety Regulation NSW 2017 (Ref. [1]) which requires the risks associated with the storage and handling of the goods to be conducted in a manner that minimises the risk. The acceptable minimum level of risk assessment is compliance with an applicable DG standard.

FDC Construction & Fitout Pty Ltd (FDC), on behalf of the CA, has commissioned Riskcon Engineering Pty Ltd (Riskcon) to prepare a DG assessment of the facility to ensure compliance with the applicable DG standards and thus the Regulation. This document represents the assessment of the DG storages at the warehouse to be located at Horsley Drive Business Park, NSW.

1.2 Objectives

The objectives of the study are to provide a design assessment document for the DG storages at the warehouse to determine whether the storages have been designed per the previously provided design guidance.

1.3 Scope of Services

The scope of work is to prepare a DG design assessment of the DG storages at the CA warehouse located at Horsley Business Park, NSW. The assessment does not include any other sites nor additional work which may be identified in the course of the assessment.

To fulfil Riskcon's obligations under Section 19.1 and 19.2 of the WHS Act 2017, the design of the DG stores will be based on consultation with the user groups and the operations they foresee being undertaken in these spaces. If operations in the DG stores change in the future from those that the stores were originally designed to accommodate, Riskcon would need to reassess the facilities to ensure the new operations comply with the applicable codes, standards and regulations

2.0 Methodology

2.1 General Methodology

The following methodology was adopted:

- Review of the previously provided design guidance for the facility.
- The compliance requirements based on the applicable design standards for each store were documented and the current storage arrangement assessed for consistency.
- Where non-compliance was identified, recommendations were made to correct the non-compliance.
- A draft report was prepared for review and comment by the project team.
- Any comments were incorporated into a finalised version.

3.0 Site Description

3.1 Site Location

The site is to be located at Horsley Business Park in Wetherill Park which is approximately 44 km west of the Sydney Central Business District (CBD). **Figure 3-1** shows the regional location of the site in relation to the Sydney CBD.

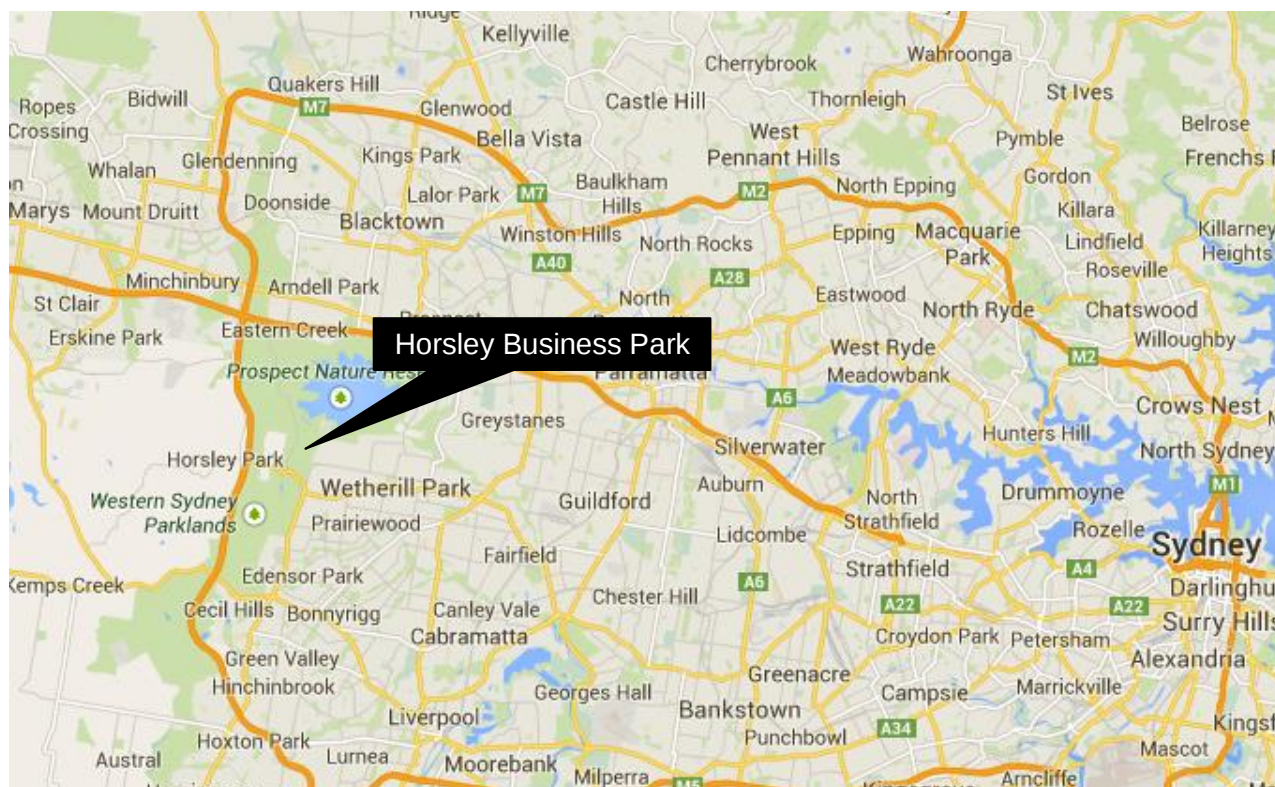


Figure 3-1: Site Location

3.2 General Description

The building consists of an office area, amenities and a warehouse split into temperature controlled and chilled areas. Product delivered to the site is decanted into smaller totes which are stored within the Automated System (AS). Product is stacked by robots in vertical columns up to 21 totes deep. Product is rotated, moved and collected as required by the system based upon product demand, turnover, used by dates, etc. Online customer orders are filled into totes containing three shopping bags which are then stacked for delivery. Delivery drivers collect the orders and delivery on an optimised delivery route.

3.3 Warehouse Detailed Description

The warehouse is separated into several key areas including:

- Administration
- Decanting stations
- Automated System (both chilled and temperature controlled)
- Tote cleaning

- Freezer
- Dispatch
- Ancillary areas

Each area is discussed in further detail in the following subsections.

3.3.1 Administration

The administration areas operate similarly to any warehouse and include office areas, lunchrooms, change rooms, etc.

3.3.2 Decanting Stations

The decanting stations are located on the bottom level of the structure and is manned by operators who receive pallets of product from forklift drivers. The operators then unload the pallets, decanting the product into specifically labelled totes ensuring the product within the tote matches the product ID in the system. This is critical as the system tracks the product within the tote based upon used by dates and the product itself.

Once the tote is filled it is loaded into AS where a robot, which is located on top of AS, raises the tote up through the column and secures it beneath the robot. The robot then travels to a designated location to store the product.

Where flammable liquid products are decanted, the tote will be lined with a metal liner to prevent any spills from contacting the plastic tote which may dissolve the plastic. In addition, the metal tote provides a layer of protection if a fire were to occur as the fire is contained within the tote and can only propagate vertically rather than horizontally.

3.3.3 AS (both chilled and temperature controlled)

The AS itself is segmented into the temperature-controlled side and the chilled side. The temperature controlled contains general chilled products stored on shelves while the chilled side contains items such as cheeses, milk, etc.

The system is completely automated by a computer system which directs up to 600 drones which move along east/west and north/south tracks to travel across the top of the AS. The process initially starts with a robot collecting the tote from the decanting station. Depending upon the product type, shelf life, turnover, seasonality, etc. the tote will be designated a location. The robot will then travel to the coordinates of the location where it will be stored. The tote may be required to be stored at a lower depth than the top available location. In this scenario, a “swarm” of robots will travel to the designated location where each will remove a tote from the designated column. Once sufficient totes have been removed to allow the subject tote to be stored, it will then be lowered into the AS. Collected totes by the swarming robots will either be relocated or may be stored back where they were taken from which is determined by the software.

When an order is required to be filled, the robots will collect the designated tote and delivery it back to the decanting area where it is lowered to the upper levels of the mezzanine where product is removed as designated by the order. Once extracted, the totes are then reloaded back into the AS for collection by the robots and storage.

The AS also has opportunity charging locations around the outside of the AS where robots may charge when running low on battery or when the robot isn't required immediately for relocation

operations. The robots park in the charging location where contactors charge the battery until the robot is required for use.

Due to the nature of the storage, sprinklers can't be provided within the system; hence, the AS is protected by a ceiling mounted sprinkler system which has been designed by FM Global in association with the manufacturer specifically for the range of products and tote materials used within the AS.

3.3.4 Tote Cleaning

Totes may become dirty due to spilled product or during transport to customers which must be cleaned prior to reuse. The tote cleaning area is an automated washing machine style cleaner using detergents and water to clean the totes which are then dried ready for reuse in the system.

3.3.5 Freezer

The freezer is not an automated area of the warehouse and is established as a normal retail store except instead of the store containing freezers with doors, the whole space is a freezer and product is stored on shelves. As personnel pick the orders, they walk through the aisles of the freezer collecting product as dictated by the customer order. Once completed, product is stacked into chiller boxes along with dry ice to keep the product cool.

3.3.6 Dispatch

The dispatch area is located in the chiller side of the warehouse where filled totes are stored prior to dispatch. Totes are stored based upon the intended delivery location with orders along a similar route / suburb are stored to maximise efficiency.

3.3.7 Ancillary areas

Ancillary areas include, but are not limited to:

- Forklift charging
- Technical space
- Refrigeration

These areas are further discussed in the following subsections.

3.3.7.1 Forklift Charging

The charging areas are designed as opportunity charging locations to charge the forklifts quickly when there is downtime. This allows the forklifts to remain in constant use throughout a shift without being required to sit idle during a dedicated charge. The charging locations are spread throughout the warehouse area.

3.3.7.2 Technical Space

The technical space is associated with the top of the AS and is where the engineers that ensure the robots are operating correctly are housed. Robot maintenance or robot retrieval during break downs occurs from this area.

3.3.7.3 Refrigeration

The refrigeration system will be a combined glycol/ammonia system where ammonia is used in the refrigeration system extracting heat from the glycol system which is transported to the chiller and freezer areas. Heat is absorbed from these areas by the glycol which is transported back to the refrigeration system to discharge the heat to atmosphere.

3.4 Quantities of Dangerous Goods Stored and Handled

The dangerous goods stored at the warehouse are for various customers and may fluctuate with customer requirements. The classes and quantities to be approved in the facility are summarised **Table 3-1**.

Table 3-1: Maximum Classes and Quantities of Dangerous Goods Stored

Class	Description	Packing Group	Quantity (kg)
1.4s	Explosives	n/a	100
2.1	Flammable gas (aerosols)	n/a	65,000 / 16,250*
2.1	Flammable Gas (LPG Bullet)	n/a	7,500 L / 4,125 kg [^]
2.2	Non-flammable, non-toxic	n/a	2,650
2.3	Ammonia	n/a	1,000
3	Flammable liquids	II & III	11,130
4.1	Flammable solids	III	1200
5.1	Oxidising agents	III	300
6.1	Toxic substances	III	700
8	Corrosive substances	II & III	24,000
9	Miscellaneous DGs	III	850
C1	Diesel Fuel	n/a	100,000
C2	Cooking oils	III	195,125

*Note: This refers to the quantity of LPG within the aerosols and not the total package weight. The LPG content within the cannisters is typically around 25% of product weight.

[^]Note: Density of 550 kg/m³

3.5 Aggregate Quantity Ratio

Where more than one class of dangerous goods are stored and handled at the site an AQR exists. This ratio is calculated using **Equation 3-1**:

$$AQR = \frac{q_x}{Q_x} + \frac{q_y}{Q_y} + [...] + \frac{q_n}{Q_n} \quad \text{Equation 3-1}$$

Where:

x,y [...] and n are the dangerous goods present

q_x, q_y, [...] and q_n is the total quantity of dangerous goods x, y, [...] and n present.

Q_x , Q_y , [...] and Q_n is the individual threshold quantity for each dangerous good of x , y , [...] and n

Where the ratio AQR exceeds a value of 1, the site would be considered a Major Hazard Facility (MHF). The threshold quantities for each class is taken from Schedule 15 of the Work Health and Safety (WHS) Regulation 2017 (Ref. [1]). These are summarised in **Table 3-2** noting Class 2.2, 4.1(II & III), 5.1 (III) 8, and 9 are not subject to MHF legislation.

Table 3-2: Major Hazard Facility Thresholds

Class	Packing Group	Threshold (tonnes)	Storage (tonnes)
2.1	n/a	200	20.375
2.3	n/a	200	1.00
3	II & III	50,000	11.13
5.1	I & II	200	0.30
6.1	III	200	0.70

A review of the thresholds and the commodities and packing groups listed in **Table 3-1** indicates only Class 2.1, 2.3, 3, 5.1 and 6.1 are assessable against the MHF thresholds. Therefore, substituting the storage masses into **Equation 3-1** the AQR is calculated as follows:

$$AQR = \frac{20.375}{200} + \frac{1}{200} + \frac{11.13}{50000} + \frac{0.3}{200} + \frac{0.7}{200} = 0.113$$

The AQR is less than 1; hence, the facility would not be classified as an MHF.

4.0 Assessment

4.1 Introduction

The warehouse operates as a Retail Distribution Centre (RDC) storing a range of mixed classes of DGs. Therefore, the applicable standard to be used for this warehouse would be AS/NZS 3833:2007 (Ref. [2]). Provided in the following section is an assessment of the facility against the standard.

Table 4-1: AS/NZS 3833:2007 Compliance Assessment

Clause	Description	Assessment	Corrective Action/Comments
3.4.1(a)	The store shall be provided with adequate natural or mechanical ventilation, in order to disperse any dusts, mists or vapours. NOTE: Adequate ventilation is dependent on the nature of the substance and the circumstances of its use.	The warehouse is ventilated for occupancy purposes according to AS/NZS 1668.2 (Ref. [3]). The risk of vapours or gases being released in a retail store is low; hence, compliance with AS/NZS 1668.2 (Ref. [3]) is considered to provide adequate ventilation.	N/A
3.4.1(b)	Racks and shelves shall be structurally sound and designed for the maximum load to which they are to be subjected. They shall be constructed of materials that are— (i) unable to absorb liquids; and (ii) compatible with the dangerous goods being kept.	The products are stored in sealed totes which are stacked vertically in columns. Any spills occurring within a tote would be contained and prevented from impacting adjacent totes. Totes containing flammable products are lined with a metal lining to protect the tote from the flammable liquid (i.e. solvent may dissolve the plastic tote).	N/A
3.4.1(c)	The design and installation of racking and shelving shall permit ready access to all stock, and allow clear access for personnel. Dangerous goods shall be located so as to ensure that there are safe passages to exits and that exits are not blocked.	The system is automated eliminating the requirement for personnel to access the DGs. Personnel only access the storage in the event of a failure of a robot and not to access product. Personnel only handle DGs when decanting into totes which is designed to provide safe access for personnel. No DGs are stored permanently at the decanting stations as they are loaded into the storage system once decanting is completed. Note: Decanting refers to the act of taking packaged goods and loading into totes and not the removal of liquid from a container.	Given the clause applies to a typical warehouse rather than an automated warehouse it is considered safety is improved via removal of personnel interacting with the storage.
3.4.1(d) 5.4.4(d)	Lighting shall be provided in accordance with Clause 5.4.4(d).	The totes contain less than 100 L of liquid and would therefore not be hazardous area assessable per AS/NZS 60079.10.1:2009.	N/A

Clause	Description	Assessment	Corrective Action/Comments
	"Where flammable dangerous goods are stored, the appropriate part of the AS/NZS 60079 series shall be referenced"		
3.4.2 5.6 7.2.3	Security and clear access shall be provided in accordance with Clauses 5.6 and 7.2.3 respectively. "All storage areas shall be appropriately secured against access by unauthorized persons. Any additional regulatory requirements, e.g. those for 'security sensitive' or 'high consequence dangerous goods', shall also apply." "The means of entry into and exit from the areas, rooms or buildings where dangerous goods are kept or handled shall be kept clear at all times. At all times, access shall also be available to— (a) firefighting equipment (see Section 9); (b) personal protective equipment (see Clause 7.9); (c) clean-up materials and equipment (see Clause 8.5.2); and (d) the place where the manifest is kept."	The site is a controlled site; hence, unauthorised personnel may not enter the site.	N/A
3.4.3	The following housekeeping procedures need to be established and maintained: a) The aisles of the store shall be kept clear. b) In order to prevent accumulation of old material that could deteriorate and become a chemical hazard, stock integrity shall be monitored. c) Liquids should not be stored above powders and solids. Liquids in glass bottles should be stored at lower levels. d) Packages shall be stored in such a manner that leaks cannot affect other substances in the store.	a) Decanting aisle are kept clear for forklift access. No aisles where DGs are stored due to the nature of the system. b) Stock turnover is high; hence, accumulation of old material does not occur. Stock age is moderated by the automated system ensuring product does not remain stored within the system. c) Liquids may be stored above powders and glass bottles. However, all totes are sealed	N/A

Clause	Description	Assessment	Corrective Action/Comments
	e) All packages shall be handled with care so that the possibility of leaks is minimized. f) Packages shall be regularly inspected and, when any signs of spill, leak or deterioration are observed, the suspect package shall be examined and rendered safe. g) Minor spills or leaks of any dangerous goods shall be dealt with in accordance with Clause 3.4.9.2. h) Packages that are not of a reusable type, and whose contents have been fully used, shall be treated in accordance with Section 10. i) Labels shall be retained on emptied containers until the containers have been decontaminated, at which time the labels shall be removed or obscured. j) Packages should not be kept in direct contact with the floor. NOTE: Pallets or low shelves may be used.	preventing release of liquid down into lower totes. d) Packages are stored in totes preventing substances impacting products stored beneath e) As above f) Packages are inspected prior to storage and transport g) Spills are contained within totes which are cleaned in a dedicated area of the warehouse prior to reuse h) N/A i) N/A j) Packages are not stored on the floor.	
3.4.4	Incompatible goods should not be stored together on the same shelf. This applies to both horizontal and vertical storage on shelving. Packaged dangerous goods of Divisions 6.1 or 8 shall be prevented from contaminating any foodstuffs, foodstuff containers, or articles for direct human application that are not in liquid-tight containers, by keeping them apart by a lateral distance of at least 1 m, a liquid-tight partition or on separate shelves.	All containers are liquid tight and stored in totes which are sealed preventing downward movement of liquids. All totes have restricted volumes resulting in a dispersed risk and reduced risk of contamination of products for consumption.	N/A
3.4.8 Table 9.3	All retail stores shall be provided with fire protection in accordance with Section 9 of this Standard. Table 9.3 requires for a package store storing 100 m³ to 250 m³ to have;	The facility is fitted with extinguishers, hose reels and hydrants as required. The facility is also fitted with an automatic sprinkler system.	N/A

Clause	Description	Assessment	Corrective Action/Comments
	• Portable fire extinguishers • Fire hose reels • Fire hydrants • Automatic fire suppression		
3.5.2	The following provisions apply to the design and construction of retail distribution centres storing dangerous goods in retail packages: a) Provision shall be made to confine any spill of dangerous goods within the premises. b) All solid and liquid effluent resulting from the management of an incident involving dangerous goods shall be contained within the premises as far as is reasonably practicable. c) Internal bunding for different classes within the retail distribution centre is not necessary. Compliance with Items (a) and (b) above is deemed to be sufficient for such premises. d) Any materials that are incompatible, or might react dangerously if mixed, shall be segregated so that the possibility of interaction is minimized. e) Where a retail distribution centre stores flammable solids, flammable liquids, or aerosols of Class 2.1, above the minor storage quantities given in Section 2 of this Standard, and shares a common wall with an adjoining protected place, the common wall shall have an FRL/FRR of at least 120/120/120. Where such a common wall is between the retail distribution centre and an on-site protected place (e.g. an administration block), the wall shall have an FRL/FRR of at least 60/60/60	a) The site has been designed to contain any spills that may occur within the boundaries of the premises. b) as above c) n/a d) Classes will be separated from each other to minimise interactions e) n/a	N/A

Clause	Description	Assessment	Corrective Action/Comments
3.5.3	The primary function of retail distribution centres is storage. Activities such as decanting, repacking (other than to meet orders), blending, heat shrink-wrapping, battery charging, parking, or maintenance of vehicles shall not be carried out within 3 m of the storage area.	Activities not involved in the storage of these goods does not occur within 3 m of the storages. Note: Decanting referred to in this clause refers to the transfer of liquid. Decanting occurring at this site is the unboxing of products into totes.	N/A
3.5.4	Dangerous goods of Classes or Divisions 2.1, 2.2, 3, 4.1, 4.3 or 5, or combustible liquids, shall not be kept near any heating or ignition sources such as stoves, heaters, heat shrink- wrapping equipment or light switches (see also Clause 7.2.9). Smoking shall not be permitted in retail distribution centres where dangerous goods are kept. Warning signs to prohibit smoking and to exclude other ignition sources shall be displayed at entrances to the retail distribution centre, e.g. DANGER: NO SMOKING, NO IGNITION SOURCES.	Electrical equipment will be located outside of the hazardous zone.	N/A
3.5.6	Bollards, crash barriers or other suitable protective barriers shall be installed where there is a risk of the goods, racking or shelving being damaged by vehicular traffic, including fork-lift trucks. Such protective barriers shall be maintained in good condition.	Appropriate protection is included as required. Protection has also been provided to prevent personnel from interacting with the storage system.	N/A
3.5.8	Where aerosols are kept in retail distribution centres, they shall be either— (a) stored within strong mesh enclosures (i.e. caged); or (b) dispersed throughout the store. Aerosols shall be—	The aerosols will be dispersed throughout the storage system in totes which will prevent the rocketing of aerosols in the event of a fire.	Refer to Section 3.5.4 with regards to ignition sources.

Clause	Description	Assessment	Corrective Action/Comments
	(i) stored under cover and protected from exposure to the weather and direct sunlight; (ii) kept at least 3 m from any source of heat or ignition; and (iii) stored in a manner that reduces the risk of collapse of stacks or any damage to the aerosol containers.		

5.0 Work Health and Safety

5.1 Introduction

As a Person Conducting a Business or Undertaking (PCBU) there are several operational obligations that must be satisfied in addition to the design and operation of a storage. These additional requirements are based on the quantity of goods being stored. Provided in **Table 5-1** is a comparison of the quantities being stored against the thresholds detailed in Schedule 11 of the WHS Regulation (Ref. [1]).

Table 5-1: Placard and Manifest Thresholds

Class	PG	Quantity (kg)	Placard Quantity (kg)	Manifest Quantity (kg)	Fire Protection Quantity (kg)
1.4s	n/a	100	n/a	n/a	n/a
2.1	n/a	20,375	5,000	10,000	20,000
2.2	n/a	4,250	5,000	10,000	20,000
2.3	n/a	1,000	50	500	2,000
3	II & III	11,130	250	2,500	10,000
4.1	III	1,200	1,000	10,000	10,000
5.1	III	300	250	2,500	10,000
6.1	III	700	250	2,500	10,000
8	II & III	24,000	250	2,500	10,000
9	III	850	1,000	10,000	20,000
C1 & C2	III	195,125	10,000	100,000	20,000

Based on the quantities of goods being stored, the site would be classified as a Manifest site. In addition, the site would also exceed the Fire Protection Quantity limits. Therefore, the following requirements will apply to the site:

5.2 Clause 346

A Hazardous Chemicals [*Dangerous Goods*] register is to be prepared which must include;

- A list of hazardous chemicals stored, used or handled
- The current Safety Data Sheet (SDS) for DGs stored, used or handled

5.3 Clause 347

Prepare a manifest of chemicals in accordance with Schedule 11 of the Regulation.

5.4 Clause 348

Notify the regulator of the Hazardous Chemicals that exceed the quantities detailed in Schedule 11 of the Regulation.

5.5 Clause 349

An outer warning placard must be prominently displayed at the site. The placard is to show the words “HAZCHEM” in red lettering on white or silver background and is to have the dimensions as those shown in should have dimensions as shown in **Figure 5-1**.

In addition, the chemical store containing the hazardous chemical that exceed the placard quantity is to be designated with a placard. The placards shown in **Figure 5-2** and **Figure 5-3** will be required to be located at all entrances to the warehouse. It is noted that while the Regulation only requires a 100 mm x 100 mm Class placard, 250 mm x 250 mm is much more visible for emergency responders upon arrive at the site in the event of an emergency.



Figure 5-1: HAZCHEM Placard



Figure 5-2: Combustible Liquid Placard

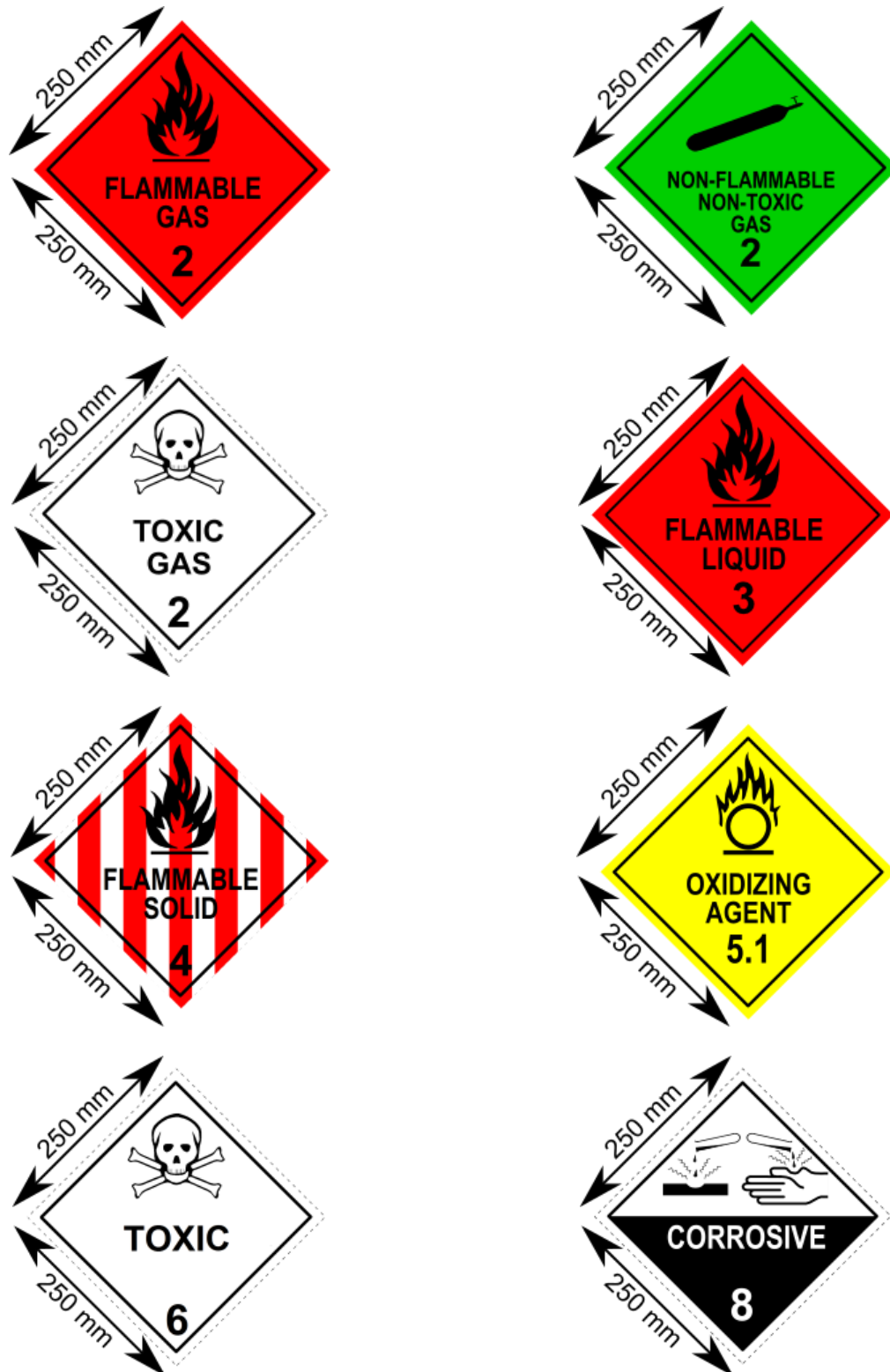


Figure 5-3: DG Placards

5.6 Clause 351

A PCBU must manage the risk to health and safety associated with using and storing a hazardous chemical [*Dangerous Good*] and have regard to the following:

- Hazardous properties of the chemical [Dangerous Good];
- Reactions between chemicals (physical) or between the chemical and other substances/materials;
- The nature of the work to be carried out with the hazardous chemical
- Any structure, plant or system of work used in the handling, generation or storage of the hazardous chemical [Dangerous Good] or that could react with the hazardous chemical [Dangerous Good] at the workplace.

In order to comply with this requirement, it is necessary to conduct a risk assessment and to identify those hazards and risks associated with the storage and handling of the hazardous chemicals [Dangerous Goods]. The following recommendation has been made

- A risk assessment of the hazardous chemical [Dangerous Good] storage areas be conducted, including the use of the chemicals in the manufacturing areas.

5.7 Clause 361

A PCBU must prepare an emergency response plan and submit to the primary emergency service organisation.

5.8 Clause 355

In areas where there is potential for vapours to accumulate the area is to be assessed. Therefore, the following recommendation has been made:

- A Hazardous Area Classification (HAC) report and associated drawings should be prepared for flammable liquid and aerosol storage in accordance with AS/NZS 60079.10.1:2009 (Ref. [4]) to ensure compliance with Clause 43.

In addition, to comply with the AS/NZS 3000:2007 (Ref. [5]) it is necessary to prepare a Hazardous Area Dossier which details the location of all electrical equipment installed within the hazardous zones in addition to certificates of compliance for the equipment. The dossier also documents any changes, maintenance, repair to equipment within the zone. Therefore, the following recommendation has been made:

- A Hazardous Area Dossier should be developed prior to occupation (if electrical equipment is located within the Hazardous Area).

5.9 Summary of Requirements

In summary, a Manifest site will require the following:

- A Dangerous Goods Register, indicating the type of chemical, any notations that may be required from the risk assessment and the Safety Data Sheet for the chemical.
- A Dangerous Goods manifest indicating quantities of DGs stored.
- A Dangerous goods notification to the Regulator.
- Placards and Signage as shown in **Figure 5-1** to be affixed to the site entrance and **Figure 5-2** and **Figure 5-3** to be affixed at the entrances to the warehouse.
- A risk assessment of the Dangerous Goods storage and handling areas.

- An Emergency Response Plan and Emergency Services Information Booklet.
- A hazardous area classification per AS/NZS 60079.10:2009.
- A hazardous area dossier (if electrical equipment is located within the zone).

6.0 Conclusion and Recommendations

6.1 Conclusions

A review of the classes, quantities and locations of DGs stored at the CA warehouse was conducted to assess the compliance with the Work Health and Safety Regulations 2017 and the relevant Australia Standards for storage of DGs at the site.

The storage locations were assessed according to the standard applicable to the classes of DGs stored and the relevant design requirements to comply with the standard detailed. Based on this review, it is concluded that should the aforementioned design requirements be incorporated into the DG storages they will comply with the standards; hence, comply with the Regulations.

6.2 Recommendations

The following recommendations have been made for the facility:

- A Dangerous Goods Register, indicating the type of chemical, any notations that may be required from the risk assessment and the Safety Data Sheet for the chemical.
- A Dangerous Goods manifest indicating quantities of DGs stored.
- A Dangerous goods notification to the Regulator.
- Placards and Signage as shown in **Figure 5-1** to be affixed to the site entrance and **Figure 5-2** and **Figure 5-3** to be affixed at the entrances to the warehouse.
- A risk assessment of the Dangerous Goods storage and handling areas.
- An Emergency Response Plan and Emergency Services Information Booklet.
- A hazardous area classification per AS/NZS 60079.10:2009.
- A hazardous area dossier (if electrical equipment is located within the zone).

7.0 References

- [1] SafeWork NSW, "Work Health and Safety Regulation," SafeWork NSW, Lisarow, 2017.
- [2] Standards Australia, "AS/NZS 3833:2007 - Storage and Handling of Mixed Classes of Dangerous Goods, in Packages and Intermediate Bulk Containers," Standards Australia, Sydney, 2007.
- [3] Standards Australia, "AS/NZS 1668.2:2002 - The Use of Ventilation and Airconditioning in Buildings - Ventilation Design for Indoor Air Contaminant Control," Standards Australia, Sydney, 2002.
- [4] Standards Australia, AS/NZS 60079.10.1:2009 - Explosive Atmospheres Part 10.1: Classification of Areas, Explosive Gas Atmospheres, Sydney: Standards Association of Australia, 2009.
- [5] Standards Australia, "AS/NZS 3000:2007 - Wiring Rules," Standards Australia, Sydney, 2007.