

HAZCHEM



HSNO Compliant Buildings and Structures for Flammable Substances

March 2010
Version 1.0



ISSN 1176-0907

PRACTICE NOTE **18**

Purpose of the Practice Note

Members are sometimes asked to design a building that is to contain hazardous substances. Buildings that hold flammable substances have separate and additional requirements to those required by the Building Act. These requirements are found under the Hazardous Substances and New Organisms Act 1996 (HSNO Act).

Clause F3 of the Building Code covers buildings in which flammable/oxidising gases and liquids are stored and/or used. The verification method F3/VM1 refers to specific regulations and controls made under the HSNO Act as a means of compliance with Clauses F3.3 (a) to (e) of the Building Code.

It is necessary at an early stage to confirm the viability of the building project in terms of land use and resource management controls under the Resource Management Act. The Ministry for the Environment has provided guidance in their documents:

- ME 424 Land use planning guide for hazardous facilities
- ME 339 Assessment guide for hazardous facilities
- ME 610 Above ground bulk tank containment
- ME 645 Hazardous Facilities Screening Procedure.

Early consultation with an electrical specialist experienced in flammable substances can assist with building optimisation, selection of suitable electrical services, lighting, and process control equipment. This will minimise the extent of the hazardous areas and so minimise the cost of compliance.

1.0 Building Requirements for Flammable Liquids and Gases under the HSNO Act

Two principal pieces of legislation under the HSNO Act provide controls for the storage and use of flammable substances:

- the Hazardous Substances (Classes 1 to 5 Controls) Regulations 2001; and
- the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004.

The Hazardous Substances (Classes 1 to 5) Regulations 2001 are designed to prevent ignition of flammable liquids and gases. However, they also require compliance with Schedule 10 of the Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004. Schedule 10 is primarily designed to control the adverse effects of fire should ignition occur. It achieves this by ensuring a building holding flammable substances is built to a certain type of construction, and has corresponding separation from neighbours.

Flammable substances include liquids such as petrol, solvents and paints; and gases such as LPG and CNG. Differing requirements exist for flammable liquids and gases in different circumstances, and reference should be made to the legislation quoted below for details.

As a guide, the separation distance required from another structure or neighbour is determined by several factors:

- the type and quantity of the flammable substances held in the building
- the size of the containers holding the flammable substances
- the fire resisting construction of the building
- the usage of the neighbouring property.

Schedule 10 details four levels of construction for buildings containing flammable liquids, referred to as Types A, B, C, and D¹.

Basically, separation distance is decided according to:

- the building structure's resilience
- the quantity of flammables
- the pack size
- the sensitivity of the neighbouring land use.

A set of tables specifying the separation distances is provided in clause 30 of Schedule 10. Separation distance requirements start at one metre for as little as 250 litres of flammable liquid in Type A and Type B buildings, and can be as great as 30 metres for large quantities.

Where the required separation distance cannot be complied with, the person in charge of the building may apply to the Environmental Risk Management Authority (the Authority) for a waiver or reduction in separation distance. This application for approval is made under Clause 33 of Schedule 10. To qualify for a waiver, an alternative solution will need to be provided, for example:

- For a reduction in the separation distance of up to 50 per cent, an intervening vapour tight wall of 240/240/240 minute construction may need to be erected.
- For a reduction greater than 50 per cent, additional measures will need to be put in place such as sprinkler systems and /or upgrading the building construction.

The Authority would treat each application on its merits and is likely to require sound reasoning as to why the prescribed separation distances are not able to be complied with. Granting a waiver would depend on the factors involved, including the building location and the controls in place, to prevent ignition and to control the effects of unintended ignition.

- ¹ Type A building means a building—
- (a) that is—
 - (i) constructed to provide a platform on which 1 or more containers are located; and
 - (ii) secured to prevent unauthorised access; and
 - (iii) part of a secondary containment system; and
 - (b) the following parts of which are made of non-combustible materials:
 - (i) the platform; and
 - (ii) the shelter roof (if any).

Type B building means a framed building that—

- (a) has non-combustible cladding; and
- (b) is part of a secondary containment system.

Type C building means a building that—

- (a) has a fire rating of 120/120/120 minutes and which is made of structurally strong materials such as brick, block concrete and reinforced concrete; and
- (b) has a roof made of wood and iron or equivalent products; and
- (c) is part of a secondary containment system.

Type D building means a building that—

- (a) has a fire-resistance rating of 240/240/240 minutes and which is made of structurally strong materials such as brick, block concrete and reinforced concrete; and
- (b) has a reinforced concrete roof with a fire rating of 240/240/240 minutes; and
- (c) is part of a secondary containment system.



2.0 Hazard Classification of Substances

The nature of the controls is determined by the hazardous properties of each substance.

Single component hazardous substances in New Zealand at the time of introduction of the HSNO Act were approved by way of transfer notices which were formalised in the New Zealand Gazette.

Transfer notices: http://www.ermanz.govt.nz/resources/hs-pubs_gaz.html

Many other substances (e.g. mixtures) are approved by means of group standards. These group standards include Site and Storage Conditions.

Group standards: <http://www.ermanz.govt.nz/hs/groupstandards/index.html>

The hazard classifications of many individual substances can be found on the ERMA New Zealand website in the HS classification index:

HS classification index: <http://www.ermanz.govt.nz/hs/compliance/chemicals.html>

3.0 References

3.1 Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004.

Schedule 8 of this transfer notice specifies controls for stationary container systems (tanks). Part 13 of this schedule (clauses 56 to 65 inclusive) specifies controls for stationary container systems used in connection with burners and stationary engines. Clause 62(3) (b) specifies that where a tank is located in a building, it must be located in a room or chamber that has a 240/240/240 minute fire resistance rating.

Schedule 10 of this transfer notice specifies controls relating to the adverse effects of unintended ignition of class 2 (flammable gases) and class 3.1 (flammable liquids) hazardous substances. This schedule specifies building types and separation distances for the various flammable substances and the various quantities stored.

Transfer Notice: <http://www.ermanz.govt.nz/resources/publications/pdfs/consolidatedGN35and128.pdf>

3.2 Hazardous Substances (Emergency Management) Regulations 2001

These regulations specify the minimum emergency management provisions that must be in place (required for both flammable and non flammable hazardous substances). These include the provision of secondary containment for hazardous substances that are liquids or likely to liquefy in a fire. These are specified in regulations 35 to 41. They also include provisions for signage which are specified in regulation 42.

3.3 Hazardous Substances (Identification) Regulations 2001

These regulations specify the minimum identification requirements that must be in place (required for both flammable and non flammable hazardous substances). This includes provisions for signage, which are specified in regulations 51 and 52.

3.4 Hazardous Substances (Classes 1 to 5 Controls) Regulations

These regulations specify the minimum requirements for substances with classes 1 (explosives), 2 (Flammable gases), 3 (Flammable Liquids), 4 (Combustible and self reactive solids) and 5 (Oxidising agents) hazard classifications. These include separation of incompatible substances, delineation of hazardous atmosphere zones, and provision of walls with specified fire rating.

3.5 Codes of Practice

Codes of practice provide an explanation of the regulatory requirements or a practical means of meeting these regulatory requirements.

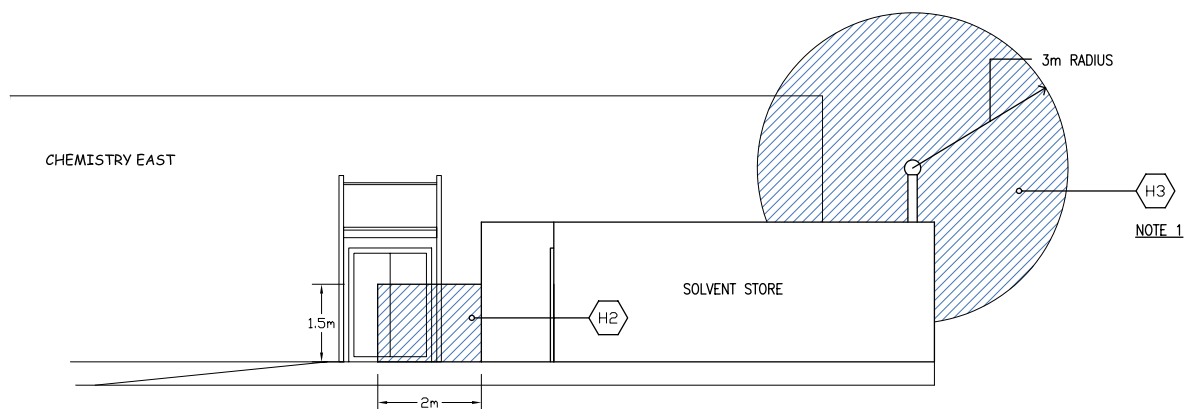
Codes of Practice: <http://www.ermanz.govt.nz/hs/compliance/codesofpractice.html>

4.0 Test Certification

Test certifiers are persons approved by ERMA New Zealand to issue test certificates. Other than minor quantities, the storage of flammable and oxidizing substances require test certificates.

Register of test certifiers: <http://www.ermanz.govt.nz/search/tc.html>

It is strongly recommended that input from the test certifier is sought before building construction commences.



DANGEROUS GOODS STORE EAST ELEVATION
HAZARDOUS ZONE LAYOUT
SCALE 1:100

5.0 Queries

Any queries regarding the controls can be directed to a test certifier, or to the HSNO Compliance Help Line 0800 376 234.

Example:

It is intended to construct a building for storing 5,000 litres of isopropyl alcohol (2-Propanol) in containers that are no greater than five litres in size. It is desired to place this building as close as possible to the site boundary.

Outcome:

- **Step 1:** refer to ERMA New Zealand HSNO Chemical Information Database. Isopropyl alcohol has the hazard classifications 3.1B, 6.1E, 6.3B and 6.4A.
- **Step 2:** refer to Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 Schedule 10 clause 26.
- **Step 3:** Design a Type D building which can be located adjacent to the site boundary.

Review Questions

1. It is intended to construct an outside storage area (i.e. no shelter) for 20,000 litres of turpentine contained in 209 litre drums. What secondary containment is required, and what separation is required to an office building?
2. It is intended to construct a building which uses LPG for heating purposes. The LPG is to be supplied in 45 kg cylinders and provision is required for six cylinders. The cylinders are to be located against the wall of the building. What form of construction is required for the wall?
3. It is intended to construct a warehouse containing 90,000 litres of finished goods, 60,000 litres of which have a 3.1C flammable classification, and 30,000 of which have a 3.1B flammable classification. The package sizes will be less than 60 litres. The building is to be located 10 metres from a boundary which has another warehouse building located on it. It is intended to locate the office as close as possible to the warehouse. What principal features are required in the design?
4. What is the threshold quantity of diesel that triggers secondary containment when the diesel is stored outside in 209 litre drums?

Answers

1. 10,000 litres secondary containment capacity and 13.33 metres separation from the office building.

Refer to:

- HSNO chemical information database
- Hazardous Substances (Emergency Management) Regulations, Regulation 38
- Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 Schedule 10 clause 26.

2. The wall must be constructed of fire resisting material for two meters on either side of the cylinders, and there must not be any openings located below the top of the cylinders and within two metres either side of the cylinders.

Refer to:

- HSNO chemical information database
- Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 Schedule 10 clause 20.

3. The proposed warehouse is to be a Type C building and the office is to be separated from it by 9.5 metres.

Refer to:

- HSNO chemical information database
- Hazardous Substances (Dangerous Goods and Scheduled Toxic Substances) Transfer Notice 2004 Schedule 10 clause 25.

4. 1000 litres.

Refer to:

- HSNO chemical information database
- Hazardous Substances (Emergency Management) Regulations, Regulation 38.

Version History

Version 1.0 – Initial release (March 2010)

The Institution of Professional Engineers Inc.
Pūtahi Kaiwetepanga Ngaio o Aotearoa

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March 2010

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