

Fire Safety Guideline

Guideline for bulk storage of rubber tyres



Version 03 – 5 December 2014

Fire Safety Branch
Community Safety Directorate



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1 Scope

This document details Fire & Rescue NSW (FRNSW) guidelines for the bulk storage of rubber tyres, or related subsidiary products, including those in open yards or within buildings and structures.

2 Application

This guideline should be used by managers of any new facility which is intended to store new or used rubber tyres and related subsidiary products, or of any existing facility that is being modified to store rubber tyres in bulk quantities.

Note: Related subsidiary products include the by-products of used tyre waste processing such as shredded or granulated tyre scrap.

This guidelines provides minimum recommended requirements for both internal (i.e. within a building or structure) and external bulk storage of rubber tyres.

3 Background

Rubber tyres are not easily ignitable, however when alight, they are extremely difficult to extinguish. The Calorific value of rubber tyres is nearly 40 000 kilojoules/kilogram, which is generally twice that of other common combustible materials.

Note: When tyres burn, the high energy release rate results in a very hot fire and a considerable volume of smoke being generated, both of which present a high hazard to the community, environment and firefighters.

The physical properties of rubber tyres create difficulties in extinguishing burning tyres. The shape of tyres and the tyre stacking arrangement result in many three dimensional pockets which are difficult to access or penetrate with extinguishing mediums. Rubber also naturally repels water thus resulting in extinguishing mediums shedding from the tyre and draining away.

Burning tyre stacks must be physically separated in order to be extinguished. These guidelines identify maximum stack sizes and minimum distances which assist fire services to contain and extinguish tyre fires.

Due to the hazardous nature of rubber tyre storage, the relevant planning authority may require any proposed facility be subject to a 'Fire Safety Study'. This study should be conducted in accordance with the guidelines of *Hazardous Industry Planning Advisory Paper (HIPAP) No.2 - Fire Safety Guidelines*.

Note: *HIPAP No.2 - Fire Safety Study Guidelines* is available from NSW Department of Planning.

All facilities that store more than five (5) tonnes or 500 waste (used) tyres, or involves processing more than 5,000 tonnes of waste tyres per year, are required to hold an environment protection licence issued by the NSW Environment Protection Authority.

Note: Licensing requirements are defined by the NSW *Protection of the Environment Operations Act 1997*. For the purposes of this guideline, FRNSW defines small versus large tyre facilities by the previous threshold values of 50 tonnes or 5000 tyres.



4 Acceptable rubber tyre storage

- (a) **Bundled tyres** — a number of tyres strapped together in bundles and stacked either within a system or on their sides (see Figure 1 below);

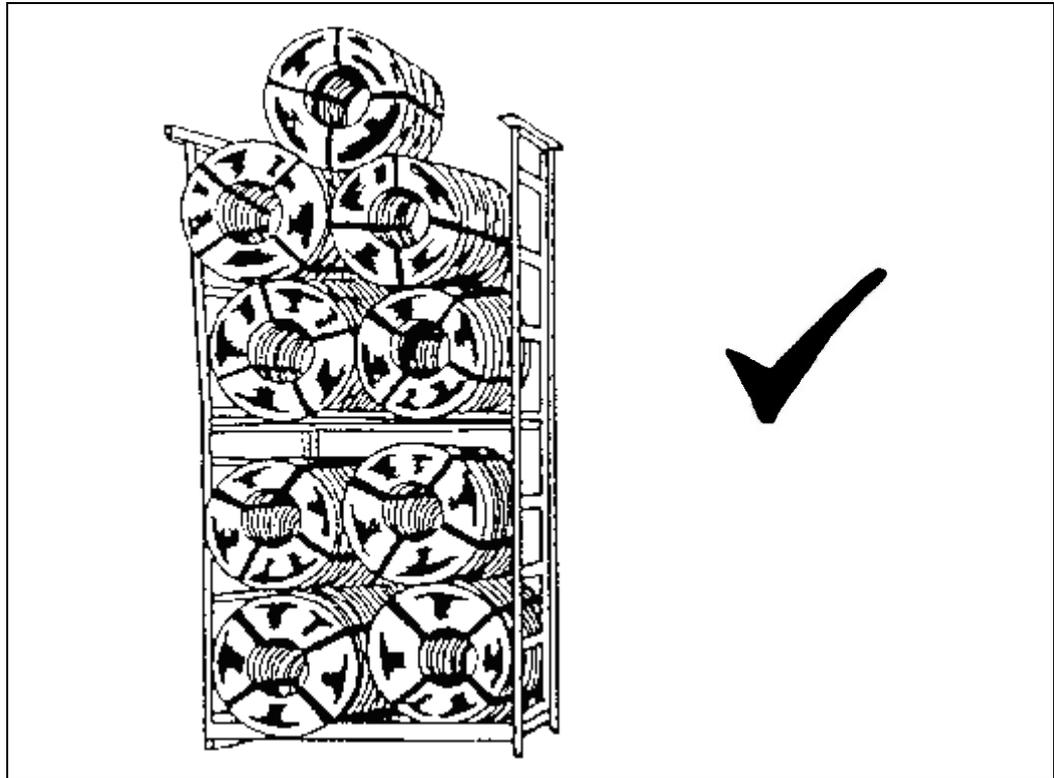


Figure 1 Tyres bundled and stacked

- (b) **Pallet systems** — a system containing a number of tyres which includes stringers for material handling equipment (see Figure 2 below);

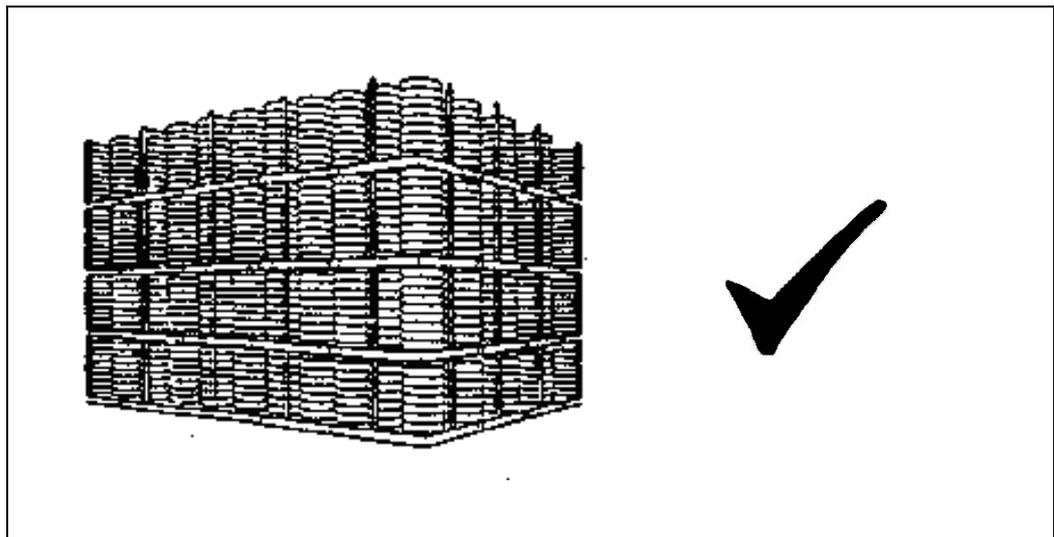


Figure 2 Tyres stacked by pallet system

- (c) **Horizontal systems** — a system (e.g. pallets, shelving, racks) where tyres are stacked upright along a horizontal length exceeding 1.5m (see Figure 3 below);

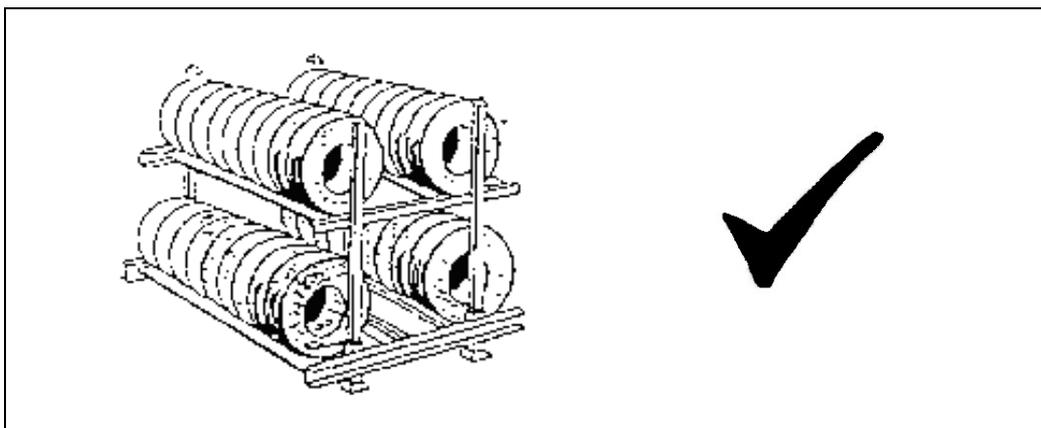


Figure 3 Horizontally stacked tyres

- (d) **Laced storage (outdoor storage only)** — tyres which are stacked overlapping to create a woven or laced arrangement (see Figure 4 below);

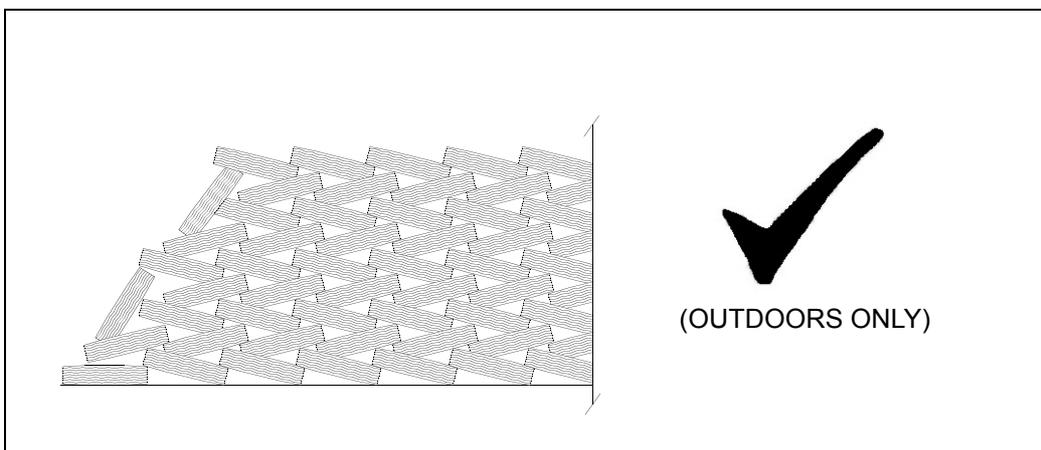


Figure 4 Tyres Stacked in Lace Arrangement

- (e) **Portable systems** — small portable systems that can be readily moved by fork lift (see Figure 5 below);

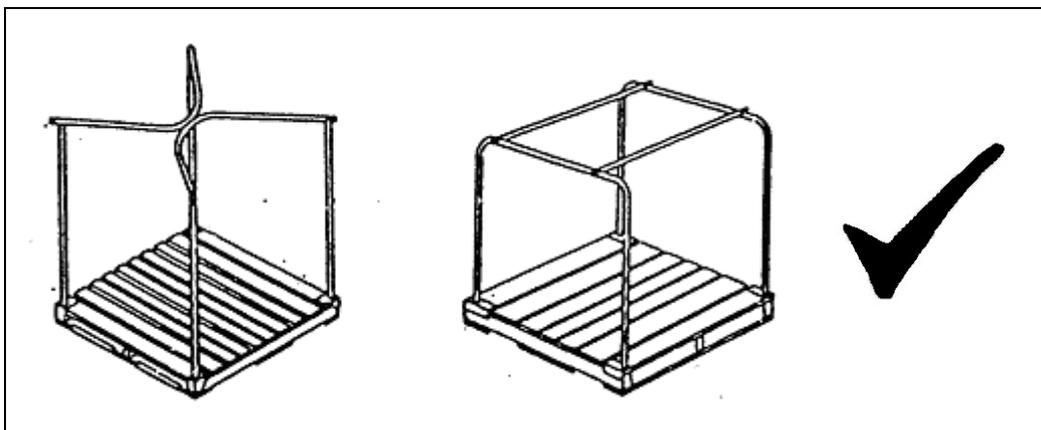


Figure 5 Portable systems

5 Unacceptable rubber tyre storage

Tyres stacked on their treads, known as 'tread up' storage, is not acceptable (see Figure 6 below). In the event of fire, tread up tyres easily roll away and ignite neighbouring stacks unless they are retained within a suitable rack storage system.

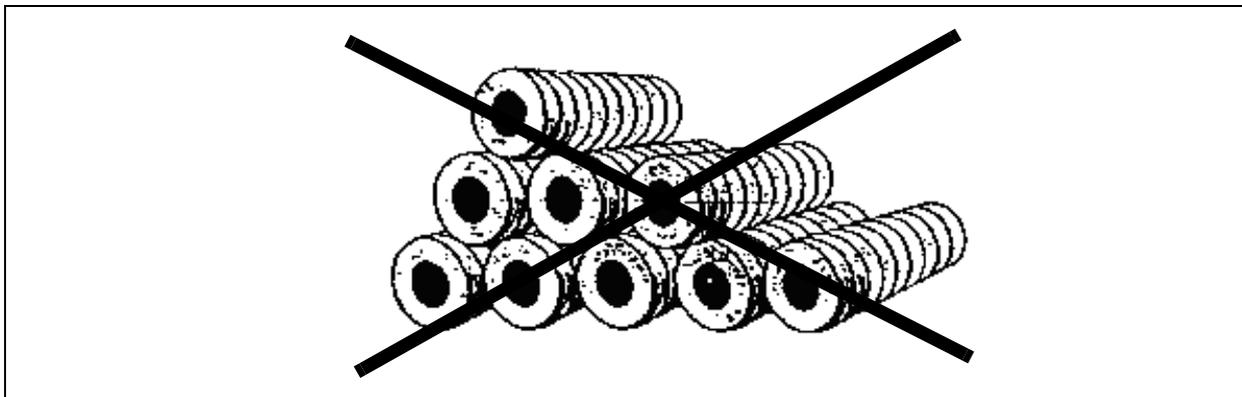


Figure 6 Tread-up storage

6 External tyre storage

6.1 General requirements

The external tyre storage site (i.e. open yard) should be level, clear of all rubbish and combustible materials, and enclosed by fences or walls constructed of non-combustible materials.

Note: The fence or wall should be sufficient height to keep unauthorised persons from entering.

A hydrant system complying with Australian Standard AS 2419.1 should be provided when the total quantity of outdoor storage will exceed 50 tonnes in weight.

6.2 Size of tyre stacks and piles

Individual tyre stacks should not exceed 3.7m in height, 60m² in area and 12.5 tonnes in weight (see Figure 7 below and Figure 8 on page 5).

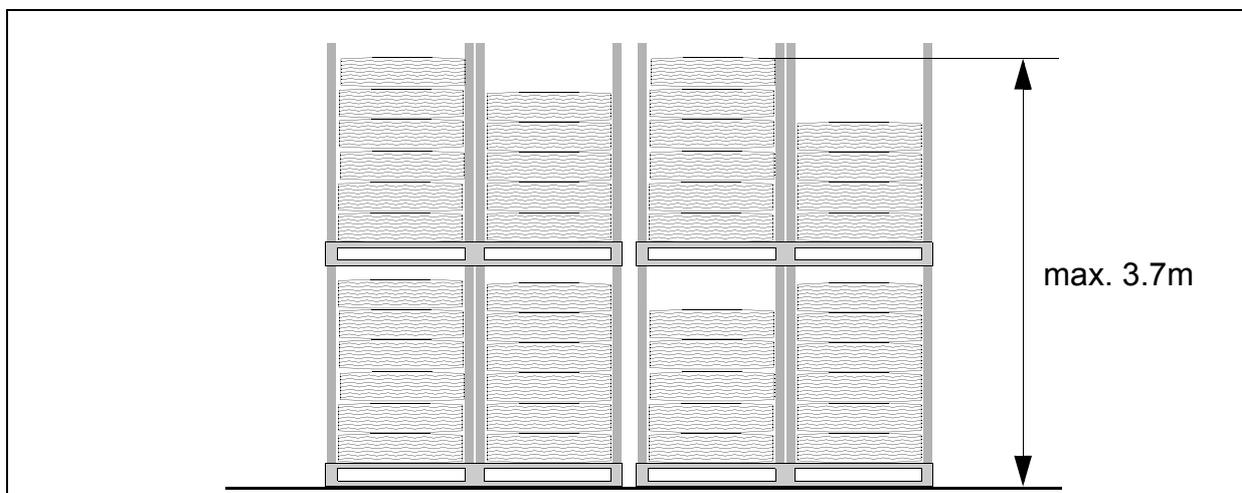


Figure 7 Maximum tyre stack heights

A maximum of four (4) individual tyre stacks can be grouped into a stack pile. A minimum clear separation of 2.5m at the base must be maintained between each stack (see Figure 8 below).

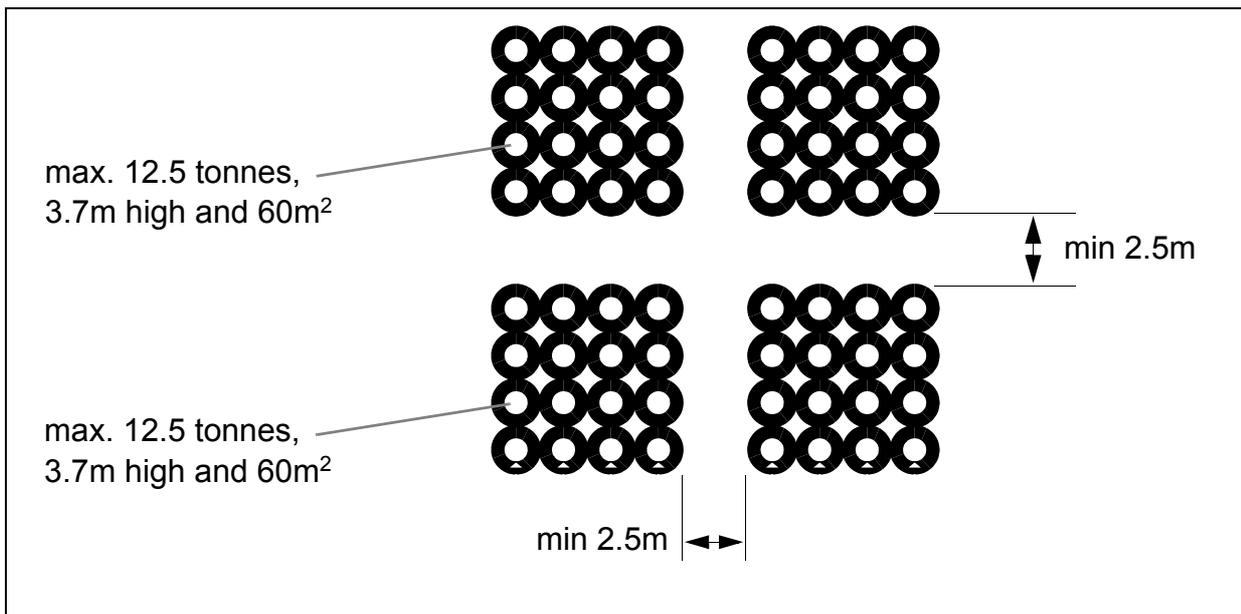


Figure 8 Minimum separation distances between stacks in pile (stack of four)

A minimum clear separation of 18m must be maintained between each stack pile of four stacks (see Figure 9 below).

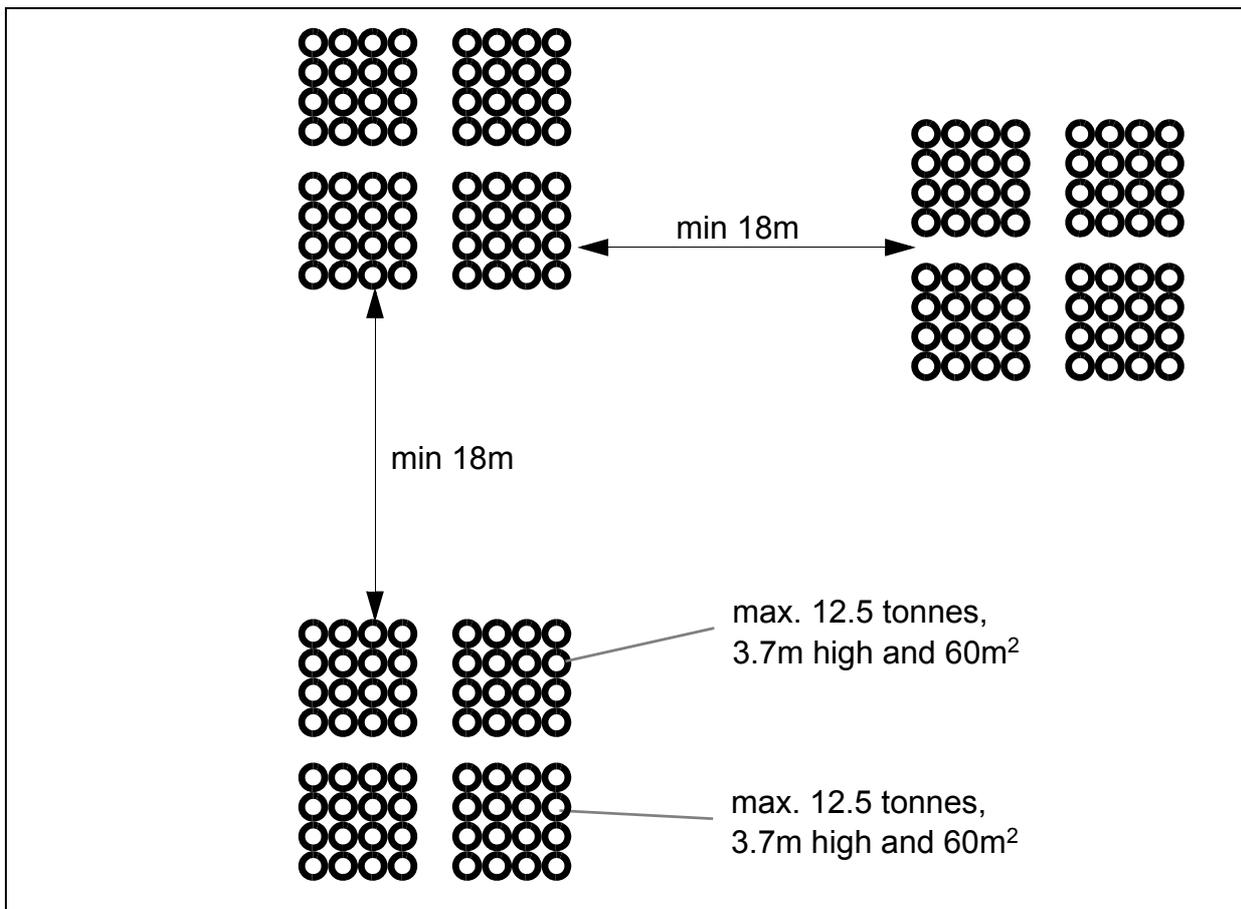


Figure 9 Minimum separation distances between piles (stacks of four)



If the storage of tyres exceed a single four (4) stack pile then the facility has the capacity to exceed 50 tonnes of storage. thus will be regarded as a 'large' tyre storage facility.

Note: A facility not having the capacity to store more than one stack pile (i.e. less than 50 tonnes) is regarded as a small tyre facility.

6.3 Minimum boundary clearances

- (a) **Small tyre facilities (less than 50 tonnes)** — tyre stacks should be at least 6m from all non-combustible boundaries and buildings, and 18m from combustible boundaries (see Figure 10 below);

Note: A public road may form part of this separation distance, however tyre stacks must be at least 6m from the site boundary facing the public road.

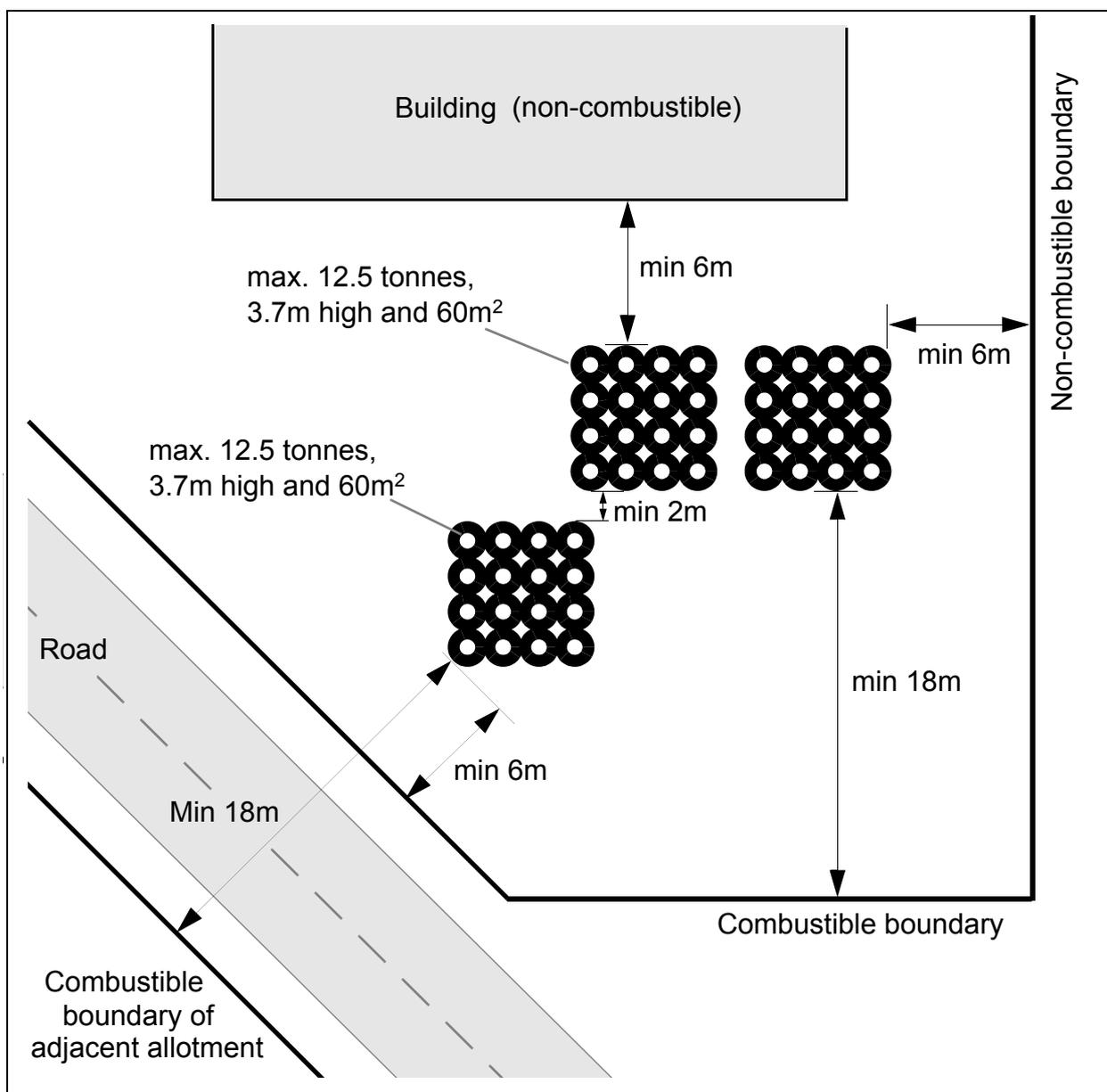


Figure 10 Minimum boundary clearances for small tyre facilities

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- (b) **Large tyre facilities (50 tonnes or more)** — tyre stacks should be at least 18m from any boundary or any building (see Figure 11 below);

Note: A public road may form part of this separation distance, however tyre stacks must be at least 6m from the site boundary facing the public road;

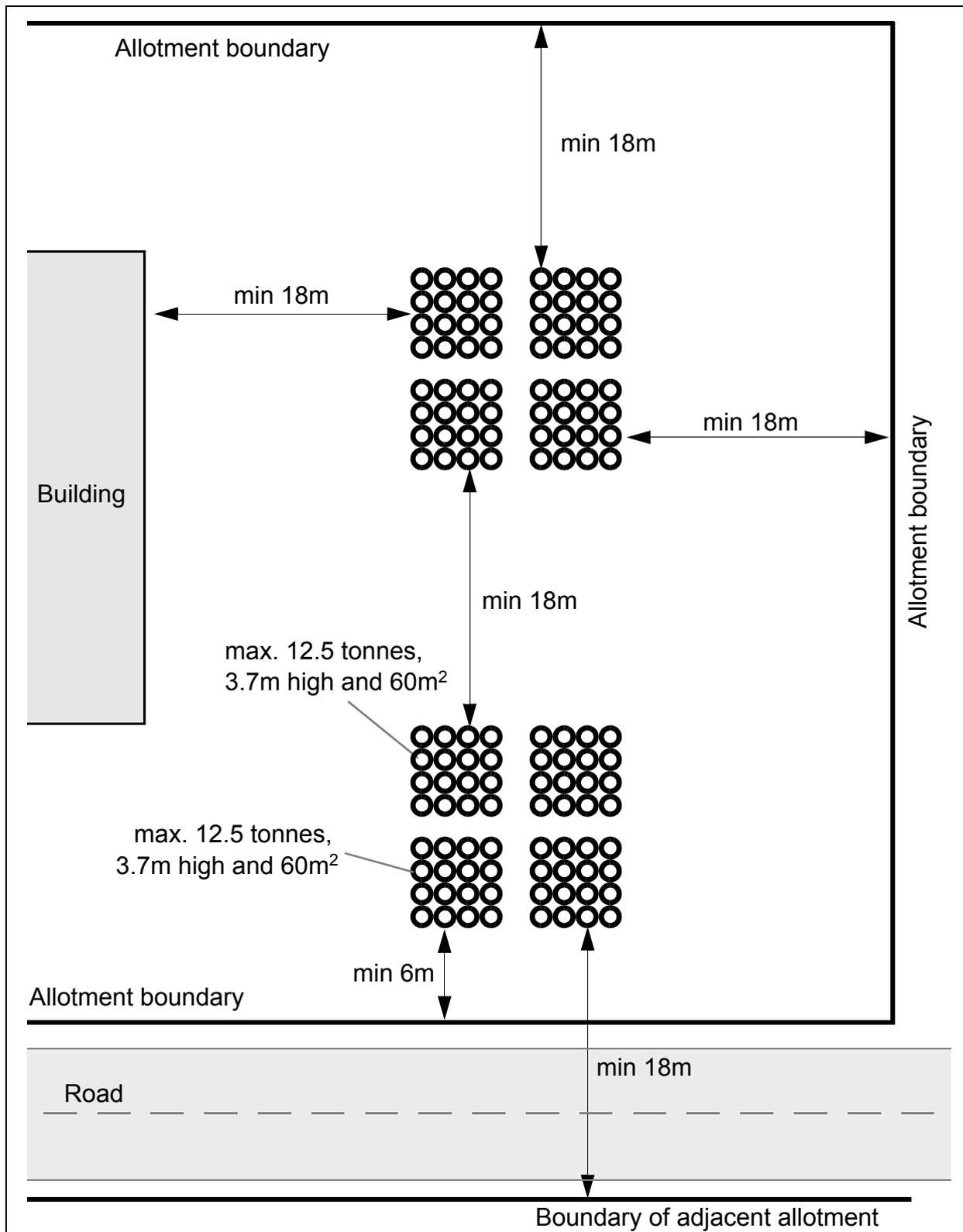


Figure 11 Minimum boundary clearances for large facilities

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6.4 Site access for FRNSW appliances

Any external tyre storage facility should have at least two site access points for FRNSW appliances, each being not less than 4m wide (see Figure 12 below).

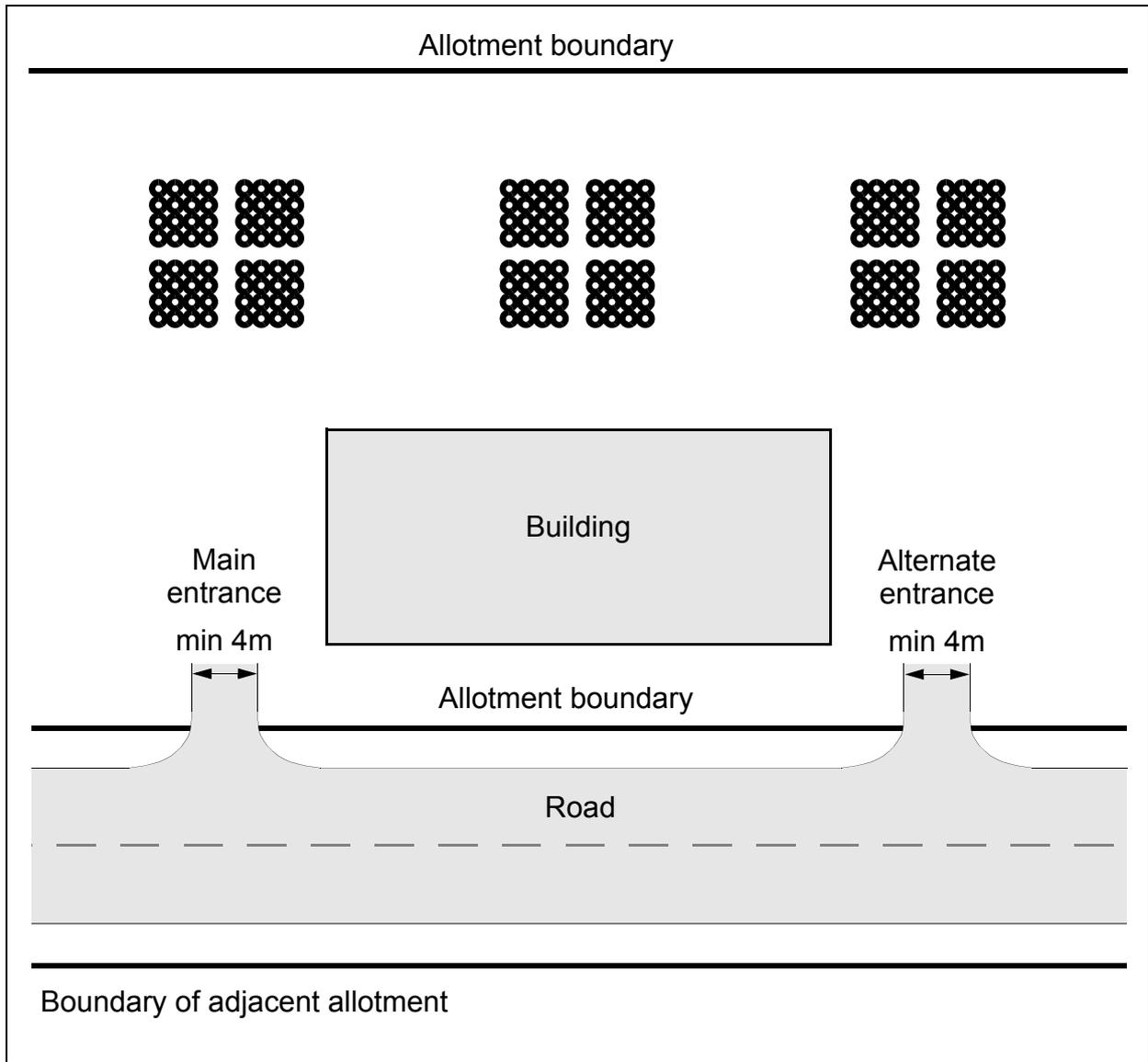


Figure 12 Alternative site access for FRNSW appliances

7 Internal tyre storage (i.e. buildings)

7.1 General requirements

Buildings which have a floor area of 2 000m² or more and contain more than 20 tonnes of tyres should have a sprinkler system complying with AS 2118.1.

Buildings which have a floor area of 2 000m² or more and contain more than 10 tonnes of tyres should have smoke and heat vents complying with specification E2.2c of the BCA (Volume one).

Individual tyre stacks within buildings or structures should not exceed 3.7m in height and 30m² in area (refer to Figure 7 on page 4).

Stored tyres must remain at least 1m clear in all directions from the underside of the building's roof or ceiling, roof structural members, lights (includes light fixtures) and sprinkler heads.

A minimum clearance of 1m must be maintained along paths of travel to required exits and firefighting equipment (e.g. hose reels, extinguishers, hydrants). The paths of travel must be kept clear and unobstructed at all times.

7.2 Unsprinklered Buildings

A minimum clearance of 3m should be provided between stacks in an unsprinklered building (see Figure 13 below).

A minimum clearance of 3m should be provided between tyre stacks and any building structural member in an unsprinklered building (see Figure 13 below).

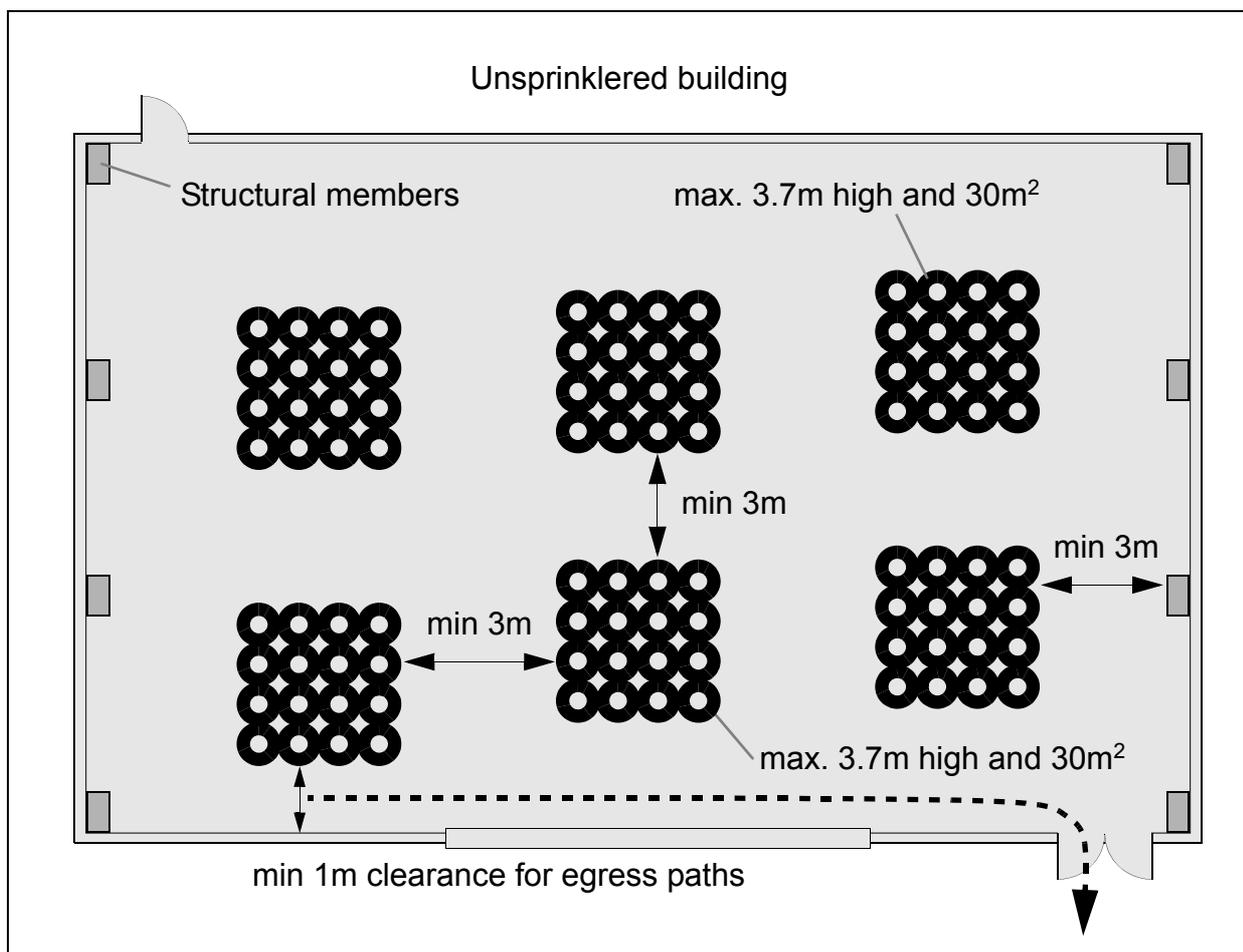


Figure 13 Minimum clearance distances in an unsprinklered building

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7.3 Sprinklered Buildings

Where installed, the sprinkler system design should be suitable for the hazard (i.e. rubber tyres).

A minimum clearance of 2m should be provided between tyre stacks in a sprinklered building (see Figure 14 below).

A minimum clearance of 1.5m should be provided between tyre stacks and any building structural member in a sprinklered building (see Figure 14 below).

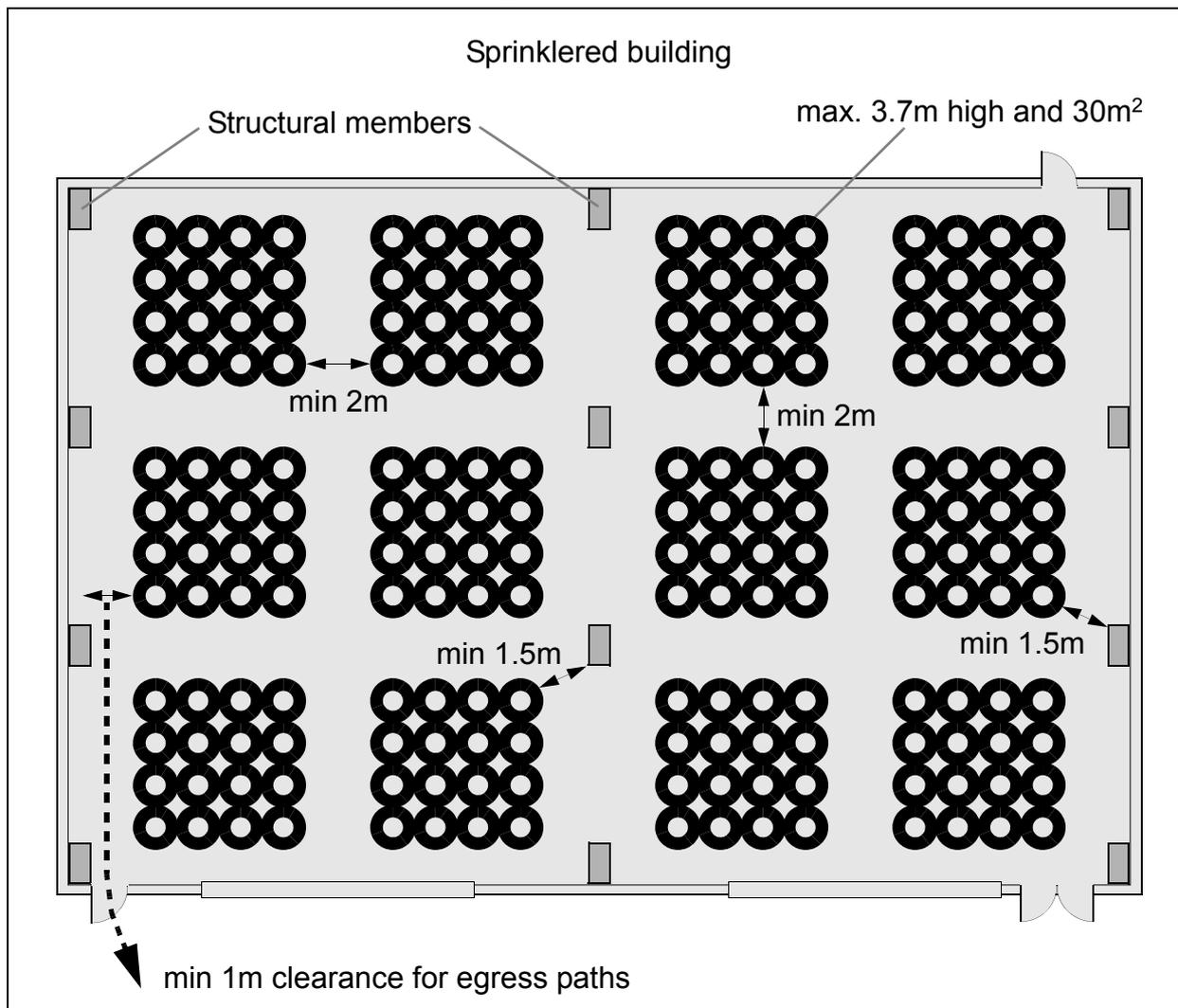


Figure 14 Minimum clearance distances in a sprinklered building

8 Site containment of contaminated water

If the tyre storage facility has a hydrant or sprinkler system, provision should be made for the retention of contaminated water run off. The minimum containment capacity should be calculated on the basis of two (2) hydrants operating simultaneously at 10 L/sec each (a total of 20 L/sec) plus the calculated maximum sprinkler design output, operating for a period of 90 minutes.

If the tyre storage facility does not have a sprinkler system, the demand from a hydrant system will be greater. In this case, the minimum containment capacity should be calculated at three (3) hydrants operating simultaneously at 10 L/sec each (a total of 30 L/sec) for a period of 90 minutes.

9 References

Hazardous Industry Planning Advisory Paper (HIPAP) No. 2 Fire Safety Study Guidelines, NSW Department of Planning, 2011, Sydney NSW, Australia

Australian Building Codes Board, 2014, *National Construction Code Volume One, Building Code of Australia Class 2 to Class 9 Buildings*, 2014, Canberra ACT, Australia

Standards Australia, 2004, *AS 2419.1 (Amend Nos 1 and 2) Fire hydrant installations —Part 1: System design, installation and commissioning*, Standards Australia, Sydney NSW, Australia

Standards Australia, 2006, *AS 2118.1 Automatic fire sprinkler systems —Part 1: General systems*, Standards Australia, Sydney NSW, Australia

National Fire Protection Association, 1996, *NFPA 231D Standard for Storage of Rubber Tires*, Quincy Massachusetts, United States of America

FM Global, 1991, *Factory Mutual Engineering Committee (FMEC) 8-3 Rubber Tire Storage*, Norwood Massachusetts, United States of America





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