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1 Scope

This document details NSW Fire Brigades (NSWFB) recommended minimum requirements for the storage of rubber tyres, including those in open yards or within buildings and structures.

2 Application

This document should be used by the managers of any new facility 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.

This document provides recommendations for both internal (i.e. within a building or structure) and external bulk storage of rubber tyres.

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 also cause difficulty when trying to extinguish tyre fires. The shape of tyres and the tyre stacking arrangement result in many pockets which are difficult to penetrate with extinguishing mediums. Furthermore, rubber naturally repels water resulting in extinguishing mediums quickly being shed and drained away.

Due to these reasons, tyre stacks involved in fire must be physically separated in order to be extinguished. Adopting the recommendations provided in this document will assist the NSWFB 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.

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

Currently, all facilities that store 50 or more tonnes of old (used) rubber tyres are required to be licensed by the NSW Department of Environment and Climate Change (DECC).

Note: These requirements are in addition to all other requirements of the Building Code of Australia.
3 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](image)

(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](image)
(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);

![Horizontally Stacked Tyres](image)

*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);

![Tyres Stacked in Lace Arrangement](image)

*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);

![Portable Systems](image)

*Figure 5 Portable Systems*
4 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.

5 External Tyre Storage

5.1 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 of 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.

5.2 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).
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 rubber tyre storage is required to be greater than one pile of four (4) stacks, the tyre storage facility is required to be licensed as the storage capacity can exceed 50 tonnes in weight.

**Note:** A facility having a tyre storage capacity not greater than one stack pile (i.e. less than 50 tonnes) is classified as a small tyre facility. A facility having a tyre storage capacity greater than one stack pile (i.e. 50 tonnes or more) is classified as a large tyre facility.

### 5.3 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.
(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*
5.4 Site Access for NSWFB Appliances
Any external tyre storage facility should have at least two site access points for NSWFB appliances, each being not less than 4m wide (see Figure 12 below).

Figure 12 Alternative Site Access for NSWFB Appliances
6 Internal Tyre Storage (Buildings)

6.1 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.

6.2 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](image-url)
6.3 Sprinklered Buildings

Where installed, the sprinkler system design should be suitable for the hazard.

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).

7 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.
8 References

The following documents are recommended for further reading:

Hazardous Industry Planning Advisory Paper (HIPAP) No. 2 Fire Safety Study Guidelines, NSW Department of Planning, 1990, Sydney NSW, Australia

Australian Building Codes Board, Building Code of Australia 2007 Volume 1, CanPrint Communications, 2007, Fyshwick ACT, Australia

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

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

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

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