

Handreiking Opslag van autobanden - Bijlagen -

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BIJLAGE I

Foto's brand bandenopslag in Californië



Een zee van vuur bij een brand in een bandenopslag van bijna 5 miljoen autobanden, in Westley, Californië. De brand heeft totaal 18 dagen geduurd. Met behulp van graafmachines zijn zoveel mogelijk niet-brandende banden weggehaald, terwijl ondertussen de smeulende massa middels enkele hogedrukstralen met schuim werd bedekt.



Op de voorgrond zijn de stalen draden duidelijk zichtbaar. Dit is nagenoeg het enige dat overblijft na de verbranding van autobanden.





Op deze foto is de keramisch klei-achtige korst zichtbaar die de brandende massa bedekt. Onder andere hierdoor is het blussen met water onmogelijk, aangezien het water de smeulende kern van de bandenstapel niet kan bereiken.

Wanneer bij de verbranding een te lage temperatuur wordt bereikt, zal de verbranding onvolledig zijn. Hierdoor komen veel Schadelijke stoffen vrij, waaronder olie.

Op de foto vloeit een stroom olie naar een lager gelegen opvangbassin, die normaal gesproken in de winter gevuld is met water.

Vanwege de enorme hitte die bij de brand vrijkwam, was de kans groot dat het opvangbassin, gevuld met liters olie, zou ontsteken. Om te voorkomen dat een plasbrand zou ontstaan, werd de olieplas met een kleine waterstraal gekoeld.





BIJLAGE II

Bandenbrand in Kampen (17 sept 2002)

Kampen stelt provincie aansprakelijk voor brandschade

KAMPEN, 19 september - De gemeente Kampen stelt de provincie Overijssel aansprakelijk voor de kosten die zijn gemaakt bij de brand van dinsdagavond op een illegale bandenopslag in Kampen. Als de provincie geen einde maakt aan de illegale opslag, stapt de gemeente naar de rechter.

Dat heeft burgemeester J. Oosterhof van Kampen woensdag bekendgemaakt. "De gemeente heeft geen bevoegd gezag om op te treden tegen de illegale bandenopslag. De provincie had dat moeten doen", zegt Oosterhof.

Volgens de burgemeester heeft de eigenaar van de banden nooit een vergunning van de provincie gekregen voor het opslaan van de banden. Oosterhof meldde eerder bij de provincie de veiligheid op het terrein niet langer te kunnen garanderen.

Volgens milieugedeputeerde H. Nap-Borger van de provincie Overijssel is het voorbarig te stellen dat de provincie de banden onmiddellijk op moet ruimen. "We wachten het onderzoek van de politie af. Daarna zullen we de banden afvoeren."

Volgens de gedeputeerde is de bandenopslag sinds begin 2002 illegaal. Toen verklaarde de Raad van State een beroep tegen de weigering van een vergunning ongegrond. Sindsdien is de provincie bevoegd gezag over de bandenopslag, erkent de provincie. Met bestuursdwang is de afgelopen maanden geprobeerd de opslag te verwijderen.

De brandweer rukte dinsdag met groot materieel uit om de brand bij de bandenopslag tegenover een woonwijk te blussen. De brandweer verwacht nog geruime tijd nodig te hebben met nabluswerkzaamheden. Een hectare opslag brandde volledig uit. Op het terrein lagen naar schatting van de brandweer enkele tienduizenden banden opgeslagen. De politie sprak dinsdagavond over honderdduizenden, maar volgens de brandweer is een deel eerder afgevoerd.

De politie sluit brandstichting niet uit. De technische recherche onderzoekt het terrein woensdag op sporen. Een wijkagent ontdekte als eerste de brand en wist bewoners van een naastgelegen pand in veiligheid te brengen. (ANP)

bron: <http://www.beveiliging.nl/nieuws/actsep.htm#A62>



Felle brand maakt einde aan illegale opslag tienduizenden autobanden

Papieren strijd eindigt in vuurzee

Michiel Satink

Op een idyllische plek langs de IJssel in Kampen ontsierden vele tienduizenden autobanden jarenlang het uitzicht. De gemeente Kampen en de provincie Overijssel vochten tien jaar een papieren strijd om aan de illegale bandenopslag een einde te maken. Tot een felle brand medio september de opslag in de as legde. De brandweer rukte massaal uit. Commandant Cor Bastiaan: 'We maakten ons zorgen over wat er zoal de lucht ingaat als een dergelijke berg banden in brand staat.'

De gemeente Kampen en provincie Overijssel hebben jaren getwist over de enorme bandenberg, die in de volksmond bekendstaat als de 'schandvlek' van Kampen. Dat de banden weg moeten, daar is iedereen het over eens, onenigheid over de te volgen procedures gooit steeds roet in het eten. Tot dinsdagavond 17 september. Terwijl de provincie overweegt om over te gaan tot het onder bestuursdwang verwijderen van alle banden, breekt er brand uit op het terrein. Om half acht 's avonds krijgt de brandweer de melding binnen: een surveillerende politieagent ziet rook op het terrein en slaat alarm. Gezien de gevaren die een brand op dit terrein met zich mee kan brengen, gaat de officier van dienst meteen mee. Acht minuten na de melding is de eerste spuitwagen ter plaatse. Meteen blijkt dat het een grote brand is. Een tweede tankwagen is in aantocht en ook een slangenwagen, met 1500 meter aan brandweerslangen, rukt uit.

Omdat de brand dichtbij een woonwijk is, wordt meteen groot alarm geslagen. Binnen een half uur zijn twintig brandweermannen bezig met het bestrijden van de brand. 'Het woonhuis naast het terrein was onze eerste prioriteit, dat wilden we behouden', zegt brandweercommandant Cor Bastiaan. De politie heeft inmiddels de bewoners van het woonhuis en enkele huisdieren in veiligheid gebracht. Door de gunstige wind en door waterstralen tussen het huis en de brand te richten, weet de brandweer het huis te behouden. Bastiaan: 'De wind stond parallel aan de IJssel, van het woonhuis af. Dus het huis en de daarnaast staande molen liepen geen gevaar. Bovendien verdween de rook

over de IJssel, zodat evacuatie van de woonwijk niet nodig bleek. Onder het terrein zit geen rioolstelsel. We hebben alleen één duiker afgedamd, meer hoefden we niet te doen om te voorkomen dat vervuild bluswater zich zou verspreiden.'

Crisisteam

Kort na het uitbreken van de brand wordt een crisisteam geformeerd waarin onder meer de burgemeester, hulpdiensten en voorlichting zitting hebben. Terwijl de brandweer van twee zijdes de spectaculaire brand onder toezicht oog van vele honderden toegestroomde burgers probeert in te dammen, is de politie druk met het aanbrengen van wegafzettingen. Het crisisteam overlegt met de metingdiensten van de Rijksdienst voor Volksgezondheid en Milieu (RIVM). 'We maakten ons zorgen over wat er zoal de lucht ingaat als een dergelijke berg autobanden in de brand staat.' De neerslag van roetdeeltjes wordt gemeten op aan-

wezigheid van chloor. Bij de verbranding van rubber kan ook eventueel dioxine vrijkomen. Al snel blijkt er van grote vervuiling geen sprake. 'Uit metingen bleek dat er zelfs geen graasverbod voor dieren afgekondigd hoefde te worden.'

De brandweer is inmiddels met groot materieel uitgerukt. Ook een wagen voor grootwatertransport wordt ingezet, alsmede een container met overleg- en vergaderruimte en een verzorgingscontainer. Korpsen uit de omliggende gemeenten worden niet opgeroepen omdat het Kamper korps over voldoende bluscapaciteit beschikt. Water wordt ter plaatse uit de rivier de IJssel gepompt. Om de brand sneller in te dammen, wordt overwogen schuim in te zetten. 'Daarmee hadden we de uitstoot van roet kunnen beperken. Het brandoppervlak was echter zo groot, dat we teveel schuim nodig zouden hebben.' De middelgrote brand breidt zich in de loop van de avond uit tot één hectare.



Het Kamper korps in actie tijdens de brand in een opslag voor duizenden banden.

FOTO'S: DICK VOS / BROERS & VONK





De brandende banden zorgen voor een enorme rookontwikkeling die door de gunstige wind aan de stad ontsnapt.

Het publiek blijft toestromen en slaat vanaf een afstandje de werkzaamheden van de brandweer gade.

Tijdens de brand weet de brandweer tien containers met banden uit de brand te redden. De brandweer is verbaasd over de aantallen die het ontdekt. Naar schatting van de brandweer liggen er zo'n honderd-duizend banden opgeslagen. De brand blijkt lastig te doven, want zodra er aan smeulende banden wordt getrokken, laait het vuur weer op. De brandweer besluit

het terrein nat te houden, de banden worden doordrenkt met water. Tijdens het hoogtepunt van de brand zijn veertig brandweerlieden bezig met bluswerkzaamheden. Uiteindelijk worden zeventig brandweermannen ingezet, in wisselende samenstelling.

Furieus

Pas donderdagmiddag om 16.00 uur, bijna twee etmalen na het uitbreken van de brand, keert de laatste bluswagen terug naar de kazerne. Burgemeester Jan

Oosterhof heeft furieus gereageerd en stelt de provincie aansprakelijk voor de brand en de afwikkeling van de schade. Als de provincie geen einde maakt aan de illegale opslag, stapt hij naar de rechter. Volgens milieudeputeerde Herma Nap-Borger van de provincie Overijssel is het voorbarig te stellen dat de provincie de banden meteen na de brand op moet ruimen. 'We wachten het onderzoek van de politie af. Daarna zullen we de banden afvoeren'. Over de oorzaak van de brand is nog weinig bekend. 'Vluchtige stoffen zijn na zo'n brand nog moeilijk te vinden', zegt Bastiaan. 'En doordat de brandweer veel banden heeft verplaatst, blijft er van mogelijke sporen van brandstichting weinig over.'

Zo'n tien jaar geleden begon ondernemer Corstiaan van de Beek met de opslag van banden op het terrein van de voormalige houthandel Cramer aan de IJsseldijk in Kampen. Tot grote ontevredenheid van de gemeente die het terrein wilde aankopen, saneren en geschikt maken voor woningbouw. De gemeente wilde van de banden af, maar deed tevergeefs pogingen de eigenaar zo ver te krijgen. Van de Beek wees de gemeente erop dat de provincie het bevoegd gezag had. Van de Beek was in afwachting van het verlenen van een milieuvergunning voor de opslag van zijn banden. Eind jaren negentig werd projectontwikkelaar Reiny van der Sluis eigenaar van het terrein. Aan de opslag van de banden veranderde dit niets, die bleven eigendom van Van de Beek. Terwijl de bandenberg gestaag groeide, weigerde de provincie een milieuvergunning te verstrekken. Van de Beek ging in beroep. Pas begin 2002 werd de bandenberg officieel illegaal: de milieuvergunning zou definitief niet verstrekt worden, de banden moesten weg. Toch gebeurde er niets. In maart maakte de provincie bekend dat het bestuursdwang op wilde leggen. Ook wilde de provincie dat de gemeente Kampen een hek om het terrein zou plaatsen. Jongeren die zich tijdens zomerse dagen op het strandje nabij de opslag ophielden, betraden regelmatig het terrein. Het hek moest de mensen - en het nodige afval - van het terrein houden. 'Sommige mensen hebben de indruk dat het daar een vuilstort is. Het trekt dan ook veel extra troep aan', zei wethouder Jan Wieten in april. Maar het hek kwam er nooit. De bandenberg bleef waar die was. Tot de felle brand op 17 september een abrupt einde maakte aan de papieren strijd.

Begin oktober is de afvoer van de banden definitief begonnen. Het vuur heeft de ambtelijke molen in de hoogste versnelling gezet. Terwijl de gemeente en de provincie zich nog altijd afvragen hoe de geschiedenis rond het bandenterrein zich zo lang voort heeft kunnen slepen, heerst in de brandweerkazerne in Kampen tevredenheid. Bastiaan: 'De brand verliep onder perfecte omstandigheden: de wind was gunstig, er zijn geen gewonden gevallen. Na een brand in de veilinghallen in IJsselmuiden vorig jaar en de brand op het terrein van de voormalige pannenfabriek Berk was dit de derde grote brand in een jaar tijd in deze gemeente. Wat dat betreft hebben we ons brandweerkhart flink kunnen ophalen.'

B&B

BIJLAGE III

Overzicht jurisprudentie afvalstof- grondstof

Instantie	Datum uitspraak	Kenmerk	Uitspraak
Hoge Raad	8 juli 1994	DD 94.421	ontheffing papierpulp meststof
Hof van Justitie	25 juni 1997	C-224/95, C-304/94 C-330/94, C342/94	begrip afvalstof
Hoge Raad	7 april 1998	106862 E	cassatie Hof A'dam d.d. 18-12-96: groenresten zijn bedrijfsafvalstoffen
Raad van State	25 augustus 1998	H01.97.0709	specialiteitenbeginsel, papierpulp
Hof van Justitie	5 oktober 1999	C-175/98 C-177/98	Voorlopige opslag voorafgaand aan nuttige toepassing of verwijdering
Hof van Justitie	18 december 1997	C-129/96	In beginsel mag geen enkel type residu, industrieel restproduct of andere bij productieprocessen ontstane stof van het begrip afvalstof worden uitgesloten
Hof van Justitie	15 juni 2000	C-418/97 C-419/97	LUWA-bottoms en houtspaanders lijst van aanwijzingen voor afvalstoffenkarakter
Raad van State	4 juli 2000	E03.97.1433	Begrip verwijdering van afvalstoffen
Raad van State	30 november 2000	200005055/1	niet-van -toepassing criteria niet meer bruikbaar
Raad van State	20 maart 2001	E03.96.0707	gebruikte autobanden zijn afvalstof
Hof Den Bosch	30 maart 2001	20.001706.00	beroep uitspr. Rb Maastricht 5-11-99. begrip afvalstof, subjectieve intentie ontdoener
Raad van State	10 april 2001	E03.97.1224/1	toepassen schone grond-BSB ter ophoging, geen afvalstof
Raad van State	eind juni 2001	??	licht verontreinigd hout is afvalstof, Electrabel
Raad van State	14 juli 2001	200102641/2	betrouwbaarheid ondernemer kan rol spelen in verstrekken afvalvergunning
Hof Arnhem	9 oktober 2001	21-000637-96	Plasticresten zijn afvalstof (zaak Besselse)
Raad van State	12 december 2001	199901922/1 e.v.	brandstofbalen plastic/papierfractie, scheiden en persen; aanwijzing ontdoen van afval
Raad van State	3 april 2002	200103485/1	Beoordeling zogenaamde energiekorrels. Geen afvalstof, korrels worden doelbewust geproduceerd uit afvalstof en zijn vergelijkbaar met reguliere brandstoffen (ook qua uitstoot).
Rb Alkmaar	21 december 2001	14/036	Houtsnippers: geen brandstof maar afval
Vz Raad van State	4 juni 2002	200201903/2	Tarragrond geen afvalstof
Rb Alkmaar	5 juli 2002	14.035060.00	CFK-houdende koel- en vriesapparatuur (bestemd voor export naar Afrika) is afval

Eigenaar aansprakelijk voor opslag gevaarlijke stoffen

Een gemeente is eigenaar van een perceel grond, waarop zich loodsen bevinden. Deze loodsen worden gehuurd door een professionele bewaarnemer, die de loodsen gebruikt voor de opslag van gevaarlijke stoffen, die in eigendom toebehoren aan een ander bedrijf. Nadat brand heeft gewoed in de loodsen sommeert de gemeente zowel de professionele bewaarnemer als de eigenaar van de stoffen in de loodsen aanwezige brandresten te verwijderen. Geen van beiden geeft gehoor aan deze sommatie, waarna de gemeente alleen de eigenaar van de gevaarlijke stoffen dagvaardt tot schadevergoeding op grond van onrechtmatige daad. De eigenaar stelt dat volgens art. 175 boek 6 Burgerlijk Wetboek voor de aansprakelijkheid voor gevaarlijke stoffen alleen de professionele bewaarnemer aansprakelijk is. En dat dit volgens lid 2 van dit artikel met uitsluiting van de eigenaar van de stoffen is. De rechtbank verwerpt dit verweer: de regeling van art. 175 laat onverlet de aansprakelijkheid van anderen op grond van onrechtmatige daad, voorzover doel en strekking van die regeling niet onaanvaardbaar wordt doorkruist. Weliswaar treft de eigenaar – anders dan de bewaarnemer – geen enkel verwijt van de verwezenlijking van het gevaar, maar de rechtbank acht het onrechtmatig dat de eigenaar heeft geweigerd de restanten van de hem toebehorende stoffen van het terrein te verwijderen. De rechtbank wijst de vordering van de gemeente derhalve toe.

(uit: Arbo actueel, november 2001)

Bedrijven moeten gevaren stoffen gaan bijhouden

(18 juli 2002)

Bedrijven moeten verplicht gaan bijhouden wat de gevaren zijn van de stoffen die zij maken of importeren. Zij moeten bovendien hun afnemers laten weten wat de zogenoemde gevaarseigenschappen van de stoffen zijn. Het gaat zowel om bestaande als nieuwe stoffen. Dit heeft het kabinet besloten. De wetswijziging moet het voor bedrijven eenvoudiger maken om in te schatten wat de gevaren zijn van de materialen die zij in huis halen, zodat zij passende maatregelen kunnen nemen.

Onafhankelijke deskundigen worden ingeschakeld om de eigenschappen van de stoffen te controleren. Als van een stof geen gegevens beschikbaar zijn, valt ze automatisch in de hoogste risicocategorie.

(uit: Arbo actueel, juli 2002)



BIJLAGE IV

Transportation of Dangerous Goods Act, 1992

Enabling statute: Transportation of Dangerous Goods Act, 1992
Transportation of Dangerous Goods Regulations
SCHEDULE II

Source: <http://laws.justice.gc.ca/en/T-19.01/SOR-85-77/171434.html>
Updated to August 31, 2001

LIST II DANGEROUS GOODS OTHER THAN EXPLOSIVES

=====
Col. ICol. IICol. IIICol. IVCol. VCol. VICol. VIICol. VIIICol. IXCol. X
ProductClassifi-IdentificationPackingSpecialBulk Consumer Limited Passenger Passenger

Item Shipping name and Description caution Number Group Provisions Transport
Commodity Quantity Vehicles Ship

1845 RESIN SOLUTION, 3 UN1866 II 5 L
(2029) *flammable* III 60 L
1846 Resorcinol 6.1 UN2876 III 109 100 kg
(2030) 9.2
1847 Rosin oil 3 UN1286 III 60 L
(1223)
1848 Rubber scrap or Rubber shoddy, 4.1 UN1345 II 15 kg
(404) powdered or granulated, not exceeding 840 microns and
rubbercontent exceeding 45 per cent
1849 RUBBER SOLUTION 3 UN1287 II 5 L(405)III60 L
1850 Rubidium 4.3 UN1423 I 69 P P P P(2032)
1851 Rubidium hydroxide 8 UN2678 II 15 kg(1255)



BIJLAGE V

Ontario Fire Code, section 3.3

Ontario Fire Code

SECTION 3.3 *STORAGE*

Illustrated Commentary



Storage	Illustrated Commentary	1
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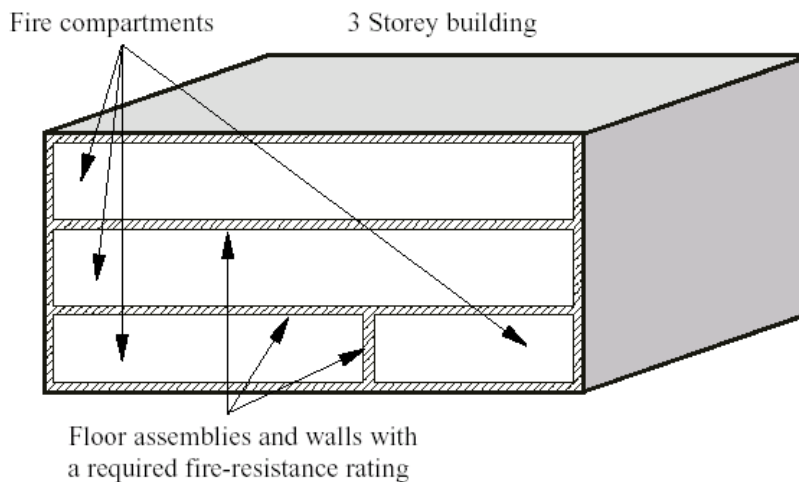
3.3.1. Indoor Tire Storage
Application

3.3.1.1. This Subsection applies to **buildings** used for the storage of tires in which the bulk volume of tires stored in one **fire compartment** exceeds 425 m³.

Subsection 3.3.1. Indoor Tire Storage applies to buildings where storage of tires situated in one fire compartment exceeds the bulk volume of 425m³.

For example, this subsection would not apply to a 3 storey building where each storey contains less than 425m³ of stored tires even though the total bulk volume of tires in the building exceeded 425m³.

Rationale: Each storey in the building would be considered to be a separate fire compartment.



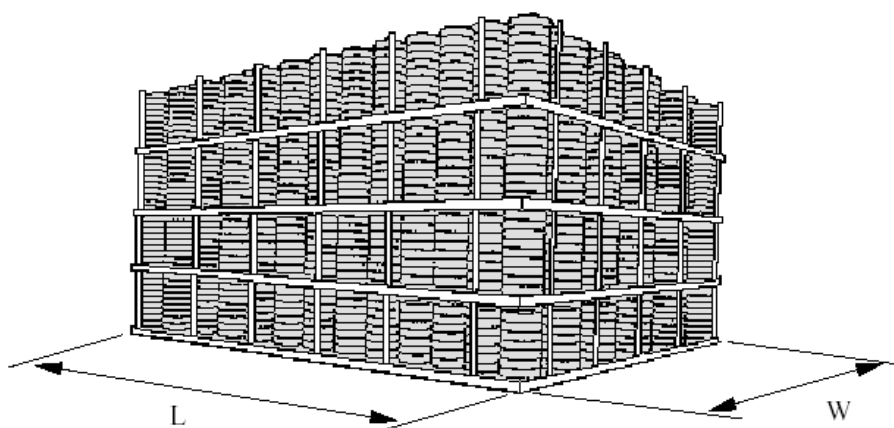
Building means any structure used or intended for supporting or sheltering any use or occupancy.
Fire compartment means an enclosed space in a building that is separated from all other parts of the building by enclosing construction that provides a fire separation having a required fire-resistance rating.

3.3.1. Indoor Tire Storage

Tire pile dimensions

3.3.1.2. A single pile of tires in a tire storage location shall occupy an area not greater than 500 m² with a maximum length of 30 m.

Placing a limit on the maximum area of a pile and limiting the piles maximum length and width can enhance fire-fighting activities.



$$\text{Area} \leq 500 \text{ m}^2$$

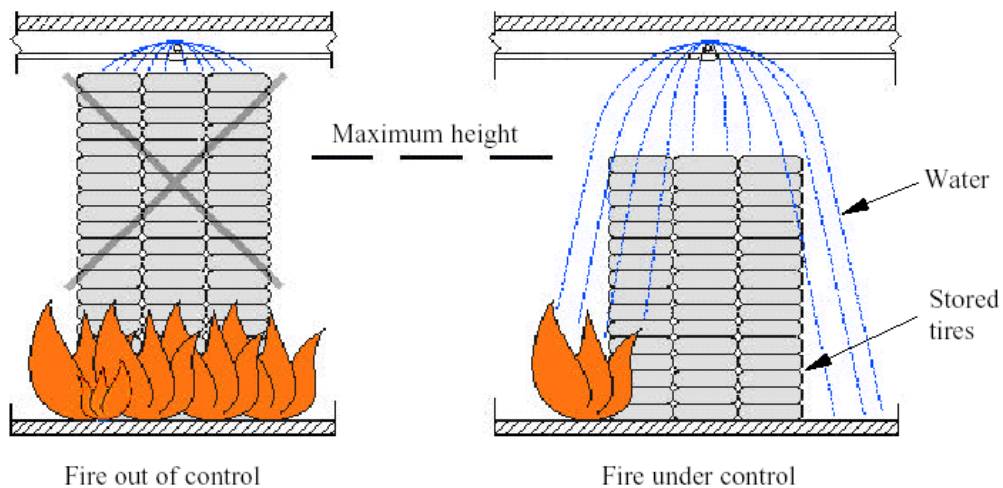
$$L \leq 30 \text{ m}$$

3.3.1. Indoor Tire Storage

Tire pile dimensions

- 3.3.1.3.(1) The maximum piling height of tires shall not exceed the height used for the design of the fixed extinguishing system installed as required in Article 3.3.1.8.
- (2) The maximum piling height allowed in Sentence (1) shall be posted in conspicuous locations.

The objective of this requirement is to ensure that the sprinkler system has the capability to control or extinguish a fire.



3.3.1. Indoor Tire Storage

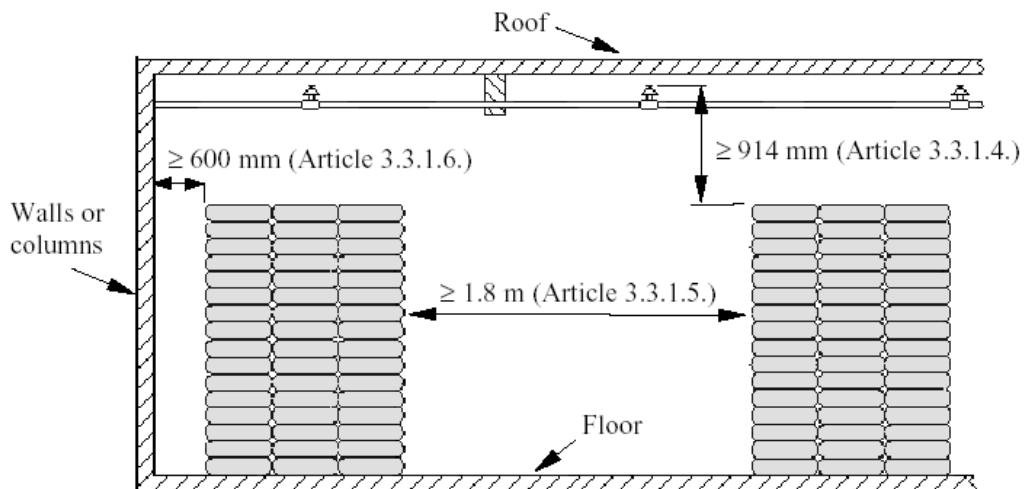
Pile clearance

- 3.3.1.4. A clearance of at least 914 mm shall be maintained between the tops of piles and sprinkler head deflectors.
- 3.3.1.5. Aisles between individual piles shall be at least 1.8 m wide.
- 3.3.1.6. A clearance of at least 600 mm shall be maintained between piles of tires and columns and enclosing walls.

The clearance required by Article 3.3.1.4. is intended to ensure that the water (extinguishing agent) discharging from the sprinkler head is not obstructed by the stored tires. An obstruction could prevent the extinguishing agent from discharging over the fire area, thus causing the automatic extinguishing system to be ineffective.

Article 3.3.1.5. provides aisles for fire department access to the piles.

Article 3.3.1.6. specifies the clearance required between storage piles and structural elements of the building that will reduce the possibility of structural damage resulting from a fire.



3.3.1. Indoor Tire Storage
Pile clearance

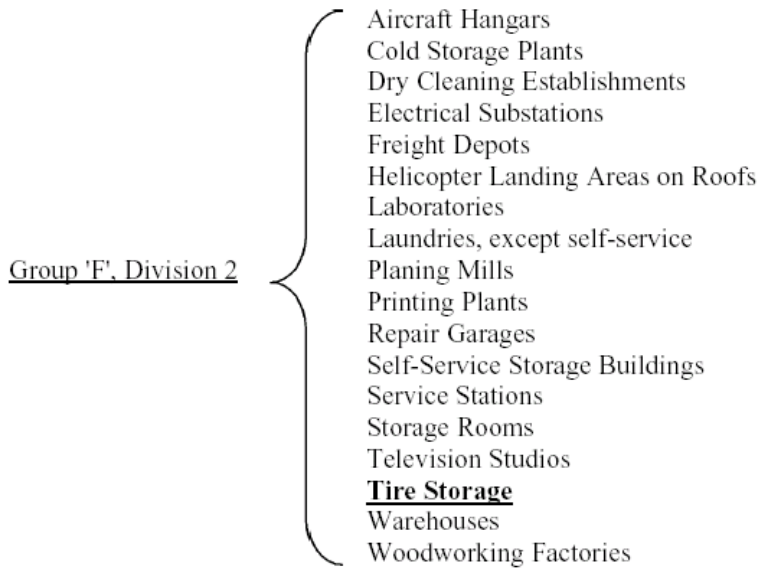
3.3.1.7. A tire storage location shall be classified as a Group 'F' Division 2 **occupancy.**

The Building Code classifies industrial occupancies into 3 divisions.

These include:

- High Hazard Group 'F' Division 1,
- Medium Hazard Group 'F' Division 2 and
- Low Hazard Group 'F' Division 3.

Similar to the Ontario Building Code, the Fire Code classifies a tire storage location as a Group 'F' Division 2.



Occupancy means the use or intended use of a building or part thereof for the shelter or support of person, animals or property.

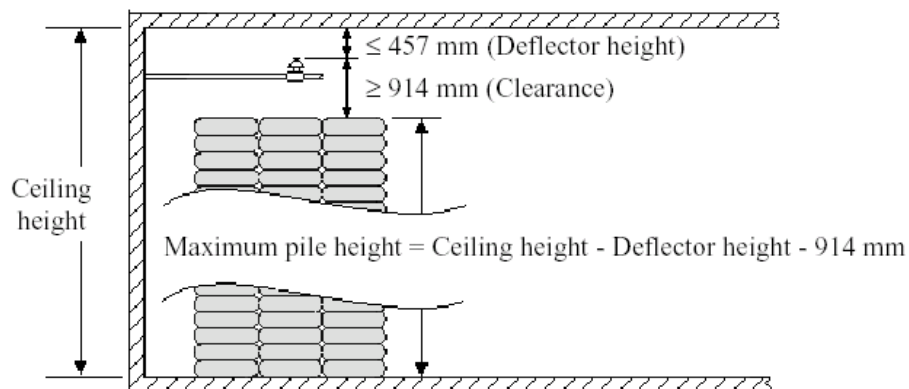
3.3.1. Indoor Tire Storage

Warehouse fire extinguishing systems

- 3.3.1.8.(1) Where the **floor area** of a tire storage location exceeds 250 m², the **floor area** shall be provided with an **approved** automatic fire extinguishing system installed in conformance with NFPA 231D, "Storage of Rubber Tires".
- (2) The design of the automatic fire extinguishing system required in Sentence (1) shall be based on the maximum piling height available.

A fire occurring in a pile of stored rubber tires would be extremely smoky, hot and difficult to control or extinguish. For these reasons, a specially designed and installed automatic fire extinguishing system shall be provided to protect each floor area containing stored tires where the floor area exceeds 250 m². An automatic fire extinguishing system is not required where the floor area does not exceed 250 m².

To determine the maximum pile height, you would have to consider the ceiling height of the space under consideration and height of the sprinkler head deflectors above the finished floor. For example, the NFPA standard requires the sprinkler head deflectors to be installed not more than 457 mm below the floor slab or roof deck. Further, article 3.3.1.8. requires that a clearance of not less than 914 mm be maintained between the top of the piles and the sprinkler head deflectors.



Approved means approved by the Chief Fire Official.

Floor area means the space on any storey of a building between exterior walls and required firewalls and includes the space occupied by interior walls and partitions, but does not include exits and vertical service spaces that pierce the storey.

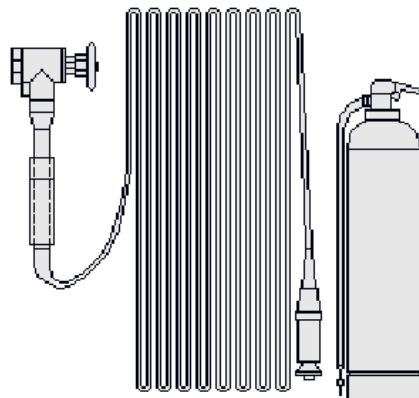
3.3.1. Indoor Tire Storage

Warehouse fire extinguishing systems

3.3.1.9. A standpipe and hose system shall be installed in conformance with NFPA 231D, "Storage of Rubber Tires".

When installing a standpipe and hose system in a sprinklered building, the installation must be compatible with the sprinkler system. The NFPA 231D "Storage of Rubber Tires" standard requires 38 mm fire hose to be provided to reach any portion of the storage area using one of the following methods of supplying water to the fire hoses:

- a) hydrants
- b) a separate piping system for the fire hose stations
- c) valved hose connections on sprinkler risers where such connections are made upstream of sprinkler control valves, or
- d) an adjacent sprinkler system

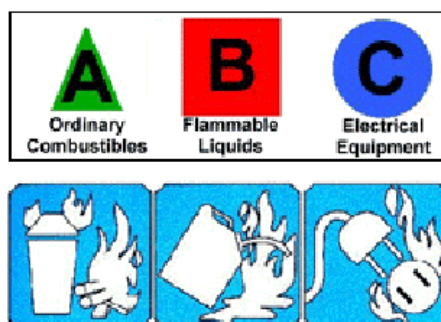


3.3.1. Indoor Tire Storage

Portable extinguishers

- 3.3.1.10. Portable extinguishers conforming to Section 6.2 shall be provided in tire storage locations so that there is one extinguisher with a 2A:10BC or higher rating for every 250 m² of **floor area**.

This Article requires that portable fire extinguishers provided in the floor area be of a multi-purpose type and have a nominal rating of at least 2A:10BC. At least one fire extinguisher must be provided for every 250 m² of floor area.



Floor area means the space on any storey of a building between exterior walls and required firewalls and includes the space occupied by interior walls and partitions, but does not include exits and vertical service spaces that pierce the storey.



BIJLAGE VI

Fire Code 374, Canada

FC 374, Fire Protection Standard for General Storage (Indoor and Outdoor), September 1994

(Replaces FC 374(M), General Storage, March 1977)

1 GENERAL

1.1 Purpose

This standard prescribes fire protection requirements for the handling and storage of materials in indoor and outdoor general storage facilities on Government of Canada property in order to minimize risks to life, property, and the environment, and to protect and conserve the Government's financial position.

1.2 Application

This standard applies to all:

- a. departments and agencies listed in Schedule I and II of the *Financial Administration Act* (FAA) with the exception of the Department of National Defence;
- b. branches designated as departments for the purposes of the FAA; and
- c. those departments and other portions of the Public Service as defined in Part I of Schedule I of the *Public Service Staff Relations Act*.

1.3 Scope

- a. This standard prescribes fire protection engineering requirements for the handling and storage of materials in indoor and outdoor general storage facilities. (See Appendix A).
- b. This standard excludes requirements for bulk storage of unprocessed materials, such as agricultural products, coal, salt and wood chips.

2. GENERAL REQUIREMENTS

2.1 Codes and Standards

Except as otherwise provided in this standard, the design and operation of storage facilities shall conform to the applicable requirements of:

- a. the NBC; and
- b. the NFC.

2.2 Classification of Products

- a. Products shall be classified in accordance with the requirements of the NFC. (See Appendix A)
- b. When the storage involves materials in more than one product classification, the entire storage shall be considered to come under the most stringent requirements.

3. INDOOR STORAGE

3.1 Means of Egress

- a. Means of egress shall comply with the requirements of the NFC and this Subsection.

- b. Aisles providing access to exits shall be not less than 1 m wide.
- c. Dead-end aisles in storage areas shall not exceed:
 - i. 5 m where hazardous materials are stored; and
 - ii. 10 m for all other commodities.

3.2 Materials Placing

- a. The height and area for individual storage areas shall not exceed that permitted by the NFC. (See Appendix A)
- b. The height and area of individual storage areas of products or materials involving more than one commodity classification shall not exceed that permitted for the most hazardous commodity in the individual storage area.
- c. Separation aisles and fire department access aisles in storage areas shall conform to the requirements of the NFC.
- d. At least 1 m clearance shall be maintained between the top of storage and the bottom of unit heaters, radiant space heaters and ceiling ducts.
- e. Where floor openings for fire fighting purposes are provided, aisles shall be so arranged that all of these openings are readily accessible.
- f. Products and materials shall be stored so as not to block floor drains or wall scuppers.
- g. Products and materials susceptible to water damage shall be placed on skids or pallets so that they will be raised above the floor at least 100 mm. (See Appendix A).
- h. Products that expand with the absorption of water shall be stored at least 600 mm from walls and columns. (See Appendix A).

3.3 Combustible Fibres

3.4 Hazardous Materials

- a. The storage and handling of hazardous materials shall conform to the requirements of the NFC and this Subsection.
- b. The storage and handling of hazardous materials on ships in a marine terminal shall be in accordance with the requirements of the "International Maritime Dangerous Goods Code (IMO)".

4. OUTDOOR STORAGE

4.1 Materials Placing

- a. The height and area of individual storage areas of products or materials shall not exceed that permitted by the NFC. (See Appendix A)
- b. The height and area of individual storage areas of mixed commodity classifications shall not exceed that permitted for the most hazardous commodity in the individual storage area.
- c. A continuous aisle of at least 5 m in width shall be maintained between the boundary of the storage site and all stored products.
- d. A continuous aisle of at least 5 m in width shall be maintained parallel to and on both sides of any railway line.
- e. Combustible materials shall not be stored on the roof of any building.

4.2 Products of Limited Combustibility

- a. This Subsection applies to the outdoor storage of:
 - i. Class I and Class II commodities; and
 - ii. intermodal shipping containers, other than those containing hazardous materials.
- b. Individual storage areas that consist essentially of noncombustible materials such as Class I or Class II commodities shall not exceed 2000 m² in area.
- c. When storage is in intermodal shipping containers of noncombustible construction, the size of individual storage areas shall not exceed 4000 m².
- d. The separation distance between individual storage areas shall be not less than 2 m.
- e. Fire department access routes shall conform to the requirements of the NFC for outdoor storage of Class III and IV commodities.

4.3 Lumber and Forest Products

- a. The maximum height of randomly stacked or unranked piles of logs or timbers shall not exceed 6 m unless approved special extinguishing equipment, such as portable turrets, deluge sets or monitor towers are installed.

7. FIRE PROTECTION

7.1 Portable Extinguishers

- a. Portable extinguishers shall be provided throughout indoor storage facilities in accordance with the requirements of the NFC.
- b. Each industrial truck shall be equipped with a multi-purpose dry chemical extinguisher having a rating of at least 2-A,10-B,C, except as permitted in (c).

- c. Where it is impractical to equip industrial trucks with portable extinguishers, the provision of such extinguishers may be waived where specifically approved and where sufficient multi-purpose dry chemical extinguishers having a rating of at least 4-A,20-B,C are provided throughout the storage buildings at designated locations so that the travel distance to such an extinguisher from any point within the building does not exceed 15 m.
- d. Portable extinguishers installed in dusty locations shall be enclosed in suitably marked dust-tight cabinets.
- e. The location of portable extinguishers shall be clearly identified by the use of signs or other means, such as the painting of columns to which they are affixed.

7.2 Standpipe and Hose Systems

- a. Standpipe and hose systems shall be provided in storage buildings where required by the NBC.
- b. Standpipe systems in storage buildings shall be designed for Class II or Class III service as defined by NFPA 14. (See Appendix A)
- c. A fire hose system shall be provided in storage buildings that are sprinklered but that are not required by the NBC to have a complete standpipe and hose system. The system shall consist of hose stations with not more than 30 m of 38 mm diameter fire hose, supplied from the sprinkler system piping, and conforming to the requirements of NFPA 13 and NFPA 231.

7.3 Sprinkler Systems

- a. Sprinkler systems shall be installed in storage buildings:
 - i. where required by the NBC (see Appendix A);
 - ii. where required by the NFC (see Appendix A); or
 - iii. where the total area occupied by storage exceeds that shown in Table 7.3.A.

**Table 7.3.A
Forming Part of Clause 7.3.(a)**

Type of Storage	Area (m2)
Class I commodities	2000
Class II commodities	1000
Class III commodities, Group C plastics, & closed containers of distilled beverage alcohol	500
Class IV commodities and Group B plastics	250
Group A plastics	250
Hazardous materials	100

- b. Sprinkler systems shall be hydraulically designed and conform to the requirements of the NFC, FC Standard No. 403, "Sprinkler Systems", and the applicable NFPA standards. (See Appendix A).

7.4 Exterior Fire Protection

- a. Except as otherwise provided in this Subsection, all storage facilities shall be provided with fire hydrants and an adequate water supply for fire fighting. (See Appendix A)
- b. Except as permitted in (c), fire hydrants shall be located so that all parts of an outdoor storage area are no further than 75 m from a hydrant.
- c. The distance to fire hydrants may exceed 75 m if:
 - i. the outdoor storage area is protected by approved special extinguishing equipment, such as portable turrets, deluge sets or monitor towers; or
 - ii. the storage area contains only products of limited combustibility, such as described in Subsection 4.2.
- d. Fire hydrants shall be so located that all parts of the perimeter of a storage building can be reached by a fire hose with not more than 120 m of hose attached to a hydrant. This distance may be increased to 150 m if the building is equipped with a Class I or Class III standpipe system.
- e. Fire hydrants shall be connected to an approved public or private water supply system.
- f. Hydrants shall be accessible for connection to fire department apparatus operating on access roads. (See Appendix A.)
- g. In storage sites adjoining bodies of water, and in which the requirements of (a) cannot be met, access at least 5 m in width shall be provided to the body of water for fire department pumping apparatus.
- h. Where municipal fire protection is inadequate, the FC shall be consulted to determine an alternate method of providing adequate fire protection.
- i. Clear access to hydrants, hose and hydrant stations, post indicator valves and fire department connections shall be maintained at all times.
- j. Locations of fire equipment designated in (e), which are not readily visible from access roads shall be clearly indicated by signs.

7.5 Fire Alarm Systems

- a. Fire alarm systems shall be installed in storage buildings
 - i. where required by the NBC; or
 - ii. where the gross floor area exceeds 3000 m².
- b. Fire alarm systems shall be designed and installed in accordance with the requirements of Chapter 3-4, "Standard for Fire Alarm Systems".

7.6 Watchman Service

- a. If watchman service is provided on a property which includes outdoor storage facilities, the rounds shall be arranged to ensure that the outside storage areas are covered.
- b. Watchmen, if utilized as recommended in (a), shall be instructed as to the proper procedure to notify the local fire department in the event of fire and shall be familiar with the use of the fire protection equipment provided.

7.7 Fire Emergency Procedures

- a. A Fire Safety Plan shall be developed and implemented in all storage facilities in accordance with Chapter 3-1, "Standard for Fire Safety Planning and Fire Emergency Organization".
- b. The administrative official shall review the fire safety plan at least annually to verify the accuracy of the information respecting the type of products being stored, the storage configuration, and the sprinkler system design criteria. (See Appendix A)

APPENDIX A EXPLANATORY MATERIAL

A-1.3.(a) Some examples of indoor and outdoor general storage facilities are: warehouses; air cargo terminals; marine terminals; and lumber yards. For specialized storage, such as records, archives, museum collections, etc., reference should be made to specific NFPA or TB standards for such occupancies.

A-2.2.(a) The NFC uses the commodity classification system of NFPA 231, which contains many examples of commodities for classification purposes. The following is a brief overview of the NFPA 231 classifications:

Class I commodity is defined as essentially non-combustible products in ordinary corrugated cartons or in ordinary paper wrapping, with or without combustible pallets.

Class II commodity is defined as Class I products in slatted wooden crates, solid wooden boxes, multiple thickness paperboard cartons or equivalent combustible packaging material, with or without combustible pallets.

Class III commodity is defined as wood, paper, natural fibre, cloth, or Group C plastics, with or without combustible pallets.

Class IV commodity is defined as Class I, II, or III products in corrugated cartons, containing an appreciable amount of Group A plastics or with Group A plastics packaging, with or without combustible pallets. Group B plastics and free-flowing Group A plastics are also included in this class.

Group A plastics include, but are not limited to, ABS, acrylic, butyl rubber, fibreglass reinforced polyester, natural rubber (if expanded), nitrile rubber, polycarbonate, polyester elastomer, polyethylene, polypropylene, polystyrene, polyurethane, highly plasticized PVC, and SBR.

Group B plastics include, but are not limited to, cellulose, fluoroplastics, natural rubber (not expanded), nylon, and silicon rubber.

Group C plastics include, but are not limited to, fluoroplastics, melamine, phenolic, rigid PVC, and urea formaldehyde.

A-3.2.(a) "Individual storage area" is a defined term in the NFC. It generally replaces the term "pile" as used in previous editions of this standard, which could be

misinterpreted as meaning only solid piled storage. Whether materials are stored in solid piles, in bin boxes, on racks, or on shelves, it is the intent that large storage areas be subdivided into individual storage areas separated by aisles not less than 2.4 m in width. The NFC prescribes the height and area limits of individual storage areas or piles as follows:

Height and Area Limits for Individual Storage Areas (or piles) for Indoor Storage				
Product Classification	Unsprinklered Buildings		Sprinklered Buildings	
	Area, m ²	Height of Storage, m	Area, m ²	Height of Storage, m*
Class I & Class II	500	6.5	1500	9.0
Class III, Group C plastics, and distilled beverage alcohol	250	4.5	1000	9.0
Class IV & Group B plastics	250	3.6	1000	9.0
Group A plastics	250	1.5	500	6.1
Aerosols	See Subsection 3.3.5 of NFC			
Flammable & Combustible Liquids	See Subsection 4.2.7 of NFC			
Other Dangerous Goods	See Subsection 3.3.6 of NFC			

* Sprinklered rack storage may exceed 9.0 m in height.

A-3.2.(g) It may be impracticable to store some commodities above the floor due to structural or other limitations. In such cases other approved means of protecting the material from water damage should be used. For example, trenches and floor drains may be used for rolled paper storage.

A-3.2.(h) Some examples of products which may expand when wet are roll paper and baled combustible fibres such as jute, hemp, and sisal.

.A-4.1.(a) "Individual storage area" is a defined term in the NFC. It generally replaces the term "pile" as used in previous editions of this standard, which could be misinterpreted as meaning only solid piled storage. Whether materials are stored in solid piles, in bin boxes, on racks, or on shelves, it is the intent that large storage areas be subdivided into individual storage areas separated by substantial aisles. The following table is a summary of the height and area limits of individual storage areas or piles derived from the NFC and Subsection 4.2 of this standard:

Height and Area Limits and Minimum Clearances for Individual Storage Areas (or piles) for Outdoor Storage			
Product Classification	Max. Base Area, M ²	Max. Height of Storage, m	Min. clear space around ISA, m
Noncombustible intermodal shipping containers (no dangerous goods)	4000	*	2
Class I & II commodities	2000	*	2
Class III and IV commodities, Group A, B and C plastics, Lumber, Timber, Manufactured Buildings, Wrecked Vehicles	1000	if <3 if <3 but <6	6 twice the height of storage
Wood Chips, Hogged Material	15000	18	9
Rubber Tires, Combustible Pallets	1000	3	15
Dangerous Goods	1000	6	6

* The maximum height should be determined by the base area of the pile, the type of packaging, stability of the pile under normal as well as fire conditions, combustibility of the materials, and the limit of the effective reach of fire hose streams.

A-6.1.(c)A clearance of at least 300 mm in all directions is recommended for light fixtures to prevent breakage of the fixture or ignition of commodities. Guards and shades may also help prevent breakage.

A-7.2.(b)The purpose of clause 7.2.(b) is to require the installation of 38 mm diameter fire hose for occupant use. Class I systems do not provide this. Also, the exception in NFPA 14 for Class III systems in sprinklered buildings does not apply. The choice between a Class II or Class III system is determined by the height and area of the building in accordance with the NBC requirements.

A-7.3.(a)The sprinkler requirements of the NBC are based mainly on the occupancy classification, construction, height, and area of the building. The sprinkler requirements of the NFC are based on the commodity classification, the quantity of product stored, the size of the individual storage area, and the storage height, rather than on the floor area of the building.

A-7.3.(b) NFPA standards applicable to storage include:

- i. NFPA-13, "Installation of Sprinkler Systems";
- ii. NFPA-231, "General Storage";
- iii. NFPA-231C, "Rack Storage of Materials";
- iv. NFPA-231D, "Storage of Rubber Tires"; and
- v. NFPA-30B, "Manufacture and Storage of Aerosol Products".

A-7.4.(a)The FC and the local fire department should be consulted regarding the adequacy of the water supply and the required location and distribution of fire hydrants.

A-7.4.(f) Hydrants should be located so that they:

- i. are not less than 1.5 m nor more than 3 m from access roads;
- ii. are not less than 15 m from buildings;
- iii. have a clear space of 1.0 m on all sides; and
- iv. are positioned with the large pumper connection facing the access road.

A-7.7.(b) The FC should be consulted for advice on the adequacy of fire protection if there are any significant changes in the commodity classifications, storage height, or storage methods being used.



BIJLAGE VII

National Building Code, Building access handbook

BUILDING ACCESS HANDBOOK

Appendix 3

Classification of Building Use

The Building Code classifies buildings according to their use. The purpose of classification is to establish which code requirements are applicable. Most buildings are classified as containing a single major occupancy although there are usually other "minor" occupancies in the building which are integral with the major occupancy and considered subsidiary to it. If a building contains more than one major occupancy, such as a hotel (Group C, residential) with restaurants and conference rooms on the main floor (Group A, assembly), the Code stipulates the building must comply with the requirements for each major occupancy it contains.

The following are examples of the major occupancy classifications described in Table 3.1.2.1. of the British Columbia Building Code and referred to throughout this Handbook:

Group A, Division 1 **Assembly**

Motion picture theatres
Theatres, including
experimental theatres

Opera houses
Television studios admitting a
viewing audience

Group A, Division 2 **Assembly**

Art galleriess
Auditoria
Bowling Alleys
Churches and similar places of worship
Museums
Passenger stations and depots
Recreational piers
Restaurants
Schools and colleges, nonresidential
Undertaking Premises

Gymnasias
Lecture halls
Libraries
Liscenced beverage establishments
Clubs, nonresidential
Community halls
Court rooms
Dance halls
Exhibition halls (other than classified
in Group E)

Group A, Division 3 **Assembly**

Arenas
Rinks

Indoor swimming pools with or
without spectator seating

Group A, Division 4 **Assembly**

Amusement park structures (not elsewhere classified) Bleachers	Grandstands Reviewing stands Stadia
--	---

Group B, Division 1 **Institutional**

Jails Penitentiaries Police stations with detention quarters	Psychiatric hospitals with detention quarters Reformatories with detention quarters
--	--

Group B, Division 2 **Assembly**

Children's custodial homes Convalescent homes Hospitals Infirmaries Nursing homes Sanitoria without detention quarters	Orphanages Psychiatric hospitals without detention quarters Reformatories without detention quarters
---	--

Group C **Residential**

Apartments Boarding houses Clubs, residential Colleges, residential Convents Dormitories	Hotels Houses Lodging houses Monasteries Motels Schools, residential
---	---

Group D **Business & Personal Service**

Banks Barber and hairdressing shops Beauty parlours Dental offices Dry-cleaning establishments, self- service, not using flammable or explosive solvents or cleaners	Laundries, self-service Medical offices Offices Police stations without detention quarters Radio stations Small tool and appliance service establishments
--	--

Group E **Merchantile**

Department stores Exhibition halls Markets	Shops Stores Supermarkets
--	---------------------------------

Group F, Division 1 Industrial, High Hazard

Bulk plants for flammable
Bulk storage warehouses
for hazardous substances
Cereal mills
Chemical manufacturing
or processing plants
Distilleries
Dry-cleaning plants
Feed mills

Bulk plants for flammable liquids
Bulk storage warehouses
for hazardous substances
Cereal mills
Chemical manufacturing
or processing plants
Distilleries
Dry-cleaning plants
Feed mills plants

Group F, Division 2 Industrial, Medium Hazard

Aircraft hangars
Box factories
Candy plants
Cold storage plants
Dry-cleaning establishments not using
flammable or explosive solvents or
cleaners
Electrical substations
Factories
Freight depots
Warehouses
Wholesale rooms
Laboratories
Laundries except self-service

Mattress factories
Planing mills
Printing plants
Repair garages
Sales rooms
Service stations
Storage rooms
Television studios not admitting a
viewing audience
Helicopter landing areas on roofs
Woodworking factories
Workshops

Group F, Division 3 Industrial, Low Hazard

Creameries
Factories
Laboratories
Power plants
Sales rooms
Sample display rooms

Storage garages including open air
parking garages
Storage rooms
Warehouses
Workshops

Explanation of Building Height and Building Area

In order to determine what code requirements apply to a building it is necessary to determine not only its major occupancy but also its height and area. The higher and/or larger a building is the more stringent are the code's fire and life safety requirements. Building height and area also have a limited effect on access requirements.

Building height is measured in storeys above grade and is defined as "...the number of storeys contained between the roof and the floor of the first storey ...". The key here is the term "first storey" which is defined as the "...uppermost storey having its floor level not more than 2 m above grade...". This means that a storey which is partly below grade might not be included in a building's height for code classification purposes. Therefore, a building of two storeys in "building height" may contain more than two storeys, e.g. a two storey apartment block with a basement level partly above grade. Such a building is considered as two storeys in building height but contains three storeys.

Building area is defined as "...the greatest horizontal area of a building above grade within ... exterior walls or within ... exterior walls and ... firewalls...". In most cases this is the area of the first storey. It is not the sum of the areas of all the storeys in the building. The best way to describe building area for the purposes of the Building Code is to start by viewing the building from above. From this bird's eye perspective trace around the apparent outside perimeter. This will include portions of storeys that may project beyond the exterior walls of lower storeys.

BIJLAGE VIII

NFPA 231D

231D-4

STORAGE OF RUBBER TIRES

NFPA 231D

Standard for

Storage of Rubber Tires

1994 Edition

NOTICE: An asterisk (*) following the number or letter designating a paragraph indicates explanatory material on that paragraph in Appendix A.

Information on referenced publications can be found in Chapter 6 and Appendix D.

Chapter 1 Introduction

1-1 Scope.

1-1.1 This standard shall apply to the indoor storage of rubber tires.

1-1.2 The provisions contained in this standard shall apply to new facilities for tire storage and the conversion of existing buildings to tire storage occupancy. This standard can be used as a basis for evaluating existing storage facilities.

1-1.3 Miscellaneous storage, as defined in this standard, shall be permitted to be protected in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

1-2 Definitions. Unless expressly stated otherwise, for the purposes of this standard, the following definitions shall apply:

Approved. Acceptable to the authority having jurisdiction.

NOTE: The National Fire Protection Association does not approve, inspect, or certify any installations, procedures, equipment, or materials; nor does it approve or evaluate testing laboratories. In determining the acceptability of installations, procedures, equipment, or materials, the authority having jurisdiction may base acceptance on compliance with NFPA or other appropriate standards. In the absence of such standards, said authority may require evidence of proper installation, procedure, or use. The authority having jurisdiction may also refer to the listings or labeling practices of an organization concerned with product evaluations that is in a position to determine compliance with appropriate standards for the current production of listed items.

Authority Having Jurisdiction. The organization, office, or individual responsible for approving equipment, an installation, or a procedure.

NOTE: The phrase "authority having jurisdiction" is used in NFPA documents in a broad manner, since jurisdictions and approval agencies vary, as do their responsibilities. Where public safety is primary, the authority having jurisdiction may be a federal, state, local, or other regional department or individual such as a fire chief; fire marshal; chief of a fire prevention bureau, labor department, or health department; building official; electrical inspector; or others having statutory authority. For insurance purposes, an insurance inspection department, rating bureau, or other insurance company representative may be the authority having jurisdiction. In many circumstances, the property owner or his or her designated agent assumes the

role of the authority having jurisdiction; at government installations, the commanding officer or departmental official may be the authority having jurisdiction.

Available Height for Storage. The maximum height at which tires can be stored above the floor while maintaining adequate clearance from structural members and the required clearance below sprinklers.

Bundled Tires. A storage method in which a number of tires are strapped together.

Conventional Pallet. A material handling aid designed to support a unit of load with stringers to provide support for material handling devices.

Encapsulated. A method of packing consisting of plastic sheet completely enclosing the sides and top of a combustible commodity or combustible package.

NOTE: Stretch-wrapping around the sides only shall not be considered to be encapsulated.

Horizontal Channel. Any uninterrupted space in excess of 5 ft (1.5 m) in length between horizontal layers of stored tires. Such channels may be formed by pallets, shelving, racks, or other storage arrangements.

Labeled. Equipment or materials to which has been attached a label, symbol, or other identifying mark of an organization that is acceptable to the authority having jurisdiction and concerned with product evaluation that maintains periodic inspection of production of labeled equipment or materials and by whose labeling the manufacturer indicates compliance with appropriate standards or performance in a specified manner.

Laced Storage. Tires stored where the sides of the tires overlap, creating a woven or laced appearance. [See Figure 1-3(g).]

Listed. Equipment or materials included in a list published by an organization acceptable to the authority having jurisdiction and concerned with product evaluation that maintains periodic inspection of production of listed equipment or materials and whose listing states either that the equipment or material meets appropriate standards or has been tested and found suitable for use in a specified manner.

NOTE: The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the listing organization to identify a listed product.

Miscellaneous Storage.* The storage of rubber tires that is incidental to the main use of the building. Storage areas shall not exceed 2000 ft² (186 m²). (See Section 3-3.)

On-side Storage. Tires stored horizontally or flat.

On-tread Storage. Tires stored vertically or on their treads.

Palletized. Storage on portable racks of various types utilizing a conventional pallet as a base.

Pyramid Storage. On-floor storage in which tires are formed into a pyramid to provide pile stability.

1994 Edition

Rack. Any combination of vertical, horizontal, and diagonal members that supports stored materials. Racks may be fixed or portable. A fixed rack is a supporting framework that remains in a fixed position within the warehouse during normal usage and into which the placement and retrieval of storage is by means of handling tires individually or in pallet loads.

NOTE: See NFPA 231C, *Standard for Rack Storage of Materials for Rack Arrangements*.

Rubber Tires. Pneumatic tires for passenger automobiles, aircraft, light and heavy trucks, trailers, farm equipment, construction equipment (off-the-road), and buses.

Shall. Indicates a mandatory requirement.

Should. Indicates a recommendation or that which is advised but not required.

Sprinkler Temperature Rating. Ordinary temperature-rated sprinklers include temperature ratings between 135°F and 175°F (57°C and 80°C), and high temperature-rated sprinklers include temperature ratings between 250°F and 300°F (121°C and 149°C).

Storage Aids. Commodity storage devices such as shelves, pallets, dunnage, separators, and skids.

1-3 Illustrations. The following illustrations do not necessarily cover all possible storage configurations.

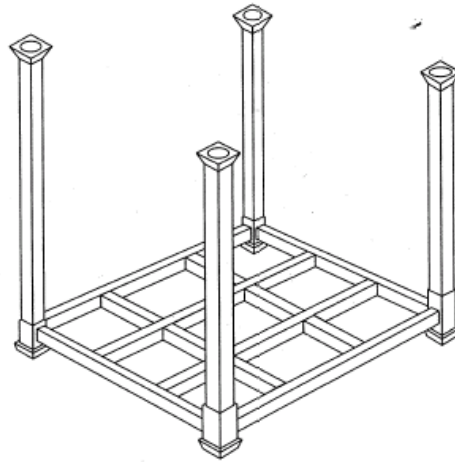


Figure 1-3(a) Typical open portable rack unit.

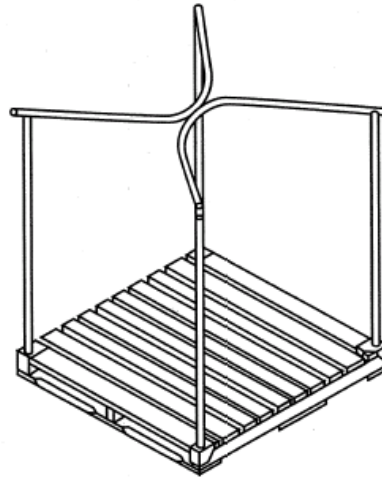
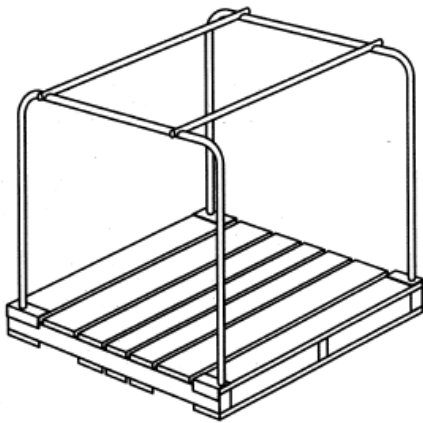


Figure 1-3(b) Typical palletized portable rack units.

231D-6

STORAGE OF RUBBER TIRES

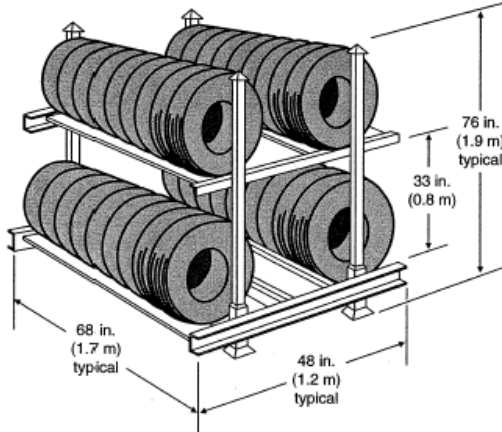


Figure 1-3(c) Open portable rack.

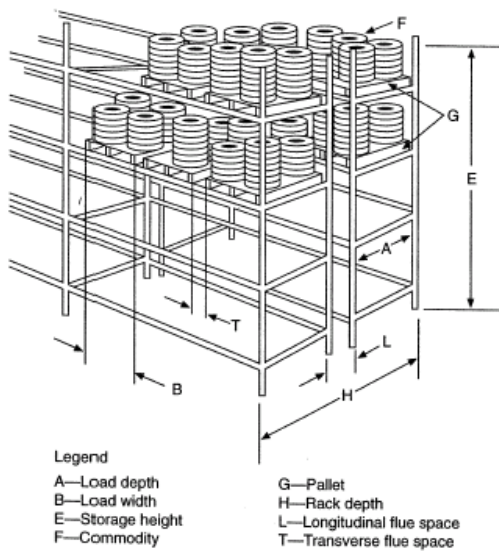


Figure 1-3(d) Double-row fixed rack storage.

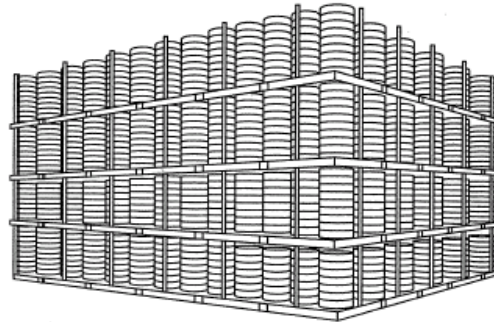


Figure 1-3(e) Palletized portable rack on-side storage arrangement (bundled or unbundled).



Figure 1-3(f) On-floor storage; on-tread, normally bundled; distance along tire hole not to exceed 25 ft (7.7 m).

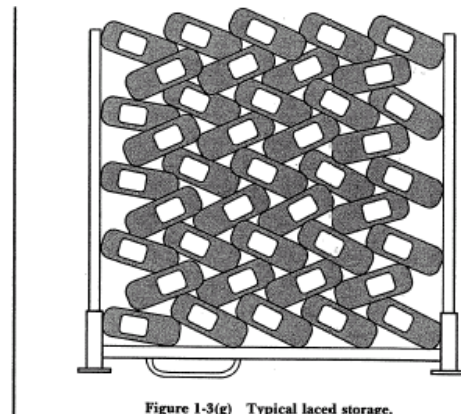


Figure 1-3(g) Typical laced storage.

Legend
 A—Load depth
 B—Load width
 E—Storage height
 F—Commodity
 G—Pallet
 H—Rack depth
 L—Longitudinal flue space
 T—Transverse flue space

Chapter 2 Building Arrangement

2-1* Construction.

2-1.1* Buildings used for the storage of tires that are protected in accordance with this standard shall be permitted to be of any of the types described in NFPA 220, *Standard on Types of Building Construction*.

2-1.2 Steel columns shall be protected as follows:

- (a) Storage exceeding 15 ft through 20 ft (4.6 m through 6 m) in height.

One-hour fireproofing or one sidewall sprinkler directed to one side of the column at a 15-ft (4.6-m) level.

(b) Storage exceeding 20 ft (6 m) in height.

Two-hour fireproofing for the entire length of the column, including connections with other structural members; or two sidewall sprinklers, one at the top of the column and the other at a 15-ft (4.6-m) level, both directed to the side of the column.

Exception: The above protection shall not be required where storage in fixed racks is protected by in-rack sprinklers.

2-2 Fire Walls.

2-2.1 Where protection in accordance with Section 4-1 is provided, stored tires shall be segregated from other combustible storage by aisles at least 8 ft (2.4 m) wide. Where not so protected, stored tires shall be separated by fire walls.

2-2.2 Where tires are stored up to 15 ft (4.6 m) high, walls between adjacent warehouse areas and between manufacturing and warehouse areas shall have not less than a 4-hour fire rating. Where tires are stored over 15 ft (4.6 m) high, walls between manufacturing and warehouse areas shall have a fire rating of not less than 6 hours.

Chapter 3 Storage Arrangement

3-1* Piling Procedures.

3-1.1 Piles shall not be more than 50 ft (15 m) in width.

Exception No. 1: Where tires are stored on-tread, the dimension of the pile in the direction of the wheel hole shall be not more than 50 ft (15 m).

Exception No. 2: Tires stored adjacent to or along one wall shall not extend more than 25 ft (7.6 m) from that wall.

3-1.2 The width of the main aisles between piles shall not be less than 8 ft (2.4 m).

3-2 Clearances.

3-2.1 The clearance from the top of storage to sprinkler deflectors shall be not less than 3 ft (0.9 m).

3-2.2 Storage clearance in all directions from roof structures shall be not less than 3 ft (0.9 m).

3-2.3 Storage clearance from ducts shall be maintained in accordance with NFPA 91, *Standard for Exhaust Systems for Air Conveying of Materials*.

3-2.4 Storage clearance from unit heaters, radiant space heaters, duct furnaces, and flues shall be not less than 3 ft (0.9 m) in all directions or shall be in accordance with the clearance shown on the approval agency label.

3-2.5* Clearance shall be maintained to lights or light fixtures to prevent possible ignition.

3-2.6 Not less than 24 in. (0.6 m) clearance shall be maintained around the path of fire door travel unless a barricade is provided.

3-3 Miscellaneous Storage.

3-3.1 On-tread storage piles, regardless of storage method, shall not exceed 25 ft (7.6 m) in the direction of the wheel holes.

3-3.2 Acceptable storage arrangements shall include:

- (a) On-floor, on-side storage up to 12 ft (3.7 m) high;
- (b) On-floor, on-tread storage up to 5 ft (1.5 m) high;
- (c) Double-row or multi-row fixed or portable rack storage up to 5 ft (1.5 m) high;
- (d) Single-row fixed or portable rack storage up to 12 ft (3.7 m) high; or
- (e) Laced tires in racks up to 5 ft (1.5 m) in height.

Chapter 4 Fire Protection

4-1 Automatic Sprinkler Systems.

4-1.1 Automatic sprinklers, where provided, shall be installed in accordance with NFPA 13, *Standard for the Installation of Sprinkler Systems*.

4-1.2* Sprinkler discharge densities and areas of application shall be in accordance with Table 4-1.2.

To use the graph in Figure 4-1.2, note the example indicated by the broken line. Read across the graph at a storage height of 14 ft (4.3 m) until the storage height intersects the storage height curve at a sprinkler density of 0.45 gpm/ft² [18.3 (L/min)/m²]. Then read down until the sprinkler density intersects the sprinkler operating area curves at 3,200 ft² (297 m²) for ordinary sprinklers and 2,000 ft² (186 m²) for high temperature sprinklers.

4-1.3 System Requirements.

4-1.3.1 For the purpose of selecting sprinkler spacings in hydraulically designed sprinkler systems, to obtain a stipulated density, 60 lb (4 atmospheres) /in.² (414 kPa) shall be the maximum discharge pressure used at the calculation starting point.

4-1.3.2 In buildings used in part for tire storage, for the purposes of this standard, the required sprinkler protection shall extend 15 ft (4.6 m) beyond the perimeter of the tire storage area.

4-1.4 In-rack Sprinkler System Requirements.

4-1.4.1 In-rack sprinklers, where provided, shall be installed in accordance with NFPA 231C, *Standard for Rack Storage of Materials*, except as modified by 4-1.4 through 4-1.4.5.

4-1.4.2 In-rack sprinkler deflectors shall be located at the same level as the bottom of the pallet support to maintain an unobstructed clear space of at least 4 in. (102 mm). In-rack sprinklers shall be located at least 2 ft (0.6 m) from rack uprights.

4-1.4.3 The maximum horizontal spacing of sprinklers in racks shall be 8 ft (2.4 m).

4-1.4.4 Sprinklers in racks shall discharge at not less than 30 psi (207 kPa).

4-1.4.5 Water demand for sprinklers installed in racks shall be based on simultaneous operation of the most hydraulically remote 12 sprinklers where only one level is installed in racks.

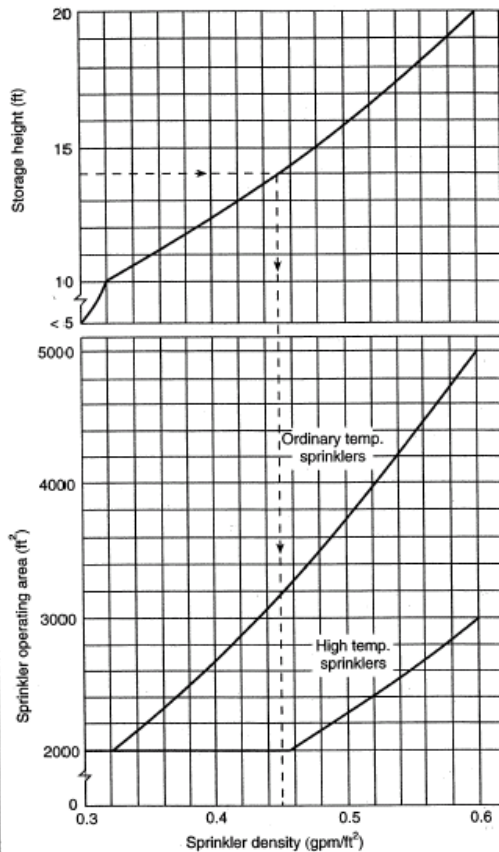


Figure 4-1.2 Sprinkler system design curves for palletized portable rack storage and fixed rack storage with pallets over 5 ft to 20 ft (1.5 m to 6 m) in height.

4-2 High-expansion Foam Systems.

4-2.1* High-expansion foam systems installed in accordance with NFPA 11A, *Standard for Medium and High-Expansion Foam Systems*, as modified herein, shall be permitted to be installed in addition to automatic sprinklers. Where so installed, a reduction in sprinkler discharge density to one-half the density specified in Table 4-1.2 or 0.24 gpm/ft² [(9.78 L/min)/m²], whichever is higher, shall be allowed.

4-2.2 High-expansion foam systems shall be automatic in operation.

4-2.3 Detectors shall be listed and shall be installed at the ceiling at one-half listed spacing in accordance with NFPA 72, *National Fire Alarm Code*.

4-2.4 Detection systems, concentrate pumps, generators, and other system components essential to the operation of the system shall have an approved standby power source.

4-3 Water Supplies.

4-3.1 The rate of water supply shall be sufficient to provide the required sprinkler discharge density over the required area of application plus provision for generation of high-expansion foam and in-rack sprinklers where used.

4-3.2 Total water supplies shall include provision for not less than 750 gpm (2,835 L/min) for hose streams, in addition to that required for automatic sprinklers and foam systems. Water supplies shall be capable of supplying the demand for sprinkler systems and hose streams for not less than 3 hours.

Exception: For on-floor storage up to and including 5 ft (1.5 m) in height, hose stream requirements shall be permitted to be 250 gpm (946 L/min), with a water supply duration of not less than 2 hours.

4-3.3* Where dry pipe systems are used, the area of sprinkler application shall be increased by not less than 30 percent.

4-4 Manual Inside Protection.

4-4.1 Where automatic sprinkler protection is provided, small hose [1½ in. (38 mm)] shall be provided to reach any portion of the storage area. Small hose shall be supplied from one of the following:

- Hydrants;
- A separate piping system for small hose stations;
- Valved hose connections on sprinkler risers where such connections are made upstream of sprinkler control valves;
- Adjacent sprinkler systems.

4-4.2 Portable Fire Extinguishers. Portable fire extinguishers shall be provided in accordance with NFPA 10, *Standard for Portable Fire Extinguishers*. Up to one-half of the requirement complement of portable fire extinguishers for Class A fires shall be permitted to be omitted in storage areas where fixed, small hose lines [1½ in. (38 mm)] are available to reach all portions of the storage area.

4-5 Hydrants. At locations without public hydrants, or where hydrants are not within 250 ft (76 m), private hydrants shall be installed in accordance with NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*.

4-6 Alarm Service.

4-6.1 Automatic sprinkler systems and foam systems, where provided, shall have approved central station, auxiliary, remote station, or proprietary waterflow alarm service.

Exception: Local waterflow alarm service shall be permitted to be provided where recorded guard service also is provided.

NOTE: See NFPA 601, *Standard on Guard Service in Fire Loss Prevention*.

4-6.2 Alarm service shall comply with NFPA 72, *National Fire Alarm Code*.

4-7* Fire Emergency Organization. (Also see Appendix B.)

Table 4-1.2

Piling Method	Piling Height (ft)	Sprinkler Discharge Density (gpm/ft ²) (See Notes 1 and 2)	Areas of Application (ft ²) (See Note 1.)	
			Ordinary Temp.	High Temp.
(1) On-floor storage	Up to 5	0.19	2,000	2,000
(a) Pyramid piles on-side	Over 5 to 12	0.30	2,500	2,500
(b) Other arrangements such that no horizontal channels are formed (See Note 3.)	Over 12 to 18	0.60	N/A	2,500
(c) Tires on-tread (See Note 4.)	Up to 5	0.19	2,000	2,000
	Over 5 to 12	0.30	2,500	2,500
(2) Palletized portable rack storage	Up to 5	0.19	2,000	2,000
(a) On-side or on-tread	Over 5 to 20	See Figure 4-1.2		
	Over 20 to 30	0.30 plus high-expansion foam	3,000	3,000
(b) On-side	20 to 25	0.60 and 0.90 (see Note 5); or	N/A	5,000
			N/A	3,000
		0.60 with 1-hr fireproofing of roof and ceiling assembly; or	N/A	4,000
		0.75	N/A	4,000
(3) Open portable rack storage, on-side or on-tread	Up to 5	0.19	2,000	2,000
	Over 5 to 12	0.60	5,000	3,000
	Over 12 to 20	0.60 and 0.90 (see Note 5); or	N/A	5,000
			N/A	3,000
		0.30 plus high-expansion foam	3,000	3,000
(4) Single-, double-, and multi-row fixed rack storage on pallets, on-side or on-tread	Up to 5	0.19	2,000	2,000
	Over 5 to 20	See Figure 4-1.2; or		
		0.40 plus one level in-rack sprinklers; or	3,000	3,000
		0.30 plus high-expansion foam	3,000	3,000
	Over 20 to 30	0.30 plus high-expansion foam	N/A	3,000
(5) Single-, double-, and multi-row fixed rack storage without pallets or shelves, on-side or on-tread	Up to 5	0.19	2,000	2,000
	Over 5 to 12	0.60	5,000	3,000
	Over 12 to 20	0.60 and 0.90 (see Note 5); or	N/A	5,000
			N/A	3,000
		0.40 plus one level in-rack sprinklers; or	3,000	3,000
		0.30 plus high-expansion foam	3,000	3,000
	Over 20 to 30	0.30 plus high-expansion foam	N/A	3,000
(6) Laced tires in racks	See A-4-1.2.			

NOTE 1: Sprinkler discharge densities and areas of application are based on a maximum clearance of 10 ft (3.1 m) between sprinkler deflectors and the maximum available height of storage. The maximum clearance is noted from actual testing and should not be viewed as a definitive measurement. The authority having jurisdiction should use the appropriate judgement where this distance is modified.

NOTE 2: The densities and areas provided in the table are based on fire tests using standard response, standard orifice (1/2 in. (12.7 mm)), and large orifice (1 7/32 in. (13.5 mm)) sprinklers. The use of extra large orifice (ELO) (5/8 in.) sprinklers shall be permitted where listed for such use, and where installed at a minimum operating pressure of 10 psi (69 kPa). In buildings where "old style" sprinklers exist, discharge densities shall be increased by 25 percent. For use of other types of sprinklers, consult the authority having jurisdiction.

NOTE 3: Laced tires on-floor, vertical stacking on-side (typically truck tires), and off-road tires.

NOTE 4: Piles shall not exceed 25 ft (7.6 m) in direction of wheel holes.

NOTE 5: Water supply shall fulfill both requirements.

NOTE 6: N/A = Not applicable.

For SI units: 1 sq ft = 0.0929 m²; 1 gpm/sq ft = 40.746 (L/min)/m².

4-7.1 Arrangements shall be made to permit rapid entry into the premises by the municipal fire department, police department, or other authorized personnel in case of fire or other emergency.

4-7.2 Plant emergency organizations, where provided, shall be instructed and trained in the following procedures:

- (a) Maintenance of the security of the premises;
- (b) Means of summoning outside aid immediately in an emergency;
- (c) Use of portable extinguishers and small hose lines or small fires and mop-up operations;
- (d) Operation of the sprinkler system and water supply equipment;
- (e) Use of material handling equipment while sprinklers are still operating to effect final extinguishment;
- (f) Supervision of sprinkler valves after the system is turned off so that the system can be reactivated if rekindling occurs.

4-7.3 A fire watch shall be maintained when the sprinkler system is not in service.

Chapter 5 Building Equipment, Maintenance, and Operations

5-1 Mechanical Handling Equipment.

5-1.1 Industrial Trucks. Power-operated industrial trucks shall comply with NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Maintenance, and Operation*.

5-2 Storage of Empty Wood Pallets. Wood pallets shall be stored in accordance with the requirements of NFPA 231, *Standard for General Storage*, Section 4-4.

5-3 Cutting and Welding Operations.

5-3.1 Where welding or cutting operations are necessary, the requirements of NFPA 51B, *Standard for Fire Prevention in Use of Cutting and Welding Processes*, shall be followed. Where possible, work shall be removed to a safe area.

5-3.2 Welding, soldering, brazing, and cutting shall be permitted to be performed on rack or building components that cannot be removed, provided no storage is located below and within 25 ft (7.6 m) of the working area and provided flame-proof tarpaulins enclose this area. During any of these operations, the sprinkler system shall be in service. Extinguishers suitable for Class A fires with a minimum rating of 2A and charged inside hose lines, where provided, shall be located in the working area. A fire watch shall be maintained during these operations and for not less than 30 minutes following completion of open-flame operation.

5-4 Waste Disposal. Rubbish, trash, and other waste material shall be disposed of at regular intervals.

NOTE: See NFPA 82, *Standard on Incinerators and Waste and Linen Handling Systems and Equipment*.

5-5 Smoking. Smoking shall be strictly prohibited. "No Smoking" signs shall be posted in prohibited areas.

Exception: Locations prominently designated as smoking areas.

5-6 Maintenance and Inspection.

5-6.1 Fire walls, fire doors, and floors shall be maintained in good repair at all times.

5-6.2 The sprinkler system and the water supplies shall be inspected, tested, and maintained in accordance with NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*.

Chapter 6 Referenced Publications

6-1 The following documents or portions thereof are referenced within this standard and shall be considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

6-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

NFPA 10, *Standard for Portable Fire Extinguishers*, 1994 edition.

NFPA 11A, *Standard for Medium- and High-Expansion Foam Systems*, 1994 edition.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 1994 edition.

NFPA 24, *Standard for the Installation of Private Fire Service Mains and Their Appurtenances*, 1992 edition.

NFPA 25, *Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems*, 1992 edition.

NFPA 51B, *Standard for Fire Prevention in Use of Cutting and Welding Processes*, 1994 edition.

NFPA 72, *National Fire Alarm Code*, 1993 edition.

NFPA 91, *Standard for Exhaust Systems for Air Conveying of Materials*, 1992 edition.

NFPA 220, *Standard on Types of Building Construction*, 1992 edition.

NFPA 231, *Standard for General Storage*, 1990 edition.

NFPA 231C, *Standard for Rack Storage of Materials*, 1991 edition.

NFPA 505, *Fire Safety Standard for Powered Industrial Trucks Including Type Designations, Areas of Use, Maintenance, and Operation*, 1994 edition.

Appendix A Explanatory Material

This Appendix is not a part of the requirements of this NFPA document but is included for informational purposes only.

A-1-2 Miscellaneous Storage. The limitations on the type and size of storage are intended to identify those situations where tire storage is present in limited quantities and incidental to the main use of the building. Occupancies such as aircraft hangars, automobile dealers, repair garages, retail storage facilities, automotive and truck assembly plants, and mobile home assembly plants are types of facilities where miscellaneous storage could be

present. The fire protection sprinkler design densities specified by NFPA 13, *Standard for the Installation of Sprinkler Systems*, are adequate to provide protection for the storage heights indicated. Storage beyond these heights or areas presents hazards that are properly addressed by this standard and are outside the scope of NFPA 13.

A-2-1 Smoke removal is important to manual fire fighting and overhaul. Since most fire tests were conducted without smoke and heat venting, protection specified in Section 4-1 was developed without the use of such venting. However, venting through eave-line windows, doors, monitors, gravity, or mechanical exhaust systems is essential to smoke removal after control of the fire is achieved.

A-2-1.1 Building codes and insurance requirements affect the type of construction selected.

A-3-1 It is not the intent to limit the pile length.

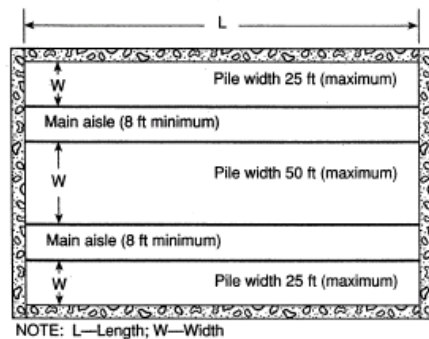


Figure A-3-1 Typical piling arrangement in accordance with Section 3-1.

A-3-2.5 Incandescent light fixtures should have shades or guards to prevent ignition of commodity from hot bulbs where possibility of contact with storage exists.

A-4-1.2 Density and areas of application in Table 4-1.2 have been developed from fire test data. Protection requirements for other storage methods are beyond the scope of this standard at the present time. From recent fire testing with densities of 0.45 gpm/ft² [18.3 L/min/m²] and higher, there have been indications that large orifice sprinklers at greater than 50-ft² (4.6-m²) spacing produce better results than the 1/2-in. (12.7-mm) orifice sprinklers at 50-ft² (4.6-m²) spacing.

Table 4-1.2 is based on operation of standard sprinklers. Use of "quick response" or other special sprinklers should be based on appropriate tests as approved by the authority having jurisdiction.

The current changes to Table 4-1.2 represent test results from rubber tire fire tests performed at the Factory Mutual Research Center.

Storage heights and configurations, or both, [e.g., laced tires, automated material handling systems above 30 ft (9.1 m), etc.] beyond those indicated in the table have not had sufficient test data developed to establish recommended criteria. Detailed engineering reviews of the protection should be conducted and approved by the authority having jurisdiction.

A-4-1.2 Note 3 to Table 4-1.2. Laced tires are not stored to a significant height by this method due to the damage inflicted on the tire (i.e., bead).

A-4-2.1 In existing buildings used for tire storage, high-expansion foam might be used to augment an existing sprinkler system whose calculated density is below that required for the proposed storage height. For example, an existing system calculated to provide 0.25 gpm/ft² [(10.2 L/min)/m²] could be used for storages requiring up to 0.50 gpm/ft² [(20.3 L/min)/m²] with the addition of a high-expansion foam system. An alternative might be to reinforce or redesign the sprinkler system.

A-4-3.3 Wet systems are recommended for tire storage occupancies. Dry systems may be permitted only where it is impracticable to provide heat.

A-4-7 Information on emergency organization is provided in NFPA 600, *Standard on Industrial Fire Brigades*. (Also see Appendix B.)

Appendix B Recommendations for Fighting Rubber Tire Fires in Sprinklered Buildings

This Appendix is not a part of the requirements of this NFPA document but is included for informational purposes only.

B-1 Introduction.

It is essential that the steps necessary for fighting rubber tire fires be understood by both the building occupant and the fire service to prevent unnecessary injury or loss of life and to prevent loss of fire control during overhaul. This necessitates emergency preplanning with the local fire department, building occupant, and others as deemed necessary.

Fire tests of rubber tire storage have indicated that smoke can quickly obstruct the visibility within a building and obscure the burning materials; plans for the attack and extinguishment of the fire should be prepared in advance.

Because the products of combustion are harmful, all personnel assigned to interior functions should use breathing apparatus even before obscuration occurs.

Ventilation efforts should be carefully controlled. Drafts from open doors and windows allow fresh air to reach the fire and make control of the fire difficult. Doors and windows should be closed as soon as possible to limit the air supply to the fire and to allow control by automatic systems to be established.

Fire brigades should be trained and equipped with the necessary tools and equipment to respond to a fire emergency and, if possible, attack the fire prior to the arrival of the fire department.

Review of building and fire protection system plans should be part of the ongoing training of both the on-site personnel and fire departments.

A tire fire can progress quickly through the phases described in the following paragraphs, and each phase presents different conditions to responding emergency personnel. Items for consideration in the emergency preplanning program are provided for inclusion in such plans.

Observations at tire fire tests and accounts of actual fires have indicated that, while automatic sprinklers with adequate densities in approved configurations can control a fire, extinguishment by sprinklers alone normally does not

occur. The four tests used also indicate that sprinkler protection can be overcome by:

- (a) Storage exceeding the heights indicated in this standard; and
- (b) Storage configurations that inhibit the movement of heat to the roof, slowing sprinkler operation, and inhibit the waterflow to the seat of the fire, reducing sprinkler effectiveness.

Incipient Stage. This stage occurs within 2 to 5 minutes of ignition.

Important: Drafts from open doors increase the intensity of the fire and make control difficult. Doors should be closed as quickly as possible to isolate the fire area.

Important: Fire tests indicate that smoke obscuration occurs within 6 to 9 minutes of ignition, even when the fire is sprinkler controlled. Breathing apparatus might be needed even before obscuration occurs.

If caught in the incipient stage, control can be achieved using interior hand hose and portable extinguishers. Quick reaction is essential, as this window of opportunity no longer exists within 2 to 5 minutes of actual ignition, since the generation of heat and smoke make the area untenable. Dry chemical extinguishers have been found to be most effective but should be backed up with small hose, as the "knock-down" is only temporary.

Tires in the affected area should be removed from storage. Tires removed from storage should be taken out of doors, thoroughly soaked, and left where they cannot expose other combustibles. The area where the fire occurred should be closely watched for several hours for rekindling.

While the first sprinkler can be expected to operate within the first 2 to 5 minutes of ignition, the updraft from the fire can disrupt the sprinkler pattern to such an extent that the water might not get to the seat of the fire. After the first 4 minutes, the fire has generally progressed beyond the stage where portable extinguishers are effective and, within minutes, the smoke and carbon monoxide make the area untenable. Vision is obscured, and any personnel without breathing apparatus is at risk.

Active Stage. The active stage of the fire follows the initial stage and is generally defined as that period where the sprinkler system is establishing control over the fire.

Important: Even though the fire is sprinkler controlled, roof temperatures resulting from the tire fires can reach temperatures high enough to cause steel joists to deflect and possibly fail. In recent fire tests, gas temperatures at roof level ranged between 1,110°F and 1,450°F (593°C and 788°C) for 10 minutes. Roof steel exposed to this high gas temperature could deflect or fail if subjected to additional loading. **DO NOT** place personnel on roof to attempt ventilation.

Important: Local fire departments attempting to draft from the sprinkler supply system will decrease the sprinkler effectiveness. If possible, separate municipal hydrants should be identified for fire department use.

Important: As the sprinklers gain control of the fire, the smoke will turn from black to gray. A return to black smoke is an indication that the sprinklers are not controlling the fire. Pump and system pressure also should be

monitored. Loss of system pressure is an indication of more sprinklers operating, pump failure, or loss of control.

Responding local fire departments should be arriving by this time. Building personnel should advise arriving fire personnel of the location of all occupants of the building. At this point, there is little for the fire department to do except to connect to the municipal water supply and prepare to supplement the fire protection system through the fire department connection.

Fire department personnel or maintenance personnel, or both, should respond to the fire pump room and work to maintain operation of the fire pump. System discharge pressure should be observed to determine if the pressure is stable. Unstable or decreasing discharge pressure indicates changes in the operating conditions of the fire protection system.

During this stage, the building is untenable, and obscured vision makes the use of hose streams questionable. It should be noted that, in buildings with smoke vents, longer use of fire hose might be possible, but at some risk to personnel. It is best to allow the sprinklers to take control of the fire. Most of the sprinklers will begin to operate within 15 to 20 minutes of ignition, if sprinkler control is effected. Sprinklers should be allowed to operate at least 60 to 90 minutes to gain control. Successful fire tests indicate that waterflow stabilizes within the first 20 minutes of the fire.

The building is best left unventilated at this time. As control is gained, the smoke will change from black to gray and will diminish in intensity. During this period, at least six charged 1½-in. (38.1-mm) hose lines should be laid out preparatory to entering the building. Portable flood lights should be secured as well as turn-out gear, breathing apparatus, and forklifts for the overhaul crew.

Critical Stage. The critical stage occurs between the final extinguishment and the ventilation of the building.

Important: Ventilation should be done slowly, and the sprinklers should be left in operation. A return to black smoke is an indication that control is being lost. If this happens, ventilation should cease, the building should be closed, and the sprinkler system should be allowed to regain control. It should be understood that, during the attempt to ventilate the building, the fire intensity can increase due to the addition of outside air. Additional sprinklers can be expected to operate during the ventilation effort. If control has been gained, extra sprinklers might make no difference in overall performance. If control has not been gained or is marginal, this increase in the number of operating sprinklers could make regaining control more difficult due to the overall increase in sprinkler demand. Unless there is a system failure, the sprinklers should regain control. If there is any doubt that control of the fire has been gained, the sprinkler system should be allowed to "soak" the fire for longer than 90 minutes.

Important: The officer in charge should have a contingency plan if control is lost due to a system failure. In the event that control of the fire is lost, as evidenced by such indicators as increasing smoke generation, loss of pressure at the fire pump discharge (indicating massive sprinkler operation), or collapsing roof, efforts should be directed toward preventing the spread of the fire beyond the area bounded by the fire walls. At this point, consideration

should be given to shutting off the sprinklers in the fire area to provide water for protecting the exposures.

After 60 to 90 minutes and when the smoke intensity has diminished, the building should be ventilated around the periphery of the fire area. If control has been gained, the roof temperature will usually have cooled sufficiently to allow roof vents to be opened manually if they have not already opened automatically.

Overhaul. Although visible fire is no longer present, overhaul of the area of the fire should be conducted to be certain of complete extinguishment.

Important: Care should be taken that the hose streams do not lower the pressure or water supply to the sprinkler system. Sprinkler operation should cease only when the fire chief is certain that hose can control the fire.

Important: Caution should be used, as the tire piles will be unstable.

As soon as the smoke clears to the extent that the building can be entered, entry should be made using small hose streams that should be directed into the burning tires. Sprinklers should be kept in operation during this period.

Forklifts and other means should be used to remove the tires from the fire area to outside the building. It usually is necessary to keep the sprinklers in operation during this procedure at least until there is no evidence of flame. Patrols should be made of the affected area for at least 24 hours following the fire.

Following fire extinguishment, all fire protection systems should be restored to service as quickly as possible. These systems include, but are not limited to:

- (a) Sprinkler systems
- (b) Alarm systems
- (c) Pumps
- (d) Water supplies.

Use of High-expansion Foam. If a high-expansion foam system is used in connection with automatic sprinklers, sprinklers may be permitted to be shut off 1 hour after ignition, and foam may be permitted to soak the fire for an additional 1 hour before the building is opened and overhaul is begun. Limited tests with high-expansion foam indicate that fire extinguishment is largely complete after a period of soaking in foam. As a precautionary measure, charged hose streams should be available when foam is drained away.

After the initial fill, foam generators should be operated periodically during the soaking period to maintain the foam level. This is necessary, since sprinklers and products of combustion will cause partial foam breakdown.

Appendix C Guidelines for Outdoor Storage of Scrap Tires

C-1 General. The intent of these recommendations is to provide fire protection guidance to minimize the fire hazard in areas for outside scrap tire storage. Each individual property has its own special conditions of tire handling, exposure, and topography. For this reason, only basic fire protection principles that are intended to be applied with

due consideration of the local factors involved are covered in this appendix. The authority having jurisdiction should be consulted in all cases.

Rubber has a heat combustion of about 15,000 Btus per pound, or roughly twice that of ordinary combustibles (e.g., paper and wood). Once ignited, fire development is rapid, and high temperatures can be expected due to the large exposed surface area of tires. Burning is likely to persist for hours. In cases where the fire is controlled, rekindling is a possibility.

These recommendations are not intended to apply to storage of shredded tires (chips, granules, etc.).

C-2 Definitions. Unless expressly stated elsewhere, for the purpose of these recommendations, the following terms are defined as indicated:

Aisle. An accessible clear space between storage piles or groups of piles suitable for housekeeping operations, visual inspection of piling areas, and initial fire-fighting operations.

Clear Space. Any area free of combustible materials. This does not preclude the storage of noncombustible materials that will not transmit an exposure fire.

Fire Lane. A clear space suitable for fire-fighting access and operations by motorized fire apparatus.

Scrap Tire. A tire that is no longer suitable for vehicular use.

Units (equivalent passenger). One average size passenger tire weighing approximately 25 lb (11 kg).

Yard. The outdoor areas where scrap tires are stored.

C-3 Fire Experience.

C-3.1 Fire experience in outdoor storage of scrap tires reveals a number of concerns, including the generation of large amounts of black smoke; the fact that the storage is often too close to buildings on the same or adjacent premises, which causes fires in these exposed buildings; the generation of oil during a fire where the oil contributes to the fire or where the runoff contaminates the surrounding area; delays in reporting fires; and the lack of fire-fighting capabilities. The fire hazards inherent in scrap rubber tire storage are best controlled by a positive fire prevention program that includes the objectives that a fire be contained to the pile of origin and that the exposures to other piles or associated structures be limited.

C-3.2 Fire Prevention.

C-3.2.1 The fire hazard potential inherent in scrap rubber tire storage operations can best be controlled by a positive fire prevention program. The method of stacking should be solid piles in an orderly manner and should include:

- (a) Fire lanes to separate piles and to provide access for effective fire-fighting operations.
- (b) Separation of yard storage from buildings and other exposures.
- (c) An effective fire prevention maintenance program including control of weeds, grass, and other combustible materials within the storage area.

(d) Consideration of topography, since oil accumulations or runoff can be expected in fire conditions. Scrap tire storage preferably should be on a level area.

C-3.2.2 Appropriate steps should be taken to limit access to the tire storage area. Acceptable access should be provided for fire-fighting equipment.

C-4 Exposure Protection.

C-4.1 For 500 units or less, the minimum separation between scrap rubber tires and structures should be 25 ft (7.6 m) or as reduced by Chapter 3, "Means of Protection," and Chapter 4, "Application of Means of Protection," of NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*.

C-4.2 For More than 500 Units.

C-4.2.1 The minimum distance between outside scrap rubber tire storage and buildings should be determined in accordance with NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*. Since the minimum distance is based on exposure from a burning building, restrictions are needed for application to an outside storage configuration.

(a) The height of exposing fire from burning tires should be considered as 1.5 times the height of the tire pile, since flames extending above the burning tires contribute to the size of the radiation surface area. In accordance with NFPA 80A, the height of the exposing fire equals the building height. The height of combustibles stored within the building is not covered; it depends on the severity of the exposure fire. A comparative building height would have to exceed the height of piling by several feet at least, and it could be substantially higher. Furthermore, the height (and width) of flames above a fire-penetrated roof would be substantially influenced by the debris of the fire-damaged or collapsed roof, whereas flame height above yard storage would have no such restriction.

(b) The width of the exposing fire should be taken as the combined width of piles facing the exposed building, disregarding the nominal separation between piles provided by narrow access aisles and roadways. In order for storage piles to be considered isolated piles, the minimum separation distance between piles should be in accordance with Table C-4.2.3. This distance can be reduced to that necessary to provide a dirt berm at least 1.5 times the height of the pile.

(c) The percent of opening in the exposing wall area should be considered to be 100 percent.

(d) The severity of the exposing fire should be considered as severe.

C-4.2.2 Means of protecting a building exposed by burning tire storage should be selected from NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*, Chapter 3, and separation adjustments should be based on building construction and protective measures as provided in NFPA 80A, Chapter 4, except that the separation should never be reduced below that necessary for fire-fighting access. (See Section C-4.3.)

C-4.2.3 Table C-4.2.3 provides representative separations between the exposed building and piles or between isolated piles.

C-4.2.4 Because of the extensive fire expected in scrap tire storage, some form of exposure protection for adjoining

Table C-4.2.3 Representative Exposure Separation Distances¹ Tire Storage Pile Height (ft)

		8	10	12	14	16	18	20
Exposed Face Dimensions (ft)	25	56	62	67	73	77	82	85
	50	75	84	93	100	107	113	118
	100	100	116	128	137	146	155	164
	150	117	135	149	164	178	189	198
	200	130	149	167	183	198	212	226
	250	140	162	181	198	216	231	245

¹Separation distances are based on NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*, Chapter 2, using a factor of 1.5 in accordance with C-4.2.1(a).
For SI units: 1 ft = 0.305 m.

properties should be considered. If the clear space as recommended in Table C-4.2.3 cannot be provided, provide a dirt berm 1.5 times the height of the tire storage.

C-4.2.5 The distance between storage and grass, weeds, and brush should be 50 ft (15 m).

C-4.3 Fire-fighting Access.

C-4.3.1 Maximum pile height should be 20 ft (6 m). Pile width and length should not exceed 250 ft (76.2 m) without a separation according to Table C-4.2.3. Dirt berms may be permitted to be used in lieu of cross aisles in accordance with C-4.2.1(b). (See Figure C-4.3.1.)

C-4.3.2 The fire department should be consulted for advice on provision of all-weather roadways to and within the storage area. Depending on such factors as storage area configuration and size, access obstruction (e.g., rivers, railroad yards), prevailing wind direction, and alternative tactics, fire-fighting strategy might necessitate that one or more aisles be wider than those described in C-4.3.1.

C-4.3.3 Pre-emergency planning should be made with the local fire protection agency so that fire emergencies can be properly handled in the tire storage facility.

C-5 General Fire Protection.

C-5.1 General.

C-5.1.1 Weeds, grass, and similar vegetation should be eliminated throughout the entire yard. Combustibles should be removed as they accumulate.

C-5.1.2 Smoking should be prohibited within the tire storage area. Other types of potential ignition sources such as cutting and welding, heating devices, and open fires should be prohibited.

C-5.1.3 Suitable safeguards should be provided to minimize the hazard of sparks from such equipment as refuse burners, boiler stacks, and vehicle exhaust.

C-5.2 Water Supplies.

C-5.2.1 A public or private fire main and hydrant system should be provided. A water system should be provided to supply a minimum of 1,000 gpm (3,780 L/min) for less than 10,000 units storage, or 2,000 gpm (7,560 L/min) for 10,000 units or more for a duration of 3 hours.

C-5.2.2 If there is access to a lake, stream, pond, or other body of water in the vicinity of the storage area, a fire department suction connection should be provided.

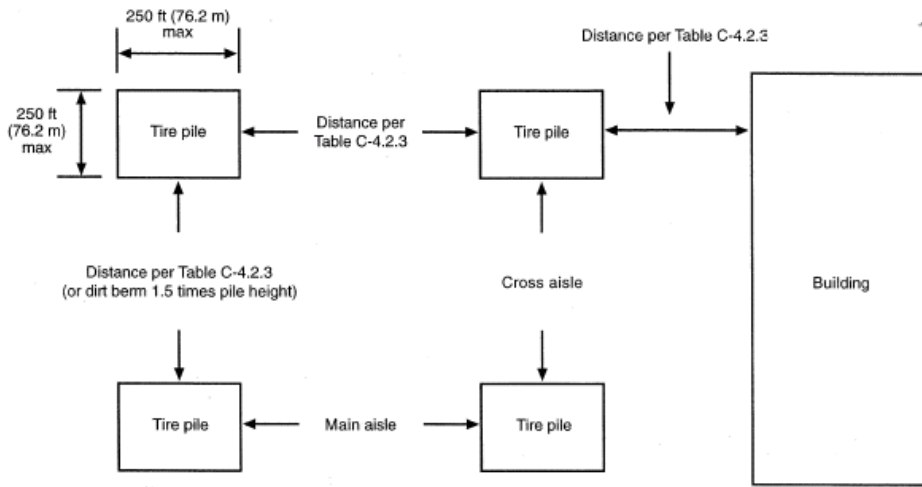


Figure C-4.3.1 Tire pile arrangement.

C-5.2.3 If fire hoses are not immediately available from responding public fire departments, on-site storage of 1,000 ft (304.8 m) of 2½-in. (63-mm) hose and sufficient nozzles should be provided.

C-5.2.4 Bulldozers, front-end loaders, and similar equipment may be permitted to be used to move tires not yet involved in the fire, to create breaks in the tire pile, or to cover burning tires with soil.

NFPA 13, *Standard for the Installation of Sprinkler Systems*, 1994 edition.

NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*, 1993 edition.

NFPA 82, *Standard on Incinerators and Waste and Linen Handling Systems and Equipment*, 1994 edition.

NFPA 231C, *Standard for Rack Storage of Materials*, 1991 edition.

NFPA 600, *Standard on Industrial Fire Brigades*, 1992 edition.

NFPA 601, *Standard on Guard Service in Fire Loss Prevention*, 1992 edition.

Appendix D Referenced Publications

D-1 The following documents or portions thereof are referenced within this standard for informational purposes only and thus are not considered part of the requirements of this document. The edition indicated for each reference is the current edition as of the date of the NFPA issuance of this document.

D-1.1 NFPA Publications. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101.

D-1.2 Other Publication.

FMRC J. I. OWIR3.RR, "Rubber Tires: Investigation of Common Protection for Three Types of Storage," March 1993, prepared for Rubber Manufacturers Association, 1400 K Street NW, Washington, DC 20005.

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BIJLAGE IX

Fire Safety Code of Practice for the Recycling and Waste Handling Industry

oktober 1998

Introduction

Subsequent to the July 1997 fire at the Plastimet Recycling Facility, the Ontario Fire Marshal's Office released a document entitled ***Protecting the Public and the Environment by Improving Fire Safety at Ontario's Recycling and Waste Handling Facilities***. Recommendation 11 of this report states:

Ontario's waste handling and recycling industry be encouraged to establish an industry-wide council to set industry codes of practice and foster good business practices.

A committee of recycling and waste handling representatives was formed by the Office of the Fire Marshal to prepare the code of practice for the industry. The committee included individuals who represented a broad range of organizations and associations:

Pam Russell, Russell Environmental Services, SWANA

Frank Zechner, Philip Environmental, OWMA

Dave Baker, Miller Waste Systems

Dr. Len Shaw, Canadian Association of Recycling Industries

John Sanderson, Composite Manufacturing Corporation, OWMA

John Hanson, Recycling Council of Ontario

Fred Edgecombe, Canadian Plastics Industry Association

Ben Shepherd, Toronto Works Department

Steen Klint, County of Simcoe, SWANA

Doug Smith, Laidlaw Environmental Services

Wayne Arndt, City of Guelph, AMRC

Dale Wood Office of the Fire Marshal

This Code of Practice was developed by the industry-based committee and has been reviewed and approved by the Office of the Fire Marshal. It is hoped that this document will provide a standard for development and operation for all recycling and waste management facilities in Ontario.

October 1998

1. INTRODUCTION AND APPLICATION

The intention of this code of practice is to provide a standard of development and operation for all recycling and waste handling facilities in Ontario. This standard sets out fire protection requirements for life safety, property protection, and protection of the natural environment. The Ontario Fire Code must be met at all times, and compliance with this code of practice does not preclude the requirements of any other provincial statute.

This document has been drafted for particular use by the recycling and waste handling industry, however the principles that are contained in the code are applicable for any facility that handles large quantities of combustible materials. The authors therefore recommend that all material handling, processing, and storage operations adopt this code of practice.

Waste management has evolved significantly during the last decades. Waste processing, as opposed to waste disposal is becoming the norm, and the number and variety of waste processing facilities is increasing at a rapid rate. It is important that landfills, waste handling plants and transfer stations be developed and operated in a manner that allows them to be publicly acceptable, safe, and environmentally-desirable operations.

Recycling facilities in particular have received negative publicity in recent years as a result of serious fires that occurred at the Plastimet and Hagersville recycling operations. Subsequent to the 1997 Plastimet fire, the Office of the Fire Marshal issued a report entitled *Protecting the Public and the Environment by Improving Fire Safety at Ontario's Recycling & Waste Handling*

Facilities. This report points out concerns that should be addressed by the Code of Practice for the Recycling and Waste Handling Industry.

- Storage of combustible materials in unsecured or outdoor areas can pose a fire safety risk as a result of accessibility to vandals.
- Storage of materials that are mixed with incompatible materials or stored improperly. Given that most of the Workplace Hazardous Material Information System (WHMIS) requirements do not apply to wastes, it is not uncommon for containers to be unlabelled, mislabeled and lacking in Material Safety Data Sheets (MSDS). Therefore, it is often difficult for waste handlers to know how the materials should be stored and handled.
- Fire departments face the challenge of not knowing what materials are stored at many industries in their community. As a result, the firefighters' ability to effectively manage a fire emergency may be hampered by not knowing what is stored, or how or where it is stored. For these reasons, floor plans and inventory lists are essential components of pre-fire planning.
- There is concern about the storage of materials in extremely large piles. Bacterial action and oxidation are two chemical reactions that may result in spontaneous heating within large insulating piles. These piles may self-ignite, creating deep-seated fires that are both difficult and labour intensive to fight.

It is important that the waste management industry be encouraged to develop in a safe and progressive manner. The adoption of a code of practice by the waste handling industry is an important step in ensuring a consistently high standard of safety for the industry.

2. SECURITY

Many fires that occur at recycling and waste handling facilities are started after hours by vandals or intruders. Proper security is therefore a necessary part of providing adequate fire protection.

2.1 Recycling and waste handling facilities shall maintain adequate external lighting to discourage and prevent unauthorized access.

2.2 Any areas containing outdoor storage of combustible materials shall be adequately fenced.

2.3 Gates shall be maintained on all access roads onto the site to discourage and prevent unauthorized access.

2.4 Secure doors and windows shall be maintained on all buildings and the buildings shall be kept locked outside of regular working hours.

3. STORAGE

3.1.0 General

3.1.1 Storage requirements for both indoor and outdoor storage of combustible products and dangerous goods are outlined in Parts 3 and 4 of the National Fire Code and the Ontario Fire Code. This includes the short-term or long-term storage of the following products, whether raw or waste materials, goods in process, or finished goods;

- Class I to IV commodities, and Group A, B, and C plastics
- Tires
- Aerosol products
- Dangerous goods
- Compressed gases
- Flammable and combustible liquids
- Ammonium nitrate
- Matches
- Cellulose nitrate
- Wood chips
- Lumber and forest products
- Special requirements for salvage yards

3.1.2 The Ontario Fire Code specifies such requirements as access aisles, clearances, pile size, signage, sprinkler protection, ignition sources, and fencing. The requirements are based on the relative hazard or classification of a commodity.

3.1.3 The relative hazard or classification of a commodity is a function of both the material and its configuration. For example, a solid block of wood is relatively difficult to ignite and slow to burn. If, however, the wood is in a configuration that maximizes surface area to volume, such as a pile of idle wood pallets, it burns much more rapidly.

3.1.4 Often in recycling and waste facilities a variety of commodities is being stored. It is tempting to "average the commodities", but using this "averaging" method to determine sprinkler protection recommendations is not adequate. Protection for the highest hazard commodity should be provided. An alternative is to segregate the high hazard commodities and protect them accordingly. However, keeping the high hazard commodities properly segregated can be very difficult in normal warehouse operations.

3.2.0 Classification of Class I, II, III, and IV Commodities

3.2.1 Noncombustible materials do not burn and do not, by themselves, require sprinkler protection. Consider free flowing, powdered or granular, inert materials stored in bags on wood pallets, not in racks, as a noncombustible commodity. A fire will burn through the bags causing the material to flow or spill out, filling up any flue spaces and reducing the fire intensity.

3.2.2 Class I commodities are defined as essentially noncombustible products in ordinary corrugated cartons or in ordinary paper wrappings, with or without combustible pallets.

3.2.3 Class II commodities are defined as Class I products in slatted wooden crates, solid wooden boxes, multiple thickness paperboard cartons, or equivalent combustible packaging material, with or without combustible pallets.

3.2.4 Class III commodities are defined as wood, paper, natural fiber cloth, or Group C plastics, with or without combustible pallets. Products may contain a limited amount of Group A or B plastics.

3.2.5 Class IV commodities are defined as Class I, II or III products in corrugated cartons, containing an appreciable amount (no more than 25% by volume or 15% by weight) of Group A plastics or with Group A plastics packaging, with or without combustible pallets. Group B plastics and free-flowing Group A plastics are also included in this group.

3.3.0 Classification of Group A, B, and C Plastics

3.3.1 The heat of release rate (Btu/min or kW) for plastic materials can be three to five times greater than for a similar arrangement of ordinary combustibles. The purpose of classifying plastics is to advise of the relative heat of combustion (Btu/lb or kJ/kg) and burning rate (lb/min or kg/min) of the plastic. Group A plastics have the highest heat of combustion and burning rate, while Group C plastics approach the heat of combustion and burning rate of ordinary combustibles.

3.3.2 Group A plastics include, but are not limited to, ABS, acrylic, butyl rubber, fiberglass reinforced polyester, natural rubber (if expanded), nitrile rubber, polycarbonate, polyester elastomer, polyethylene, polypropylene, polystyrene, polyurethane, highly plasticized PVC, and SBR.

3.3.3 Group B plastics include, but are not limited to, cellulose, fluoroplastics, natural rubber (not expanded), nylon, and silicone rubber.

3.3.4 Group C plastics include, but are not limited to, fluoroplastics, melamine, phenolic resins, rigid PVC, and urea formaldehyde.

4. HOT WORK AND SMOKING

Hot work involving open flames or producing heat or sparks, including cutting, welding, soldering, brazing, grinding, adhesive bonding, and thermal spraying, thawing of pipes are a major cause of uncontrolled fires in recycling and waste handling facilities. The purpose of this section is to advise how hot work and smoking should be addressed in a recycling or waste handling facility.

4.1.0 HOT WORK

4.1.1 Welding equipment shall be used only by qualified, authorized personnel. All required personnel protective equipment shall be used.

4.1.2 Only approved equipment in good condition shall be used, and any defects must be reported immediately. Defective equipment shall be tagged and removed from service until it is repaired. Frequent inspections should be carried out.

4.1.3 Adequate ventilation must be provided.

4.1.4 Particular precautions must be taken prior to welding or cutting in dusty or hazardous locations.

4.1.5 The areas in which welding is being done should be clear of combustibles, screened off with proper screens, and provided with suitable fire extinguishers.

4.1.6 Compressed gas cylinders should be handled with care and secured in an upright position. They should be stored neatly, with empty cylinders stored separately and clearly marked.

4.1.7 Hoses and cables must be protected from any possibility of damage. In some cases it may be necessary to suspend them. Hoses should be tested for leaks monthly with a soap solution.

4.1.8 Special care must also be used when working in confined spaces. All entries shall be made in conformance with the legal requirements. Special clothing should be worn, preferably fireproofed, but wool is acceptable.

4.1.9 Never feed oxygen from the cylinder into a confined area.

4.1.10 Welding or cutting must not be done in containers that have held flammable or poisonous substances until they have been thoroughly cleaned, purged, tested and safeguarded.

4.1.11 Protect cylinders, hose, legs, and feet when flame cutting.

4.1.12 Put stub end of welding rods in a suitable refuse container.

4.1.13 Oil or grease should not be used on equipment containing oxygen.

4.1.14 Always remove an oxy-acetylene torch from a confined space when the torch is not in use.

4.1.15 Anyone performing hot work outside of designated areas must be accompanied by a qualified standby person with an extinguisher to act as fire watch.

4.1.16 Cylinders, piping and fittings used in welding and cutting shall be protected against damage.

4.1.17 No cylinder of compressed gas used in welding and cutting shall be dropped, hoisted by slings or magnets or transported or stored in a horizontal position.

4.1.18 The valve of a cylinder shall be closed when the cylinder is spent or is not being used, and the cap replaced.

4.1.19 Precautions to prevent a fire shall be taken when using a blow torch or welding or cutting equipment or a similar piece of equipment.

4.1.20 No arc welding electrode or ground lead shall be hung over a compressed gas cylinder.

4.1.21 An area where electric welding is carried on shall be kept reasonably free of electrode stubs and metal scrap.

4.2.0 SMOKING

4.2.1 Smoking is prohibited in the workplace in accordance with municipal by-laws, provincial regulations, and federal statutes.

4.2.2 Smoking shall not be permitted in areas where combustibles are stored.

4.2.3 Smoking shall only be permitted in those areas approved and designated for smoking.

5. HOUSEKEEPING

5.1 Proper housekeeping is of utmost importance in providing a safe work area. Shops, yards, plants, office, job sites, and work areas shall be kept neat and orderly at all times.

5.2 The work area floor shall be kept free from oils, greases or liquids that may cause a person to fall.

5.3 Aisles and passageways must be kept clear and clean.

5.4 Dispose of all waste rags etc. in proper closed metal containers to minimize the risk of spontaneous combustion and reduce the release of vapours.

5.5 Properly store, or put away, all tools and equipment at the end of each shift.

5.6 Provide an adequate work area around each machine or system to permit safe maintenance, servicing and cleaning. Surrounding floor areas shall be free from obstructions that would create a slip, trip or other safety related hazard.

5.7 Fire egress doors and passageways must be kept clear with four foot clearances.

5.8 Bale storage areas are to be clear with aisles as specified in the National Fire Code/Ontario Fire Code maintained between rows.

5.9 Bale storage heights and areas to be in accordance with the National Fire Code/Ontario Fire Code.

6. EMPLOYEE TRAINING

6.0.1 All recycling and waste management facility Owners/Operators shall ensure that at least one of the facility employees has a thorough understanding of the Ontario Fire Code, Ontario

Regulation 388/97, the Fire Protection and Prevention Act, RSO 1997.c.F.4, and the Provincial Occupational Health and Safety Act.

6.0.2 It is essential that each organization have staff who are trained to respond to a fire emergency in a prompt, positive and intelligent manner. In order to respond appropriately, training and practicing fire drill must become an integral part of each facility's preparedness. Persons with little training or experience may have difficulty dealing effectively with a fire related emergency.

6.0.3 Workers shall be instructed on emergency procedures in a language that they understand.

6.1.0 General

6.1.1. The owner/operator shall be responsible for:

- Ensuring that each recycling or waste management facility has established and implemented an occupational health and safety training program (as required by the Provincial Occupational Health and Safety Act & Regulations, the Canadian Occupational Health and Safety Regulations, or equivalent);
- Establishing an Occupational Health and Safety Committee to be responsible for ongoing plant diligence with respect to fire safety and prevention;
- Ensuring that staff is trained in the Fire Safety Plan for the facility and that all staff are trained in their respective duties outlined in the plan;
- Ensuring that an up-to-date copy of all site drawings indicating the location and specifications of all fire protection features and equipment such as fire separations, emergency lighting, fire alarm systems, automatic sprinkler systems, standpipe systems, portable fire extinguishers, and fixed extinguishing systems are maintained on site and readily accessible, and that supervisory staff have been adequately trained in the interpretation of these documents;
- Appointing, organizing and training supervisory staff to carry out fire safety duties and emergency procedures;
- Ensuring that a sufficient number of alternate staff are trained to respond to a fire emergency in the event that a supervisor is absent;
- Ensuring that fire drills involving all staff are held at least once a year and that all staff are trained in site specific fire drill procedures;
- Providing training on evacuation plans and the location of exits and emergency escape routes (particularly designated handicapped routes);
- Providing training on the location and operation of the fire alarm system;
- Ensuring that proper training is provided to aid in the identification, elimination and/or control of fire hazards on a site specific basis;
- Providing training on the use of portable fire extinguishers and other fire safety equipment and systems on-site;
- Providing training on alternate measures for fire safety during temporary shutdown of fire protection equipment or systems;
- Providing training with respect to maintenance, inspection and testing of fire protection equipment and systems and record keeping of same (for a period of at least two years);
- Maintaining adequate training and fire drill records for a period of at least one year;
- Providing instruction to key personnel and the fire department on how to access the site during off-hours;
- Providing training in fire watch procedures in the event of a shutdown of the fire protection equipment and systems; and,
- Promoting and practicing personal safety in the workplace.

6.2.0 Staff Training Requirements

6.2.1 Training shall be provided before specific duties are performed with refresher training conducted at least annually.

6.2.2 Records shall be kept of all staff training for a period of at least two years.

6.2.3 Training shall be conducted by a person who the local fire department feels is adequately familiar with the requirements of the Ontario Fire Code and the potential hazards of the facility.

6.3.0 Material Storage

6.3.1 Owners/Operators are responsible for providing training to the appropriate staff on safe material storage procedures. The Ontario Fire Code differentiates between indoor and outdoor storage and classes of materials. The Fire Code includes the following topics of particular interest:

- Surface of ground; clearance from vegetation;

- Containment of run-off;
- Proximity to sensitive use areas;
- Fencing;
- Pile size and separation of piles;
- Storage beneath power lines;
- Fire department access and aisle access;
- Proximity to hydrant systems and water supply;
- Combustible, flammable, hazardous, and dangerous materials;
- Housekeeping;
- Sources of ignition;
- Deviations from requirements;
- Fire detection, prevention and extinguishing equipment and systems;
- Ventilation;
- Automatic and manual shutdown of systems;
- Notification; and,
- Closure to public.

6.4.0 Material Control

6.4.1 During the course of operating a facility, employees are required to handle and store a variety of materials. Employers are responsible for providing training to minimize the risk of employee injury and providing for the safety and health of their employees involved in material control functions.

6.4.2 Material control training for fire safety, fire prevention and emergency response procedures is recommended in the following areas, as appropriate for the facility:

- Material control and management:
 - Hazardous waste;
 - Radioactive and Explosive materials;
 - Compressed gases;
 - Dangerous goods;
 - Reactive substances;
 - Combustible materials;
 - Fuel dispensing; and
 - spills response.

- First aid
- C.P.R.

6.4.3 Training shall be in accordance with the employee's assigned duties, and shall include:

- Plant operations overview/familiarization:
 - Type of materials handled; and
 - Plant physical layout.
- Facility policies and procedures such as:
 - Traffic routes and traffic flow;
 - Storage areas and shelving;
 - and
 - Housekeeping.
- Risks/Hazards:
 - General safety precautions;
 - Fire;
 - Personal injury;
 - Stacking/tiers and load stability;

Floor loading; and
Clearance limits.

6.5.0 Fire Emergency

6.5.1 Owners/Operators shall be required to provide site-specific fire emergency training for their employee's in the following areas:

- Emergency procedures to be used in the event of a fire including:

Sounding the alarm;
Notifying the fire department;
Providing access for fire
fighting; and
Evacuation procedures.

- Identification of alternate fire safety measures in the event of a temporary shutdown of fire protection equipment or systems;
- Site and floor plans that feature the type, location and operation of fire protection systems, access for fire fighting, building exits and other relevant information;
- Procedures for notifying the fire department and assisting them in accessing the property for water tanker shuttle operations and fire fighting purposes such as providing the location of any potential flammable or combustible materials on site;
- Ensuring evacuation of on-site visitors and contractors; and
- Dealing with the press and members of the public.

6.6.0 Response

6.6.1 Employers shall provide fire safety awareness training to employees as appropriate and provide additional task-specific training for incipient fire responders commensurate with those duties, functions and responsibilities that the employee is expected to perform. Individual responsibilities shall be delineated in the employer's organization statement or operating policies.

6.6.2 Incipient fire responders shall receive awareness training. At a minimum training shall consist of:

- Location and use of fixed and portable fire extinguishers, standpipes, sprinklers and other fire equipment;
- Protective clothing and equipment requirements, including breathing apparatus;
- Equipment inspection, maintenance and testing; and
- Basic first aid medical procedures.

7. FIRE SAFETY PLANS AND EMERGENCY RESPONSE

7.1 Fire safety and emergency response plans shall be developed in accordance with the *Fire Safety Planning Guidelines for Recycling Facilities and Waste Processing Operations*, and shall be reviewed by the local fire department.

8. MINIMUM SEPARATION AND LAND USES:

8.1 The siting of recycling and waste handling facilities shall be in accordance with local zoning and planning requirements and provincial approval requirements.

8.2 The local fire department and municipal office shall be made aware of any potential impacts or hazards associated with the operation of the recycling or waste handling facility.

8.3 A site evaluation may be required under the Environmental Protection Act or the Environmental Assessment Act.

9. DANGEROUS GOODS

9.1 Industries that handle, store and transport dangerous goods are regulated by the Transportation of Dangerous Goods Act (TDG).

9.2 Table 9.1 indicates the materials that are regulated under TDG, and the maximum quantities that can be stored on site that would allow for an exemption from the regulations. This information is extracted from the National Fire Code.

10. FIRE EXTINGUISHERS AND SMOKE VENTING

Adequate fire extinguisher and smoke venting provisions are necessary in order to help contain and control a fire that may occur in a recycling or waste handling facility.

10.1.0 Fire Extinguishers

10.1.1 Fire extinguishers shall be supplied, installed, inspected, tested and maintained in accordance with the Ontario Fire Code.

10.1.2 A portable fire extinguisher shall be affixed to each piece of mobile equipment (forklifts, front end loaders, etc.) which meets the requirements set out in 10.1.1.

10.2.0 Smoke Venting

10.2.1 Where the collective individual storage for dangerous goods exceed 10m² in a fire compartment, manual or automatic venting of smoke and toxic gases shall be provided from the storage area under fire conditions.

10.2.2 Fire Compartment means an enclosed space in a building that is separated from all other parts of the building by enclosing construction providing a fire separation having a required fire-resistance rating.

**Table 9.1
Small Quantity Exemptions for Dangerous Goods**

Class⁽¹⁾	Dangerous Goods	Maximum Exempt Amount
1	Explosives	(See Subsection 3.1.1 TDG)
2	Gases Division 1 ⁽¹⁾ Flammable Division 2 Non-flammable Division 3 Poisonous Division 4 Corrosive	25 kg ⁽²⁾ 150 kg 0 0
3	Flammable Liquids and Combustible Liquids	0 ⁽³⁾
4	Flammable Solids Division 1 Flammable Solids Division 2 Subject to spontaneous ignition Division 3 Reactive with water	100 kg ⁽⁴⁾ 50kg 50kg
5	Oxidizing Substances Division 1 Oxidizers Division 2 Organic peroxides	250 kg or 250 L 100 kg or 100 L

6	Poisonous and Infectious Substances	
	Division 1 Poisonous substances	
	Packing Group I ⁽⁵⁾	0
	Packing Group II	100 kg or 100L
	Packing Group III	1000 kg or 1000L
	Division 2 infectious substances	0
7	Radioactive Materials	(See Subsection 3.1.1 TDG)
8	Corrosive Substances	
	Packing Group I	500 kg or 500 L
	Packing Group II	1000 kg or 1000L
	Packing Group III	2000 kg or 2000L
9	Miscellaneous	
	Division 1 Miscellaneous	See Article 3.1.2.1 ⁽⁶⁾
	Division 2 Environmental Hazard	See Article 3.1.2.1 ⁽⁶⁾
	Division 3 Specific Wastes	See Article 3.1.2.1 ⁽⁶⁾

Notes to Table 9.1

(1) The numbers refer to the class and division of dangerous goods as defined in the Transportation of Dangerous Goods Regulations

(1) See A-3.2.8.(2) in Appendix A (NFC) for volume to mass conversions

(1) See Part 4 of The Fire Code (1997).

(1) 50 kg for nitrocellulose based product, and 10 kg for "strike anywhere matches"

(1) The Transportation of Dangerous Goods Act defines "packing group" as "a level of hazard inherent to dangerous goods". Packing Group I products are more hazardous than Packing Group III products

(1) Small Quantity exemptions may be determined by other authorities such as the Transportation of Dangerous Goods Act, the Workplace Hazardous Materials Information System (WHMIS), and environmental legislation