THE CORPORATION OF THE CITY OF BRAMPTON

BY-LAW NUMBER 36-74

A By-law for preventing fire, the spread of fire and for the preservation of life.

WHEREAS The Planning Act, R.S.O. 1970, Chapter 348, Section 38(1)24 enables the enactment of this By-law;

THE COUNCIL of the Corporation of the City of Brampton ENACTS as follows:

1) The National Fire Code of Canada 1963 (hereinafter referred to as the Code) subject to the changes hereafter mentioned is hereby adopted and forms part of this By-law.

2) The City Fire Chief and members of the fire department as assigned by him to the division of fire prevention are hereby designated inspectors pursuant to Section 1.5 of the Code.

3) The following sections of the Code are hereby deleted:

Section 1.3.3
Section 2.1.4.11 (2)
Section 2.1.6
Section 2.2.1.7
Section 2.2.2.3 (1)
Section 2.3

4) Section 1.3.4 of the Code is deleted and the following inserted in its place:

1.3.4 Penalties

1.3.4.1. Every person who contravenes or fails to comply with this Code or who fails to carry out an order made under this Code or any condition attached to a permit or to which a permit is subject is guilty of an offence and where no other penalty is provided under this Code is liable on summary conviction to a fine of not less than $50.00 (Fifty Dollars) and not more than $300.00 (Three Hundred Dollars) or to imprisonment for a term not exceeding ten days or to both such fine and imprisonment and in default of payment of the fine to imprisonment for an additional term not exceeding thirty days.

5) The following Sub-section is added to 1.4:

1.4.2.21. A permit shall be required for the purpose of starting fires in open air as defined in 2.1.4.11.

6) The following sentence is inserted in lieu of 2.1.4.11(2)

2.1.4.11 (2)

(a) A person to whom a permit has been issued under sentence (1), shall place and keep a competent person at all times in charge of the fire while it is burning or smouldering and shall provide that person with efficient appliances and equipment in order to prevent the fire from getting beyond control or causing damage or becoming dangerous.

(b) The fire shall be not less than 200 feet from any building or overhead wires and a 20' radius from the fire shall be cleared of vegitation and other combustibles.

(c) The issuance of this permit does not relieve the holder of same, in any way, from complying with any Provincial regulations that are now or may be in effect at the time the permit is issued.

7) The following sub-section is added to Section 2.1.4:

2.1.4.16 Fire Protection - Deep Fryers.

(1) All deep fryers whether portable or permanently fixed shall be provided with an approved automatic extinguishing system.

(2) Where a deep fryer is located within an occupancy required to have an approved fire detection or alarm system, the said extinguishing system shall be inter-connected to same in such a manner as to sound the alarm upon activation.

8) Schedule "A" to this By-law is inserted in lieu of section 2.1.6.

9) The following sub-section is inserted in lieu of 2.2.1.7.

2.2.1.7. Fire Protection Equipment

One or more of the following approved systems shall be installed in any place of assembly, hotel or motel as may be required by the Fire Chief:
Sprinkler System - Standpipe system.
Fire Detection System-Smoke Venting System.
Such installation shall be in accordance with good engineering practice and shall be subject to the approval of the Fire Chief.

10) The following sentence is inserted in lieu of 2.2.2.3 (1):

2.2.2.3. (1) Fire Alarm and Detection systems shall be installed as defined in the Building By-law and more particularly as follows:

(a) An approved Fire Detection system shall be installed throughout the building in all rooms or areas excepting washrooms and corridors.

(b) An approved fire alarm system shall be installed throughout the building.

(c) A relay suitable for the purpose of transmitting an alarm to the Fire Department Central Fire Alarm Panel shall be provided in the system control panel.

11) Schedule "B" to this By-law is inserted in lieu of Section 2.3.

12) By-law No. 1682 of the former Corporation of the Town of Brampton is hereby repealed and By-law No. 11-64 of the former Corporation of the Township of Chinguacousy in so far as it applies to lands now within the Corporation of the City of Brampton are hereby ~~repeated~~. repealed

READ A FIRST, SECOND AND THIRD TIME and PASSED in Open Council this 6th day of May, 1974.

James E. Archdekin

Mayor

Kenneth R. Richardson

Clerk

for By-law 36-74

SCHEDULE "A" FIRE PREVENTION PLAN

2.4 FLAMMABLE AND COMBUSTIBLE LIQUIDS

DEFINITIONS USED IN SECTION 2.4 - FLAMMABLE AND COMBUSTIBLE LIQUIDS

Approved means acceptable to the Authority having jurisdiction.

Atmospheric Tank means a storage tank which has been designed to operate at pressures from atmospheric through 0.5 psig.

Baffle means a non-liquid tight transverse partition in a cargo tank.

Bulk Plant means that portion of a property where flammable or combustible liquids are received by tank vessel, pipe lines, tank car, or tank truck and are stored or blended in bulk for the purpose of distributing such liquids by tank vessel, pipe line, tank car, tank truck or container.

Cargo tank means any tank having a capacity of more than 100 gallons used for carrying of flammable or combustible liquids or asphalt and mounted permanently or otherwise upon a tank truck.

Chemical plant means a plant or portion thereof other than a refinery or distillery where flammable or combustible liquids are produced by chemical reactions or used in chemical reactions.

Closed container means a container, so sealed by means of a lid or other device that neither liquid nor vapour can escape from it at ordinary temperatures.

Combustible liquid - See liquids.

Compartment means a liquid-tight division in a cargo tank.

Consumer outlet means any premises at which gasoline or an associated product of the operator of the outlet, is put into the fuel tanks of motor vehicles used by the operator of the outlet or into portable containers used by the operator of the outlet.

Container - See closed container.

Crude petroleum means hydrocarbon mixtures that have a flash point below 150°F. and which have not been processed in a refinery.

Distillery means a plant or that portion of a plant where flammable or combustible liquids produced by fermentation are concentrated, and where the concentrated products may also be mixed, stored, or packaged.

Drum means a container having a capacity of less than 50 gallons but more than 10 gallons.

Fire area means an area of a building separated from the remainder of the building by construction having a fire resistance rating of at least one hour and having all communicating openings protected by closures having a fire resistance rating of at least 3/4 hour.

Flammable aerosol means an aerosol which is required to be labelled "Flammable" under the Canadian Hazardous Substances Labelling Act. For the purposes of this Code, such aerosols are considered flammable liquids with a flash point below 73°F .

Flammable liquid means any liquid having a flash point below 100° F and having a vapour pressure not exceeding 40 pounds per square inch (absolute) at 100°F.

Flash Point as applied to flammable and combustible liquids means the minimum temperature at which it gives off vapour in sufficient concentration to form an ignitible mixture with air near the surface of the liquid within the vessel as specified by the appropriate test procedure and apparatus as follows: The flash point of liquids having a viscosity less than 45 SUS at 100°F. (37.8°C.) and a flash point below 200°F. (93.4°C.) shall be determined in accordance with the Standard Method of

Test for Flash Point by the Tag Closed Tester, ASTM D-56-70. The flash point of liquids having a viscosity of 45 SUS or more at 100°F. (37.8°C.) or a flash point of 200°F. (93.4°C.) or higher shall be determined in accordance with the Standard Method of Test for Flash Point by the Pensky-Martens Closed Tester, ASTM D-93-71.

Gallon means the Canadian standard gallon as defined under the Canadian Weights and Measures Act 1951 as amended 8 July 1959.

Liquid means any material which has a fluidity greater than that of 300 penetration asphalt when tested in accordance with ASTM Test for Penetration of Bituminous Materials, D-5-65. When not otherwise identified, the term liquid shall include both flammable and combustible liquids.

Combustible liquid shall mean any liquid having a flash point at or above 100°F. (37.8°C.)

Unstable (reactive) liquid shall mean a liquid which in the pure state or as commercially produced or transported will vigorously polymerize, decompose, condense, or will become self-reactive under conditions of shock, pressure, or temperature.

Low pressure tank means a storage tank which has been designed to operate at pressures above 0.5 psig but above 15 psig.

Marine service station means any premises at which gasoline or an associated product is sold and put into the fuel tanks of motor boats or other watercraft or into portable containers.

Portable container means an approved container that has a capacity of 10 gallons or less, that is designed, manufactured and used or to be used for the storage, use or conveyance "flammable" or "combustible" liquids, but excludes a container which is integral with or attached to any appliance or equipment.

Pressure Vessel means storage tank which has been designed to operate at pressures above 15 psig.

Reactive Liquid - See Unstable liquid

Refinery means a plant in which flammable or combustible liquids are produced on a commercial scale from crude petroleum, natural gasoline, or other hydrocarbon sources.

Safety Can means an approved portable container, of not more than five gallons capacity, having a spring-closing lid and spout cover and so designed that it will relieve internal pressure when subjected to fire exposure.

Service station means any premises at which gasoline or an associated product is sold and is put into the fuel tanks of vehicles or into portable containers and shall include marine service stations.

Semi-trailer means a conveyance designed for carrying goods and so constructed that a part of the conveyance rests upon part of a tractor.

Stake truck means a motor vehicle equipped with a platform and normally used for the transportation of packaged goods.

Storage tank means a closed vessel installed either aboveground or below ground in a fixed location.

Tank truck means a motor vehicle having one or more tanks mounted on the frame or chassis of the vehicle.

Tractor means a motor vehicle designed to provide motive power for a semi-trailer.

Trailer means a vehicle designed for carrying goods and so constructed that it is drawn by a motor vehicle but no part of it rests upon the motor vehicle.

Vapour pressure means the pressure, measured in pounds per square inch absolute exerted by a liquid, as determined by the Standard Method of Test for Vapour Pressure of Petroleum Products (Reid Method), ASTM D-323-68.

Vehicle shall include a tank truck, stake truck, trailer, semi-trailer, tractor and other conveyance designed for, or capable of, transporting flammable or combustible liquids.

SECTION 2.4 FLAMMABLE AND COMBUSTIBLE LIQUIDS

2.4.1 SCOPE AND APPLICATION

2.4.1.1. This Section applies specifically to the Storage, Handling, Use and Sale of Flammable and Combustible Liquids except those that are solid at 100°F. or above.

2.4.1.2. The flash point of flammable and combustible liquids shall be determined in accordance with the standard method of test for flash point given in the definitions.

2.4.1.3. The authority having jurisdiction may impose additional requirements beyond those stipulated in Section 2.4 if considered necessary for the safe storage and use of liquids which have unusual burning characteristics, are subject to self-ignition when exposed to the air, are highly reactive with other substances, are subject to explosive decomposition, or have other hazardous properties.

2.4.1.4. This Section shall not apply to:

(1) The transportation of flammable or combustible liquids when in conformity with the regulations of the Canadian Transport Commission;

(2) The design, construction & installation of fuel oil tanks and piping connected with oil burning equipment and within the scope of C.S.A. Standard B139-1971; Installation Code for Oil Burning Equipment.

(3) The installation, piping, storage and handling of liquefied petroleum gases in tanks and cylinders connected with gas burning equipment and within the scope of C.S.A. Standard

B149.2-1969 & Supplement No. 2; Installation Code for Propane Burning Appliances & Equipment.

(4) The Production Storage and Handling of Liquified Natural Gas, CSA Z276-1972;

(5) The storage of flammable or combustible liquids on farms and isolated construction projects, and;

(6) liquids such as certain halogenated hydrocarbons and mixtures containing hydrocarbons which are without flash points, but may be flammable under certain conditions.

2.4.2 REGISTRATION

2.4.2.1 A licence shall be required:

(1) to operate a Service Station or Marine Service Station;

(2) to operate a Bulk Plant; or

(3) to transport either flammable or combustible liquids.

NOTE: Suggested forms for the original application; the licence itself and for a renewal application are given in Appendix _____.

2.4.2.2. Licences referred to in 2.4.2.1. (1) and (2) shall at all times be displayed in a conspicuous position on the licenced premises and licences referred to in 2.4.2.1. (3) shall be carried with the licenced vehicle.

2.4.3 DRUMS AND PORTABLE CONTAINERS, DESIGN AND CONSTRUCTION, STORAGE, HANDLING, USE AND SALE

2.4.3.1. SCOPE

(1) This Subsection shall apply to the design and construction of drums and portable containers and the storage, handling, use and sale of flammable or combustible liquids in drums or containers, not exceeding 50 gallons individual capacity and including flammable aerosols, excepting as listed under 2.4.3.1.(2) below.

(2) This Subsection shall not apply to the storage, handling, use and sale of the following:

(a) Drums or containers in service stations, bulk plants, refineries, chemical plants, distilleries, and commercial and manufacturing plants.

(b) Flammable liquids in the fuel tanks of vehicles, portable or stationary engines.

(c) Flammable or combustible paints, oils, varnishes and similar mixtures used for the painting, decoration or maintenance of buildings when not kept for a period in excess of 30 days, and

(d) Alcoholic beverages, foods, drugs, or medicines when packaged in portable containers.

2.4.3.2 DESIGN, CONSTRUCTION, AND CAPACITY OF DRUMS OF PORTABLE CONTAINERS

(1) Only drums and portable containers that are approved shall be used.

(2) Drums and portable containers meeting the requirements of and containing products authorized by the following shall be deemed to be acceptable:

(a) metal drums and portable containers meeting the requirements of the Canadian Transport Commission Regulations for the Transportation of Dangerous Commodities.

(b) Portable containers of metal or plastic for petroleum fuels meeting the requirements of C.S.A. Standard B252-1971; Portable Metal Containers for Gasoline and other Petroleum Fuels; and B144-1972 Portable Plastic Containers for Petroleum Fuels respectively; or Petroleum Fuels.

(c) safety cans listed by the Underwriters' Laboratories of Canada.

(3) Except as provided in 2.4.3.2.(2) and 2.4.3.2.(4), all flammable or combustible liquids in drums and portable containers shall be distinctly marked or labelled in easily legible type, which is in contrast to any other printed matter on the label, to read:

WARNING! FLAMMABLE
Keep away from heat, sparks and open flames
Keep closed when not in use.

(4) Such markings as referred to in 2.4.3.2.(3) are not required when the drum of portable container is labelled as to hazard in accordance with the requirements of the Canadian Transport Commission Regulations for the Transportation of Dangerous Commodities or the Hazardous Products (Hazardous Substances) Regulations of Canada P.C. 1970-373

(5) The storage, handling and use and sale of flammable or combustible liquids in glass or plastic portable containers other than in Sentence (2) above shall only be permitted when reagents of electrolytic purity are required or upon presentation of satisfactory proof that the storage in metal containers would adversely affect their chemical purity.

(6) The storage, handling, use and sale of flammable or combustible liquids in plastic portable containers of more than 1 pint capacity shall only be outdoors.

2.4.3.3. STORAGE, HANDLING, USE AND SALE INSIDE BUILDINGS

(1) The quantity of flammable or combustible liquids stored, handled or used in drums or portable containers shall comply with the requirements of Sentences 2.4.3.3.(3) - (8), except that the authority having jurisdiction may impose a lesser quantity limitation or require greater fire protection where an unusual hazard to life or property is involved. Similarly increase of the quantities stipulated may be authorized where the type of construction, fire protection provided, or other factors substantially reduce the hazard.

(2) Flammable or combustible liquids including stock for sale shall not be stored in or adjacent to exits, elevators or means of egress.

(3) Assembly Occupancies, Apartments and Hotels:

In assembly occupancies, apartments and hotels, the storage

of more than 10 gallons of liquids with a flash point below 140°F. or more than 50 gallons of liquids with a flash point of 140° F or above shall be in portable containers stored in an approved storage cabinet conforming to Article 2.3.4 or in an inside storage room conforming to Article 2.4.3.5 not having an opening communicating directly with that portion of the building used by the public.

(4) Office, Educational and Institutional Occupancies:

(a) In office, educational and institutional occupancies only quantities of flammable or combustible liquids approved as essential for the operation of office equipment, maintenance, demonstration, treatment or laboratory work shall be permitted to be stored.

(b) Any storage permitted in (a) above shall be kept in approved metal closed containers, stored in an approved storage cabinet conforming to Article 2.4.3.4, in safety cans or in an approved inside storage room conforming to Article 2.4.3.5 not having an opening communicating directly with that portion of the building used by the public.

(5) Laboratories:

(a) Individual containers used in laboratories for flammable liquids shall conform to Article 2.4.3.2 and not exceed a capacity of 1 gallon;

(b) Not more than 10 gallons of flammable liquids shall be stored in laboratories outside of an approved storage cabinet conforming to Article 2.4.3.4 or an approved inside storage room conforming to Article 2.4.3.5; and

(c) Not more than 50 gallons of combustible liquids shall be stored in laboratories outside of an approved storage cabinet conforming to Article 2.4.3.4 or an approved inside storage room conforming to Article 2.4.3.5

(6) Mercantile Occupancies and Retail Stores:

(a) In rooms or areas accessible to the public, in mercantile occupancies and retail stores, storage of flammable or combustible liquids shall be limited to quantities needed for display and merchandising purposes but shall not exceed 2 gallons per square foot of gross floor area. The gross floor area used for computing the maximum quantity permitted shall be considered as that portion of the store actually being used for merchandising flammable or combustible liquids. NOTE: Materials needed for display and merchandising purposes should SHALL be restricted to one case of each brand name and each side displayed.

(b) When the aggregate quantity of stock in addition to that needed for display & merchandising purposes exceeds 50 gallons of flammable liquids , 200 gallons

of combustible liquids with a flash point below 140°F. or 400 gallons of combustible liquids or any combination of flammable and combustible liquids exceeding 200 gallons provided the individual aggregate quantities of each are not exceeded, it shall be stored in an inside storage room complying with the requirements of Article 2.4.3.5. For watermiscible liquids, these quantities may be doubled.

(c) Portable containers in the display area shall not be stacked more than 3 feet or two containers high, whichever is the greater, on either the ground or fixed shelving unless secured in an approved manner.

(d) Shelving in mercantile occupancies and retail stores shall be of stable construction and of sufficient depth and arrangement that the containers displayed thereon shall not be easily displaced.

(e) Any leaking container shall be immediately removed to a safe location outside the building and the spillage cleaned up immediately.

(7) Industrial Buildings:

(a) Storage of flammable and combustible liquids in industrial buildings shall comply with the requirements of Table 2.4.3.3.(7) and (b), (c) and (d) in those portions of buildings used for such storage shall be subdivided by a separation having a minimum fire resistance rating of 1 hour.

(b) Other combustible materials shall not be stored adjacent to flammable or combustible liquids.

TABLE 2.4.3.3.(7)

INDOOR CONTAINER STORAGE IN INDUSTRIAL BUILDINGS

Liquid	Storage Level	Protected Storage* Maximum Per Pile Gals. (see (c))	Protected Storage* Maximum Per Pile Height (see (c))	Unprotected Storage Maximum Per Pile Gals. (see (c))	Unprotected Storage Maximum Per Pile Height (see (c))
Flammable: Flash Point < 73°F.	Ground & Upper Floors	2,250 (50)	3 ft. (1)	540 (12)	3 ft. (1)
	Basement	NOT PERMITTED		NOT PERMITTED	
Flammable: Flash Point 73°F to < 100F	Ground & Upper Floors	13,500 (300)	6 ft. (2)	3,775 (75)	3 ft. (1)
	Basement	NOT PERMITTED		NOT PERMITTED	
Combustible: Flash Point < 140°F	Ground & Upper Floors	13,500 (300)	9 ft. (3)	3,775 (75)	9 ft. (3)
	Basement	4,500 (100)	9 ft. (3)	NOT PERMITTED	
Combustible: Flash Point ≥ 140°F.	Ground & Upper Floors	45,000 (1,000)	15 ft. (5)	11,250 (250)	12 ft. (4)
	Basement	6,750 (150)	9 ft. (3)	NOT PERMITTED	

* A sprinkler or equivalent fire protection system installed in accordance with Part 4 and approved by the Authority having jurisdiction. (Numbers in parentheses indicate corresponding number of 45 gallon drums).

Question as to whether allow any unprotected storage

(c) When two or more classes of flammable or combustible liquids are stored in a single pile, the maximum gallonage permitted in that pile shall be the smallest of the two or more separate maximum gallonages.

(d) Aisles shall be no more than 12 feet from any container. Main aisles shall be at least 8 feet wide and side aisles at least 4 feet wide.

(e) Each pile shall be separated from each other by at least 4 feet.

(8) Flammable and Combustible Liquid Storage Buildings:

(a) If the storage building is located 50 feet or less from another building or the property line, the exposing wall shall have a fire-resistance rating of at least 2 hours with any opening protected by an approved closure. This distance may be altered at the discretion of the Authority having jurisdiction after consideration of the height, size and character of construction and occupancy of the exposed buildings.

(b) The total quantity of flammable or combustible liquids within a building shall not be restricted, but the arrangement of storage shall comply with Table 2.4.3.3.(7).

(c) Containers in piles shall be separated by pallets or noncombustible dunnage when necessary to provide stability and to prevent excessive stress on container walls.

(d) No pile shall be closer than 3 feet to the nearest beam, chord, girder or other obstruction. There shall be a minimum clearance of 3 feet below sprinkler deflectors or discharge orifices of water-spray, or other overhead fire protection systems.

(e) Aisles at least 4 feet wide shall be provided for access to doors, windows and standpipe connections.

interpolation

2.4.3.4 DESIGN, CONSTRUCTION, AND CAPACITY OF CABINETS FOR THE STORAGE OF FLAMMABLE AND COMBUSTIBLE LIQUID, PORTABLE CONTAINERS.

(1) Portable containers having a total capacity of not more than 50 gallons of flammable liquids or not more than 100 gallons of combustible liquids may be stored in a cabinet conforming to the requirements of Sentence 2.4 below. When approved by the Authority having jurisdiction, as many as 3 cabinets may be located in a single fire area.

(2) Storage cabinets shall be of an approved design and constructed to limit the internal temperature to not more than 325°F. when subjected to a 10 minute fire test using the standard time temperature curve as set forth in C.S.A. Standard B54.3-1964 Methods of Fire Tests of Walls, Partitions, Floors, Roof, Ceilings, Columns, Beam and Girders. All joints and seams shall remain tight and the door shall remain securely closed

during the fire test. Cabinets shall be labelled in conspicuous lettering, "FLAMMABLE - KEEP FIRE AWAY".

(3) Metal cabinets constructed in the following manner shall be deemed to be in compliance with Sentence (2). The bottom, top, door and sides of cabinet shall be at least 0.0418 in. sheet steel and double walled with $1\frac{1}{2}$-inch air space. Joints shall be riveted or welded. The door shall be provided with a three-point lock, and the door sill shall be raised at least 2 inches above the bottom of the cabinet.

(4) Wooden cabinets constructed in the following manner shall be deemed in compliance with Sentence (2) above. The bottom, sides and top shall be constructed of an approved grade of plywood at least 1 inch in thickness, which shall not break down or delaminate under the fire test conditions. All joints shall be rabbetted and shall be fastened in two directions with flathead wood screws. When more than one door is used, there shall be a rabbetted overlap of not less than 1 inch. Hinges shall be mounted in such a manner as to not lose their holding capacity due to loosening or burning-out of the screws when subjected to the fire test.

2.4.3.5 DESIGN AND CONSTRUCTION OF INSIDE STORAGE ROOMS FOR THE STORAGE AND HANDLING OF FLAMMABLE AND COMBUSTIBLE LIQUID CONTAINERS.

(1) Inside storage rooms shall have a fire separation from the remainder of the building as given in the Table 2.4.3.5(1) below:

AUTOMATIC FIRE PROTECTION PROVIDED*	FIRE RESISTANCE OF ENCLOSURE IN HOURS	MAXIMUM ROOM SIZE, SQ. FT.	MAXIMUM TOTAL QUANTITIES OF LIQUID GALS./SQ. FT. OF FLOOR AREA
with system	2 hour	500 sq. ft.	8
no system	2 hour	500 sq. ft.	4
with system	1 hour	150 sq. ft.	4
no system	1 hour	150 sq. ft.	2

* Automatic fire protection provided shall be an approved system of sprinklers, water spray, carbon dioxide, dry chemical or Halon.

(2) The room shall be liquid-tight where the walls join the floor.

(3) Openings to other rooms or buildings shall be provided with noncombustible liquid-tight raised sills or ramps at least 4 inches above the surrounding floor, and shall be protected with approved self-closing fire doors. An open-grated trench inside of the room which drains to a safe location may be substituted for the sill or ramp.

interpretation e.g. TANK OUTSIDE UNDERGROUND

(4) Shelving, racks, dunnage, scuffboards, floor overlay and similar installations shall be of noncombustible material except that wood at least 1 inch nominal thickness may be used.

(5) Electrical wiring and equipment located in inside storage rooms used for flammable liquids shall be approved for Class 1, Division 2 Locations and for combustible liquids, shall be approved for general use.

NOTE: The Canadian Electrical Code, C.S.A. C22.1-1972 provides information on the design and installation of electrical equipment.

(6) Every inside storage room shall be provided with either a gravity or a continuous mechanical exhaust ventilation system designed to prevent the accumulation of vapour-air mixtures in a concentration over 1/5 of the lower flammable limit and meeting the requirements of (a)-(g) below.

(a) Mechanical ventilation shall be used if flammable liquids are dispensed within the room.

(b) exhaust air shall be taken from a point near a wall on one side of the room and within 12 inches of the floor with one or more make-up air inlets located on the opposite side of the room within 12 inches from the floor. The location of both the exhaust and inlet air openings shall be arranged to provide air movement across all portions of the floor to prevent accumulation of flammable vapours;

(c) exhaust air from the room shall be discharged to the outdoors directly;

(d) if ducts are used, they shall not be used for any other purpose and shall comply with the requirements of Part 6 of the National Building Code of Canada;

(e) if make-up air to a mechanical system is taken from within the building, the duct opening shall be provided with an approved damper;

(f) make-up air for gravity systems shall be supplied directly from the outside of the building; and

(g) Mechanical ventilation shall provide at least 1 cfm of exhaust air per square foot of floor area, but not less than 150 cfm.

2.4.3.6 CONTAINER STORAGE IN INSIDE STORAGE ROOMS

(1) In every inside storage room there shall be maintained one clear aisle at least 3 feet wide.

(2) Containers over 25 gallons capacity, containing liquids with a flash point below 140 F. shall not be stacked one upon the other.

(3) Dispensing shall be by an approved pump or through an approved self-closing faucet.

2.4.3.7 CONTAINER STORAGE IN OUTDOOR STORAGE AREAS

(1) The quantity of flammable or combustible liquids stored in containers in outdoor storage area shall be in accordance with Table 2.4.3.7.(1) and Sentences 2.4.3.7.(2) to (7) inclusive.

TABLE 2.4.3.7.(1)
OUTDOOR CONTAINER STORAGE

Liquid	Maximum Total Quantity Liquid per Pile (Gallons)	Distance Between Piles, ft.	Minimum clearance to Property Line ft.	Minimum Clearance to Street, Alley or Public Way ft.
Flammable: Flash Point < 73°F.	1,000	5	20	10
Flammable: Flash Point 73°F. to < 100°F.	3,500	5	20	10
Combustible: Flash Point < 140°F.	7,000	5	10	5
Combustible: Flash Point ≥ 140°F.	17,500	5	10	5

(2) When two or more liquids of different flash points stored in a single pile, the maximum total gallonage in that pile shall be the smallest of the two or more separate gallonages based on the storage requirement for the more hazardous liquid.

(3) Within 200 feet of each container, there shall be a 10-foot wide access way to permit approach of the fire department apparatus.

(4) If adjacent property constitutes a fire exposure hazard to the outdoor storage area and there is no fire protection available for such exposures, the clearances to the adjoining property line given in Table 2.4.3.7(1) shall be doubled.

(5) When the total quantity of liquids stored outdoors does not exceed 50% of the maximum per pile permitted in Table 2.4.7.3.(1) the clearances to the property line, street, alley or public way may be halved but not reduced to less than 3 feet.

(6) A maximum of 1,000 gallons of flammable or combustible liquids may be stored adjacent to buildings located on the same premises and under the same management provided that the buildings shall either be one storey high and used for the storage and handling of flammable or combustible liquids, or shall have the two adjacent walls with a fire resistance rating of at least 2 hours and having no opening within 10 feet of such storage.

(7) The outdoor storage area shall be either graded in a manner to divert possible spills away from buildings and other adjacent property shall be surrounded by a curb at least 6 inches high. When curbs are used, drains shall be provided to prevent any accumulation of ground or rain water or spills of flammable or combustible liquids. Drains shall terminate at a safe location remote from the outdoor storage area and shall not:

(a) create a hazard to public health or safety;

(b) contaminate any fresh water source or waterway;

(c) interfere with the rights of any person; and

(d) allow entry of liquids into the sewer system or underground stream, or drainage system.

(8) Where there is a possibility that the conditions listed under (a) (b) (c) or (d) in (7) above might occur, approved vented traps shall be provided and maintained.

2.4.3.8 FIRE PROTECTION

(1) Small hose or portable fire extinguishers, shall be available at locations where flammable or combustible liquids are stored.

(2) At least one portable fire extinguisher having a rating of not less than 10-B units shall be located outside but not more then 10 feet from the door opening into any inside storage room.

(3) At least one portable fire extinguisher having a rating of not less than 10-B units shall be located not less than 10 feet, nor more than 25 feet, from any flammable inside liquid storage area located outside an inside storage room.

(4) All fire equipment shall be installed in accordance with the requirements of Part 4.

2.4.3.9 CARE AND CLEANLINESS

(1) Drums and portable containers shall be inspected frequently for leaks and any spilled liquid flushed away promptly to a safe location in accordance with 2.4.3.(7) and (8), or soaked up with an approved noncombustible absorbent, and the latter disposed of in an approved manner.

(2) In all areas where flammable or combustible liquids are stored or handled:

(a) scrupulous care and cleanliness shall be maintained;

(b) combustible materials other than those essential to operations, shall not be permitted;

(c) the use of open flames or spark producing devices shall be prohibited; and

(d) cleaning rags shall be stored in approved type self-closing type waste cans.

(3) Outdoor areas used for the storage and handling of flammable or combustible liquids:

(a) shall be kept clear of grass, weeds, and other combustibles;

(b) where necessary to prevent the entry of unauthorized personnel, the storage area shall be fenced in an approved manner.

2.4.3.10 SMOKING

Smoking shall be strictly prohibited in all flammable or combustible liquid storage and handling areas. "NO SMOKING" signs shall be prominently posted.

2.4.3.11 STATIC PROTECTION

Containers used for dispensing flammable liquids shall be electrically bonded or grounded during the transfer of liquids inside buildings in accordance with good practice. DEFINE.

2.4.4 TANK STORAGE

2.4.4.1 DESIGN AND CONSTRUCTION OF STORAGE TANKS

(1) Materials

(a) Storage tanks shall be built of steel except as required in (b) and (c).

(b) Storage tanks may be built of materials other than steel for installation aboveground subject to the specific approval of the authority having jurisdiction unless they are only used for the storage of combustible liquids with a flash point 200°F or over where they are not exposed to any spill or leak of a flammable or combustible liquid of flash point below 200°F.

(c) Storage tanks built of materials other than steel shall be designed to specifications embodying principles recognized as good engineering design for the material used and shall be approved by the authority having jurisdiction.

(d) Unlined concrete storage tanks may be used for storing flammable or combustible liquids having a gravity of 35 degrees API or less concrete storage tanks with an approved special lining may be used for other services provided the design is in accordance with sound engineering practice.

(e) Storage tanks may have either combustible or noncombustible linings.

(f) Special engineering consideration shall be required if the specific gravity of the liquid to be stored exceeds that of water or if the storage tanks are designed to contain flammable or combustible liquids at liquid temperatures below zero degrees F.

(2) Atmospheric Storage Tanks:

(a) Atmospheric storage shall be built in accordance with the following standards of design:

(i) Underwriters' Laboratories of Canada Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids, ULC-142-1972;

(ii) Underwriters' Laboratories of Canada Standard for Steel Inside Tanks for Oil-Burner Fuel, ULC 80-1960;

(iii) Canadian Standards Association Standard Z-87-1965, or Underwriters' Laboratories of Canada Standard for Steel Underground Tanks for Flammable Liquids and Combustible Liquids, ULC-58-1972;

(iv) American Petroleum Institute Standards No. 12A, Specification for Oil Storage Tanks with Riveted Shells, Seventh Edition, September 1951 or No. 650, Welded Steel Tanks for Oil Storage, Fourth Edition, 1970; or

(v) American Petroleum Institute Standards No. 12B, Specification for Bolted Production Tanks, Eleventh Edition, May 1958 and Supplement 1,April 1962; No. 12D, Specification for Large Welded Production Tanks, Seventh Edition, August 1957; or No. 12F, Specification for Small Welded Production Tanks, Sixth Edition, March 1968. Tanks built in accordance with these standards shall be used only as production tanks for storage of crude petroleum in oil-producing areas.

REFERANCE TO STANDARDS ADD - AND AMMENDMENTS THERETO

(b) Low pressure storage tanks and pressure vessels may be used as atmospheric tanks.

(c) Atmospheric storage tanks shall not be used for the storage of a flammable or combustible liquid at a temperature at or above its boiling point.

(3) Low Pressure Storage Tanks:

(a) The normal operating pressure of the storage tank shall not exceed the design pressure of the tank.

(b) Low pressure storage tanks shall be built in accordance with approved standards of design. Low pressure storage tanks may be built in accordance with:

(i) American Petroleum Institute Standard No. 620, Recommended Rules for the Design and Construction of Large, Welded, Low-Pressure Storage Tanks, Fourth Edition 1970; or

(ii) The principles of the Code for Unfired Pressure Vessels, Section V111, Division 1 of the ASME Boiler and Pressure Vessels Code, 1971 Edition.

(4) Pressure Storage Tanks

(a) Pressure vessels may be used as low pressure storage tanks.

(b) The normal operating pressure of the vessel shall not exceed the design pressure of the vessel.

(c) Pressure vessels shall be built and inspected in accordance with C.S.A. B51-1969 Code as amended 1972 for the Construction and Inspection of Boilers and Pressure Vessels.

(5) Provisions for Internal Corrosion:

If corrosion is anticipated beyond that provided for in the standards or design formulae used, additional metal thickness or suitable protective coatings or linings shall be provided to compensate for the corrosion loss expected during the design life of the tank.

2.4.4.2 INSTALLATION OF OUTSIDE ABOVEGROUND STORAGE TANKS

(1) Location with Respect to Property Lines and Buildings:

(a) Every aboveground storage tank for the storage of flammable and combustible liquids shall be located with respect to property lines and buildings in accordance with Table 2.4.4.2.(1)(a).

*TABLE 2.4.4.2.(1)(a)
LOCATION OF BULK STORAGE TANKS ABOVE GROUND

Tank Capacity, Gallons	Minimum Distance Storage Tank Shell to Centre Line of Dike ***	Minimum Distance of Storage Tank Shell to Nearest Building or to Property Line, feet
501 to 1,000	One-half the tank height*	10**
1,001 to 50,000	10 feet or one-half tank height, whichever is greater	10
50,001 to 100,000		15
100,000 to 500,000		30
500,001 to 1,000,000		40
over 1,000,000		50

* When diking necessary for compliance with Sub-section 2.4.4.6.

** For Combustible Liquids may be 3 feet

*** Where the clearance required to the centre line of dike exceeds that required to the nearest building or property line the clearance to the dike shall prevail.

(b) Where end failure of horizontal storage tanks may endanger adjacent property, the tanks shall be placed with the longitudinal axis parallel to such property

(c) The spacing of storage tanks for special purposes requiring special engineering design shall be subject to the specific approval in writing by the Authority having jurisdiction.

(2) Spacing (Shell-to-Shell) Between Aboveground Storage Tanks:

(a) Any two aboveground storage tanks for flammable or combustible liquids shall have a clear space between them of not less than that specified in Table 2.4.4.2.(2)(a).

TABLE 2.4.4.2.(2)(a)
SPACING BETWEEN BULK STORAGE TANKS ABOVE GROUND

Capacity of Storage Tanks	Minimum Clear Air-Space
Tanks of equal capacity neither of which exceeds 50,000 gallons.	3 feet
Tanks of unequal capacity and only one of which exceeds 50,000 gallons.	One-half the diameter of the smaller tank but not in any event less than 3 feet.
Tanks of equal capacity each exceeding 50,000 gallons.	One-half the diameter of either tank.
Tanks of unequal capacity each exceeding 50,000 gallons.	One-half the diameter of the smaller tank.

Tanks of any capacity.	The greater of (a) the distance prescribed above or (b) the full diameter of the smaller tank (where the tanks are of unequal capacity).

(b) When tanks storing flammable or combustible liquids of flash point below 200°F. are arranged in three or more rows or in an irregular pattern, greater spacing or other means shall be provided at the discretion of the authority having jurisdiction so that inside tanks are accessible for fire fighting purposes. This shall not be required when storage tanks are used only for combustible liquids of flash point above 200 F. and are not within a diked area or drainage path for a tank or tanks storing flammable or combustible liquids with a flash point below 140 F.

(c) The minimum separation between a liquefied petroleum gas cylinder or tank and a flammable or combustible liquid storage tank shall be 20 feet.

(d) Means such as diversion curbs or grading shall be taken to prevent any possible accumulation of flammable or combustible liquids under adjacent liquefied petroleum gas cylinders or tanks.

(e) Liquefied petroleum gas cylinders or tanks shall not be located inside diked storage areas for flammable or combustible liquids and shall be a minimum distance of 10 feet away from the centre line of the wall of the diked area.

2.4.4.3 NORMAL VENTING FOR ABOVEGROUND STORAGE TANKS

(1) Atmospheric storage tanks shall be vented to prevent the development of a vacuum or pressure sufficient either to distort the roof of a cone roof tank, or to exceed the design pressure, as a result of filling, emptying, or atmospheric temperature changes.

(2) Normal vents shall be sized in accordance with:

(a) the tank design standards listed in Article 2.4.4.1; or

(b) American Petroleum Institute Standard No. 2000-1968, Venting Atmospheric and Low Pressure Storage Tanks, and shall be of sufficient size to permit free outflow or inflow of vapour or air during normal filling or emptying operations.

(3) Low-pressure storage tanks and pressure storage tanks shall be vented to prevent the development of a vacuum or pressure sufficent to exceed the design pressure as a result of filling, emptying or atmospheric temperature changes. Tank protection shall also be provided to prevent overpressure from any pump discharging into the storage tank.

(4) Storage tanks for flammable liquids with a flash point below 73°F. shall be equipped with venting devices which shall be normally closed except when venting under excess pressure or vacuum conditions.

(5) Storage tanks of 3,000 barrels capacity or less containing crude petroleum and outside aboveground atmospheric tanks under 800 gallons capacity containing other than flammable liquids with a flash point below 73° F. may have open vents.

2.4.4.4 EMERGENCY RELIEF VENTING FOR FIRE EXPOSURE FOR ABOVEGROUND STORAGE TANKS

(1) Except as provided in (2) below, every aboveground storage tank shall have some form of construction or device to relieve excessive internal pressure caused by exposure fires.

(2) Storage tanks of over 10,000 gallons capacity for combustible liquids with a flash point 200° F. and over and not within either a diked area or the drainage path of flammable or combustible liquids with a flash point below 200°F. do not require emergency venting.

(3) In a vertical storage tank the construction referred to in Sentence (1) above may take the form of a floating roof, lifter roof, a weak roof-to-shell seam, or other approved pressure relieving construction. The weak roof-to-shell seam shall be constructed to fail preferential to any other seam.

(4) Where entire dependence for emergency relief is placed upon pressure relieving devices, the total venting capacity of both normal and emergency vents shall be sufficient to prevent rupture of the shell or bottom in vertical storage tanks , or of the shell or heads in horizontal storage tanks. If unstable liquids are stored, the effects of heat or gas resulting from polymerization, decomposition, condensation, or self-reactivity shall be taken into account. The total capacity of both normal and emergency venting devices shall be determined by good engineering practice as outlined in the

Appendix to A.P.I. Standard 620.

(5) Each storage tank venting device installed after 1973 shall be stamped with:

(a) the opening pressure;

(b) the pressure at which the valve reaches the full open position;

(c) the flow capacity at the full discharge pressure, expressed in cfph of air at 60°F. and at a pressure of 14.7 psia.

(6) The flow capacity of storage tank venting devices 12 in. and smaller nominal pipe size shall be determined by an actual test of each type and size of vent. These flow tests may be conducted by the manufacturer if the results are certified by a qualified testing agency. The flow capacity of storage tank venting devices larger than 12 in. nominal pipe size, including manhole covers with long bolts or equivalent may be calculated provided that the start to discharge pressure is actually measured, the rating pressure and corresponding free orifice area are stated, the word "calculated" appears on the nameplate, and the calculation is based on a flow coefficient of 0.6 applied to the rated orifice area.

2.4.4.5 VENT PIPING FOR ABOVEGROUND STORAGE TANKS

(1) Vent piping materials and construction shall be in accordance with Subsection 2.4.5.

(2) Vent pipe outlets for storage tanks for flammable liquids shall terminate outside of buildings, not less than 12 feet above the adjacent ground level, at least from building openings, and arranged so that flammable vapours will not be trapped by eaves or other obstructions.

(3) When tank vent piping is manifolded, pipe sizes shall be such as to discharge, within the pressure limitations of the system, the vapours they may be required to handle when manifolded tanks are subject to the same fire exposure. Storage tank vent piping for combustible liquids with a flash point 200°F or above shall not be interconnected with vent piping serving tanks used for storing other flammable or combustible liquids.

(4) Vent piping for storage tanks for flammable liquids shall not be manifolded with vent piping for tanks storing combustible liquids unless positive means are provided to prevent the vapours from the flammable liquids entering tanks storing the combustible liquids.

2.4.4.6 DRAINAGE, DIKES AND WALLS FOR ABOVEGROUND STORAGE TANKS

(1) Drainage, and Diked Areas: The area surrounding a storage tank or group of tanks shall be drained according to Sentence (2) or shall be diked in accordance with Sentence (3), to prevent accidental discharge of liquid from endangering adjoining property or reaching waterways.

(2) Drainage: Where protection of adjoining property or waterways is by means of a natural or man-made drainage system, such systems shall comply with Sentences 2.4.3.7.(7) and (8).

(3) Diked Areas: Where protection of adjoining property or waterways is accomplished by designing for the retention of the liquid around the tank by means of a dike, the diked area shall comply with the following:

(a) Except as provided in (b) below, the volumetric capacity of diked area shall not be less than 110 percent of the greatest amount of liquid that can be released from the largest storage tank within the diked area, assuming a full tank or the capacity of all the other storage tanks whichever is the greater. To allow for the volume occupied by the storage tanks, the capacity of the diked area enclosing more than one tank shall be calculated after deducting the volume of the tanks, other than the largest tank, below the height of the dike; or

(b) For a storage tank or group of tanks with fixed roofs containing crude petroleum with boil-over characterictics, the volumetric capacity of the diked area shall be not less than the capacity of the largest storage tank served by the enclosure, assuming a full tank. The capacity of the diked enclosure shall be calculated by deducting the volume below the height of the dike of all the storage tanks within the enclosure; and

(c) The base and walls of the diked area shall be of earth, steel, concrete or solid masonry and dikes shall be designed, constructed and maintained so to be impervious to the liquids being stored, and to withstand a full hydrostatic head. The walls of all earth dykes shall have a flat section at the top not less than 2 feet wide. The slope of an earthen wall shall be consistent with the angle of repose of the material with which the wall is made. This Sentence is not intended to preclude the use of natural topography; and

(d) Except as provided in (e) below, the walls of the diked area shall be restricted to an average interior height of 6 feet above interior grade;

(e) Dikes may be higher than an average of six feet above the interior grade when provisions are made for normal and emergency access to storage tanks, valves and other equipment and safe egress from the diked enclosure.

(i) When either the average height of the dike containing flammable liquids exceeds 12 feet, measured from the interior grade, or when the distance between any tank and the top inside edge of the dike wall is less than the height of the dike wall, provisions shall be made for the normal operation of valves and for access to storage tank roofs at a level not below the top of the dike. These provisions may

be met through the use of remote operated valves and elevated walkways.

(ii) When the height or location of dike walls prevents fire fighting access to storage tanks containing flammable or combustible liquids with flash points below 140°F., approved fixed fire extinguishing systems shall be provided on the storage tanks.

(f) Where provision is made for draining water from diked areas, drainage shall be provided in accordance with the requirements of Sentences 2.4.3.7.(8) and (9). Control of drainage shall be accessible under fire exposure conditions and outside the diked area.

(g) Combustible materials, other than that used for approved dike stiles or walkways, empty or full drums or portable containers shall not be permitted within the diked area.

2.4.4.7 TANK OPENINGS OTHER THAN VENTS FOR ABOVEGROUND STORAGE TANKS

(1) Each connection to an aboveground storage tank through which liquid can flow shall be provided with a valve located as close as practical to the shell. Such valves and their connections to the tank, when external, shall be made of steel except when the chemical characteristics of the liquid stored are incompatible with steel. When materials other than steel are necessary, such materials shall be suitable for the pressures, structural stresses and temperatures involved, including those of possible fire exposure.

(2) Gauging openings for storage tanks for flammable liquids shall be provided with caps or covers. Such covers shall be closed when not gauging.

(3) Filling and emptying connections for flammable or combustible liquids with a flash point below 200°F. which are made and broken as part of normal operating conditions shall be located outside of buildings at a location free from any source of ignition and greater than five feet away from any building opening. Such connections shall be kept closed and liquid tight when not in use and shall be identified.

2.4.4.8 INSTALLATION OF UNDERGROUND STORAGE TANKS

(1) Location:

(a) Excavations for underground storage tanks shall not undermine foundations of existing structures.

(b) Building foundations and supports shall not transmit loads to underground storage tanks.

(c) Underground storage tanks shall be located:

(i) not less than three feet from a building or street line;

(ii) not less than two feet from an adjacent tank; and

(iii) not less than five feet from a property line, all measured horizontally.

(d) Underground storage tanks at any service station or consumer outlet, shall not have a capacity over 10,000 gallons.

(e) Underground storage tanks shall be installed so that the level of any piping connected to the tanks is below the top of the tanks.

(f) Underground storage tanks not subjected to vehicular traffic shall be installed at least two feet below grade level.

(g) Subject to Sentence (h) underground storage tanks subjected to vehicular traffic shall be installed at least three feet below grade level.

(h) In lieu of the depth of cover referred to in Sentence (g), eighteen inches of sand plus six inches of reinforced concrete or eighteen inches of sand plus eight inches of unreinforced concrete may be used.

(i) The concrete slabs referred to in Sentence (h) shall extend at least one foot horizontally in all directions beyond the outline of the storage tank.

(j) Subject to Sentence (k) below, and where, by reason of solid rock substratum, or for any other reason acceptable to the authority having jurisdiction, it is not practicable to comply with (f), (g) or (h), storage tanks may be installed so that,

(i) it is at least 75 per cent below grade level; and

(ii) that portion above grade level is provided with an earth covering of more than two feet thick.

(k) With specific approval in writing from the authority having jurisdiction, the 75 per cent referred to in

Sentence (j) (i) may be reduced to 50 per cent, provided that the earth cover referred to in Sentence (j)(ii) is increased to three feet.

(2) Installation: The installation of storage tanks shall conform to the following requirements:

(a) Tests shall be performed by a qualified engineer to ascertain the soil condition relative to corrosion, and corrosion protection provided in accordance with Sentence 2.4.4.9,

(b) Storage tanks shall be inspected at the time of installation, and any damage either to the tanks or to their protective coating shall be repaired before tanks are installed;

(c) Storage tanks shall be carefully lowered into the excavation by use of lifting lugs and hooks and, where necessary, by the use of spreader bars, but chains or slings shall not be used around the tanks and any method of handling that might result in damage to the protective coating of the tank shall not be used.

(d) After storage tanks have been positioned in the excavation, and subject to Sentence (f), the tanks and their associated vents shall each be subjected to a recorded 5 psig pressure test with either air or nitrogen, and,

(i) Storage tanks and vent lines shall retain the pressure for a minimum of two hours after the source of pressure has been removed;

(ii) if a pressure drop is recorded, the storage tanks and vent lines, shall be inspected to locate every source of leakage;

(iii) all leaks shall be repaired, and the pressure test repeated;

(iv) the pressure tests shall be continued until the requirements of Sentence (d)(i) have been met;

(v) the records of the pressure test shall be certified by the owner or his authorized representative and shall be retained by the owner and kept available for inspection, and,

(vi) the pressure required shall be measured by an instrument calibrated in increments not greater than 1/10 p.s.i.

(e) Storage tanks shall be set on clean sand not less than six inches in depth and the tanks backfilled with clean sand free of cinders and stones which is compacted in not greater than 12 in. layers to maximum density, in a thickness not less than 12 ins. on each side, each end, and above the tanks. In certain areas and subject to the specific approval of the Authority having jurisdiction, crushed stone or stone screenings may be substituted for the sand.

(f) If storage tanks are to be held in place with combustible liquids while being pressure tested in accordance with Sentence (d), liquid shall not be placed in the tank until the fill pipe and vent line have been installed in the tank

and until all other openings have been plugged;

(g) Ballasting of storage tanks as provided for in Sentence (2)(f) shall not be effected with a flammable liquid; and

(h) If spillage occurs when tanks are being filled with a combustible liquid in accordance with Sentence (2)(f), resulting in damage to the tank coating, the damage shall be repaired and all the sand that has been contaminated by the spilled liquid shall be replaced.

(3) Installation of Underground Storage Tanks Subject to Flood or High Water Conditions:

(a) Where a high water table is anticipated, underground storage tanks shall be anchored;

(i) by the use of concrete slabs under the tanks and anchor straps;

(ii) by the use of ground anchors, or

(iii) by the use of a concrete slab on top of the tanks.

(b) The concrete slabs referred to in Sentence (3) (a) shall be reinforced and the size of the slabs shall be determined on the basis of tank size, ground cover, water-table elevation and the calculated up-lift stress of the tanks when empty.

(c) Underground storage tanks shall not be placed in direct contact with the reinforced concrete slabs referred to in Sentence (3)(a) but shall be separated by the use of wood saddles, a minimum of six inches of sand, or an interlayer of composite materials. Wood saddles shall

be designed and located in accordance with good engineering practice.

(d) The strength of the anchor straps and ground anchors referred to in Sentence (3)(a) shall be calculated for the stresses indicated in Sentence (3)(b) and shall be installed in such a manner that the anchor straps and ground anchors do not interfere with the protective coating on the tank, and that the straps are not tighter than hand-tight.

2.4.4.9 CORROSION PROTECTION OF UNDERGROUND STORAGE TANKS

(1) Corrosion protection for underground storage tanks and their associated piping shall be provided by one or more of the following approved methods:

(a) Use of protective coatings or wrappings; and

(b) Cathodic protection; or

(c) Use of corrosion resistant materials of construction.

(2) The selection of the type of corrosion protection used shall be based upon the corrosion history of the area and the judgment of a qualified engineer.

2.4.4.10 VENTS FOR UNDERGROUND STORAGE TANKS

(1) Location and Arrangement for Flammable Liquid Storage Tanks

(a) Vent pipes from underground storage tanks for flammable liquids shall be located so that the discharge point is outside any building; is higher than the fill pipe openings; and more than 12 feet above the adjacent grade level.

(b) Vent pipes from underground storage tanks for flammable liquids shall not be obstructed by any device that may cause back pressure.

(c) Outlets from vent pipes from underground storage tanks for flammable liquids shall terminate in a location where flammable vapours will not enter building openings, or be trapped under eaves or other obstructions.

(2) Location and Arrangement for Combustible Liquid Storage Tanks:

(a) Vent pipes from underground storage tanks for combustible liquids shall be located so that the discharge point is outside any building; is higher than the fill pipe opening and more than seven feet above general grade level.

(b) Vent pipes may be fitted with return bends, coarse screens or other devices to minimize ingress of foreign material.

(3) Size of Vent Openings.

Every underground liquid storage tank shall be provided with vent openings of cross-section 1 area sufficient to permit free escape of air and vapour when the tank is being filled at its maximum filling rate.

(4) Vent Piping

(a) Piping materials and construction shall be in accordance with Subsection 2.4.5.

(b) Piping shall be laid so as to drain toward the underground storage tank without sags or traps.

(c) Piping shall be located so that they will not be subjected to physical damage.

(d) The tank end of vent piping shall enter the underground storage tank through the top.

(e) Piping shall not extend into the underground storage tank more than one inch except when the vent is equipped with a vent alarm.

(f) When piping is manifolded, the total cross-sectional area shall be such as to discharge, within the pressure limitations of the system, the vapours it may be required to handle when manifolded underground storage tanks are filled simultaneously.

(g) Piping for underground storage tanks for flammable liquids shall not be manifolded with vent piping for tanks for combustible liquids unless positive means are provided to prevent the vapours from flammable liquids entering tanks storing combustible liquids.

2.4.4.11 OPENINGS, OTHER THAN VENTS, IN UNDERGROUND STORAGE TANKS

(1) Connections for all tank openings in underground storage tanks shall be liquid and vapour tight.

(2) Openings for manual gauging, if independent of the fill pipe, shall be provided with a vapour tight cap or cover which shall be kept closed when not gauging.

(3) Fill and discharge piping shall enter underground storage tanks only through the top and shall be sloped toward the storage tanks.

(4) Filling and emptying connections for flammable or combustible liquids with a flash point below 200°F. which are made and broken shall be located outside buildings at a location free

from any source of ignition and not less than five feet away from any building opening. Such connection for any liquid shall be closed and liquid tight when not in use and shall be identified in an approved manner.

2.4.4.12 INSTALLATION OF STORAGE TANKS INSIDE BUILDINGS

(1) Location: Tanks other than fuel oil storage tanks within the scope of C.S.A. Standard B139 shall not be permitted inside buildings except in Industrial Plants, Service Stations, Processing Plants, Refineries, or on Piers and Wharves and with the specific approval of the Authority having jurisdiction.

(2) Vents:

(a) Vents for storage tanks inside buildings shall be provided and shall meet the requirements of Sentences 2.4.4.3., 2.4.4.4., 2.4.4.5.(2) and 2.4.4.10. except that emergency venting by the use of weak roof seams on tanks shall not be permitted.

(b) Approved automatic sprinkler systems shall be considered as equivalent to an approved water spray system for the purposes of calculating the required air flow rates for emergency vents described in Sentence 2.4.4.4.(6).

(c) Vents shall be so arranged that the outlets discharge vapours outside the buildings as required in Sentence 2.4.4.10.(1).

(3) Vent Piping: Vent piping materials and construction shall be in accordance with Subsection 2.4.5.

(4) Tank Openings Other than Vents in Inside Storage Tanks

(a) Connections for all tank openings in inside storage tanks shall be liquid and vapour tight.

(b) Every connection to an inside storage tank through which liquid may flow shall be provided with a valve located as close as practical to the shell of the tank. Such valves shall conform to the requirements of Subsection 2.4.5.

(c) Flammable or combustible liquid inside storage tanks except those in one-storey buildings designed and protected for flammable or combustible liquid storage, shall have an automatic-closing heat-actuated valve on each withdrawal connection below the liquid level, except on connections used for emergency disposal. This function of this valve may be incorporated into the valve required in (b), but if a separate valve, it shall be located adjacent to the valve required in (b).

(d) Openings for manual gauging of flammable or combustible liquids with a flash point below 140°F. if independent of the fill pipe, shall be provided with a vapour tight cap or cover which shall be kept closed when not gauging. Each such opening for any liquid shall be protected against liquid overflow and possible vapour release by means of a spring loaded check valve or other approved device. Substitutes for manual gauging include, but are not limited to, heavy duty flat gauge glasses,

magnetic, hydraulic or hydrostatic remote reading devices and sealed float gauges.

(e) Fill pipes for inside storage tanks for flammable liquids with a flash point below 73°F. other than crude oils, gasolines and asphalts, shall be designed and installed as to minimize the possibility of generating static electricity by terminating within six inches of the bottom of the storage tank.

(f) Fill pipes for inside storage tanks shall be installed to minimize vibration of the pipe.

(g) Fill pipe inlets for inside storage tanks shall be located outside of buildings at a location away from any source of ignition and not less than five feet away from any building opening. They shall be provided with a liquid and vapour tight cap kept closed when not filling and the fill pipe inlet shall be identified in an approved manner.

(h) Inside liquid storage tanks shall be equipped with an approved device, to prevent overflow into the building. Suitable devices include, but are not limited to, float valves, preset meters on the fill line, valves actuated by the weight of the tank contents, low head pumps which are incapable of producing overflow; or liquid tight overflow pipes at least one pipe size larger than the fill pipe discharging by gravity back to the outside source of liquid or to an approved location.

2.4.4.13 SUPPORTS, FOUNDATIONS AND ANCHORAGE FOR ABOVEGROUND STORAGE TANKS

(1) Tanks shall rest on the ground or on foundations made of concrete, masonry, piling or steel subject to the provision of a protective inter layer meeting the requirements of 2.4.4.8.(3) (c). Tank foundations shall be designed to minimize the possibility of uneven settling of the tank and to minimize corrosion in any part of the tank resting on the foundation.

Notes:

(a) Appendix E of API Standard 650: Specification for Welded Steel Tanks Oil Storage and Appendix B of API Standard 620: Recommended Rules for the Design and Construction of Large, Welded, Low Pressure Storage Tanks, provide information on tank foundations.

(b) The design of supports for special storage tanks such as spheres require special engineering consideration. Appendix N of API Standard 620: Recommended Rules for the Design and Construction of Large, Welded, Low Pressure Storage Tanks, contains information regarding supporting structures.

(c) In areas subject to earthquakes, the design of storage tank supports and connections require special consideration.

(2) When tanks are supported above the foundation, tank supports shall be installed on firm foundations. Supports shall be of

concrete, masonry or protected steel.

(3) Steel supports or exposed piling shall be protected by materials giving a fire resistance rating for the assembly of not less than two hours, except that steel saddles need not be protected if they are less than 12 inches high at their highest point. Subject to the specific approval of the authority having jurisdiction water spray protection or its equivalent may be used in lieu of fire-resistive materials to protect the storage tank supports.

(4) Every aboveground storage tank shall be supported so as to prevent the excessive concentration of loads on the supporting portion of the shell.

(5) Where a tank is located in an area that may be subjected to flooding, the installation shall conform to the applicable requirements of Sentence 2.4.4.8.(3).

2.4.4.14 IDENTIFICATION OF ABOVEGROUND STORAGE TANKS

(1) Every aboveground storage tank shall be permanently marked to provide identification of its contents on at least two sides in lettering of a size sufficient to ensure legibility from at least 15 ft or from outside a dike area, whichever is the greater. 4" SAY IT

(2) The markings in (1) above shall be situated to provide clear identification both to operating and to fire fighting personnel.

2.4.4.15 ELIMINATION OF SOURCES OF IGNITION IN STORAGE TANK LOCATIONS

(1) In storage tank locations where flammable vapours may be present, precautions shall be taken to eliminate or control sources of ignition. Sources of ignition may include open

flames, lightning, smoking, cutting and welding, hot surfaces, frictional heat, sparks (static, electrical or mechanical), spontaneous ignition, chemical and physical-chemical reactions and radiant heat.

2.4.4.16 TESTING OF STORAGE TANKS

(1) All storage tanks, whether shop-built or field-erected, shall be leak tested before they are placed in service in accordance with the applicable paragraphs of the Standard under which they were built.

(2) Aboveground shop built storage tanks are normally shop tested for leaks and the C.S.A. or U.L. of C. label shall be acceptable as evidence of such testing.

(3) Aboveground field erected storage tanks are normally field tested for leaks and the U.L. of C. label or API monogram shall be acceptable as evidence of such testing.

(4) Underground Shop Built Storage Tanks:

(a) Underground shop built storage tanks are normally shop tested for leaks and the C.S.A. or U.L. of C. label shall be acceptable as evidence of such testing.

(b) Underground shop built storage tanks are also required to be field tested in accordance with the requirements of Sentence 2.4.4.8.(2)(d).

(5) When the vertical length of the fill or vent pipes on liquid storage tanks is such that when filled with liquid the static head imposed upon the bottom of the storage tank exceeds 10 pounds per square inch, the storage tank and associated piping

shall be tested hydrostatically to a pressure equal to the static head thus imposed. In special cases where the height of the vent above the top of the storage tank is excessive, the hydrostatic test pressure shall be specified by the Authority having jurisdiction.

(6) Underground piping connected to storage tanks shall be pressure tested in accordance with Sentence 2.4.5.7.

2.4.5 PIPING AND PUMPING SYSTEMS

2.4.5.1 SCOPE AND APPLICATION

(1) The piping systems referred to in this Subsection shall consist of pipe, tubing, flanges, bolting, gaskets, valves, fittings, the pressure containing parts of other components such as expansion joints and strainers, and devices which serve such purposes as mixing, separating, snubbing, distributing, metering, or controlling flow.

(2) This Subsection shall not apply to any of the following:

(a) tubing or casing on any oil or gas wells and any piping connected directly thereto;

(b) piping for vehicles, aircraft, watercraft or other portable or stationary engines;

(c) piping systems on Service Stations covered in Subsection 2.4.6.;

(d) piping system in Bulk Plants covered in Subsection 2.4.7.;

(e) piping systems on Piers and Wharves covered in Subsection 2.4.8.; or

(f) piping within the scope of the applicable provincial boiler and pressure vessel Code.

2.4.5.2 MATERIALS FOR PIPING, VALVES AND FITTINGS

(1) The material design, fabrication, assembly, test and inspection of piping systems containing flammable or combustible liquids shall be suitable for the maximum anticipated working pressures and structural stresses.

(2) Piping systems for liquids shall be of material resistant to heat and mechanical damage, chemically resistant to the liquid contained and of adequate design strength to withstand the maximum anticipated service temperature. The use of materials subject to failure from internal stress, from rupture by mechanical damage, and combustible or low-melting materials subject to failure even in moderate exposure fires shall not be permitted.

(3) Steel Piping

(a) Where steel piping is used the piping including welded and seamless grades, shall meet the requirements of American Petroleum Institute Specification 5L or be of an approved equivalent standard.

(b) Where service pressures exceeding 125 lb/sq. in. are to be designed for, extra heavy duty steel piping with forged or cast steel or extra heavy malleable threaded fittings shall be used.

(4) Copper and Brass Piping

(a) Copper tubing and copper or brass piping may be used but not where temperatures of over 400°F. may be encountered.

(b) Copper tubing and copper or brass piping used shall be installed and maintained in accordance with good practice, and comply with C.S.A. Standard HC 7.5, Seamless Copper and Red Brass Pipe.

(c) Flexible copper tubing shall be protected against mechanical injury.

(5) Other Piping Materials

(a) When problems of corrosion, contamination, sanitation or high standards of purity are factors, special piping materials may be used subject to the specific approval of the Authority having jurisdiction.

Note: Such materials include steel piping lined with tin, glass, rubber or other material resistant to the liquid being handled; and piping made from such materials as stainless steel, copper, nickel, lead, carbon, graphite, glass, porcelain, thermosetting plastic of high melting point and hard rubber.

2.4.5.3 CORROSION PROTECTION OF PIPING SYSTEMS

(1) Exposed steel piping shall be protected against external corrosion either by the use of galvanized piping or protected in an approved manner by painting, wrapping or other coating.

(2) Underground steel piping shall be protected from external corrosion either by the use of galvanized piping or protected in an approved manner by wrapping, coating with asphaltic material, or cathodic protection.

(3) Upon completion of all exposed or underground piping systems all couplings, flanges and bolts shall be coated with

butuminous enamel or other approved material.

2.4.5.4 IDENTIFICATION OF PIPING SYSTEMS

(1) All exposed liquid piping shall be coloured yellow and identified in accordance with CGSB Specification 24-GP-3 - Code for Identification and Classification of Piping Systems.

(2) Where the content of aboveground liquid piping cannot otherwise easily be determined, the piping shall be marked at 10 ft. intervals to provide product identification.

2.4.5.5 JOINTS IN PIPING SYSTEMS

(1) Threaded joints shall be made in accordance with good practice and an approved joint compound for the material being handled shall be used to seal the joints.

(2) Welding procedures, and welding operations shall be in accordance with the requirements of C.S.A. Standard W47 or the appropriate provincial code.

(3) Flanged connections shall be provided in welded systems for ease of dismantling so as to avoid subsequent in-place cutting and welding operations.

(4) Flanged joints shall be made using forged or cast steel flanges of the appropriate pressure rating conforming with good practice, except as permitted in (5) and (6).

(5) Bronze flanges in 2-in. and smaller sizes may be used where copper and brass piping is permitted.

(6) Bolting materials for flanged connections in steel piping systems shall be of alloy steel conforming to good practice. In existing installations carbon steel and wrought iron bolts may be accepted subject to the approval of the Authority having jurisdiction.

(7) Joints for non-ferrous piping may be threaded, flanged, flared, brazed or silver soldered. Brazing or soldering alloys where used shall have a minimum melting point of 1000°F.

(8) Joints shall avoid the use of dissimilar metals to minimize the danger of electrolytic action.

2.4.5.6 GASKETS IN PIPING SYSTEMS

Gaskets in flanged connections shall be of a material resistant to the liquid being carried and capable of withstanding fire exposure temperatures.

2.4.5.7 PRESSURE TESTING OF PIPING SYSTEMS

(1) All piping systems used for flammable or combustible liquids shall be pressure tested with air or water, to at least 50 psig or one and one-half times the maximum operating pressure, whichever is the greater. A pressure test performed with air shall not exceed 100 psig. When piping systems are pressure tested:

(a) with air, the lines shall be soaped and shall retain the pressure for a minimum period of two hours after the source of pressure has been removed; or

(b) with fluid, the lines shall retain the pressure for a minimum of six hours after the source of pressure has been removed; and

(c) the pressure shall be measured by an instrument calibrated in increments not greater than one-half of one pound per square inch.

(2) When piping is pressure tested hydraulically and the piping contains a flammable liquid, all safety precautions required by this Code for flammable liquids shall be observed.

(3) Piping that has been pressure tested and proven tight shall have the pressure test records certified by the owner, or his authorized representative and retained by the owner available for inspection.

2.4.5.8 LOCATION AND ARRANGEMENT OF PIPING

(1) General: Piping shall be installed outdoors whenever possible and located so as not to expose buildings or equipment. The point of entrance to buildings shall be arranged so that the piping within the building is direct and as short as possible.

(2) Aboveground Outdoor Piping:

(a) Aboveground outdoor piping shall be supported in a substantial manner, so arranged as to prevent excessive vibration or strain on connecting equipment, and protected by guards to protect against possible vehicular impact or other physical injury.

(b) Horizontal spans of aboveground outdoor piping shall be such as to not impose excessive stress on the pipe wall. Unsupported spans shall normally be limited to 20 ft. Longer spans shall be supported in a manner acceptable to the Authority having jurisdiction.

(c) Pipe may be located on the exterior side of noncombustible walls but not above windows. It may also be located above roofs of noncombustible construction provided

drainage can be arranged to dispose of any leakage in accordance with Sentences 2.4.3.7.(8) and (9).

(d) Where aboveground piping crosses roadways, or railway sidings, ample overhead clearance and warning signs indicating the clearance height shall be provided.

(e) Piping passing through dike walls shall be designed to minimize stresses as a result of settlement or fire exposure.

(3) Underground Piping:

(a) Underground piping shall be laid and located so as not to be subjected to stress from building foundations or other facilities subject to vibration or settling.

(b) Underground piping passing alongside buildings or similar structures shall be located at least 1 foot from the foundations.

(c) Piping passing under railway tracks shall be installed in accordance with General Order No. E-10 of the Canadian Transport Commission.

(d) Piping adjacent to railway tracks shall be installed in accordance with General Order No. O-32, Part 5, of the Canadian Transport Commission.

(e) Piping to be buried shall be laid in undisturbed soil where possible, using backfill as described in Sentence 2.4.4.8.(2)(e).

(4) Piping in Ducts or Trenches:

(a) Indoor trenches may be used for piping for flammable or combustible liquids only subject to specific approval in writing from the Authority having jurisdiction. Such piping shall be provided with trapped drains leading to an approved location.

(b) When piping in indoor trenches contains flammable liquids the trench shall be provided with positive ventilation or it shall be filled with sand.

(5) Piping in Tunnels:

Flammable or combustible liquid piping shall not be located in service tunnels.

(6) Piping Entrances to Buildings:

Piping entrances to buildings shall be located aboveground unless specifically approved in writing by the Authority having jurisdiction. In all such cases, the piping shall be provided with inside and outside control valves at the points of entrance. Where the piping passes through a wall, a pipe sleeve shall be provided and the annular space shall be permanently sealed.

(7) Indoor Piping:

(a) Indoor piping may be underground located in trenches as described in Sentence 2.4.5.8.(4) or supported overhead, except that piping containing flammable liquids shall only be so installed when specific approval in writing is given by the Authority having jurisdiction.

(b) Overhead piping shall be installed close to the ceiling or beams or along walls at least 6 feet above the floor to protect it against mechanical injury. Pipe risers shall be installed alongside of pilasters, between flanges of steel columns or in securely anchored larger perforated pipe. Guards are not normally required if the risers are close to the walls and columns except where they are exposed to mobile equipment.

(c) Piping for flammable or combustible liquids shall be supported by approved pipe hangers of such design as to prevent lateral motion of the pipe.

(d) Where possible pipes carrying flammable or combustible liquids shall be supported from building framing members.

(e) In buildings of steel frame construction pipes carrying flammable or combustible liquids shall be fastened to steel beams or columns by bolted clips or pipe hangers which grip the flanges and have a retaining strap.

(f) Piping carrying flammable or combustible liquids shall not be installed under combustible flooring.

(g) Piping under concrete ceilings shall be suspended with the use of through bolts or expansion shields. Expansion shields shall be used in the horizontal position except in sound concrete having a gravel or crushed stone aggregate. Shields are not permitted in cinder concrete, gypsum or ceilings of similar construction.

(h) For indoor piping systems, inside buildings, at least one hanger shall be provided for each length of pipe. Unsupported spans shall not exceed 12 feet for pipe up to 1-1/4 in. diameter or 15 feet for larger diameter pipe.

(8) Provision for Expansion and Flexibility in Piping Systems

(a) In the design of flammable or combustible liquid piping systems, provision shall be made for thermal expansion and contraction by the use of pipe bends, welding elbows or other approved flexible joints. Expansion slip joints shall not be used.

(b) Approved flexible hose connectors may be used where necessary in systems carrying flammable or combustible liquids to prevent the development of dangerous stresses due to vibration, settling or thermal change.

(c) Flexible hose connectors shall be constructed and tested to Underwriters' Laboratories Standard No. 567.

2.4.5.9 VALVES IN PIPING SYSTEMS

(1) General:

(a) Valves in piping systems for flammable or combustible liquids shall be of an approved type and have the appropriate service rating for the maximum temperatures and pressures which may be encountered.

(2) Location of Valves

(a) Shut-off valves shall be provided in all flammable or combustible liquid piping and pumping systems to stop

the flow of liquid should a fire occur or liquid accidentally escape. Where practicable, such valves shall be located out of doors or immediately adjacent to an interior wall accessible from outdoors.

(b) Shut-off valves shall be provided:

(i) at connections to storage tanks where the transfer of liquids is by other than positive displacement-type pumps;

(ii) on supply piping where it enters buildings or structures;

(iii) on branch lines from the main supply line where the supplying equipment is in other fire areas;

(iv) on supply lines at dispensing locations.

(3) Design of Valves

(a) Diaphragm valves shall have no direct connections between the liquid and air section of the valve that might permit leakage of the liquid past the packing into the air lines.

(b) Globe valves if used shall be arranged so that the packing is on the low pressure size.

(c) Rising stem or other indicating-type valves shall be used where it is necessary to see whether the valves are open or shut.

(d) Valve bodies shall be of cast steel except as permitted in Sentences (e) or (f) below.

(e) Valve bodies may be of bronze for copper or brass pipe in sizes up to 2 inch.

(f) When corrosion or product purity is a factor, stainless steel, monel metal or lined-steel bodied valves may be used.

(4) Identification of Valves

To reduce the possibility of product mixing, all aboveground valves shall be marked to provide identification as follows:

(a) All those controlling "Flammable Liquids" shall be identified by a tag coloured red and octagonal in shape.

(b) All those controlling "Combustible Liquids" shall be identified by a tag coloured any colour other than red, green or red-orange shades and round in shape.

(c) The tags shall be of enamelled metal, anodized aluminum, substantial fibre or solvent resistant plastic.

(d) The tags shall be marked in clear legible permanent characters with the name of the product.

(e) Every tag shall at all times be kept clean so that its colour is easily recognizable, and its inscription is readily legible.

2.4.5.10 HEATING OF PIPING SYSTEMS

(1) General

Heating equipment shall be arranged so that it does not overheat locally or otherwise create an ignition source for the liquids handled.

(2) Methods of Applying Heat

(a) Flammable or combustible liquid lines may be steam traced using the minimum steam pressure to make the liquid fluid.

A regulator shall be provided in the steam line with a relief valve on the down stream side set at a higher pressure. The pipe and tracing shall be enclosed with noncombustible insulation.

(b) Electrical heating cables or thermal electrical induction methods shall comply with the requirements of the Canadian Electrical Code CSA B22.1 or the appropriate provincial codes.

(c) Where specific approval in writing from the enforcing authority is obtained thermal electrical conduction methods of pipe tracing may be utilized by passing a low voltage alternating current through the pipe. Such systems shall be installed and tested as complete units. Unheated sections shall be insulated by means of nonconductive fittings. Systems shall be provided with thermostatic controls, high temperature limit controls and protected by fuses or fused disconnect switches of the lowest practical rating. All parts of the piping and fittings shall be enclosed by electrical and thermal insulating covering to prevent accidental grounding of the systems. Switches, transformers, contactors or other spark producing equipment shall be in a safe area away from flammable liquid vapours.

(d) The use of open flames as a heat source, is prohibited.

2.4.5.11 METHODS OF TRANSFER FOR LIQUID SYSTEMS

(1) Pumping

(a) Pumps for flammable and combustible liquid piping systems installed above grade outside of buildings shall be located not less than 10 ft. from the property line and not less than 5 ft. from any building opening.

(b) Pumps for liquid piping systems located indoors shall be in rooms that conform to the requirements of Sentence 2.4.3.5. except where the design or use of equipment specifically precludes such an arrangement.

(c) Pumps for liquid piping systems shall be provided with duplicate control switches: one located at the pump and one at an approved remote location; to shut down the pumps in case of emergency.

(d) Pits for subsurface pumps for liquid piping systems or piping manifolds of submersible pumps shall withstand the external forces to which they may be subjected without damage to the pump, storage tank or piping. The pit shall be no larger than necessary for inspection and maintenance and shall be provided with a tight-fitting cover.

(2) Hydraulic

(a) Hydraulic transfer systems may be used for liquids such as carbon disulphide that are immiscible with water.

(b) All tanks for hydraulic transfer systems for flammable and combustible liquid shall be constructed, installed and tested in accordance with provincial regulations.

Such systems shall be arranged so that water pressure in excess of the design pressure of the tank or piping cannot be developed. Operating pressures shall be controlled by a constant-level float valve or a pressure-reducing valve on the water supply. Systems shall be arranged so that there is no water pressure on the system except when liquid is being discharged. Check valves shall be provided in both water and flammable or combustible liquid piping to prevent back flow.

(3) Inert Gas

(a) Inert gas transfer systems for flammable and combustible liquids, shall be constructed, installed and tested in accordance with provincial regulations.

(b) Pressure regulators for inert gas transfer systems shall be provided in the gas line to control the pressure of the gas which shall be maintained at the minimum pressure required to force the liquid through the piping system at the rate required.

(c) A relief valve shall be provided with a slightly higher setting on the downstream side of the regulator referred to in (b) above or on the tank.

(d) Means of automatically shutting off the gas supply and bleeding the gas pressure in the event of fire shall be provided on all inert gas transfer systems.

(e) Transfer systems utilizing compressible gases such as nitrogen or carbon dioxide as the transfer medium shall not be used, except where other transfer methods are not practicable.

(4) Compressed Air

Compressed air transfer systems shall not be permitted for the transfer of flammable or combustible liquids.

2.4.5.12 ELECTRICAL EQUIPMENT FOR PIPING SYSTEMS

Electrical equipment in the vicinity of pumps and auxiliary equipment handling flammable or combustible liquids, and in any area where vapours or explosive mixtures may be found shall comply with the Canadian Electrical Code C.S.A. C22.1.

2.4.5.13 FIRE PROTECTION FOR PIPING SYSTEMS

A portable extinguisher having at least a 20-BC classification shall be provided in the vicinity of pumps and ancillary equipment used for the transfer of flammable or combustible liquid.

2.4.5.14 GENERAL CARE AND CLEANLINESS OF PIPING SYSTEMS

(a) The area around outdoor pump sites for flammable or combustible liquids shall be kept free of dried grass, weeds or vegetation and combustible debris or materials for a distance of not less than 15ft.

(b) Liquid pump houses and pump rooms shall not be used for any other purpose.

2.4.5.15 OPERATING PROCEDURES FOR PIPING SYSTEMS

(1) Employee Training

Employees concerned with transfer operations involving flammable or combustible liquids shall be given instruction in firesafety hazards and emergency procedures by means of the following:

(a) Standard procedures for normal operation as well as for emergencies shall be given to operators and posted in printed form on notice boards for convenient reference.

(b) A series of routine check points for the prompt detection of abnormal conditions shall be established and shall be given to the operator for observation at least once each shift.

(c) All employees shall be instructed in the importance of constant attendance during all transfer operations whether or not the system is equipped with automatic controls. Special emphasis in this regard shall be given to new employees.

(d) All employees shall be drilled in extinguishing procedures for fires involving flammable and combustible liquids.

(e) Conspicuous signs shall be posted indicating the location of all manual emergency shutoff valves, and for the operation of fire protection equipment. Employees shall be instructed in the location and function of the valves.

(f) Employees shall be instructed in the flammable or combustible liquid colour coding and identification of the piping systems to prevent the danger of accidents when liquids are being transferred and when maintenance work is performed.

(2) Inspection and Maintenance

(a) Regular frequent inspections shall be made of all aboveground piping systems to detect and correct leakages. Flammable vapour indicators shall be used to detect small leakages.

Open flames or spark producing devices shall not be used for testing purposes.

(b) Regular frequent inspections and tests shall be made of all safety shutoff valves and other firesafety devices to ensure proper operation. Particular attention shall be directed to normally open fusible link operated valves, float valves and automatic controls.

(c) Piping system, shall not be worked upon while they are under pressure. If connections or piping are to be opened the system shall be drained.

(d) Where liquid handling units have to be repaired, wherever practical they shall be removed and taken to maintenance areas.

(e) Before any cutting by torch or welding is carried out on any equipment or piping handling flammable or combustible liquids all liquids and vapours shall be drained, purged or the system sealed. The atmosphere shall be tested with a flammable vapour indicator to make sure that no explosive concentration is present.

(f) "Danger - Do Not Open" tags shall be attached to all valves on liquid piping systems that are shut off for maintenance purposes. The responsibility for issuing and removing such tags shall be that of the supervisor in charge of the maintenance work.

(g) All unused liquid piping shall be removed and open end pipes capped or plugged.

2.4.6 SERVICE STATIONS

2.4.6.1 SCOPE

This article shall apply to the storage, handling and use of flammable or combustible liquids in service stations and consumer outlets including marine service stations.

2.4.6.2 STORAGE AND HANDLING

(1) General

(a) Each service station storage capacity shall be restricted to not more than 30,000 gallons of flammable liquids and 20,000 gallons of combustible liquids with a flash point below 140°F. except that up to 50,000 gallons of flammable liquids may be stored if the service station has direct access to any part of a highway that is a controlled access highway.

(b) Flammable liquids shall not be stored or handled within any building having a basement, cellar or pit into which flammable vapours may travel.

(c) A maximum of 45 gallons of flammable liquids and 500 gallons of combustible liquids with a flash point below 140°F. shall be stored aboveground at a service station or consumer outlet except that greater quantities may be stored 50 ft. or more from any building and from the public access portion of the property.

(d) Flammable liquids shall not be stored, dispensed or transferred within a service station or consumer outlet building unless the building meets the requirements of an inside storage room stipulated in Sentence 2.4.3.5., except as provided in Sentence 2.4.6.3.(5).

(e) Combustible liquids of flash point below 140°F. may be stored and dispensed inside a building from storage tanks of not more than 500 gallons individual capacity and not more than 2000 gallons aggregate capacity provided fill and vent pipes are located outside of the building in accordance with Sentences 2.4.4.3 and 2.4.4.5.

(f) All fill pipes and valves associated with the storage tanks referred to in (e) above shall be permanently marked to indicate the liquid in each storage tank, and the equipment controlled by the valves.

(g) When a property having flammable or combustible liquid storage tanks is sold or leased, the owner of the property shall inform the purchaser or lessee of the existence of the storage tank or tanks and shall provide proof that the storage tank or tanks comply with the provisions of Subsection 2.4.12.

(h) Flammable and combustible liquids shall be stored in portable containers or drums as required in (2) below; in aboveground storage tanks as required in Sentence 2.4.4.2 vented in accordance with Sentences 2.4.4.3 and 2.4.4.4; or in underground storage tanks as required in Sentence 2.4.4.8 and vented in accordance with Sentence 2.4.4.10.

(2) Portable Containers and Drums

(a) All packaged gasoline and associated products stored aboveground shall be in approved portable containers distinctly marked with the common name of the container contents, such as "Gasoline", "Kerosine" or "Diesel Fuel" as the case may be.

(b) Sale of flammable or combustible liquids shall only be made:

(i) in prepackaged portable containers that are clearly marked with the name of the liquid they contain, and are sealed and leak-proof; or

(ii) in approved shipping containers that are clearly marked with the name of the liquid dispensed; are securely closed to prevent leaks or spills; meet the design and construction requirements of Sentence 2.4.3.2. (2) (a) and are predominantly red in colour; or

(iii) in approved portable containers meeting the requirements of Sentence 2.4.3.2. (2) (b).

(c) The special sample containers used in the taking of test samples by an authorized representative of the Government of Canada or of the Province by the wholesaler who supplied the liquid to the service station, or by an analytical chemist whose expert opinion is required with respect to the liquid, shall be deemed to meet the requirements of (b) (ii) above.

(d) Every portable container at a service station shall be kept tightly closed when disconnected from the pumping apparatus.

(e) An approved drum or other approved metal portable container that is equipped with a pump shall be deemed to be closed only when the connection between the pump and the container is of a vapour tight type.

(f) Sentences (1) (d), (1) (e) and (2) (d) shall also apply to the storage and movement of empty containers.

(g) Containers and drums shall not be filled beyond their nominal capacity.

(3) Tank Piping and Valves

(a) All piping associated with gasoline or associated product storage tanks shall meet the requirements of American Petroleum Institute Specification 5L or an approved equivalent standard.

(b) Piping shall be protected from external corrosion if aboveground by painting, wrapping, coating or other approved manner and if underground by wrapping, coating with asphaltic material, galvanizing, cathodic protection, or other approved manner.

(c) Piping shall be firmly supported, and protected when necessary from vehicle impact or other physical damage by guards.

(d) When a bulk storage tank installed aboveground has piping or a fitting connected to it at any point below the highest level to which the gasoline or associated product

will rise, the piping or fitting shall be provided with an internal or external steel control valve located as near as practicable to the shell of the storage tank.

(e) Connections to pipelines through which tank cars or tank vehicles discharge by means of pumps into aboveground storage tanks shall be provided with soft seat check valves for automatic protection against back flow; and designed, installed and maintained to prevent leakage or spillage.

(f) Interconnected systems carrying different liquids shall be separated, wherever possible, with steel blinds or locked valves.

2.4.6.3 ATTENDANCE, SUPERVISION AND DISPENSING PROCEDURES

(1) Every service station shall have an attendant or supervisor on duty whenever the station is open for business.

(2) Consumer outlets not accessible to or open to the public do not require an attendant. Such stations may be used by commercial, industrial or manufacturing establishments.

(3) No person shall dispense flammable or combustible liquids with a flash point below 140°F. by means of a nozzle controlled by a valve referred to in Sentence 2.4.6.8 at a service station unless he is a competent trained employee authorized by the licensed operator of the service station.

(4) The licensed operator in charge of a service station shall ensure that while a flammable or combustible liquid with a

flash point below 140°F. is being dispensed at the service station to the fuel tank of a motor vehicle by means of an automatic valved nozzle referred to in Sentence2.4.6.8 a competent trained employee authorized by the licensed operator of the service station is in constant immediate attendance at the motor vehicle.

(5) Flammable liquids shall only be dispensed or transferred inside buildings by the use of approved moveable, completely enclosed pumping equipment.

(6) Special Type "Self-Service" Dispensers

(a) No person shall at any service station, permit or have facilities for dispensing flammable or combustible liquids with a flash point below 140°F. by any mode known as "self-service", without specific permission in writing from the Authority having jurisdiction.

(b) The special type dispensing devices referred to in (a) such as, but not limited to, coin-operated, card operated, and remote preset types may be permitted at service stations, provided there is at least one qualified attendant on duty for each 12 hoses while the station is open to the public. The attendant's primary function shall be to supervise, observe and control the dispensing of flammable liquids while the liquids are being dispensed. It shall be the responsibility of the attendant to prevent the dispensing of flammable liquids into portable containers not in compliance with Sentence 2.4.3.2. (2)(b),

to control sources of ignition and to take emergency action regarding accidental spills.

(c) The attendant on duty shall be capable of performing the functions and assuming the responsibilities required in Sentence (b) above.

(d) Emergency controls for dispensing facilities shall be installed at a location acceptable to Authority having jurisdiction, but such controls shall be 100 feet or less from the dispensing equipment.

(e) Instructions for the operation of dispensers shall be conspicuously posted.

(7) Persons shall not be permitted to dispense flammable liquids into the fuel tank of a motor vehicle while the engine of the vehicle is running.

(8) Where a diesel fuel dispensing outlet is less than 25 ft. from a gasoline dispensing outlet, persons shall not dispense any fuel to the fuel tank of a motor vehicle while the engine of the motor vehicle is running.

(9) Flammable or combustible liquids with a flash point below 140°F. shall not be dispensed to the fuel tank of a motor vehicle while any part of the motor vehicle or any vehicle attached to it is on a highway, except that this shall not prohibit the dispensing of up to 5 gallons of these liquids from a portable container to a motor vehicle immobilized on a highway.

(10) Every person dispensing flammable liquids shall:

(a) Take all precautions necessary to prevent overflow or spillage of the liquid being dispensed;

(b) not knowingly overfill the fuel system after an automatic nozzle shuts off,

(c) not drain or pour flammable or combustible liquids with a flash point below 140°F. from any dispensing equipment in proximity to open sources of ignition or any item referred to in Sentence 2.4.6.3.(10); and

(d) In the event of spillage referred to in (a) above, immediately apply an approved absorbent material to the spilled liquid.

(11) Persons shall not be permitted to have any lighted match, lighter, pipe, cigar or cigarette within 10 ft. of any dispensing location.

2.4.6.4 DISPENSING SYSTEMS

(1) Fixed dispensing devices shall be installed:

(a) at least 10 ft. from any highway;

(b) at least 3 ft. from any property line;

(c) at least 25 ft. from any open flame or other ignition source, and outside of buildings unless specific approval in writing is given by the Authority having jurisdiction;

(d) not within any wholly enclosed part of a building; and

(e) on a pump island.

(2) Apparatus dispensing flammable liquids into the fuel tanks of vehicles owned by the public shall not be located at a bulk

plant unless separated by a fence or equivalent barrier from the area in which the bulk operations are conducted.

(3) The requirements of (3) above shall not prohibit the temporary use of moveable storage tanks in connection with the dispensing of flammable or combustible liquids into the fuel tanks of vehicles or other motorized equipment on premises not normally accessible to the public. Such installations shall only be made under specific written permission from the Authority having jurisdiction and with a definite time limit not in excess of 24 hours.

2.4.6.5 DISPENSING UNITS

(1) Flammable liquids shall be transferred from storage tanks by means of fixed pumps so designed and equipped as to allow control of the flow and to prevent leakage or accidental discharge.

(2) Dispensing devices for flammable or combustible liquids shall be of approved type.

(3) Flammable liquids shall not be dispensed from a container having a capacity of less than 50 gallons but more than 10 gallons except by use of an approved barrel having a vapour tight seal.

(4) Dispensing units, except those attached to drums or containers shall be mounted either on a concrete island or protected in an approved manner against possible collision damage.

2.4.6.6 EMERGENCY POWER CUTOFF

Clearly identified and easily accessible switch or circuit breakers shall be provided at a location shielded from any possible fire involving the dispensing devices, including remote pumping systems.

The switches or circuit breakers shall be designed to shut off the power to all dispensing devices in the event of an emergency.

2.4.6.7 REMOTE PUMPING SYSTEMS

(1) These Sentences shall apply to systems for dispensing flammable liquids where such liquids are transferred from storage to individual or multiple dispensing units by pumps located elsewhere than at the dispensing units.

(2) The pumps shall be designed or equipped so that no part of the system will be subjected to pressures above its allowable working pressure. Pumps installed abovegrade, outside of buildings, shall be located not less than 10 ft. from the property line and not less than 5 ft. from any building opening, When an outside pump location is impractical, pumps may be installed inside of buildings as provided for dispensers in Sentence 2.4.6.3 (5) or in pits as provided in (3) below. Pumps shall be substantially anchored and protected against physical damage by vehicles.

(3) Pits for subsurface pumps or piping manifolds of submersible pumps shall withstand the external forces to which they may be subjected without damage to the pump, storage tank, or piping. The pit shall be no larger than necessary for inspection and maintenance and shall be provided with a fitted cover.

(4) A control shall be provided that will permit the pump to operate only when a dispensing nozzle is removed from its bracket on the dispensing unit and the switch on this

dispensing unit is manually actuated. This control shall also stop the pump when all nozzles have been returned to their brackets.

(5) An approved impact valve, incorporating a fusible element having a maximum temperature rating of 160°F. and designed to close automatically in the event of severe impact or fire exposure shall be installed in the dispensing supply line at the base of each individual dispensing device but not higher than or more than 1/2 inch below the base of the pump.

(6) After the completion of the installation, including any paving, all underground lines connected to tanks shall be pressure tested in accordance with the requirements of Sentence 2.4.5.7. except for the soaping of the lines required in Sentence 2.4.5.7.(1)(a).

2.4.6.8 DELIVERY HOSE AND NOZZLES

(1) Every hose through which a flammable or combustible liquid is dispensed at a service station or consumer outlet shall be restricted to a maximum length of 15 usable ft. unless retracting mechanism is used, in which case up to 20 usable ft. may be used.

(2) Every hose through which a flammable or combustible liquid with a flash point below 140°F. is dispensed other than a hose through which the liquid is dispensed manually shall be equipped with a valved nozzle of non-magnetic material so constructed that the valve

(a) can be kept open only by manual pressure and closes automatically immediately the manual pressure is released; or

(b) has a latch-open device as an integral part of the assembly and automatically shuts off when,

(i) the gasoline tank is filled,

(ii) the valved nozzle falls from the filling neck of the vehicle tank, or

(iii) the valved nozzle is subject to rough usage;

and the valved nozzle having such latch-open device shall be of an approved type.

(3) The provisions of (2) above do not apply to hoses for tank trucks and vehicles that are equipped for making tight connections.

(4) Every nozzle of the type referred to in (2)(b) above when required to be serviced or repaired, shall be returned to the factory of the manufacturer, or to an agency authorized by the manufacturer, and after servicing or repairing shall be subjected to and shall pass the tests specified by the Underwriters' Laboratories of Canada.

(5) Every nozzle of the type referred to in (2)(b) above that has been tested, after servicing or repairing in accordance with (4) above, and before being returned to service, shall have affixed upon it a permanent label or marking that shall represent the manufacturer's certification of such testing and shall display the letter "R" and the date of test.

2.4.6.9 MARINE SERVICE STATIONS

(1) The dispensing area shall be separated from other structures so as to provide room for safe ingress and egress of craft to be fuelled, and at a location approved by the Authority having jurisdiction. Dispensing units shall in all cases be at least 25 feet from any activity involving fixed sources of ignition.

(2) Dispensing shall be by approved dispensing units with or without integral pumps and may be located on open piers, wharves, floating docks, on shore or on piers of the solid fill type.

(3) Dispensing nozzles shall be automatic-closing without hold-open latch.

(4) Tanks and pumps not integral with the dispensing unit, shall be on the shore or on a pier of the solid fill type, except that where shore location would require excessively long supply lines to the dispenser, the Authority having jurisdiction may authorize the installation of storage tanks on a pier provided that applicable portions of Subsection 2.4.4 relative to spacing, diking and piping are complied with and the quantity so stored does not exceed 1,000 gallons aggregate capacity;

(5) Shore storage tanks supplying marine service stations may be located aboveground, where rock ledges or high water table make underground tanks impractical.

(6) Where storage tanks are at an elevation which would produce gravity head on the dispensing unit, the storage tank out-

shall be equipped with an approved check valve positioned adjacent to and outside the storage tank valve specified in Sentence 2.4.6.2 (3) to prevent syphoning action from the storage tank in the event of line rupture.

(7) Piping between shore storage tanks and dispensing units shall be as specified in Subsection 2.4.5. except that where dispensing is from a floating structure, suitable lengths of approved flexible hose may be employed between the shore piping and the piping on the floating structure as may be necessary to accommodate the change in water level or shore line.

(8) A readily accessible valve to shut off the supply from shore shall be provided in each pipeline at or within 6 ft. of the pier.

(9) Piping shall be located so as to be protected from the danger of mechanical damage.

2.4.6.10 ELECTRICAL EQUIPMENT AND WIRING

All electrical equipment and wiring shall be of a type specified by and shall be installed in accordance with the Canadian Electrical Code, CSA C22.1.

2.4.6.11 HEATING EQUIPMENT

(1) Heating and air-conditioning equipment shall be installed to conform to the following Standards, or to the corresponding Provincial Regulations:-

(a) CSA B139-1971 "Installation Code for Oil Burning Equipment",

(b) CSA B149.1-1971, "Installation Code for Natural Gas Burning Appliances and Equipment",

(c) CSA B149.2-1969, "Installation Code for Propane Burning Appliances and Equipment", or

(d) CSA C22.1-1969, "Canadian Electrical Code, Part 1".

2.4.6.12 DRAINAGE AND WASTE DISPOSAL

(1) Provision shall be made in the area where flammable liquids are dispensed to prevent spilled liquids from flowing into the interior of service station buildings. Such provision may be by grading driveways, raising door sills, or other equally effective means complying with Sentences 2.4.3.7 (8) and (9).

(2) Crankcase drainings and flammable or combustible liquids shall not be dumped into sewers but shall be stored in special tanks or drums outside of any building until removed from the premises.

(3) Where used or waste oil is collected,

(a) in a tank:

(i) the tank shall be installed underground outside the building,

(ii) the fill pipe shall be tightly capped at all times when not in actual use, and fill pipes shall be located outside the building,

(iii) the tank shall be vented to outside air in accordance with Sentence 2.4.4.3, and

(iv) the fill pipe and the pipe through which the use or waste oil is removed shall be installed and protected in accordance with Sentence 2.4.4.11; or

(b) in a container, the requirements of this Code governing flammable liquids apply to the handling of the used or waste oil and to the container.

(4) All waste tank fill pipes not equipped with a tight fitting cover on the date this Code comes into force shall be so equipped within 6 months of that date.

2.4.6.13 ELIMINATION OF SOURCES OF IGNITION

(1) In addition to the dispensing procedures specified in Sentence 2.4.6.3. at every service station and consumer outlet there shall be at least one clearly legible sign for each pump island, or dispensing location,

(a) not smaller than 8½ inches by 11 inches; and

(b) bearing the words "No Smoking within 10 Feet - Turn Ignition Off While Being Refuelled" in letters not less than one inch in height.

(2) The sign referred to in (1) above shall be painted in black on yellow ground, the colours to conform to CGSB Spec. 1-GP-12c, Code 505-101 or Code 505-301 for "Safety Yellow" and Code 512-101,-201, or -301 for "Traffic Sign Black" and shall be so located as to be visible to all drivers as they approach the pump island or dispensing location.

2.4.6.14 LEAK TESTING

(1) To facilitate early detection of underground leaks, the operators of service stations and other facilities having underground storage tanks shall,

(a) ensure that the storage tanks are gauged or dipped, including water dips, at least daily, except Sunday for facilities closed on that day;

(b) maintain a record for each storage tank to provide a permanent record of gauge or dip readings;

(c) record water dips in accordance with (a) above;

(d) reconcile gauge or dip readings with meter readings daily;

(e) when the reconciliation required by (d) above reflects a possible loss of flammable or combustible liquids, or when the water dip exceeds 2 inches, report in writing immediately to the owner of the facility; and

(f) retain all gauge or dip records for at least 2 years for inspection purposes.

(2) When a leak is suspected, or when the Authority having jurisdiction so requests, the owner of underground storage tanks shall,

(a) arrange for recorded pressure tests with readings 4 hours and 12 hours from commencement on underground storage tanks and piping at pressures of

(i) 5 psig maximum for uncovered storage tanks;

(ii) not less than 5 psig and not more than 15 psig for covered storage tanks, and

(iii) a maximum of 50 psig or one and one-half times the operating pressure, whichever is greater, but not more than 100 psig, for piping,

(b) When applying pressures in accordance with (a) above take appropriate measures to guard against the hazards that may be associated with pressure testing, where explosive mixtures of gasoline and air may be present;

(c) Ensure that all lines are disconnected at the storage tank prior to application of the line pressure test;

(d) Ensure that no pressure test is performed with liquid in the storage tank unless prior specific approval in writing has been obtained from the Authority having jurisdiction.

(e) Arrange for immediate repair or replacement of leaking systems;

(f) Take all steps reasonable in the circumstances to recover escaped liquid before back-filling after repairs;

(g) Report all leaks to the nearest Authority having jurisdiction with 12 hours of discovery of the leak; and

(h) Ensure that the pressure gauges used in testing for leaks are calibrated in increments not greater than,

(i) one-tenth of one pound per square inch for the tank test on the storage tank; and

(ii) one-half of one pound per square inch for the piping tests.

2.4.6.15 UNUSED STORAGE TANKS

Regardless of location, underground storage tanks for flammable combustible liquids that are not in use shall be handled as described in Subsection 2.4.12 - Abandonment and Removal of Underground Storage Tanks or Temporary Withdrawal from Service.

2.4.6.16 PROPERTY SOLD OR LEASED

When a licensed property having storage tanks used for gasoline or associated products is sold or leased, the owner of the property shall inform the purchaser or lessee of the existence of the storage tanks and shall provide proof that the storage tanks comply with the requirements of Subsection 2.4.12.

2.4.6.17 FIRE PROTECTION

(1) At every service station, including marine service stations there shall be at least two extinguishers,

(a) suitable for extinguishing gasoline or associated product fires;

(b) so located as to be readily accessible from every part of the service station;

(c) maintained at all times in efficient fire fighting condition; and

(d) having an effective total rating equivalent to at least 4A 20 B, C. specify multi purpose type?

(2) In certain cases of unusual hazards the Authority having jurisdiction may require additional fire extinguishing apparatus as specified in Part 4 of this Code.

2.4.7 BULK PLANTS

2.4.7.1 STORAGE

(1) Flammable and combustible liquids shall be stored in closed containers, or in storage tanks aboveground outside of buildings, or underground in accordance with Subsection 2.4.4.

(2) Containers for flammable or combustible liquids when piled one upon the other shall be separated by noncombustible dunnage sufficient to provide stability and to prevent excessive stress on container walls. The height of pile shall be consistent with stability and strength of containers.

(3) Leak testing of underground storage tanks and piping shall be carried out in accordance with the requirements of Sentence 2.4.6.14 except that:

(a) Storage tanks shall be gauged or dipped, including water dips, at least weekly; and

(b) gauge or dip readings shall be reconciled with receipt and issue records weekly.

(4) Bulk storage storage tanks, piping, pumps, valves and associated components shall be designed, installed and maintained to prevent shock pressure in the system.

2.4.7.2 BUILDINGS

(1) Exits: Rooms in which flammable or combustible liquids are stored or pumped shall have sufficient exit facilities so arranged to minimize any danger of occupants being trapped in the event of fire.

(2) Heating: Rooms in which flammable liquids are stored, dispensed, or transferred shall be heated only by means not constituting a source of ignition, such as by steam or hot water. Rooms containing heating appliances involving sources of ignition shall be located and arranged to prevent entry of flammable vapours.

(3) Ventilation: Ventilation shall be provided for all rooms, buildings, or enclosures in which flammable liquids are pumped or dispensed. The design of the ventilation systems shall take into account the relatively high specific gravity of the vapours. Natural ventilation may be designed for by the provision of openings in outside walls at floor level unobstructed except by louvres or coarse screens. Where such ventilation is inadequate, mechanical ventilation shall be provided.

(4) Flammable liquids shall not be stored, dispensed, or transferred within a building having a basement or pit into which flammable vapours may travel, unless such area is provided with mechanical ventilation designed to prevent the accumulation of flammable vapours therein.

(5) Flammable liquids shall only be dispensed or transferred inside buildings by the use of approved moveable, completely enclosed pumping equipment unless special provisions are made and approved to prevent the accumulation of flammable vapours in hazardous concentrations. Where this is accomplished by mechanical ventilation, the ventilation system shall be kept

in operation while flammable liquids are being handled and suitably electrically interlocked with the lighting equipment.

2.4.7.3. LOADING AND UNLOADING FACILITIES

(1) Tank vehicle and tank car loading or unloading facilities shall be separated from aboveground storage tanks, warehouses, other plant buildings or nearest line of adjoining property, that may be built upon by a distance of 10 ft. for flammable or combustible liquids measured horizontally. Buildings for pumps or shelters for personnel may be considered a part of the facility.

(2) Equipment such as piping, pumps, and meters used for the transfer of flammable liquids between storage tanks and the fill stem of the loading rack shall not be used for the transfer of combustible liquids.

(3) Except when used for combustible liquids with a flash point at or over 140°F. valves for the final control for filling tank vehicles shall be of the self-closing type. They shall be manually held open except where automatic means are provided for shutting off the flow when the vehicle is full or after filling of a preset amount.

(4) Static protection: Bonding facilitiesfor protection against static sparks during the loading of tank vehicles through open domes shall be provided:

(a) where flammable liquids are loaded, or

(b) where combustible liquids are loaded into vehicles which may contain vapours from previous cargoes of flammable liquids.

(5) Bonding as required in (4) above shall consist of a metallic bond wire permanently electrically connected to the fill stem or to some part of the rack structure in electrical contact with the fill stem. The free end of such wire shall be provided with a clamp or equivalent device for convenient attachment to some metallic part in electrical contact with the cargo tank of the tank vehicle. Tank vehicles not so equipped shall be required to be modified to comply within a period of 12 months of the date of adoption of this Code.

(6) The bonding connection required in (4) above shall be made fast to the vehicle or storage tank before dome covers are raised and shall remain in place until filling is completed and all dome covers have been closed and secured.

(7) Bonding as specified in (4), (5) and (6) above is not required:

(a) where vehicles are loaded exclusively with liquids not having a static accumulating tendency, such as asphalts including cutback asphalts, most crude oils, residual oils and water soluble liquids.

(b) Where no flammable liquids are handled at the loading facility and the tank vehicles loaded are used exclusively for combustible liquids; and

(c) where vehicles are loaded or unloaded through closed bottom or top connections whether the hose or pipe is conductive or non-conductive.

NOTE: Since there is no release of vapour where a spark could occur, bonding is not necessary and the hose or pipe may be conducting or non-conducting.

(8) Filling through open domes into the storage tanks of tank vehicles or tank cars, that contain vapour-air mixtures within the flammable range or where the liquid being filled can form such a mixture, shall be by means of a downspout which extends near the bottom of the storage tank. This precaution is not required when loading liquids which are non-accumulators of static charges.

(9) Facilities that do not comply with (8) above on the date this Code came into force shall be modified to comply with the requirements within 12 months of the adoption of this Code.

(10) Container filling facilities: flammable liquids shall not be dispensed into metal containers unless the nozzle and container are electrically interconnected. Where the metallic floorplate on which the container stands during filling operations is electrically connected to the fill stem or where the fill stem is bonded to the container during filling operations by means of a bond wire, the bonding provisions shall be deemed to have been complied with.

2.4.7.4 ELECTRICAL EQUIPMENT OF WIRING

All electrical equipment and wiring shall be of a type specified by and shall be installed in accordance with the Canadian Electrical Code, CSA C22.1.

2.4.7.5 ELIMINATION OR SOURCES OF IGNITION

Flammable liquids shall not be handled, drawn or dispensed where flammable vapours may reach a source of ignition. Smoking shall be prohibited except in locations designated by the Authority having jurisdiction. "No Smoking" signs shall be conspicuously posted where hazards from flammable liquids vapours normally present and the rule enforced.

2.4.7.6 DRAINAGE AND WASTE DISPOSAL

Provision shall be made to prevent flammable or combustible liquids which may be spilled at loading or unloading points from entering public sewers and drainage system, or natural waterways by complying with the requirements of Sentences 2.4.3.7.(8) and (9). Crankcase drainings and flammable or combustible liquids shall not be dumped into sewers but shall be stored in special tanks or drums outside of any building until removed from the premises.

2.4.7.7 FIRE PROTECTION

Suitable fire extinguishing devices, such as small hose or portable fire extinguishers shall be provided at hazardous locations. Additional fire extinguishing equipment may be required where storage tank over 40,000 gallons individual capacity contains flammable liquids and where an unusually severe exposure hazard exists from surrounding property. Such additional fire extinguishing equipment shall be sufficient to extinguish a fire in the largest

storage tank. The design and amount of such equipment shall be in accordance with approved engineering standards.

2.4.8 PIERS AND WHARVES

2.4.8.1 SCOPE AND APPLICATION

(1) This Article describes the requirements for flammable and combustible liquid installations on piers and wharves, including bulk transfer stations.

(2) It does not cover marine service stations covered in Sentence 2.4.6.9.

2.4.8.2 GENERAL

(1) Packaged cargo of flammable or combustible liquids, including full and empty drums and containers, bulk fuel and stores may be handled over a wharf during cargo transfer at such times and places as may be agreed upon by the wharf superintendent and the senior deck officer on duty.

(2) Wharves at which flammable or combustible liquid cargoes are to be transferred in bulk quantities to or from tank vessels shall be at least 100 feet from any bridge over a navigable waterway, or from an entrance to a superstructure of any vehicular or railroad tunnel under a waterway. The termination of the wharf loading or unloading fixed piping shall be at least 200 feet from a bridge or from an entrance to a superstructure of a tunnel.

(3) The substructure and deck shall be substantially designed for the use intended, and shall be constructed of material that will afford the desired combination of flexibility,

resistance to shock, durability, strength and fire resistance. Heavy timber construction is acceptable.

2.4.8.3 STORAGE TANKS

(1) Aboveground storage tanks shall be located on shore, in accordance with the requirements of Sentences 2.4.4.2 through 2.4.4.7 concerning aboveground storage tanks, except as permitted in (4).

(2) Underground storage tanks may be buried in piers and wharves of the solid fill type subject to the requirements of Sentences 2.4.4.8 through 2.4.4.11 concerning underground storage tanks.

(3) Enclosed storage tanks may be installed on piers and wharves of fire resistive or solid fill type construction subject to the requirements of Sentence 2.4.4.12 concerning inside storage tanks, and subject to the specific approval of the Authority having jurisdiction.

(4) Unenclosed approved drums or storage tanks, not exceeding 50 gallons individual capacity may be used for fuel supplies to heating equipment.

2.4.8.4 PIPING, VALVES AND FITTINGS

(1) GENERAL

The method of installation and materials used for piping, valves and fittings shall conform to the requirements of Subsection 2.4.5.

(2) LOCATION AND ARRANGEMENT

(a) Piping shall be supported in a substantial and workmanlike manner and arranged to prevent excessive vibration or strain on connecting equipment. Piping supports shall be of timber having no dimension less than 6 inches or of steel or concrete. If pipe is supported more than 4 feet above the pier deck, piping supports shall have a minimum fire resistance rating of 2 hours.

(b) In areas where general cargo is handled or where piping might be subject to mechanical injury from vehicles or vessels, the piping shall be suitably protected either by location or by other means of a guard arrangement.

(c) Piping between shore and piers and wharves of timber construction shall be provided with swing joints, or approved flexible connections to permit the independent movement of the piers or wharf and shore piping without strain on the pipe.

(d) Piping shall be equipped with valves on shore as required in sentence 2.4.6.9(a) so located as to be easily accessible and not be endangered by a possible fire.

(e) Access openings for inspection purposes shall be provided to valves and connections to pipe lines below deck and suitable sign shall be posted indicating their location. No freight or materials shall be placed on piers of wharves in such a manner as to obstruct these openings.

(f) Identification tags or labels of metal or other suitable material impervious to water and to the flammable or combustible liquids being transferred, shall be attached to and maintained on all pipelines and control valves to designate their use.

(3) TESTS

Piping systems shall be pressure tested in accordance with the requirements of Sentence 2.4.5.7. before being put into service and at least annually.

2.4.8.5 ELECTRICAL

(1) EQUIPMENT

Electrical equipment in the vicinity of pumps and dispensing equipment and in any area where vapour-air explosive mixtures may be formed shall conform to the requirements of Article 2.4.5. Piping and Pumping Systems, and Sentence (2) below.

(2) BONDING OF RAILWAY TRACKS

Railway tracks on any pier or wharf shall be bonded throughout their length and permanently grounded in accordance with General Order 881 of the Canadian Transport Commission. Insulating joints shall be placed in all rails where entering upon the pier or wharf.

2.4.8.6 SMOKING AND OPEN FLAMES

(1) SMOKING

Smoking shall be prohibited in the vicinity of pumps and fueling equipment and the area shall be designated by posting NO SMOKING signs.

(2) WELDING AND CUTTING, BLOW TORCHES

Where welding or cutting operations or blow torches are being used in the vicinity of combustible construction or material, such construction or material shall be protected from direct contact with the flame.

2.4.8.7 FIRE PROTECTION

(1) Portable fire extinguishers shall be provided in the vicinity of flammable liquid pumps and fueling equipment in accordance with the requirements of Part 4.

(2) Extinguishers shall be kept in the pump house or other suitable location where they will be accessible in the event of emergency, but where they will not be exposed to pilfering.

(3) Vessels loading or unloading flammable or combustible liquids or being refuelled shall be required to place suitable extinguishers on the pier or wharf so that they will be accessible in the event of emergency.

(4) Fire protection for storage tanks or other major installations shall be provided in accordance with the requirements of Subsection 2.4.4, aboveground storage tanks.

(5) Arrangements shall be made so that operating personnel know how to summon the local or mearest fire department, in the event of fire.

2.4.8.8 BULK TRANSFER STATIONS

(1) LOCATION

(a) Bulk transfer of flammable or combustible liquids shall only be permitted on piers or wharves used for no other purpose except as permitted in (b).

(b) Where it is not practicable to locate bulk transfer stations on separate piers and wharves, such stations may be located on general purpose piers and wharves subject to specific approval in writing from the Authority having jurisdiction. In such cases suitable guards or fences shall be provided around pumping equipment to prevent the entry of unauthorized personnel.

(c) Where practicable, a sump pit or settling basin shall be provided at transfer stations to carry off possible leakage from hose couplings in compliance with the requirements of Sentences 2.4.3.7 (8) and (9).

(2) HOSE CONNECTIONS

(a) Hose connections on piping shall be of the bolted flange type and all such connections shall be provided with shut-off valves.

(b) Hose connections shall not project beyond the face of the pier or wharf.

(3) CARGO HOSE

(a) Transfer of flammable or combustible liquids between tank vessels and piers or wharves shall be through approved flexible cargo hose or approved flexible jointed tubing or piping.

(b) Cargo hose if used shall be of an approved type suitable for the cargo to be transferred, designed to withstand safely the maximum working pressure to which it is to be subjected, and be maintained in satisfactory condition. It shall be pressure retested at least once annually.

(c) To minimize the danger of chafing and kinking during transfer operations, cargo hose shall be supported where it is not run on a solid foundation.

(4) CARGO PUMPS

(a) Cargo pumps shall be designed and installed in accordance with Subsection 2.4.5, piping and pumping systems.

(b) Cargo pumps capable of building up pressures in excess of the safe working pressure of the cargo hose shall be provided with return lines, relief valves or some other approved arrangement.

(c) Cargo pumps shall be located either on shore or on piers and wharves of non-combustible construction or of the solid-fill type and at least 10 feet from other buildings or structures except as permitted in (d) below.

(d) Where it is not practicable to install cargo pumps on shore or on non-combustible or solid fill piers or wharves and subject to specific approval in writing from the Authority having jurisdiction, they may be installed on piers and wharves of combustible construction if located in pump houses as described in Sentence 2.4.8.8.(5) and detached at least 10 feet from other buildings or structures.

(5) PUMP HOUSES.

(a) Pump houses shall be of noncombustible construction. The floors shall be chemically resistant to the liquid being handled, liquid-tight and built up into curbs or flashings around the wall to at least 4 inches in height.

(b) Ventilation and venting shall be provided in accordance with the requirements of Sentence 2.4.3.5.

(6) TRANSFER OPERATIONS

(a) Transfer operations shall only be carried out under the supervision and continuous presence of a qualified person.

(b) Tank vessels shall be electrically connected to the shore piping prior to the connecting of cargo hose but not when cathodic protection facilities are operating to prevent corrosion of the wharf or ship's hull. This electrical connection shall be maintained until the cargo hose has been disconnected and any spillage has been removed.

(c) The cargo hose shall be of adequate length to allow for the movement of the vessel. Gaskets shall be used in all hose joints and pipe couplings to prevent leakage and where flanged joints are used at least three bolts shall be used to ensure tight connections. Suitable drip pans shall be placed under hose connections on the pier or wharf in case there may be leakage, except where a sump pit or settling basin is provided.

(d) Cargo shall not be transferred to or from an unmanned vessel.

(e) Prior to the transfer of cargo, the person responsible for directing the operations shall ascertain that no unauthorized repair work is being carried out on the pier

or wharf and that there are no fires or open flames in the vicinity.

(f) During the transfer of cargo, the person responsible for directing the operations shall maintain a constant check on the progress of the loading or unloading of the cargo to prevent overflow.

Hose and connections shall be carefully checked for leakeage.

(g) When transfer operations are completed, the valves on the hose connections shall be closed, the cargo hose drained into appropriate facilities and such facilities shall then be emptied in a manner complying with Sentence 2.4.7.6. Care shall be taken that no liquid is discharged on to the pier or wharf or overboard during these operations.

2.4.9 INDUSTRIAL MANUFACTURING PLANTS

2.4.9.1 SCOPE AND APPLICATION

(1) This Article shall only apply to:

(a) Industrial manufacturing plants where the use of flammable or combustible liquids is incidental to the principal business such as automobile assembly, assembly of electronic equipment, and furniture manufacturing; or

(b) plants where flammable or combustible liquids are handled or used only in unit physical operations such as mixing, drying, evaporating, filtering, distilling and similar operations which do not involve chemical reactions,

such as plants compounding cosmetics, pharmaceuticals, solvents, cleaning fluids and insecticides.

(2) This Article shall not apply to chemical plant refineries or distilleries which are covered in Subsection 2.4.11.

(3) Where portions of manufacturing occupancies involve the use of flammable or combustible liquids in unit chemical operations, such as oxidation, reduction, halogenation, hydrogenation, alkylation and polymerization, those portions of the plant shall meet the requirements of Subsection 2.4.10 - Processing Buildings.

2.4.9.2 INCIDENTAL STORAGE AND USE OF FLAMMABLE AND COMBUSTIBLE LIQUIDS

(1) All flammable or combustible liquids shall be stored in storage tanks or approved containers.

(2) Containers shall be located in approved storage cabinets meeting the requirements of Sentence 2.4.3.4; in approved inside storage rooms meeting the requirements of Sentence 2.4.3.5; or may be located in an open building area provided the quantity in any one fire area does not exceed:

(a) 20 gallons of flammable liquids with a flash point below 73°F; or

(b) 100 gallons of flammable liquids with a flash point above 73°F, and combustible liquids.

(3) Where the use of large quantities of flammable or combustible liquids is essential, they shall be kept in storage tanks complying with the applicable requirements of Subsection 2.4.4, storage tank.

(4) Areas in which flammable or combustible liquids are transferred from one storage tank or container to another container shall be separated from other operations in the building by an approved space or fire separation.

2.4.9.3 HANDLING LIQUIDS AT POINT OF FINAL USE

(1) Flammable or combustible liquids shall be kept in covered containers when not actually in use.

(2) Where flammable or combustible liquids are used or handled, except in closed containers, means shall be provided to dispose promptly and safely of leakage or spills.

(3) Flammable liquids may be used only where there are no open flames or other sources of ignition within the possible path of vapour travel. indicate distances in feet eg. HYDRO

(4) Flammable liquids shall be drawn from or transferred into containers or storage tanks within a building only through a closed piping system; from safety cans, by means of a device drawing through the top, or from a container by gravity through an approved self-closing valve. Transferring of any liquid by means of air pressure on the container or storage tanks is prohibited.

2.4.9.4 UNIT PHYSICAL OPERATIONS

(1) The location of unit operations in buildings shall be such that each unit of equipment is accessible from at least one side for firefighting purposes.

(2) Buildings shall be located with respect to property lines as stipulated in Sentences 2.4.10.2(1) and 2.4.10.2(2) except that the blank wall referred to in Sentence 2.4.10.2(2)

shall have a minimum fire resistance rating of two hours.

(3) Areas where unstable liquids are handled, or small scale unit chemical processes are carried on, shall be separated from the remainder of the building by a minimum fire separation of two hours.

4.9.5 DRAINAGE

Emergency drainage systems shall be provided to direct any leakage of flammable or combustible liquids together with water used for fire fighting to a safe location, as required in Sentences 2.4.3.7(8) and (9).

2.4.9.6 VENTILATION

(1) Areas in which flammable liquids are used shall be ventilated at a rate of not less than one cubic foot per minute per square foot of solid floor area. This shall be accomplished by mechanical ventilation discharging outside of the building. Provision shall be made for the introduction of make-up air in such a manner as not interfere with the ventilation pattern. Ventilation shall be made to all floor areas and pits where flammable vapours may collect.

(2) Local or spot general ventilation may be needed for the control of special fire or health hazards. Such ventilation, if provided, may be utilized for up to 75% of the required ventilation.

(3) Equipment used in a building and the ventilation of the building shall be designed so as to limit flammable vapour-air mixtures under normal operating conditions to the interior of equipment,

and to not more than five feet from such equipment.

2.4.9.7 LIQUID HANDLING

The storage, transfer and handling of liquids shall comply with Sentence 2.4.10.4.

2.4.9.8 TANK VEHICLE AND TANK CAR LOADING AND UNLOADING

(1) Tank vehicle and tank car loading or unloading facilities shall be separated from aboveground storage tanks, warehouses, other plant buildings or nearest line of adjoining property by a distance of 25 feet for flammable liquids and 15 feet for combustible liquids measured from the nearest position of any fill stem.

(2) Operations of the loading and unloading facility shall comply with the appropriate portions of Subsection 2.4.7 - Bulk Plants.

2.4.9.9 FIRE PROTECTION

(1) Portable fire extinguishment and control equipment shall be provided in such quantities and types as required by the Authority having jurisdiction for the special hazards of operation and storage and in accordance with the requirements of Part 4.

(2) Water shall be available in volume and at adequate pressure to supply water hose streams, foam-producing equipment, automatic sprinklers or water spray systems as the need is indicated by the special hazards of operation, dispensing and storage.

(3) Special extinguishing equipment such as that utilizing foam, inert gas, or dry chemical shall be provided as required by the Authority having jurisdiction for the special hazards

of operation, dispensing and storage.

(4) Where the need is indicated by special hazards of operation, and as required by the Authority having jurisdiction, flammable or combustible liquid processing equipment, major piping, and supporting steel shall be protected by approved water spray systems, deluge systems, approved fire resistant coatings, insulation or any combination of these.

(5) All plant fire protection facilities shall be maintained and periodically inspected and tested by the owner or his authorized representative to make sure they are always in satisfactory operating condition, and that they shall be acceptable to the authority having jurisdiction and serve their purpose in time of emergency.

2.4.9.10 SOURCES OF IGNITION

(1) Precautions shall be taken to prevent the ignition of flammable vapours. Sources of ignition include but are not limited to open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static, electrical and mechanical sparks; spontaneous ignition, including heat-producing chemical reaction; radiant heat; and industrial trucks.

(2) Flammable liquids shall not be dispensed into metal containers unless the nozzle and container are electrically interconnected. Where the metallic floorplate on which the container stands while filling is electrically connected to the fill stem or where the fill stem is bonded to the container during filling operations by means of a bond wire, the provisions of this

Sentence shall be deemed to have been complied with.

2.4.9.11 ELECTRICAL WIRING & EQUIPMENT

All electrical wiring and equipment shall be of a type specified by and shall be installed in accordance with the Canadian Electrical Code C22.1.

2.4.9.12 REPAIRS TO EQUIPMENT

Hot work, such as welding or cutting operations, use of spark-producing power tools, and chipping operations shall be permitted only under supervision of an individual in responsible charge after an inspection has been made of the area to be sure that it is safe for the work to be done and that safe procedures are followed for the work specified.

2.4.9.13 GENERAL CARE AND CLEANLINESS

(1) Maintenance and operating practices shall be established and enforced to control leakage and prevent the accidental escape of flammable or combustible liquids. Spills shall be cleaned up promptly.

(2) Aisles of adequate width shall be maintained for the unobstructed movement of personnel and fire department apparatus so that fire fighting operations can be carried out on any part of flammable or combustible liquid storage, use, or any unit physical operation.

(3) Combustible waste material and residues in a building or unit operating area shall be kept to a minimum, stored in covered metal receptacles and disposed of daily.

(4) Ground area around buildings and unit operating areas shall be kept free of weeds, trash or other combustible materials.

2.4.10 PROCESSING PLANTS

2.4.10.1 SCOPE AND APPLICATION

(1) This Article shall apply to those plants or buildings which contain chemical operations such as oxidation, reduction, halogenation, hydrogenation, alkylation, polymerization and other chemical processes.

(2) It shall not apply to chemical plants, refineries, or distilleries which are covered in Subsection 2.4.11.

2.4.10.2 LOCATION

(1) The location of each processing equipment shall be based upon its flammable or combustible liquid capacity. Processing equipment shall be located, with respect to distance to lines of adjoining property in accordance with Table 2.4.10.2(1), except when the processing plant is designed in accordance with the requirements of (2) below.

TABLE 2.4.10.2(1)

LOCATION OF PROCESSING EQUIPMENT

Processing Equipment with Emergency Relief Venting to Permit Pressure	Minimum Distance of Equipment to Property Line	
	Stable Liquids	Unstable Liquids
Not in excess of 2.5 psig	See Table 2.4.4.2(1)(a)*	2½ times Table 2.4.4.2(1)(a)*
Over 2.5 psig	1½ times distance in Table 2.4.4.2(1)(a)*	4 times distance in Table 2.4.4.2(1)(a)*

*Double distances where protection of exposure is not provided.

(2) The distances required in (1) above may be waived when the equipment is located within a building and the exterior wall facing the line of adjoining property is a blank wall having a fire resistance rating of not less than four hours. When flammable liquids with a flash point of below 73°F., or unstable liquids are handled, the blank wall shall have explosion resistance in accordance with good engineering practices, see Sentence 2.4.10.3(4).

2.4.10.3 PROCESSING BUILDINGS

(1) Construction

(a) Processing buildings shall be of noncombustible construction, except heavy timber construction with load-bearing walls may be permitted for plants utilizing only stable combustible liquids. Except as provided in Sentence 2.4.10.2(2) or in the case of explosion resistant walls used in conjunction with explosion relieving facilities, see Sentence 2.4.10.3(4), load-bearing walls shall be prohibited. Buildings handling flammable or combsutible liquids with a flash point below 140°F shall not have basements or covered pits.

NOTE: (i) Processing buildings should be limited in height and area, depending upon the type of construction and private fire protection provided, to minimize the possibility of fire of such extent as to jeopardize public safety.

(ii) Processing buildings with numerous accessible exteri openings offer favourable features for fire fighting

(ii) Provision for smoke and heat venting may be desirable to assist access for fire fighting.

(b) All processing areas shall have adequate exit facilities arranged to prevent occupants from being trapped in the event of fire. Exits shall not be exposed by the drainage facilities described in (2) below.

(2) Drainage

Emergency drainage systems shall be provided to direct flammable or combustible liquid leakage and fire protection water to a safe location, in accordance with the requirements of Sentences 2.4.3.7 (8) and (9).

(3) Ventilation

(a) Enclosed processing buildings handling flammable or combustible liquids shall be ventilated at a rate of not less than one cubic foot per minute per square foot of solid floor area Mechanical ventilation discharging outside of the building. Provision shall be made for the introduction of make-up air in such a manner as to not interfere with the ventilation pattern. Ventilation shall be made to all floor areas and pits where flammable vapours may collect.

(b) Local or spot general ventilation may be needed for the control of special fire or health hazards. Such ventilation, if provided, may be utilized for up to 75% of the required ventilation.

(c) Equipment used in a building and the ventilation of the building shall be designed so as to limit flammable vapour-air mixtures under normal operating conditions to the interior of equipment, and to not more than five feet from such equipment.

(4) Explosion Venting

Areas where flammable liquids with a flash point below 73°F. or unstable liquids are processed shall have explosion venting through one or more of the following methods:

(a) open air construction;

(b) lightweight walls and roof;

(c) lightweight wall panels and roof hatches;

(d) windows of an approved explosion venting type.

2.4.10.4 LIQUID HANDLING

(1) Storage

(a) The storage of flammable or combustible liquids in storage tanks shall be in accordance with the applicable provision of Subsection 2.4.4, Fuel Storage.

(b) If the storage of flammable or combustible liquids in outside aboveground or underground storage tanks is not practical because of building by-laws, temperature considerations or production considerations, storage tanks may be permitted inside buildings or structures in accordance with the applicable provision in Sentence 2.4.4.12.

NOTE: Production considerations necessitating storage inside buildings include but are not limited to high viscosity, purity, sterility, hydroscopicity, sensitivity to temperature change, and the need for temporary storage pending completion of sample analysis.

(c) Storage tanks inside buildings shall be permitted only in areas at or above grade which have adequate drainage and which are separated from the processing area by construction having a minimum fire resistance rating of two hours.

Openings to other rooms or buildings shall be provided with non combustible liquid-tight raised sills or ramps at least 4 inches in height, or the floor in the storage area shall be at least 4 inches below the surrounding floor. Openings shall be protected with self-closing fire doors. The room shall be liquid tight where the walls join the floor.

(d) Day tanks, running tanks, surge tanks, and feed tanks shall be permitted in process areas.

(e) The storage of flammable or combustible liquids in containers shall be in accordance with the requirements of Subsection 2 4.3.

(2) Piping, Valves and Fittings

(a) Piping, valves and fittings shall be in accordance with Subsection 2.4.5.

(b) Approved flexible connectors may be used where vibration exists or where frequent movement is necessary. Approved hose may be used at transfer stations.

(c) Piping containing flammable or combustible liquids shall be identified in accordance with the requirements of Subsection 2.4.5.

(3) Transfer

The transfer of large quantities of flammable or combustible liquids shall be through piping by means of pumps or water displacement in accordance with the requirements of Subsection 2.4.5.

(4) Equipment

(a) Equipment shall be designed and arranged to prevent the unintentional escape of liquids and vapours and to minimize the quantity escaping in the event of accidental release.

(b) Where the vapour space of equipment is usually within the flammable range, the probability of explosion damage to the equipment shall be limited by inerting, by providing an explosion suppression system, or by designing the equipment to contain the peak explosion pressure which may be modified by explosion relief.

2.4.10.5 TANK VEHICLE AND TANK CAR LOADING AND UNLOADING

Tank vehicle and tank car loading or unloading facilities shall be separated from aboveground storage tanks, warehouses, other plant

buildings or nearest line of adjoining property by a distance of 25 feet for flammable liquids and 15 feet for combustible liquids measured from the nearest position of any fill stem. Buildings for pumps or shelters for personnel may be a part of the facility. Operations of the facility shall comply with the appropriate portions of Subsection 2.4.7.

2.4.10.6 FIRE PROTECTION

(1) Portable fire extinguishers of appropriate size, type and number shall be provided in accordance with the requirements of Part 4.

(2) Where the special hazards of operation or exposure indicate a need, the Authority having jurisdiction may require the following fire control provisions.

(a) A reliable water supply with pressure and quantity adequate to meet the probable fire demands.

(b) Hydrants in accordance with accepted good practice.

(c) Hose connected to a reliable water supply that all equipment induct pumps containing flammable or combustible liquids can be reached with at least one hose stream.

(d) Nozzles capable of discharging a water spray.

(e) Processing plants protected by an approved automatic sprinkler system or equivalent extinguishing system.

(3) Approved procedures shall be established and enforced for prompt notification of fire to those within the plant and to the nearest responding fire department.

(4) All plant fire protection facilities shall be adequately maintained and periodically inspected and tested by the owner or his authorized representative to make sure they are always in satisfactory operating condition and they will serve their purpose in time of emergency.

2.4.10.7 ELIMINATION OF SOURCES OF IGNITION

(1) Precautions shall be taken to prevent the accidental ignition of flammable vapours by the elimination of all possible sources of ignition.

NOTE: Sources of ignition include but are not limited to open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static, electrical and mechanical sparks; spontaneous ignition, including heat-producing chemical reaction; and radiant heat.

(2) Flammable liquids shall not be dispensed into containers unless the nozzle and container are electrically interconnected. Where the metallic floorplate on which the containers stand while filling is electrically connected to the fill stem or where the fill stem is bonded to the container during filling operations by means of a bond wire, the provisions of this Sentence shall be deemed to have been complied with.

2.4.10.8 MAINTENANCE AND REPAIR

(1) When necessary to do maintenance work in a flammable or combustible liquid processing area, the work shall be authorized and supervised by a responsible person specifically appointed for this task.

(2) Hot work, such as welding or cutting operations, use of spark-producing power tools, and chipping operations shall be permitted only under supervision of an individual in responsible charge after an inspection has been made of the area.

2.4.10.9 ELECTRICAL WIRING AND EQUIPMENT

All electrical wiring and equipment shall be of a type specified by and shall be installed in accordance with the Canadian Electrical Code CSA C22.1.

2.4.10.10 GENERAL CARE AND CLEANLINESS

(1) Maintenance and operating practices shall be in accordance with established procedures which will tend to control leakage and prevent the accidental escape of flammable or combustible liquids. Spills shall be cleaned up promptly.

(2) Aisles of adequate width shall be maintained for the unobstructed movement of personnel and fire department apparatus so that fire fighting operations can be carried out on any part of the processing equipment.

(3) Combustible waste material and residues in a building or operating area shall be kept to a minimum, stored in closed metal waste cans, and disposed of daily.

(4) Ground area around buildings and operating areas shall be kept free of tall grass, weeds, trash or other combustible materials.

2.4.11 REFINERIES, CHEMICAL PLANTS AND DISTILLERIES

2.4.11.1 STORAGE

Flammable or combustible liquids shall be stored in drums or portable containers in accordance with Subsection 2.4.3 or in storage tanks in accordance with Subsection 2.4.4.

2.4.11.2 PIERS AND WHARVES

Piers of wharves over which flammable or combustible liquids are handled shall comply with the requirements of Subsection 2.4.8.

2.4.11.3 FIRED AND UNFIRED PRESSURE VESSELS

Pressure vessels shall be constructed in accordance with CSA B51-Code for the construction and inspection of boilers and pressure vessels.

2.4.11.4 LOCATION OF PROCESS UNITS

(1) Process units shall be located so that they are accessible from at least one side for the purpose of fire fighting.

(2) Emergency drainage systems shall be provided to direct any leakage of flammable or combustible liquids together with water used for firefighting to a safe location, in accordance with the requirements of Sentences 2.4.3.7 (8) and (9).

2.4.11.5 FIRE PROTECTION

(1) Portable fire extinguishers shall be provided in such quantities and types as are required by the Authority having jurisdiction for the special hazards of operation and storage and as required by PART 4.

(2) Water shall be available in volume and at adequate pressure to supply water hose streams, foam producing equipment,

automatic sprinklers or water spray systems as the need is indicated by the special hazards of operation and storage and as required by the Authority having jurisdiction.

(3) Special extinguishing equipment such as that using foam, inert gas, or dry chemical shall be provided as required by the Authority having jurisdiction.

(4) Smoking shall be permitted only in approved areas.

2.4.12 ABANDONMENT AND REMOVAL OF UNDERGROUND STORAGE TANKS OR TEMPORARY WITHDRAWAL OF STORAGE TANKS FROM SERVICE

2.4.12.1 SCOPE AND APPLICATION

The procedures outlined in this Article shall be followed when underground storage tanks are removed, abandoned, or temporarily taken out of service.

2.4.12.2 RENDERING STORAGE TANKS "TEMPORARILY OUT OF SERVICE"

(1) If the disuse is temporary and will not exceed 180 days, the owner of the storage tanks shall -

(a) notify the authority having jurisdiction immediately in writing;

(b) arrange for monthly gauging of each storage tank, maintain a record of such gauge readings, and hold the record available for inspection;

(c) keep locked, when not in use, all fill and gauge piping covers, dispensing facilities and power controls; and

(d) leave the vent piping open.

(2) If the disuse is temporary and will exceed 180 days, the owner of the storage tanks shall -

(a) notify the authority having jurisdiction immediately in writing;

(b) empty all storage tanks and all connected piping and dispensing facilities of any flammable liquid, and,

(i) refill the storage tanks, piping and dispensing facilities with a combustible liquid, or

(ii) insert dry ice into the storage tank at the ratio of 2 pounds for each 100 gallons of storage tank capacity to minimize the hazard of an explosion or fire;

(c) if a combustible liquid is used as referred to in subclause (i) of clause (b), the owner shall arrange for monthly gauging of each storage tank and maintain a record of such gauge readings, and keep the record available for inspection; and

(d) after complying with subclause (i) and (ii) of clause (b), ensure that the fill pipe and gauge pipe covers, dispensing facilities and power controls are kept secured.

(3) Notwithstanding Sentence (2) above, operators of underground storage tank facilities that are operated on a seasonal basis shall -

(a) at the close of each season of operation,

(i) dip each storage tank, maintain a record of such dips and hold the dip record available, and

(ii) securely fasten all fill and gauge piping covers, dispensing facilities and power controls;

(b) prior to the start of an operating season dip each storage tank and reconcile the readings thereof with the dip readings recorded in subclause (i) of clause (a); and

(c) if the reconciliation referred to in clause (b) reflects a loss of product or water intrusion, take immediate action to determine and correct the cause of the loss or intrusion.

2.4.12.3 REMOVAL OF UNDERGROUND STORAGE TANKS

When it is known that an underground storage tank will not again be used, or where an underground storage tank has been out of use for 5 years, whichever comes first, the owner of the storage tank shall -

(a) remove any flammable or combustible liquid from the storage tank, connected piping and dispensing equipment;

(b) remove the storage tank and piping from the ground;

(c) if the soil around and under the storage tank is contaminated with liquid, remove such contaminated soil and liquid;

(d) fill the cavities to grade level with clean permanent fill, and

(e) notify the authority having jurisdiction in writing.

2.4.12.4 DISPOSAL OF STORAGE TANKS

(1) Before disposing of a storage tank that is not to be re-used, the owner of the storage tank shall render the storage tank vapour-free and shall cut sufficient openings in the storage

tank to render it unfit for further use.

(2) An excavated storage tank may only be re-used for gasoline or associated products by the owner who last used the storage tank for the purpose of storing gasoline or associated product and before such re-use, the storage tank shall:

(a) be cleaned, inspected for flaws and tested;

(b) be rejected for use if the shell has been subject to excessive denting, pitting, or gouging; any reduction in the shell thickness, in excess of 0.03 inches, or any dents greater than 30° from the normal configuration shall be considered excessive; and

(c) have the protective coating restored as required in Underwriters' Laboratories of Canada Standard No. 58.

2.4.12.5 ABANDONMENT OF ABOVEGROUND STORAGE TANKS OR TEMPORARY WITHDRAWAL OF STORAGE TANKS FROM SERVICE

(1) When an aboveground flammable or combustible liquid storage tank is taken out of use for a period of up to 180 days, the owner shall

(a) remove all liquid content and make the storage tank and directly associated connected piping vapour-free;

(b) block the flow in the piping in such a manner as to isolate the disused storage tank or close and permanently lock the valves necessary to achieve such isolation;

(c) before re-use, inspect and perform tests necessary to ensure safe condition for use; and

(d) perform the actions, required by (a), (b) and (c) above, personally or through a representative specifically delegated to act on his behalf by him.

(2) Where the withdrawal from service referred to in (1) above is to be permanent or cannot be certified to be for less than 180 days, the owner or his representative shall,

(a) empty the storage tank and all connected piping of liquid and make the storage tank and connected piping vapour free; and

(b) delete the storage tank marking and substitute the word "EMPTY".

2.4.13 TANK VEHICLES FOR THE TRANSPORTATION OF FLAMMABLE AND COMBUSTIBLE LIQUIDS

2.4.13.1 SCOPE AND APPLICATION

(1) This article applies to tank vehicles to be used for the transportation of asphalt or normally stable flammable and combustible liquids with a flash point below 200°F.

(2) It does not apply to fuel tanks used in the operation of motor vehicles, or for aircraft fuel servicing vehicles.

(3) Additional safeguards may be necessary for tank vehicles used for the transportation of flammable or combustible liquids having characteristics introducing additional factors such as high rates of expansion, instability, corrosiveness and toxicity.

NOTE: Some cutback asphalts have flashpoints in the range of flammable liquids and combustible liquids having a flash

point higher than 200°F., such as asphalt, may assume the characteristics of lower flash point liquids when heated. Under such conditions it shall be appropriate to apply these requirements unless otherwise specifically exempted by the authority having jurisdiction.

2.4.13.2 TRANSPORTABLE CONTAINERS

(1) Flammable or combustible liquids shall not be tendered for transportation or transported in a container having a capacity of less than fifty gallons but more than ten gallons, unless the container,

(a) for flammable liquids is clearly marked as conforming to the requirements of shipping container specifications 5, 5A, 5B, 5C, 5L or 5M, dated the 29th day of April, 1972, of the Canadian Transport Commission or of the Department of Transportation of the United States of America in force on the 29th day of April, 1972, and

(b) for combustible liquids of flash point at or greater than 100°F., is of at least 18 gauge and conforms to the safety requirements of the specifications listed in (a) above.

(2) Where flammable and combustible liquids other than asphalt are transported by a vehicle so constructed that the containers are not permanently attached to the chassis of the vehicle and, where each container is in excess of ten gallons in capacity, there shall be only a single tier of containers of flammable liquids on the vehicle.

(3) Cargo tanks for flammable or combustible liquids having a capacity of greater than 50 gallons shall conform to the requirements of the provision respecting the construction of tank trucks, trailers and semi-trailers.

(4) A cargo tank is not permanently attached to the chassis of a vehicle shall be firmly secured to a cradle or sill, and the cradle or sill shall be anchored to the body of the vehicle by means of hook-bolts or other equally secure devices, except in the case of the transportation or movement of any empty cargo tank.

(5) A cargo tank permitted to be used in (4) above shall not have a weight when full greater than the load carrying capacity of the vehicle.

2.4.13.3 TANK VEHICLE DESIGN

(1) Design of the tank vehicle shall give engineering consideration to the structural relationship between the cargo tank, the propulsion equipment and the supporting members if any, with due regard to the weight and temperature of the cargo, road performance, braking, and required ruggedness. The general design of the cargo tank and vehicle chassis shall be arranged to give the best combination of structural characteristics and vehicle performance. The design of the suspension system shall incorporate features to help assure lateral or tipping stability when turning corners.

(2) Any cargo tank designed or used for transporting materials at liquid temperatures above ambient temperature shall have

a red warning sign permanently attached containing at least the following:

"Maximum allowable cargo temperature is _____ °F."

This maximum allowable cargo temperature shall be specified by the manufacturer of the cargo tank.

(3) Cargo tanks used for transporting flammable or combustible liquids at temperatures equal to or above their boiling points shall be constructed in accordance with Sentence 2.4.13.4.

NOTE: Possible temperature rise during transfer as well as the loading temperature and altitude must be considered when determining if the flammable and combustible liquid will be transported at or above its boiling point. Where an accurate boiling point is unavailable for the material in question, or for mixtures which do not have a constant boiling point, the 10 per cent point of a distillation performed in accordance with the Standard Method of Test for Distillation of Petroleum Products ASTM D-86-62, may be used as the boiling point of the liquid.

(4) Cargo tanks used for transporting flammable or combustible liquids at a temperature below their boiling points shall be constructed in accordance with Sentence 2.4.13.5.

(5) A single cargo tank may be divided into compartments of different specification construction. Each such compartment shall conform to specification requirements concerned.

(6) The exhaust system of vehicles used for transporting flammable or combustible liquids, including the exhaust line and muffler, shall be so located as to be clear from the fuel system and all combustible materials and shall be terminated in such a position that fumes or heat from the exhaust shall not create a hazard to the cargo tank contents or to a facility being refuelled or from which the tank truck is being refilled.

(7) The fuel tank for the vehicle shall be so located that it is not over the engine and is equipped to vent while it is being filled.

2.4.13.4 CONSTRUCTION OF CARGO TANKS, PIPING AND CONNECTIONS DESIGNED FOR TRANSPORTING FLAMMABLE OR COMBUSTIBLE LIQUIDS AT TEMPERATURES AT OR ABOVE THEIR BOILING POINTS.

Cargo tanks, piping and connections designed for transporting flammable or combustible liquids above their boiling points shall be built in accordance with Specifications MC-307 or MC-331 of Part 178 of Title 49, USA Code of Federal Regulations, or in accordance with Provincial Regulations. Continued use of cargo tanks constructed on or before December 1, 1967, to Specifications MC-304 and MC-330 shall be permitted.

2.4.13.5 CONSTRUCTION OF CARGO TANKS, DESIGNED FOR TRANSFER OF FLAMMABLE OR COMBUSTIBLE LIQUIDS AT TEMPERATURES BELOW THEIR BOILING POINTS

(1) Cargo tanks shall be constructed in accordance with the requirements of MC 306 or MC 307, except that construction to other standards or continued use of existing cargo tanks

shall be permitted subject to licenced approval of the Authority having jurisdiction.

(2) Certain tables in the US Specification specify plate thickness in USSMS gauges and others in decimals of an inch. To ensure standard interpretation, the cross-references in the following Table shall apply:

TABLE 2.4.13.5

CORRESPONDING DECIMAL INCHES TO U.S. SMS GAUGE

USSMS Gauge	Corresponding inches
19	0.044
18	0.050
17	0.056
16	0.062
15	0.070
14	0.078
13	0.094
12	0.109
11	0.125
10	0.141
9	0.156
8	0.172

(3) Tank trucks, trailers and semi-trailers with compartments carrying flammable liquids of different flash points shall be provided with a vented air space between compartments and each air space shall be constructed and maintained to ensure that any liquid in it will drain to the ground, at all times.

(4) Cargo tanks conforming to U.S. D.O.T. Specifications MC 300, 302, 303, 304, 305 or 330 and having a capacity greater than 3,500 gallons shall not be used to transport flammable

liquids unless,

(a) they are divided into compartments

(b) The compartments have an individual capacity less than 3,500 gallons; and

(c) baffles are provided where and as required by the US DOT Specs.

(5) Except where a tank truck, trailer compartment is in the same service continuously and will remain in that service, meter air-release mechanisms shall not be vented back into a compartment.

2.4.13.6 SHUT-OFF VALVES

(1) Every draw-off valve shall be threaded at the discharge end or designed to permit tight connection to the delivery hose.

(2) Every draw-off valve shall be designed and maintained to prevent leakage.

(3) Except as provided in (4) below each compartment of each tank vehicle manufactured in conformance with Sentence 2.4.13.5

(4) shall be equipped with a shut-off valve,

(a) located in the outlet that is inside the shell, or located in the sump when the sump is an integral part of the shell; and

(b) so designed and maintained that the valve shall be closed at all times except during loading or unloading operations.

(4) Every tank vehicle is exempt from the provisions of (3) above if it is constructed and marked in accordance with US DOT Spec. MC 306, MC 307 dated March, 1967, as amended to July 1971.

(5) The operating mechanism for the shut-off valve referred to in (3) above, shall be provided with a secondary control, that is:

(a) readily accessible for use in case of accident or fire during loading or unloading operations;

(b) as far as practicable from any fill or discharge opening and

(c) provided with a fusible section to close automatically in case of fire.

(6) On and after March 2, 1967 all shut-off valves referred to in Sentence 2.4.13.6(4) shall be so designed that,

(a) they are as close as is physically possible to the shell of the cargo tank; and

(b) immediately downstream from such valves there shall be a connection designed to separate upon impact or strain in such a manner as not to damage the valve or to separate the valve from the cargo tank shell.

(7) Every tank truck, trailer or semi-trailer that is used for the transportation of flammable or combustible liquids other than asphalt is exempt from the provisions of section 2.4.13.6(4) if it was in use on September 2, 1966.

(8) Except as provided in (9) below, when the outlet valve of tank trucks, trailers or semi-trailers carrying flammable or combustible liquids with a flash point above or equal to 100°F. is not in actual use the valve handle shall be detached, or, where the handle cannot be detached, the valve, or cabinet containing the valve, shall be kept locked.

(9) Where immobilization of the pump by locking the ignition effectively prevents the escape of liquid, the valve handle of any valve supplied by the pump need not be detached and the valve or cabinet need not be locked.

2.4.13.7 MARKING OF TANK VEHICLES

(1) All vehicles shall be conspicuously and legibly marked on each side and on the rear in letters at least three inches high and of a colour that contrasts sharply with the background with:

(a) the word "FLAMMABLE";

(b) the common name of the product being transported; and

(c) the name of the carrier if the name includes the common name of the liquid being transported,

(2) In the case of tank vehicles the marking requirements apply whether the vehicle is loaded or empty.

2.4.13.8 BONDING OF TANK VEHICLES

(1) Vehicle cargo tanks and vehicle chassis shall be constructed and maintained to provide electrical continuity between them.

(2) All tank truck, trailers, and semi-trailers that may be loaded or unloaded through an open dome shall be provided with an approved electric bonding clip.

(3) Tank vehicles not equipped as required by (2) above shall be modified to comply with the requirements of (2) within 6 months after the date this Code comes into effect.

2.4.13.9 ACCIDENT DAMAGE PROTECTION

(1) General

The design, construction and/or installation of all cargo tank appurtenances shall be such as to minimize the possibility of accident damage or failure of such appurtenances adversely affecting the liquid retention integrity of the storage tank.

(2) Rear Bumpers

(a) Every cargo tank shall be provided with a rear bumper to protect the storage tank and piping in the event of a rear end collision and minimize the possibility of any part of the colliding vehicle striking the storage tank.

(b) The bumper shall be located at least 6 inches to the rear of any vehicle component which is used for loading or unloading purposes or may at any time contain lading while in transit.

(c) Structurally, the bumper shall be designed to successfully absorb (no damage which will cause leakage of product) the impact of the vehicle with rated payload, with a deceleration of 2 "g" using a factor of safety of two

based on the ultimate strength of the bumper material. For purposes of this requrement, such impact shall be considered uniformly distributed and applied horizontally (parallel to the ground) from any direction at an angle not exceeding 30 degrees to the longitudinal axis of the vehicle.

(3) Front Bumpers

Every vehicle shall be equipped in front with a heavy-duty bumper.

(4) Protection of Valves and Associated Connections

(a) All valves, piping and associated connections shall be protected from damage due to collision from the rear.

(b) In addition to the requirements of the Specifications identified in Sentences 2.4.13.5 (1) and (4), the protection required by (1) above shall be such that it will prevent damage to the valves, piping and associated connections, which damage could result from collision with an object that could over-ride or under-pass the protective bumper.

2.4.13.10 CLOSURES FOR FILL OPENINGS AND MANHOLES

(1) (a) Every compartment in excess of 2,000 gallons capacity shall be accessible through a manhole of at least 11 inches × 15 inches.

(b) Manhole and/or fill opening covers shall be designed to provide secure closure of the openings. They shall have structural capability of withstanding internal fluid pressures of 9 psig without permanent deformation.

(c) Safety devices to prevent the manhole and/or fill cover from opening fully when internal pressure is present shall be provided.

2.4.13.11 VENTS FOR CARGO TANKS IN OTHER THAN ASPHALT SERVICE

(1) General

Each cargo tank compartment shall be provided with safety relief devices in accordance with the requirements contained in this section. All of such devices shall communicate with the vapour space. Shut-off valves shall not be installed between the cargo tank opening and any safety device. Safety relief devices shall be so mounted, shielded or drained as to eliminate the accumulation of water, the freezing of which could impair the operation of discharge capability of the device.

(2) Normal Venting

Each cargo tank compartment shall be provided with pressure and vacuum vents having a minimum through area of 0.44 square inch. All pressure vents shall be set to open at no more than 1 psig and all vacuum vents at no more than 6 ounces. Pressure and vacuum vents shall be designed to prevent loss of liquid through the vent in case of vehicle overturn.

(3) Loading and Unloading Venting Protection

If the cargo tank is designed to be loaded or unloaded with the dome cover closed, the vent or vents as described in (2) above or additional vents shall limit the vacuum to 1 psi and the cargo tank pressure to 3 psig based on maximum liquid

transfer rate. Unless effective protection against overfilling is made, the pressure vent shall also have sufficient liquid capacity to prevent the pressure from exceeding 3 psig in case of accidental overfilling. This pressure vent may be pressure operated or interlocked with the cargo tank loading device, and shall be designed to prevent loss of liquid through the vent under any condition of vehicle rollover.

(4) Emergency Venting for Fire Exposure

(a) Total Capacity

The total emergency venting capacity (cu.ft./hr.) of each cargo tank compartment shall be not less than that determined from Table 2.4.13.11(4)(a).

TABLE 2.4.13.11(4)(a)

MINIMUM EMERGENCY VENT CAPACITY IN CUBIC FEET FREE AIR/HOUR (14.7 PSIA AND 60°F.)

Exposed Area Square Feet	Cubic Feet Free Air per Hour	Exposed Area Square Feet	Cubic Feet Free Air per Hour
20	15,800	275	214,300
30	23,700	300	225,100
40	31,600	350	245,700
50	39,500	400	265,000
60	47,400	450	283,200
70	55,300	500	300,600
80	63,300	550	317,300
90	71,200	600	333,300

(Continuation)

Exposed Area Square Feet	Cubic Feet Free Air per Hour	Exposed Area Square Feet	Cubic Feet Free Air per Hour
100	79,100	650	348,800
120	94,900	700	363,700
140	110,700	750	378,200
160	126,500	800	392,200
180	142,300	850	405,900
200	158,100	900	419,300
225	191,300	950	432,300
250	203,100	1,000	445,000

NOTE: Interpolate for intermediate sizes.

(b) Pressure-Actuated Venting

Every cargo tank compartment shall be equipped with a pressure-actuated vent set to open at not less than 3 psig and close when the pressure drops to 3 psig or below. The minimum venting capacity for pressure-actuated vents shall be 6,000 cubic feet of free air per hour (14.7 psia at 60°F.) from a tank pressure of 5 psig. Pressure-actuated devices shall be so designed so as to prevent leakage of liquid past the device in device in case of a surge or vehicle upset, except that they shall function in case of pressure rise under any condition of vehicle roll-over.

(c) Fusible Venting

If the pressure-actuated venting required in (b) above

does not provide the total venting capacity required by (a) above, additional capacity shall be provided by adding fusible venting devices each having a minimum area of 1.25 square inches. Such fusible elements shall be so located as to not be in contact with the cargo tank contents under normal operating conditions. The fusible vent or vents shall be actuated by elements which operate at a temperature not exceeding 250°F. The venting capacity of these devices shall be rated at not more than 5 psig. When fusible venting devices are used, no less than two such devices shall be used on any cargo tank or tank compartment over 2,000 gallons in capacity, and at least one such device shall be located close to each end of the cargo tank or its compartments.

(5) Flow Testing and Marking of Vents

(a) Each type and size of venting device shall be flow tested in its required operating range. The actual rated flow capacity of the vent in cubic feet of free air per hour at the pressure in psig at which the flow capacity is determined shall be stamped on the device. The fusible vent or vents shall have their flow rating determined at 5 psig differential.

(b) These flow tests may be conducted by the manufacturer, if certified by an approved testing agency.

2.4.13.12 VENTS FOR CARGO TANKS IN ASPHALT SERVICE

(1) Every cargo tank used in asphalt service shall be provided with a vent having an effective opening at least equivalent to a nominal 2-inch pipe.

(2) Every cargo tank for asphalt service shall be provided with a manhole having a free opening of at least 15 inches in diameter designed to relieve internal pressure at between 2 and 3 pounds per square inch gauge or an equivalent relief device.

2.4.13.13 EMERGENCY DISCHARGE CONTROL

(1) Liquids Having Viscosities Less Than 45 SUS

(a) The outlets of every cargo tank or compartment used for the transportation of flammable liquids, and trucks constructed hereafter for transportation of combustible liquids having a viscosity less than 45 Saybolt Universal Seconds at 100°F., shall be equipped with a reliable and efficient shut-off valve located inside the shell; or in the sump when it is an integral part of the shell; and designed so that the valve must be kept closed except during loading and unloading operations. NOTE: The 45 second viscosity limit is included for the purposes of requiring internal valves when transporting free-flowing distillate oils, such as kerosene, diesel oil and domestic heating oil, and of excluding this requirement when transporting viscous oils such as residual fuel oil, bunker fuel oil, and asphalt products which may congeal and cause malfunctioning of the valve.

(b) The operating mechanism for the valve referred to in (a) above shall be provided with a secondary control, remote from the fill openings and discharge faucets, for use in the event of accidents or fire during delivery operations.

(c) The control mechanism shall be provided with a fusible section which will permit valves to close automatically in case of fire.

(d) In every case there shall be provided, between the shut-off valve seat and discharge faucet, a shear section which will break under strain and leave the shut-off valve seat intact.

(2) Liquids of Viscosities of 45 SUS or More

The outlets of every cargo tank used for the transportation of liquids having a viscosity equal to or greater than 45 Saybolt Universal Seconds at 100°F. shall be equipped with -

(a) a suitable shut-off valve, located internally, designed so that the valve will remain operable if the external connection is sheared off, or

(b) a front- or rear-head mounted valve securely reinforced and protected against shock or road hazards.

2.4.13.14 PRESSURE TESTS

(1) At the time of manufacture, every cargo tank shall be tested by a minimum air or hydrostatic pressure of 3 psig or at least equal to the cargo tank design pressure, whichever is greater. If compartmented, every compartment shall be

similarly tested with adjacent compartments empty and at atmospheric pressure.

(a) Air pressure, if used, shall be held for a period of at least five minutes during which the entire surface of all joints under pressure shall be coated with a solution of soap and water, heavy oil, or other material suitable for the purpose, foaming or bubbling of which indicates the presence of leaks.

(b) Hydrostatic pressure, if used, shall be done by using water or other liquid having a similar viscosity, the temperature of which shall not exceed 100°F. during the test, and the pressure applied as in (a) above, gauged at the top of the cargo tank, at which time all joints under pressure shall be inspected for the issuance of liquid to indicate leaks.

(c) All closures shall be in place while test by either using air or hydrostic pressure is made. During these tests, operative relief devices shall be clamped, plugged, or otherwise rendered inoperative. Such clamps, plugs, and similar devices shall be removed immediately after the test is finished.

(2) The test in (1) above shall be repeated following alteration or repairs which involve cargo tank integrity. If there is any leakage, undue distortion, or if failure impends or occurs, the cargo tank shall not be placed in service until repairs have been made.

2.4.13.15 OVERFLOWS AND DRAINS FOR ASPHALT TANK VEHICLES

Overflow protection for asphalt tank vehicles shall be provided in the form of reservoirs or flashing around fill and vent pipes. Overflow and drain pipes shall have thicknesses heavier than the cargo tank shell and shall be designed so that hot asphalt will not spill onto tires, brakes, or the burner equipment of vehicle's exhaust system.

2.4.13.16 COMPARTMENTATION AND IDENTIFICATION TO PREVENT INTERMIXING

(1) Tank vehicles designed to transport flammable liquids in one or more compartments and combustible liquids in other compartments or to transport chemically non-compatible liquids shall be equipped with separate piping, pumps, meters and hoses for each type of liquid.

(2) Every compartment discharge control on a tank truck, trailer or semi-trailer shall have securely attached to it a tag of enammeled metal, substantial fibre or petroleum-resistant plastic to denote the type of liquid which is contained in the cargo tank or compartment from which the control leads.

(3) A tag, referred to in (2) above, to denote:

(a) a flammable liquid shall be colour red and shall be octagonal in shape; and

(b) a combustible liquid shall be coloured any colour other than red, green or red-orange shades, and shall be round in shape.

(4) All tags, in addition to being coloured and of the specified shape, shall bear in clearly legible permanent characters the name of the liquid.

(5) Every tag shall at all times be kept clean and bright so that its colour is readily recognizable, and its inscription is readily legible.

(6) It shall be the responsibility of the loader at the point of loading to attach the correct tags.

(7) It shall be the responsibility of the driver to ensure that the correct tags have been attached before he leaves the point of loading.

2.4.13.17 LIGHTING

Lighting circuits shall have suitable overcurrent protection. The wiring shall have sufficient carrying capacity and mechanical strength, and shall be secured, insulated, and protected against physical damage, in keeping with recognized good practice.

2.4.13.18 AUXILIARY EQUIPMENT

(1) Auxiliary Internal Combustion Engines

(a) Internal combustion engines, other than those providing propulsive power, installed or carried upon a tank vehicle transportating flammable liquids for the purpose of providing power for the operation of pumps or other devices, shall meet the requirements of the following Sentences.

(b) The engine air intake shall be equipped with an effective flame arrester, or an air cleaner having effective flame arrester characteristics, substantially installed and capable of preventing emission of flame from the intake side of the engine in event of backfiring.

(c) The fuel system shall be so located or constructed as to minimize the fire hazard. If the fuel tank is located immediately adjacent to the engine, suitable shielding shall be provided to prevent spillage during the filling operation, or leakage from the tank or fuel system, from coming in contact with the engine or any parts of the ignition and exhaust systems. All parts of the fuel system shall be constructed and installed in a workmanlike manner.

(d) Pumps and other appurtenances shall be so located in relation to the engine that spillage or leakage from such parts shall be prevented from coming in contact with the engine or any parts of the ignition and exhaust system, or shielding shall be provided to attain the same purpose. The engine cooling fan shall be so positioned, rotated or shielded as to minimize the possibility of drawing flammable vapours toward the engine.

(e) When the engine is located in a position where spillage from the cargo tank or its appurtenances or from side racks might constitute a hazard, shielding shall be provided to prevent such spillage from contacting the engine or engine exhaust system and for draining such spillage away from the vicinity of the engine.

(f) Where the engine is carried within an enclosed space, provision shall be made for air circulation at all

times to prevent accumulation of explosive vapours and to avoid overheating.

(g) The exhaust system shall be substantially constructed and installed and free from leaks. The exhaust line and muffler shall have approved clearances from combustible materials, and the exhaust gases shall be discharged at a location which will not constitute a hazard. When engines are carried as in (f) above, the exhaust gases shall be discharged outside of each such closed space.

(h) The ignition wiring shall be substantially installed with firm connections, and spark plug and all other terminals shall be suitably insulated to prevent sparking in event of contact with conductive materials. The ignition switch shall be of the enclosed type.

(2) Auxiliary Electric Generators and Motors

(a) Electrical equipment installed or carried upon a tank vehicle transporting flammable or combustible liquids for the operation of pumps or other devices used for the handling of product and operating product handling accessories shall meet the requirements of the following Sentences:

(b) Generators which are mounted on the engine providing propulsive power for the vehicle or an auxiliary engine, or located in the immediate vicinity of such engine or its exhaust system, may have general purpose enclosures. Generators located elsewhere shall be provided with

enclosures meeting the requirements for Class 1 Group D hazardous locations:

(c) Motors having sparking contacts shall be provided with enclosures meeting the requirements for Class 1 Group D hazardous locations.

(d) Wiring shall be designed for the maximum loads to be carried and shall be installed so as to be protected from physical damage and contact with possible product spill either by location or by being enclosed in metal conduit or other oil-resistant protective covering. Junction boxes shall be sealed.

(e) Switches, overload protection devices and other sparking equipment shall be located and enclosed as provided for generators in (b) above.

(f) Where the generator or motor is located within an enclosed space, provision shall be made for air circulation to prevent overheating and possible accumulation of explosive vapour.

(3) Burner and Burner Tubes for Asphalt Tank Vehicles

(a) Fuel tanks for the vehicle engine and fuel tanks for the burners on asphalt trucks shall be located remotely from the burner or protected by a noncombustible shield from the burner to prevent flashback.

(b) Burner tubes shall be maintained in safe operating condition.

(c) The bottom of internal burner tubes shall be located as low in the cargo tank as proper design and functioning will permit.

(d) Instructions for the method of operating the burner equipment and the pumping equipment, if so equipped, shall be provided in the vehicle at all times.

(e) A legible red warning sign shall be permanently attached near the burners on any tank vehicle equipped with burners and shall contain at least the following information:

"WARNING"

This burner equipment must not be operated while the vehicle is being located or is in transit, or when the burner tubes are not completely submerged.

(4) Pumps and Hose

(a) When a pump is used to deliver liquids, automatic means shall be provided to prevent pressure in excess of the design working pressures of the accessories, piping and hose.

(b) Each length of hose used for delivery of product by pump shall be marked to indicate the manufacturer's recommended working pressure.

(c) All pressure hoses and couplings shall be inspected at intervals appropriate to the service, with the maximum operating pressure applied to the hose and couplings with the hose extended. Any hose showing

material deteriorations, signs of leakage, or weakness in itself or at the couplings shall be withdrawn from service and either repaired or discarded.

2.4.13.19 PARKING BRAKES

(1) Every stake truck, tank truck, tractor, trailer, or semi-trailer operated or parked singly or in combination, shall at all times be equipped with a parking brake of the design referred to in (3) below or chock blocks, or both adequate to prevent movement of the vehicle when parked either singly or in combination on any grade on which the vehicle is operated or parked and under any condition of loading.

(2) The parking brake or brakes shall at all times be capable of being applied in conformance with the requirements of (1) above by the driver's muscular effort or by spring action or by other energy, provided that, if such other energy is depended on for application of the parking brake, an accumulation of such energy shall be isolated from any common source and used exclusively for the operation of the parking brake.

(3) The parking brake shall be so designed, constructed and maintained that when one applied -

(a) it shall remain in the applied condition, with the effectiveness required by (1) above, despite exhaustion of any source of energy or leakage of any kind; and

(b) it cannot be released unless adequate energy is available in the brake system upon release to make an immediate further effective application.

(4) Every vehicle equipped with the type of brake referred to in (3) above shall be conspicuously and legibly marked with a symbol or marking in evidence thereof.

(5) The parking brake referred to in (3) above shall be set, or the chock blocks shall be positioned, whenever the vehicle is parked, including parking for loading and unloading.

2.4.13.20 FIRE EXTINGUISHERS

(1) Each tank vehicle shall be provided with at least two portable fire extinguishers having a total of at least a 20-B, C rating. Each extinguisher installed after 1973 shall have at least a 5-B, C rating. Ratings shall be in accordance with Part 4 of this Code.

(2) Fire extinguishers shall be located in an accessible place on each tank vehicle, at least one of which shall be in the cab.

2.4.13.21 GENERAL OPERATING CONDITIONS

(1) Drivers shall be thoroughly trained in the method of operating tank vehicles and in the procedures for loading and unloading tank vehicles. Tank vehicles shall not be operated unless they are in good repair, devoid of accumulation of grease, oil or other flammables, and free of leaks.

(2) The person in charge of a vehicle, while the vehicle is being driven, repaired, loaded or unloaded shall not have

in his possession any -

lighted match;

lighted lighter;

lighted pipe;

lighted cigar; or

lighted cigarette,

and he shall do everything in his power to prevent any other person from having in his possession any of these articles while that person is in the vehicle or taking delivery from the vehicle, or while that person is within twenty-five feet of a vehicle while it is parked, being loaded, being unloaded or being repaired.

(3) Dome covers shall be closed and latched while the tank vehicle is in transit.

(4) Tank vehicles shall not be operated with a cargo temperature above the maximum allowable cargo temperature specified on the warning sign required by Sentence 2.4.13.3.(2).

(5) Material shall not be loaded into or transported in a cargo tank at a temperature above its ignition temperature, unless safeguarded in a manner approved by the authority having jurisdiction.

(6) Flammable or combustible liquids, which are loaded at or above their boiling points or may reach their boiling point temperature during transit, shall be loaded only in cargo tanks constructed in accordance with Sentence 2.4.13.4.

(7) Flammable or combustible liquids shall be loaded only into cargo tanks whose material used in construction shall be compatible with the chemical characteristics of the liquid. The flammable or combustible liquid being loaded shall also be chemically compatible with the liquid hauled on the previous load unless the cargo tank has been cleaned.
NOTE: In case of doubt, the supplier or producer of the flammable or combustible liquid or other competent authority should be consulted.

(8) Combustible liquids shall not be loaded into an adjacent compartment to flammable liquids unless double bulkheads are provided, nor shall chemically noncompatible chemicals be loaded into adjacent compartments unless separated by double bulkheads.

(9) To prevent a hazard from a change in flash point of liquids, cargo tanks or any compartment thereof, which have been utilized for flammable liquids, shall not be loaded with combustible liquids until such cargo tanks or compartment and all piping, pumps, meters and hose connected thereto have been completely drained. Cargo tanks, compartments and piping, pump, meter or hose which does not drain completely shall be flushed at the loading point with a quantity of combustible liquid equal to twice the capacity of piping, pump, meter and hose, to clear any residue of flammable liquid from the system.

NOTE: To reduce the danger of static ignition when changing from flammable to combustible liquid (switch loading), other precautions may be necessary.

(10) When a compartment that has been used to carry one type of flammable liquid is to be used to carry another type, all of the existing type shall be completely removed from the compartment, and from the piping and accessory delivery equipment connected thereto, before the new type of liquid is loaded.

(11) Repairs shall not be made to any tank vehicle unless the repairs can be made without hazard, nor shall any loaded motor vehicle be repaired in a building.

(12) Cargo tanks shall not be repaired by any method employing a flame, arc, or other source of ignition, unless the cargo tank is maintained vapour free or otherwise made safe in an approved manner.

(13) Vehicle shall not be used for the refuelling of vehicles except that this does not apply to the use of approved vehicles in refuelling contractor's construction equipment on a job site.

(14) Before a tank vehicle is parked inside any approved building, the driver shall check to ensure that there are no leaks in the cargo tank, piping or valves, and shall ensure that the air space in the cargo tank or compartment shall be sufficient to allow for the temperature volume expansion of the liquid and at least 1% of the compartment volume.

2.4.13.22 TANK VEHICLE OPERATION

(1) Tank trucks, trailers or semi-trailers having one or more cargo tanks mounted on the chassis thereof, shall not be operated unless -

(a) they have been designed to have good road stability;

(b) they have been maintained in good operating condition; and

(c) daily inspection has shown that the cargo tanks are not so worn or damaged as to leak.

(2) Every tank truck and trailer, other than tracked vehicles, shall be operated on not less than four wheels.

(3) Every semi-trailer shall be operated on not less than two wheels.

2.4.13.23 LOADING AND UNLOADING

(1) Loading and unloading of tank vehicles shall only be done in approved locations.

(2) The driver, operator or attendant of any tank vehicle shall not remain in the vehicle and shall not leave the vehicle unattended during the loading or unloading process but shall remain in close proximity to the discharge control so that in an emergency he can immediately shut off the flow of liquid.

(3) When transferring flammable liquids, motors of tank vehicles or motors of auxiliary or portable pumps shall be shut down during the making and breaking of hose connections. If loading or unloading is done without requiring the use of

the motor of the tank vehicle, the motor shall be shut down throughout transfer operations involving flammable liquids.

(4) If portable pumps are used for transferring flammable liquids, the portable pumps shall comply with the applicable provision of Sentence 2.4.13.17(1) or (2).

(5) Cargo tanks or compartments thereof used for the transportation of flammable or combustible liquids or asphalt shall not be filled with liquid. Sufficient space (outage) shall be provided in every case to prevent leakage from such cargo tanks or compartments by expansion of the contents due to rise in temperature in transit and in no case shall the outage be less than one percent of the compartment volume.

(6) Cargo tanks shall be free of water or volatile liquids before they are loaded with hot asphalt.

(7) When a cargo tank is filled through a top opening, bonding facilities for protection against static sparks shall comply with the requirements of Sentence 2.4.7.3 (4), (5), (6), (7), (8) and (9).

(8) External bond-wire connections or bond-wires integral with a hose are not required for the unloading of flammable or combustible liquids into underground storage tanks, nor when a tank vehicle is loaded or unloaded through tight connections such as to an aboveground storage tank or through bottom connections.

(9) Before a vehicle is unloaded, the operator of the vehicle shall gauge the storage tanks or shall use such other means as are reasonable in the circumstances to satisfy himself that the storage tanks can safely accept the volume he proposes to unload.

(10) Notwithstanding (9) above, the operator of a vehicle shall perform the gauging required by (9) above when making deliveries to service stations, consumer outlets and marines service stations.

(11) Smoking on or about any tank vehicle while loading or unloading any flammable or combustible liquid shall be prohibited. Extreme care shall be taken in the loading or unloading of any liquid into or from any cargo tank to keep fire away and to prevent persons within 25 feet from smoking, lighting matches, or carry any flame or lighted cigar, pipe or cigarette.

(12) Flammable or combustible liquids shall not be transferred to or from any tank vehicle unless the parking brakes required by Sentence 2.4.13.18 are securely set and all other reasonable precautions have been taken to prevent motion of the vehicle.

CITY OF BRAMPTON FIRE DEPARTMENT

SCHEDULE "B" SECTION 2.3

FIRE PREVENTION BYLAW

PROPERTY PROTECTION FOR

INDUSTRIAL & COMMERCIAL OCCUPANCIES

CONTENTS

SECTION 2.3 PROPERTY PROTECTION FOR INDUSTRIAL AND COMMERCIAL OCCUPANCIES.

Scope

2.3.1. Scope

2.3.1.1. This section of the Code is intended to provide for property conservation and the prevention of conflagrations by requiring that certain fire protection measures be applied in the case of particular industrial and commercial occupancies where the use, storage and handling of hazardous materials or the stock-piling of flammable materials create a potentially serious fire hazard.

2.3.2. TIRE STORAGE WAREHOUSES

Definitions

Tire means a natural or synthetic rubber hoop or band which may be either of a solid or pneumatic type forming the tread of a vehicle wheel.

Tire storage warehouse means a building or fire compartment used for the storage of tires where the quantity stored exceeds 15,000 cu. ft. in one fire compartment.

Scope

2.3.2.1. This subsection provides for the control of fires in tire storage warehouses where the quantity of tires stored exceeds 15,000 cu.ft.

Piling of tires

2.3.2.2.(1) A single pile of tires in a tire storage warehouse shall not occupy an area greater than 5000 sq.ft.

(2) The maximum length of a single pile of tires shall not be greater than 100 ft.

(3) Maximum piling height must be posted according to the design of the sprinkler system.

(4) The minimum clearance between the top of a pile of tires and the head deflectors of an automatic sprinkler installation shall be not less than 30 in.

Storage separations

2.3.2.3.(1) The width of cross aisles and main aisles between individual piles of tires shall be not less than 8 ft., but where the individual piles of tires do not exceed 2500 sq.ft. cross aisles may be not less than 4 ft.

(2) A minimum clearance space of 24 in. shall be maintained between piles of tires and unprotected columns, and between piles of tires and enclosing walls.

Sprinkler system required

2.3.2.4.(1) Each tire storage warehouse having more than 5000 sq.ft. of floor area shall be provided with an approved automatic sprinkler installation having discharge density, pressure and flow in accordance with Tables 2.3.2.A, 2.3.2.B and 2.3.2.C installed in accordance with Part 4, and as specified, with a water supply that is sufficient to supply an additional 500 gal/min. for hose streams.

(2) An approved water flow alarm device shall be provided for each main sprinkler riser installed in a tire storage warehouse.

Standpipes

2.3.2.5. A standpipe and hose stream shall be provided in each tire storage warehouse and installed in accordance with Part 4 of this Code and approved by the authority having jurisdiction.

Portable extinguishers

2.3.2.6. Approved portable extinguishers shall be provided in each tire storage warehouse,

(1) in order that, for every 5000 sq.ft. of floor area or greater fraction thereof, there is a dry chemical extinguisher with a 20B rating,

(2) when required by the authority having jurisdiction in accordance with Part 4 of the Code and

(3) maintenance shall be in accordance with Part 4 of the Code.

TABLE 2.3.2.A

Rubber-tire Storage Sprinkler discharge-density Factors for Various Pilings

	Height and type of pile*	Standard sprinklers minimum density, gpm/sq ft**
A	6 ft, on floor	0.22
B	7 ft, on floor	0.24
C	8 ft, on floor	0.26
D	9 ft, on floor	0.28
E	10 ft, on floor	0.28
F	9½ ft, wood pallets† (2 pallets high)	0.32
G	12 ft, on floor	0.32
H	12 ft, rack piled‡	0.32
J	14 ft, baffled wood pallets (3 pallets high)†	0.48

* Tires piled 5 ft or lower will not ordinarily require the application of these standards. Water supply according to usual standards will suffice.

† A 60 by 60 in. wood pallet with slatted platform boards approximately 5½ in. wide does not unduly restrict the upward flow of the products of combustion nor the downward flor of sprinkler discharge. Water-density values for pallets of other designs would have to be determined for each.

‡ A steel rack approximately one standard automobile tire wide and 10 tires high is placed between every third and fourth column of tires so that 30 tires are stored between every two racks (3 columns of 10 tires each). 2 by 4 in. wood planks are placed above each pair of racks for support of tires in column above (3 tires 12 ft high). A solid steel or plywood disk of about tire diameter with a 3/4-in. drain hole is placed on the wood planks under each column of tires.

** Water volume is in U.S. Gallons.

TABLE 2.3.2.B

Rubber-tire Storage Required Pressures and Flow at Top of Riser with 20 Standard Sprinklers Operating*

Ample initial supply for standard sprinklers

Protection area per sprinkler	Height and type of pile See Note 2*	Riser pressure and flow. Applicable to either the 1895 or 1940 sprinkler-pipe schedule. Friction loss in feed main, if any, between the cross main and riser must be added to pressures shown in table.													
		4-head branch					6-head branch					8-head branch			
			Center feed		Side feed			Center feed		Side feed			Center feed		Side feed	
		Flow, gpm**	Riser pressure, psi				Flow, gpm	Riser pressure, psi				Flow, gpm**	Riser pressure, psi			
			250-hd system	100-hd system	175-hd system	100-hd system		250-hd system	100-hd system	175-hd system	100-hd system		250-hd system	100-hd system	175-hd system	100-hd system
49 sq ft (7′ × 7′ spacing)	A B C D E F G H	480	34	30	61	56	490	38	34	48	44	540	41	38	54	51
	J	520	40	36	71	66	530	44	40	56	52	580	48	44	63	59
64 sq ft (8′ × 8′ spacing)	A B C D E F G H	480	36	32	59	55	510	39	36	55	49	560	45	40	61	56
	J	680	71	63	118	107	710	78	71	107	98	780	88	79	120	111
81 sq ft (9′ × 9′ spacing)	A B C	500	38	34	66	59	510	42	38	58	53	570	48	43	66	61
	D E	520	41	36	71	64	530	45	41	63	58	590	52	47	71	66
	F G H	590	53	48	92	83	610	59	53	82	75	680	67	61	93	85
	J	890	119	107			910	132	120			1,010	152	136		
100 sq ft (10′ × 10′ spacing)	A	510	40	36	78	73	520	44	40	64	59	570	49	45	69	63
	B	550	48	43	94	87	570	52	48	77	71	630	59	53	82	76
	C	600	56	51	110	101	620	61	56	90	82	680	68	62	96	89
	D E	650	65	59	128	117	670	71	65	104	96	730	80	72	112	103
	F G H	730	83	76			760	93	84	135	123	850	103	94	145	132

*See Notes at end of Table 2.3.2.C

**Water volume is in U.S. Gallons.

TABLE 2.3.2.C.

Rubber-tire Storage Required Pressures and Flow at Top of Riser with 15 Standard Sprinklers Operating

Tolerable initial supply for standard sprinklers

Protection area per sprinkler	Height and type of pile See Note 2	Riser pressure and flow. Applicable to either the 1895 or 1940 sprinkler-pipe schedule. Friction loss in feed main, if any, between the cross main and riser must be added to pressures shown in table.													
		4-head branch					6-head branch					8-head branch				
			Center feed		Side feed			Center feed		Side feed			Center feed		Side feed	
		Flow, gpm *	Riser pressure, psi				Flow, gpm *	Riser pressure, psi				Flow, gpm *	Riser pressure, psi			
			250-hd system	100-hd system	175-hd system	100-hd system		250-hd system	100-hd system	175-hd system	100-hd system		250-hd system	100-hd system	175-hd system	100-hd system
49 sq ft (7′ × 7′ spacing)	A B C D E F G H	360	32	29	46	43	380	34	32	44	42	400	39	37	45	43
	J	390	37	34	54	51	420	40	38	51	49	430	46	43	53	51
64 sq ft (8′ × 8′ spacing)	A B C D E F G H	360	34	31	52	48	390	37	35	49	47	400	43	39	53	50
	J	510	67	61	103	95	550	75	69	98	92	560	83	77	106	101
81 sq ft (9′ × 9′ spacing)	A B C	370	36	33	55	50	400	39	37	53	49	410	46	42	58	55
	D E	380	39	35	58	54	420	43	39	57	54	420	49	46	62	59
	F G H	430	50	46	76	70	470	56	51	74	70	480	64	59	81	77
	J	650	113	103			710	124	116			720	145	132		
100 sq ft (10′ × 10′ spacing)	A	370	37	34	58	54	400	40	38	55	52	400	46	44	56	53
	B	400	43	40	69	64	440	48	45	66	62	440	55	52	66	63
	C	430	51	46	81	75	480	56	53	78	72	480	65	61	78	74
	D E	460	59	54	95	87	510	66	61	89	84	520	75	71	90	86
	F G H	540	78	71	122	114	590	84	80	116	109	600	97	92	118	111

Notes are also applicable to Tables 2.3.2.B and 2.3.2.C

1. The initial water supply for sprinklers should be capable of being maintained for a period of at least 1 hr.
2. Height and type of pile (see Table 72-1)

A	6 ft, on floor	F	9½ ft, wood pallets (2 pallets high)
B	7 ft, on floor	G	12 ft, on floor
C	8 ft, on floor	H	12 ft, rack piled
D	9 ft, on floor	J	14 ft, baffled wood pallets (3 pallets high)
E	10 ft, on floor		

3 Flows are the average to the nearest 10 gpm of the calculated flows for center- and side-fed systems. Flows will be within + 2% of the calculated flow for center-fed systems and within − 2% of the calculated flow for side-fed systems

4 Riser pressures are the average to the nearest pound of the calculated riser pressures for the 1895 and 1940 pipe schedules Riser pressure will be not over 3 lb less than the calculated pressure for the 1940 schedule and not over 3 lb more than the calculated pressure for the 1895 schedule

5 Where protection area per sprinkler is different from that shown in table, sprinkler flow and riser pressure may be directly proportioned between the nearest protection areas shown in table for the height of piling

EXAMPLE (Table 66-3): Piling G, 12 ft. on floor Sprinkler spacing 9 by 8 ft = 72 sq ft 6-head branch lines center-fed on 250-head system.

From table, 81 sq ft protection area, flow = 470 gpm, riser pressure 56 psi
From table, 64 sq ft protection area, flow = 390 gpm, riser pressure 37 psi

17 80 19

$$\frac{(72-64)}{(81-64)} \times 80 = 40 \text{ gpm} \qquad \frac{(72-64)}{(81-64)} \times 19 = 9 \text{ psi}$$

Flow for 72 sq ft protection area = 390 + 40 = 430 gpm Riser pressure for 72 sq ft protection area = 37 + 9 = 46 psi.

6 Riser pressure and flow for 5-head branch lines may be obtained from the data given for 4- and 6-head branch lines by interpolation Data for 7-head branch lines may be obtained similarly from the 6- and 8-head branch line data

7 Where the number of sprinklers per system is different from that shown in table, riser pressure may be directly proportioned from the pressures shown in table The systems shown in the table are center-central and side-central fed, meaning that one-half the head count is on each side of the riser

8 Williams and Hazen coefficient C of 120 is used in friction-loss computations A roughness coefficient of 120 is used if the carrying capacity of the piping has not been appreciably affected by tuberculation or other obstructing material

* Water volume is in U.S. Gallons.

SUBSECTION 2.3.3. SALVAGE SHOPS AND SALVAGE YARDS INCLUDING AUTOMOBILE WRECKING YARDS

Scope

2.3.3.1. This subsection provides for the prevention and spread of fire in salvage shops and salvage yards including automobile wrecking yards.

Maintenance

2.3.3.2. The owner or occupier of a salvage shop or salvage yard or automobile wrecking yard shall not display goods or material outside the shop or yard.

Piling of salvage material

2.3.3.3.(1) Different types of salvage material shall be separated and stored in separate piles.

NOTE: Tanks or drums should be stored in separate piles separated from other salvage materials to prevent explosions should a fire occur in the salvage piles.

(2) Piles which include combustible salvage material shall be limited in height to 10 ft and in no instance shall such a pile be greater than 1000 sq.ft.

(3) Piles of salvage materials shall be separated by a clear space of 10 ft.

(4) Piles which include combustible salvage material shall not be piled within 10 ft. of the property line.

(5) The roof of a building located in a salvage yard shall not be used for storage purposes

2.3 3.4. Only fires used only for heating purposes or for operating machinery or equipment shall be lighted or allowed to burn in salvage yard except as specified in Article 2.1.4.11.

Starting fires on premises

2.3.3.5. The owner or occupier of a salvage shop or salvage yard or automobile wrecking yard shall cut down and remove grass and weeds between space separations required in Article 2.3.3.3.

Grass and Weeds

2.3.3.6. Every salvage yard premises shall be surrounded by a substantial fence not less than 8 ft. and not more than 10 ft. high (or as specified in the local zoning bylaw) which contains a gate in an opening having a width of at least 10 ft. to provide for fire department access.

Fencing

SUBSECTION 2.3.4. RETAIL AND WHOLESALE LUMBER STORAGE YARDS

Scope

2.3.4.1. This subsection provides for the prevention and spread of fires in lumber yards and woodworking plants by regulating outdoor storage, fire department access, waste burning, smoking, exhaust systems and fire protection installations.

Piling in open yards

2.3.4.2.(1) Lumber shall be piled in orderly and regular piles in conformance with Sentence (3) on solid ground and shall not be piled on refuse or sawdust-filled land unless such sawdust-filled land is prepared and covered with a layer of compacted earth to a minimum depth of 6 inches.

(2) Lumber piles shall be stable and in no case shall the height of a stickered pile exceed 20 ft.

NOTE: Stickered piles are piled with sticks between layers of boards to facilitate air drying.

(3) Lumber piles shall be arranged so that the maximum width of each individual group of piles shall not exceed 50 ft. and maximum length shall not exceed 150 ft.

(4) Stickered lumber piles shall not be located within 50 ft. of the property line or buildings wherein personnel are employed or goods warehoused.

(5) The height of bottom members supporting piles shall be adequate to permit cleaning operations under the piles, but in no case shall the height of such members be less than 6 inches.

Waste and weed control

2.3.4.3.(1) Sawdust, chips, and other waste material shall not be allowed to accumulate in piling areas.

Weeds

(2) Weeds shall be kept down by treating them with a weed-killer or by cutting and grubbing.

(3) Weeds shall be removed and disposed of off the premises.

Fire lanes

2.3.4.4.(1) Fire lanes shall surround each individual group of piles described in Sentence 2.3.4.2.(2)

(2) At least two fire lanes shall provide access to a lumber yard from separate streets where possible and such fire lanes shall be located so as to be as remote as possible from each other.

(3) Fire lanes shall conform to requirements in Subsection 2.1._. (Fire Dept. Access).

Vehicles

(4) The overnight parking of vehicles or stacking equipment in a fire lane shall not be permitted unless

(a) the fire lane exceeds 25 ft. in width,

(b) the vehicles or stacking equipment are parked on one side of the fire lane, and

(c) there is a minimum clear width of 15 ft. for passing the vehicles or stacking equipment.

Fencing

(5) Yards shall be enclosed by a fence not less than 8 ft. high.

(6) A gate opening having an unobstructed width of at least 10 ft. shall be provided for fire department access.

Burning waste

2.3.4.5.(1) Burning of shavings, sawdust, and refuse materials shall only be done under boilers, in furnaces, in incinerators or in refuse burners which are installed in accordance with Article 2.1.4.12.

(2) Where sawdust, shavings or other refuse materials are stored at an installation referred to in Sentence 2.3.4.5.(1), a storage bin of noncombustible construction shall be provided with a raised sill of sufficient height to contain the stored material.

(3) Stacks on the installations referred to in Sentence 2.3.4.5.(1) shall be provided with approved spark arrestors having openings not greater than 3/4 in. or some other means to eliminate emission of sparks

Power lines

2.3.4.6. Lumber shall not be stored beneath electrical power lines.

Heating Equipment

2.3.4.7. (1) Heating equipment shall conform with Subsection 2.1.8.

(2) Salamanders, braziers, or other open fires shall not be used.

Smoking

2.3.4.8. Smoking shall be prohibited in lumber yards except in conformance with Article 2.1.4.14.

Fire protection

2.3.4.9. (1) Where there is a fire department which will respond in case of fire, the fire department telephone number and the location of the nearest fire alarm boxes and telephones shall be posted conspicuously in working locations in the open yard and in each building.

(2) Water barrels of at least 45 gal. capacity with three approved pails attached, each of 10 qt. capacity, or approved portable extinguisher having a 2A rating shall be located throughout the passageways so that a travel distance of not more than 75 ft is needed from any part of the open yard to reach a barrel or extinguisher.

(3) Portable extinguishing equipment shall be provided in accordance with Subsection 4.__.__. in each building or shed located in a lumber yard.

(4) Where a municipal hydrant system exists, it shall be extended into the yard area so that all parts of the lumber yard can be reached by using not more than 200 ft of hose.

SUBSECTION 2.3.5. WOODWORKING PLANTS

Scope

2.3.5.1. This subsection applies to woodworking plants including sawmills and planing mills to provide for the safe handling of waste, control of sources of ignition, and first aid fire protection.

2.3.5.2. The outdoor storage of lumber shall be in accordance with Subsection 2.3.4.

Blower and exhaust systems

2.3.5.3. (1) Woodworking plants shall be equipped with blower and exhaust systems installed in accordance with NFPA Standard No. 91, Blower and Exhaust Systems 1972, to provide for the removal of wood waste.

(2) All machines which produce wood dust, particles or shavings shall be connected to the exhaust system referred to in Sentence (1).

(3) Woodworking exhaust systems shall be restricted to handling wood wastes.

(4) Any operation generating potential sources of ignition such as grinding wheels or handling of hazardous materials such as flammable vapours shall not be connected to woodworking exhaust systems which shall be restricted to handling wood wastes.

2.3.5.4. Loose shavings and sawdust shall be swept up at frequent intervals and deposited in non-combustible receptacles as described in Subsection 2.1.4. to keep the premises and machinery clean.

Appliances

2.3.5.5. Where electrically heated glue pots, soldering irons, or other heat producing appliances are in use they shall be provided with an indicating switch and a red pilot light.

Fire protection

2.3.5.6. An approved portable extinguisher of 2A rating or a small hose having an inside diameter of at least 1/2 in. coupled to a water line shall be provided within 25 ft. of any machine producing wood dust, particles or shavings.

SUBSECTION 2.3.6. OUTDOOR STORAGE OF FOREST PRODUCTS

Scope

2.3.6.1. The intent of this subsection is to minimize the fire hazard in yard storage areas containing lumber, timber, ties, poles, piles, posts and other similar forest products except woodchip storage covered in Subsection 2.3.7. and retail and wholesale lumber and storage yards covered in Subsection 2.3.4.

NOTE: Each individual property will have its own special conditions of yard use, stock handling methods and topography. For this reason, only conformity to basic fire protection principles are required herein. These requirements are intended to be applied with due consideration of all local factors involved and the approval of the authority having jurisdiction.

Fire alarm

2.3.6.2.(1) When a fire is discovered, no matter how small, the public fire department and plant fire brigade shall be notified at once.

(2) The telephone number of the fire department and the location of the nearest fire alarm box shall be posted conspicuously in several locations in the yard and buildings.

Basic Lumber Yard Protection

For large lumber operations

NOTE: In all lumber storage operations provision should be made for early fire detection and extinguishment. Such provision would require watchman and alarm service, fire brigade manpower and extinguishing equipment, and ready access by means of alleyways into all parts of the lumber storage area so that portable fire extinguishers and fire hose can be promptly brought to the site of the fire. Alleyways should be unobstructed, of sufficient width for hand or cart fire hose laying operations, and spaced relatively close together so that small fires can be effectively controlled.

2.3.6.3.(1) Where a watchman service is provided, it shall be maintained throughout the night and during all nonoperating periods.

(2) Watchmen shall be supervised by approved central station or watchman's time detector or portable watch clock.

Fire lanes

2.3.6.4. Fire lanes shall be provided as specified in Article 2.3.4.4.

Pile heights

2.3.6.5. Pile heights shall be limited to 20 ft. to permit effective operation of hose streams unless approved special extinguishing equipment such as portable turrets, deluge sets and monitor towers is installed.

Exposure protection

2.3.6.6. Yard storage areas shall be separated from mill operations and other structures to minimize fire exposure to the yard areas.

NOTE: Minimum separation should be by means of clear space permanently available for fire-fighting operations and the clear space width should be based upon the severity of exposure, which will vary with the area, height, occupancy, construction and protection of the exposing structure and the type of piling and height of adjacent lumber piles. Fire exposure between adjacent structures and nearby property constitutes one of the major fire protection problems of lumber yard operations.

Storage site

2.3.6.7.(1) The storage site shall be level, solid ground, paved or surfaced with material such as cinders, fine gravel or stone.

(2) Areas where the hazard of underground fire is present shall not be used.

(3) No piling shall be permitted on refuse or sawdust-filled land unless it is covered with a layer of compacted earch to a minimum depth of 6 inches.

Fire lanes

2.3.6.8.(1) Fire lanes conforming to the requirements of Subsection 2.1.7. shall be provided between individual groups of lumber piles.

(2) Fire lanes shall be so spaced that a maximum grid system of 50 ft by 150 ft is produced.

(3) Fire lanes shall provide access to a lumber yard directly from separate streets or roadways and such fire lanes shall be located so as to be as remote as possible from each other.

Treated lumber

2.3.6.9. Lumber and timber treated with combustible liquids shall be stored in separate piles located so that the distance between piles is five times the height of the adjacent pile but in no case less than 15 ft.

Vegetation exposure

2.3.6.10.(1) Forest, brush and grass fire exposure to the yard shall be minimized by providing adequate clear space which is carefully kept free of combustible vegetation so that

(a) the distance to exposed grass covered areas is 15 ft,

(b) the distance to exposed brush is 100 ft, and

(c) the distance to forested areas shall be as large as possible.

Open fires

2.3.6.11.(1) Heating equipment shall conform with Subsection 2.1.8.

(2) Salamanders, braziers, or other open fires shall not be used.

Spark arrester

2.3.6.12.(1) Shavings, sawdust and refuse materials shall be burned only under boilers, in furnaces, in incinerators or in refuse burners which are installed in accordance with Article 2.1.4.12.

(2) Sawdust or shavings or refuse materials shall be contained in a storage bin at an installation as specified in Sentence 2.3.4.5.(1).

(3) A storage bin of noncombustible construction shall be provided at a boiler or at other installations where sawdust or shavings are used as fuel.

(4) Stacks shall be provided with approved spark arresters having openings not greater than 3/4 in or some other means to eliminate the emission of sparks.

Smoking

2.3.6.13.(1) Smoking shall be prohibited except in approved locations.

(2) "No Smoking" signs shall be posted throughout all buildings and in the yard except in specific locations designated as safe for smoking and signs permitting smoking should be posted in those areas in conformance with Article 2.1.4.13.

(3) Smoking shall be specifically prohibited in and around railroad cars.

Fencing

2.3.6.14. Where storage areas are enclosed, gates having a clear width of at least 10 ft shall be located to permit entry of fire department apparatus

Fire Protection Equipment

Fire department protection

2.3.6.15.(1) Where there is a fire department which will respond in case of fire, the fire department telephone number and the location of the nearest fire alarm boxes and telephones shall be posted conspicuously in working locations in the open yard and in each building.

Portable extinguishers

(2) Water barrels of at least 45 gal. capacity with three approved pails attached, each of 10 qt. capacity, or approved portable extinguisher

having a 2A rating shall be located throughout the passageways so that a travel distance of not more than 75 ft is needed from any part of the open yard to reach a barrel or extinguisher.

(3) Portable extinguishing equipment shall be provided in accordance with Subsection 4.__.__. in each building or shed located in a lumber yard.

Hydrants

(4) Where a municipal hydrant system exists, it shall be extended into the yard area so that all parts of the lumber yard can be reached by using not more than 200 ft of hose.

Hydrants

2.3.6.16.(1) A yard fire hydrant system shall be provided capable of supplying four 250 gpm hose streams simultaneously for basic fire protection.

(2) Where large scale fire fighting operations are to be expected, larger water supplies with adequate mains acceptable to the authority having jurisdiction shall be provided.

(3) Hydrants shall be of an approved type with the same hose threads as used by the local fire department, and located, when possible, at fire lane intersections.

(4) Hydrants shall be spaced with sufficient 2-1/2 in hose attached to permit rapid hose lays to all parts of the piling areas at about 250 ft intervals so that any part of the yard can be reached with 200 ft of hose.

Water supply

NOTE: Powerful water supplies and large mains should be provided where public or private fire department response, with manpower and equipment that can use these supplies, is available. Large stream equipment such as portable turrets and deluge sets requires 750 to 1000 gpm for each appliance. Monitor towers may require supplies in excess of 1000 gpm for each unit. In large yards where the hazard is severe, many of these devices may be operated simultaneously.

Industrial trucks

2.3.6.17. The use, storage and maintenance of industrial trucks used in the yard and related buildings shall be in conformance with Subsection 2.3.12.

SUBSECTION 2.3.7. OUTDOOR STORAGE OF WOOD CHIPS

Scope

2.3.7.1.(1) The intent of this Subsection is to provide requirements for fire protection to minimize the fire hazard in yard storage areas containing wood chips for use in pulp and paper mills.

NOTE: Each individual property will have its own special conditions of yard use, chip handling methods and topography. For this reason, only conformity to basic fire protection principles are required herein.

Storage

(2) The storage site shall be level solid ground or paved with blacktop, concrete, or other hard surface material that can be thoroughly cleaned of all old refuse and chips before starting a new pile.

2.3.7.2.(1) Piles shall be constructed with an access walkway at least 6 ft. in width for fire fighting purposes to the top of the pile in order to reach any part of the pile with a hose stream.

(2) For piles exceeding 500 ft. in length, two or more walkways on opposite sides of the pile shall be provided.

Method of piling

2.3.7.3.(1) Piles shall not exceed 60 ft. in height, 300 ft. in width, and 500 ft. in length, unless temporary water pipes with hose connections are laid on the top surface of the pile.

(2) Piles in excess of 500 ft. in length shall be surrounded by fire lanes having at least 30 ft of clear space at the base of the piles.

NOTE: Any combustible structures near chip piles might pose a serious exposure hazard to the chip pile. For these reasons, it is recommended that a clear space be maintained between chip piles and exposing structures, yard equipment or stock, depending on the degree of exposures hazard Greater clearance is desirable when piles are high and side slopes are greater than 60 degrees.

2.3.7.4.(1) Portable fire extinguishers suitable for Class A fires shall be provided on all vehicles operating on the pile in addition to the normal Class B units for the vehicle.

(2) At least two Class A extinguishers, each with a 2-A rating, shall be provided in each hydrant house at the perimeter of the pile.

(3) Motor houses for pile operating equipment shall be provided with portable extinguishers in accordance with Subsection 4.__.__.

2.3.7.5. (1) A yard hydrant system connected to an approved water supply shall be provided.

Hydrants

(2) Hydrants shall be connected to a loop system and equipped with division valves

(3) Control valves shall be provided on each hydrant branch.

(4) Hydrants shall be of an approved type underline with the same hose threads as used by the local fire department equipped with independant hose gates or approved detachable hose valves.

(5) Hydrants shall be spaced at 300-ft. intervals.

(6) A hydrant house with hose and auxiliary equipment shall be provided to house the hydrant.

2.3.7.6 (1) There shall be at least 250 ft. of 1-1/2 inch hose with combination nozzle for each hydrant.

(2) There shall be 250 ft. of 2-1/2 inch hose with one 2-1/2 inch nozzle and one 2-1/2 by 1-1/2 in. wye connection provided at each hydrant.

Water supply

2.3.7.7.(1) A water supply capable of supplying water continuously at 1250 g.p.m. shall be provided for protection of single piles conforming to the recommendations of Sentence 2.3.7.3.(1).

(2) For multiple piles, or piles of larger area or height than described in Sentence 2.3.7.3.(1), at least 2500 g.p.m. continuous supply shall be provided.

Heavy caliber hose streams

NOTE: Where large amounts of combustible materials are located in yards, it is necessary to provide a ready means of delivering large quantities of water at effective pressures. This can best be accomplished by installing permanent monitor nozzles on the ground around the piles, and occasionally where necessary on special trestles or on roofs of buildings. Portable deluge sets for use with siamese hose lines are also valuable in many cases. The location of this apparatus, the size of piping supplying it, the arrangement of control valves and the necessary water supplies, all demand consideration in each individual case and the authority having jurisdiction should be consulted.

Weeds and debris

2.3.7.8.(1) The ground surface between piles shall be kept free of all combustible refuse, debris, and chips.

(2) Weeds, grass and similar vegetation shall be controlled throughout the entire yard by spraying with an approved weed killer or ground sterilizer or grubbed out.

(3) Dead weeds shall be removed from the yard

(4) Weed burners shall not be used

Smoking

2.3.7.9. Smoking shall be prohibited except in specified safe locations and "No Smoking" signs shall be posted throughout all buildings and in the yard and be in conformance with Article 2.1.4.13.

Security

2.3.7.10. Where storage areas are enclosed, gates at least 10 ft. in width shall be located to permit entry of fire department apparatus to the storage areas

2.3.7.11. Permanent lighting shall be installed to illuminate the entire yard area

2.3.7.12. A surveillance service shall be provided to monitor the yard and storage area when the yard is unoccupied

SUBSECTION 2.3.8. INDUSTRIAL OVENS FOR BAKING AND DRYING PROCESSES

Scope

2.3.8.1. This subsection applies to the location, design, construction and operation of industrial baking and drying ovens which are heated with oil or gas fuel or which during operation contain flammable vapours given off by the products being baked or dried.

Location

2.3.8.2. Ovens shall not be located in any storey of a building located below grade.

Construction

2.3.8.3. (1) Industrial ovens shall be constructed of noncombustible materials with interiors of smooth surfaces arranged to permit cleaning.

Roof and floors

(2) The roof and floor of ovens and heaters and associated ductwork shall have sufficient clearance or be insulated where necessary to prevent the temperature from exceeding 90°C (194°F) at combustible ceilings, floors, walls and roofing.

Explosion

(3) Explosion vents shall be provided for ovens where fuel or vapours hazards are present and shall have a venting ratio of 1 sq. ft. for each 15 cu. ft. oven volume.

(4) Explosion vents shall be designed in accordance with NFPA Standard No. 91, Standard for the Installation of Blower and Exhaust Systems for Dust, Stock and Vapour Removal or Conveying-1972.

(5) Openings or access doors equipped with approved explosion release hardware shall be acceptable in determining the venting ratio for explosion vents.

Ducts

(6) Ducts shall be of noncombustible construction and insulation where used shall be noncombustible.

(7) Exhaust ducts shall not discharge within 5 ft. of windows, or other air intake openings.

(8) Ducts or stacks shall not pass through fire walls.

Ventilation

Ovens

2.3.8.4. (1) Ovens in which flammable vapours may be present or through which products of combustion are circulated shall be ventilated in accordance with NFPA No. 86A, Standard for Ovens and Furnaces - 1971.

Interlocks

2.3.8.5.(1) In ovens where flammable vapours may be present, interlocks for ventilating fans, conveyors and heating systems shall be provided to ensure that

(a) safety shut-off valves shall close and ignition devices are de-activated;

(b) in continuous process ovens all ventilating fans are operating before conveyors are started and of any ventilating fan will automatically stop the conveyor.

Maintenance and Access

2.3.8.6.(1) Ovens and associated duct work shall be inspected, cleaned, and maintained at intervals sufficient to prevent the accumulation of combustible deposits.

(2) Hatches shall be provided to permit access for inspection, cleaning, and maintenance of ovens and associated ductwork.

(3) Fixed, noncombustible ladders, steps, or grab rails shall be provided to permit access to hatches.

Fire Protection

2.3.8.7.(1) Approved portable fire extinguishers shall be provided in accordance with Part 4.

(2) A standpipe and hose system installed in accordance with Part 4 and having shutoff/spray nozzles shall be provided so that all parts of an oven structure can be reached by a hose stream.

(3) Doors or other means of access shall be provided in ovens and associated duct work so that portable fire extinguishers or hose streams may be used in all parts of the equipment.

NOTE: Ovens containing or processing sufficient combustible materials to sustain a continuous burning fire may require to be equipped with automatic sprinklers or other fixed fire extinguishing systems as required by the authority having jurisdiction and shall include sprinklers in the exhaust ducts when necessary.

SUBSECTION 2.3.9. CLEANING AND DYEING PLANTS

Scope

2.3.9.1. (1) This subsection applies to cleaning and dyeing plants including self-service cleaning establishments where clothing or other fabrics are dry cleaned or dry dyed using combustible liquids.

(2) This subsection controls the use of flammable and combustible liquids, ventilating systems and the safe operation of appliances.

Approved solvents

2.3.9.2. Flammable liquids shall not be used in cleaning and dyeing plants for any purpose.

Self-service establishments

2.3.9.3. In self-service dry cleaning establishments solvents shall be of an approved non-flammable type.

2.3.9.4. Solvents used for cleaning and dry dyeing shall be an approved type when such solvents are combustible liquids.

Storage of solvents

2.3.9.5. Combustible liquids shall be stored and handled in accordance with Section 2.4.

Operating requirements

2.3.9.6. Where combustible liquids are used as cleaning solvents, clothing shall be thoroughly searched in the receiving room and all foreign materials, especially matches and metallic objects, removed.

2.3.9.7. Lint and refuse shall be removed from all traps in the cleaning and dry dyeing system after the close of the day's work and disposed of safely.

2.3 9.8.(1) Ventilation systems shall shut down automatically when manual fire alarm boxes or automatic fire detectors are operated.

(2) Where fire alarm systems are not installed, signs shall be posted to instruct employees to shut down the ventilation system in the event of fire.

Spotting operations

2.3.9.9. Spotting operations using combustible liquids shall not be permitted where self-service dry cleaning equipment is installed.

2.3.9.10. Combustible liquids used for spotting operations shall be used in quantities not exceeding a total of one gallon and be dispensed from approved plunger-type safety container.

Ventilation

2.3.9.11.(1) Where combustible liquids are used in a dry cleaning or dyeing process, ventilating equipment shall be provided to maintain an average solvent concentration of not more than 100 ppm within 10 ft. horizontally of a cleaning or dyeing unit and not more than 40 ppm elsewhere in the plant.

(2) Combustion air for gas or oil-fired equipment shall come though ducts from a source outside the building when such equipment is located in a cleaning or dyeing room.

(3) Appliances with open flames or with exposed electrical heating elements shall not be placed within 20 ft. of cleaning or dyeing equipment in which combustible liquids are used unless such appliances are located in a separate enclosed room or cabinet which is independently ventilated.

(4) The exhaust ventilation outlets shall be located not closer than 25 ft from any openings to buildings with other occupancies.

SUBSECTION 2.3.10. GARAGES AND SERVICE STATIONS

Scope

2.3.10.1. This subsection provides for the fire protection of service stations by regulating the storage and handling of flammable and combustible liquids, smoking and the provision of portable extinguishers.

Handling of gasoline and oil

2.3.10.2. Flammable and combustible liquids shall be stored and handled in accordance with Subsection 2.4.6.

2.3.10.3. Welding and cutting operations shall be carried out in accordance with Part 3.

Smoking

2.3.10.4. Smoking on service station premises shall be regulated according to Article 2.1.4.13.

Portable Extinguishers

2.3.10.5. Portable extinguishers shall be provided in accordance with Part 4.

SUBSECTION 2.3.11. BOWLING ALLEYS

Scope

2.3.11.1. This subsection provides for the regulation of hazards associated with alley resurfacing operations and for pin refinishing operations where the work is carried out in the building.

2.3.11.2. (1) The owner or occupier of a bowling alley shall notify the authority having jurisdiction when the alleys are to be resurfaced.

Alley resurfacing operations

(2) The resurfacing of bowling alleys shall not be carried on while the establishment is open for business.

(3) Prior to the application of flammable finishes and for one hour thereafter, all mechanical exhaust systems, electric motors, and other equipment in a bowling alley which might be a source of ignition shall be shut down and smoking and the use of open flames or lights is prohibited.

Pin refinishing

2.3.11.3. (1) Pin refinishing shall be carried out in a building provided for the purpose, or in a room at or above grade separated by walls and floor and ceiling assemblies having at least 1-hr fire resistance rating.

(2) No person shall smoke in a refinishing room.

Flammable liquids

2.3.11.4.(1) When more than 10 gallons of flammable or combustible liquid with a flash point below 140° F is to be kept in a bowling alley for purposes of refinishing the alleys, pin refinishing, or for any other purpose, they shall be stored as specified in Sentence 2.4 3.3.(3) of Section 2.4.

(2) A metal waste can(s) with a self-closing cover shall be provided for all waste rags and materials in contact with flammable finishes or solvents and the contents shall be removed daily and disposed of as directed by the authority having jurisdiction.

SUBSECTION 2.3.12. INDOOR GENERAL STORAGE

Scope

2.3.12.1. This subsection applies to the storage of commodities to a height of 21 ft or less which, with their packaging and storage aids, would classify as ordinary combustibles. It shall not apply to unpackaged bulk storage of grain, coal, or similar commodities, or special hazard commodities such as tires, plastics, roll paper, combustible fibres, flammable liquids or other commodities covered elsewhere in this Code.

Definition

2.3.12.2. Ordinary Combustibles means combustible solids or noncombustible solids with combustible packaging or storage aids.

Size of piles

2.3.12.3. (1) Heights of storage piles shall not exceed 21 ft and the clearance between the lowest structural member supporting floor-ceiling assemblies or roof-ceiling assemblies to the top of adjacent piles shall be maintained at 36 or more inches.

(2) Except as permitted in Sentence (3), the area of individual storage piles shall not exceed:

(a) 5000 sq ft in unsprinklered buildings,

(b) 10,000 sq ft in sprinklered buildings, or

(c) 10,000 sq ft outside of buildings.

(3) Where storage consists esentially of noncombustible materials, the areas of individual piles shall not exceed twice the areas in sentence (2).

Main aisles

(4) At least one main aisle shall be provided in storage buildings extending the length of the structure, having sufficient width to allow industrial trucks to manoeuvre and pass on another, but not less than one-half the height of the highest adjacent pile.

Separating aisles

(5) Separating aisles between the piles described in sentences (2) and (3) shall not be less than 8 ft.

Access aisles

(6) Access aisles at least 3 ft in width shall be provided from the main aisle to the sides of the building to provide ready access to exits to fire department access panels, and to fire protection equipment; including sprinkler control valves, fire hose stations, fire extinguishers, and fire alarm stations.

Wall clearance

(7) Wall clearance at least 2 ft in width shall be provided where commodities are stored which may swell or expand with the absorption of water

Fire stopping of palletized storage

(8) Palletized storage shall be so arranged that unobstructed horizontal channels formed by the top and bottom of pallets shall not exceed 50 ft.

Pallet and Dunnage Storage

Indoor storage

2.3.12.4.(1) Indoor storage of pallets and dunnage may be permitted where outdoor storage is not practicable if, in such cases, piles do not exceed 8 ft in height, 25 ft in width, and 2000 sq ft in area, with separating aisles of not less than 8 ft in width.

Location

(2) Pallets and dunnage not in use shall be stored outdoors, wherever possible, and so located as to avoid creating an exposure hazard to other property, except as permitted in sentence (1)

Outdoor storage

(3) Outdoor storage of pallets and dunnage shall be arranged to limit individual piles to an area of 2000 sq ft after which any additional piles shall be separated by a ten foot aisle to provide access for fire fighting.

(4) In storage buildings protected by approved automatic sprinkler systems, piles in excess of 8 ft may be permitted provided at least 3 ft of clearance is maintained between the sprinkler and the top of the piles.

Industrial Trucks

Approved types

2.3.12.5.(1) Industrial trucks, including fork lifts, tractors and motorized hand trucks shall be of an approved type.

Hazardous areas

(2) Industrial trucks shall not be permitted in hazardous areas unless specifically approved for use in such areas.

Storage of industrial trucks

(3) Fuel-fired industrial trucks shall be stored in detached garage buildings or in garage areas separated from the remainder of the storage building by means of construction having a fire resistance rating of not less than one hour.

Refueling liquid fuel

2.3.12.6.(1) Except as provided in sentence (2), industrial trucks shall not be refuelled inside warehouses or transit sheds, but at designated outside locations where fuel dispensing devices and procedures in conformance with Subsection 2.4.6. are provided.

Refueling propane

(2) Industrial trucks which are fuelled by replaceable propane containers in accordance with sentence ( ) may have the containers exchanged indoors at an approved location located at least

25 ft away from open flames or other ignition sources and open pits or underground entrances.

Exchange of cylinders

(3) Exchange of containers in conformance with sentence (2) shall be effected by:

(a) using an approved automatic quick-closing coupling (a type closing in both directions when uncoupled) in the fuel line, or

(b) closing the valve at the containers and allowing the engine to operate until the fuel in the system is consumed.

(4) Propane cylinders shall be stored in accordance with CSA 149.2-1969, Installation Code for Propane Burning Appliances and Equipment.

Battery Charging Installations

Battery operated trucks

2.3.12.7.(1) Multiple-panel battery-charging installations serving more than two trucks shall be located in a separate well ventilated area

(2) Single-panel charging installations serving one or two trucks shall be located so that ignitable material cannot be placed closer than 5 ft to the truck(s).

(3) In occupancies where combustible dusts and fibres are present in quantity, battery-charging equipment shall be located in a well-ventilated room arranged so that such materials cannot enter.

(4) Facilities shall be provided at battery charging installations for

(a) flushing and neutralizing spilled electrolyte, and

(b) protecting charging apparatus from damage by trucks.

(5) Where racks are used for support of batteries they shall be constructed, coated or covered with materials which will not generate sparks.

(6) Only trained and authorized personnel shall be permitted to change or charge batteries.

(7) Smoking shall be prohibited in the charging area and the requirements of Article 2.1.4.13. shall apply.

(8) Precautions shall be taken to prevent open flames, sparks, or electric arcs in battery charging areas.

(9) Tools and other metallic objects shall be kept away from the top of uncovered batteries.