Section 4.1. General

4.1.1. Scope

4.1.1.1. Application

1) Except as provided in Sentences (2) and (3), this Part applies to the storage, handling, use and processing of

a) *flammable liquids* and *combustible liquids* in *buildings*, structures and open areas, and

b) *dangerous goods* classified as flammable gases at *fuel-dispensing stations*.

(See Note A-4.1.1.1.(1).)

2) Areas in *process plants*, where conditions must be addressed by design and operational details specific to the hazard, need not conform to this Part, where alternative protection is provided in conformance with Article 1.2.1.1. of Division A. (See Note A-4.1.1.1.(2).)

3) This Part shall not apply to

a) the transportation of *flammable liquids* or *combustible liquids* under TC SOR/2008-34, "Transportation of Dangerous Goods Regulations (TDGR),"

b) *appliances* and their ancillary equipment within the scope of CSA B139, "Installation Code for Oil-Burning Equipment" (see Note A-4.1.1.1.(3)(b)),

c) the storage of *flammable liquids* or *combustible liquids* on farms for individual farm use and on isolated construction projects, or

d) the storage of aerosol products covered under Subsection 3.2.5.

4) In addition to the requirements in this Part, the storage, handling and use of *flammable liquids* and *combustible liquids* in laboratories shall be in conformance with Section 5.5.

5) Unless otherwise specified, this Section shall apply to all areas involved in the storage, handling or use of *flammable liquids* and *combustible liquids* covered in this Part.

4.1.2. Classification

4.1.2.1. Classification

(See Note A-4.1.2.1.)

1) For the purposes of this Part, *flammable liquids* and *combustible liquids* shall be classified in conformance with Sentences (2) and (3).

2) *Flammable liquids* shall be Class I liquids, and shall be subdivided into:

a) Class IA liquids, which shall include those having a *flash point* below 22.8°C and a boiling point below 37.8°C,

b) Class IB liquids, which shall include those having a *flash point* below 22.8°C and a boiling point at or above 37.8°C, and

c) Class IC liquids, which shall include those having a *flash point* at or above 22.8°C and below 37.8°C.

3) *Combustible liquids* shall be Class II or Class IIIA liquids, and shall be subdivided into:

a) Class II liquids, which shall include those having a *flash point* at or above 37.8°C and below 60°C, and

b) Class IIIA liquids, which shall include those having a *flash point* at or above 60°C and below 93.3°C (see Note A-4.1.2.1.(3)(b)).

4.1.2.2. Heated Liquids

1) When a liquid having a *flash point* at or above 37.8°C is being processed, stored, handled or used at a temperature at or above its *flash point*, it shall be treated as a Class I liquid.

4.1.2.3. Used Lubricating Oil

(See Note A-4.1.2.3.)

1) Except as provided in Sentence (2), used lubricating oil drained from motor vehicles shall be classified as a Class IIIA liquid.

2) When Class I or II liquids are added to the used oils described in Sentence (1), the resulting mixture shall be classified

a) through tests conforming to Subsection 4.1.3., or

b) in the absence of the tests referred to in Clause (a),

i) as a Class IC liquid if Class I liquids are added, or

ii) as a Class II liquid if only Class II liquids are added.

4.1.3. Flash Point

4.1.3.1. Determination of Flash Point

(See Note A-4.1.3.1.)

1) Except as provided in Sentences (3) and (4), the *flash point* of liquids having a kinematic viscosity less than 6 cSt at 37.8°C and a *flash point* below 93.3°C shall be determined in conformance with ASTM D 56, "Flash Point by Tag Closed Cup Tester."

2) Except as provided in Sentences (3) and (4), the *flash point* of liquids having a kinematic viscosity of 6 cSt or more at 37.8°C or a *flash point* of 93.3°C or higher shall be determined in conformance with ASTM D 93, "Flash Point by Pensky-Martens Closed Cup Tester."

3) ASTM D 3828, "Flash Point by Small Scale Closed Cup Tester," is permitted to be used for testing aviation turbine fuels within the scope of this procedure.

4) ASTM D 3278, "Flash Point of Liquids by Small Scale Closed-Cup Apparatus," is permitted to be used for paints, enamels, lacquers, varnishes and related products and their components having *flash points* between 0°C and 110°C, and having a kinematic viscosity less than 150 St at 25°C.

4.1.4. Electrical Installations

4.1.4.1. Hazardous Locations

1) Where *flammable liquids* or *combustible liquids* are present, electrical equipment shall conform to the British Columbia Electrical Safety Regulation requirements for hazardous locations. (See Notes A-4.1.4.1.(1) and A-5.1.2.1.(1).)

2) Where refrigerators are used to store Class I liquids, they shall be designed so that

a) electrical equipment located within the storage compartment, within the outer shell, on the door and on the door frame of the refrigerator is in conformance with the British Columbia Electrical Safety Regulation requirements for Class I, Zone 0 or 1 hazardous locations based on the frequency of occurrence and duration of an explosive gaseous atmosphere, and

b) electrical equipment mounted on the outside surface of the refrigerator is

i) in conformance with the British Columbia Electrical Safety Regulation requirements for Class I, Zone 2 hazardous locations, or

ii) located above the top of the storage compartment in an ordinary location and installed in conformance with the British Columbia Electrical Safety Regulation.

4.1.5. Fire Prevention and Protection

4.1.5.1. Additional Fire Protection Equipment

1) Fire protection equipment shall be provided where there are special hazards of operation, dispensing or storage.

4.1.5.2. Ignition Sources

1) Unless controlled in a manner that will not create a fire or explosion hazard, a device, operation or activity that produces open flames, sparks or heat shall not be permitted in an area described in Article 4.1.1.1. (See Note A-4.1.5.2.(1).)

4.1.5.3. Smoking

1) Except for designated safe smoking areas conforming to Subsection 2.4.2., smoking shall not be permitted in areas described in Article 4.1.1.1.

4.1.5.4. Removal of Combustibles

1) Areas described in Article 4.1.1.1. shall be kept clean and free of ground vegetation and accumulations of combustible materials not essential to operations.

2) Used rags and similar materials contaminated with *flammable liquids* or *combustible liquids* shall be stored in receptacles conforming to Article 2.4.1.3.

4.1.5.5. Emergency Planning

1) Except as provided in Sentence (2), emergency planning measures conforming to Section 2.8. shall be provided for all *buildings*, parts of *buildings* and open areas described in Article 4.1.1.1.

2) The fire safety plan required as part of the emergency planning measures in Sentence (1) shall be retained on site for reference by the *authority having jurisdiction* and personnel.

4.1.5.6. Access for Firefighting

1) Required aisles and other access paths shall be maintained to permit the unobstructed movement of personnel and fire department apparatus so that firefighting operations can be carried out in any part of an area used for the storage, use or handling of *flammable liquids* or *combustible liquids*.

4.1.5.7. Hot Works

1) Hot works shall be performed in conformance with Section 5.2.

4.1.5.8. Basement Storage

(See Note A-4.1.5.8.)

1) Except as permitted in Sentence (2) and in *dwelling units* as described in Article 4.2.4.5., and in *mercantile occupancies* as described in Sentence 4.2.5.3.(3), Class I liquids shall not be stored, handled or used in *basements* or pits.

2) Up to 10 L of Class I liquid is permitted to be stored in *basements*, provided it is stored in safety containers conforming to ULC/ORD-C30, "Safety Containers."

4.1.6. Spill Control and Drainage Systems

4.1.6.1. Spill Control

1) Except as permitted in Sentence (3), a spill of *flammable liquids* or *combustible liquids* shall be prevented from flowing outside the spill area and from reaching waterways, sewer systems and potable water sources by

a) constructing a noncombustible barrier capable of containing the spill, or

b) grading the site or sloping the floor to divert the spill to a drainage system conforming to Article 4.1.6.2.

(See Note A-4.1.6.1.(1).)

2) When barriers required in Sentence (1) are provided to contain accidental spillage from aboveground *storage tanks*, they shall conform to the requirements for secondary containment in Subsection 4.3.7.

3) Water-miscible effluent from spills and firefighting operations is permitted to be directed into a sewer system provided it does not create a fire hazard or any risk to public health or safety.

4) The fire safety plan required by Article 4.1.5.5. shall include measures to be taken to direct the overflow of spilled liquids and firefighting water away from

a) *buildings*,

b) adjoining properties,

c) *means of egress*,

d) air intakes or openings that could permit vapour entry into the *building*,

e) fire alarm control panels,

f) fire department access routes,

g) valves controlling the water supply for firefighting, or fire protection systems,

h) fire department pumper connections or wall hydrants,

i) isolation valves controlling processes, and

j) valves controlling the flow of *flammable liquids* or *combustible liquids*.

4.1.6.2. Drainage Systems

1) A drainage system referred to in Clause 4.1.6.1.(1)(b) shall

a) terminate at a location where such spill will not create a fire hazard or any risk to public health or safety, and

b) direct the spill away from the areas identified in Sentence 4.1.6.1.(4).

2) Closed drainage systems shall be equipped with a trap. (See Note A-4.1.6.2.(2).)

4.1.6.3. Spills and Leaks

1) Maintenance and operating procedures shall be established to prevent the escape of *flammable liquids* or *combustible liquids* to areas where they could create a fire or explosion hazard.

2) Except as provided in Sentence (3), all reasonable steps shall be taken to recover escaped liquid and to remove or treat contaminated soil.

3) Spilled or leaked *flammable liquids* or *combustible liquids* shall be

a) flushed to a location where they will not create a fire or explosion hazard, or any risk to public health or safety, or

b) neutralized or absorbed and cleaned up with the aid of a product that is compatible and non-reactive with the liquid being cleaned up (see Note A-4.1.6.3.(3)(b)), and

i) deposited in a receptacle conforming to Article 2.4.1.3., or

ii) disposed of in a manner that does not create a fire or explosion hazard.

4.1.7. Ventilation

4.1.7.1. Rooms or Enclosed Spaces

1) Where *flammable liquids* and *combustible liquids* are processed, handled, stored, dispensed or used within rooms or enclosed spaces, ventilation shall conform to the applicable requirements of this Part and the British Columbia Building Code. (See Note A-4.1.7.1.(1).)

4.1.7.2. Ventilation Measures

1) Except as permitted in Sentence (2), a room or enclosed space referred to in Article 4.1.7.1. shall be provided with one of the following ventilation systems:

a) continuous mechanical ventilation where Class I liquids are processed, dispensed or used in a manner that releases flammable vapours into the room or enclosed space,

b) either natural or continuous mechanical ventilation where

i) Class I liquids are stored, processed, dispensed or used in a manner that does not release flammable vapours into the room or enclosed space, or

ii) Class II liquids are processed, dispensed or used.

2) Ventilation referred to in Clause (1)(b) need not be provided for the storage of Class I liquids if

a) storage consists of only *closed containers*, and

b) no dispensing operations are performed.

3) Ventilation required in Sentence (1) shall be sufficient to ensure that flammable vapour concentrations outside the zone identified as Class I, Zone 0 or 1 in conformance with Article 4.1.4.1., do not exceed 25% of the *lower explosive limit* of the flammable vapour. (See Note A-4.1.7.2.(3).)

4) A mechanical ventilation system is deemed to comply with Sentence (3) if it is capable of exhausting at least 18 $m^3/h/m^2$ of room area, but not less than 250 m^3/h.

5) Where continuous mechanical ventilation is installed in order to meet the conditions of Sentence (1), it shall

a) be provided with automatic interlocks so that the activity generating flammable vapours cannot be performed when the ventilation system is not in operation,

b) sound an audible alarm in an attended area upon shut-down of the ventilation system, and

c) conform to NFPA 91, "Exhaust Systems for Air Conveying of Vapors, Gases, Mists, and Noncombustible Particulate Solids."

4.1.7.3. Location of Air Inlets and Outlets

1) Ventilation air inlets and outlets within a room or enclosed space referred to in Article 4.1.7.1. shall be arranged so as to provide air movement in all portions of the room to prevent the accumulation of flammable vapours in conformance with Sentence 4.1.7.2.(3).

2) Inlets and outlets conforming to Sentence (3) or (4) shall be deemed to have met the requirements of Sentence (1).

3) Where the flammable vapour being removed is heavier than air,

a) at least one air inlet shall be located at a point near a wall, and no higher than 300 mm from the floor, and

b) at least one air outlet shall be located near the opposite wall, no higher than 300 mm from the floor.

4) Where the flammable vapour being removed is lighter than air,

a) at least one air inlet shall be located at a point near a wall, and no lower than 300 mm from the ceiling, and

b) at least one air outlet shall be located near the opposite wall, no lower than 300 mm from the ceiling.

4.1.7.4. Location of Mechanical Ventilation Exhaust Air Outlets

1) Except as provided in Article 4.1.7.6., the exhaust air outlet from a mechanical ventilation system required in Article 4.1.7.2. shall be

a) located outdoors, not less than 3 m from any *building* opening, and

b) arranged so that the exhaust air does not discharge toward any unprotected opening within 7.5 m of the discharge point.

4.1.7.5. Make-up Air

1) Make-up air for a natural or mechanical ventilation system shall be taken from a point remote from any exhaust air discharge described in Article 4.1.7.4.

2) Make-up air for a natural ventilation system shall be taken from a point outside the *building*.

3) Subject to the provisions in Clause 3.2.8.2.(1)(c), where make-up air for a mechanical ventilation system is taken from within the *building*, the opening into the room or enclosed space shall be provided with a *fire damper*.

4.1.7.6. Recirculating Ventilation Systems

1) Where a mechanical ventilation system is installed in conformance with Article 4.1.7.2., and where exhaust air is recirculated, a fail-safe vapour detection and alarm system shall be provided

a) to continuously monitor the flammable vapour concentration in the exhaust air, and

b) if the vapour concentration in Clause (a) exceeds 25% of the *lower explosive limit* of the vapour, to

i) sound an alarm in an attended area,

ii) stop the recirculation of air, and

iii) redirect the exhaust air to an outdoor location.

4.1.7.7. Exclusive Use of Ducts

1) Ducts used in a ventilation system conforming to Article 4.1.7.2. shall not be used for any other ventilation or exhaust system.

4.1.7.8. Maintenance

1) All components of the ventilation system shall be kept free of obstructions that may interfere with its operation.

4.1.8. Handling of Flammable and Combustible Liquids

4.1.8.1. Containers and Storage Tanks

1) Except as provided in Sentence 4.1.8.4.(1), *flammable liquids* and *combustible liquids* shall be kept in containers conforming to Subsection 4.2.3. or in *storage tanks* conforming to Subsection 4.3.1.

2) Containers and *storage tanks* for *flammable liquids* or *combustible liquids* shall be kept closed when not in use.

3) Containers and *storage tanks* shall not be filled beyond their safe filling level.

4.1.8.2. Control of Static Electric Charge

1) When Class I liquids are dispensed from or into a container or a *storage tank*,

a) all metallic or electrically conducting material in the transfer system shall be electrically bonded and grounded, or

b) if the container or tank is made of non-electrically conducting material, measures shall be taken to minimize the potential for static electric charge to develop (see Note A-4.1.8.2.(1)(b)).

2) Except as provided in Sentence (3), when Class I liquids are transferred into a *storage tank* through the top of the tank, the fill pipe shall terminate within 150 mm of the bottom of the tank.

3) Sentence (2) shall not apply when

a) the *storage tank* vapour space cannot exceed 25% of the *lower explosive limit* or is filled with an inert gas that prevents the ignition of the vapour mixture, or

b) the liquid being transferred has a minimum conductivity that prevents the accumulation of static electricity (see Note A-4.1.8.2.(3)(b)).

4) Fill pipes referred to in Sentence (2) shall be installed in such a way as to minimize vibration of the pipe.

4.1.8.3. Transfer

1) Class I liquids shall be drawn from or transferred into containers or *storage tanks* within a *building*

a) through a piping or transfer system conforming to Section 4.5.,

b) by means of a pump designed in conformance with good engineering practice on top of the container or *storage tank*, or

c) by gravity through a self-closing valve designed in conformance with good engineering practice.

(See Note A-4.1.8.3.(1).)

2) Except as provided in Subsection 4.5.9., the transfer of *flammable liquids* or *combustible liquids* by means of pressure applied to a container or *storage tank* shall not be permitted.

4.1.8.4. Fuel Tanks of Vehicles

1) It is permitted to use movable tanks for dispensing *flammable liquids* or *combustible liquids* into the fuel tanks of vehicles or other motorized equipment provided such movable tanks are used in conformance with the requirements of this Part for *storage tanks*.

2) Only enclosed pumping equipment designed in conformance with good engineering practice shall be used to transfer Class I liquids to or from the fuel tanks of vehicles inside *buildings*. (See Note A-4.1.8.3.(1).)