NATIONAL FIRE CODE OF CANADA 1975

Issued by the

Associate Committee on the National Fire Code
National Research Council of Canada
Ottawa

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RELATIONSHIP BETWEEN NATIONAL FIRE AND NATIONAL BUILDING CODES

When using this Code it is important to appreciate both the special relationship which exists between it and the National Building Code with respect to fire safety and the need to consider the contents of both Codes in building design, construction and maintenance. The role of each Code with respect to fire safety can be summarized as follows:

National Building Code (NBC)—establishes the standard of fire safety for the construction of new buildings, the reconstruction of buildings including extensions or alterations, buildings involving a change of occupancy and upgrading of buildings to remove an unacceptable fire hazard.*

National Fire Code (NFC)—establishes the standard for fire prevention, fire fighting and life safety in buildings in use,* including standards for the conduct of activities causing fire hazards, maintenance of fire safety equipment and egress facilities, standards for portable extinguishers, limitations on building contents and the establishment of fire safety plans including the organization of supervisory staff for emergency purposes. In addition, the NFC establishes the standard for prevention, containment and fighting of fires originating outside buildings which may present a hazard to a community and sets standards for the transportation of flammable and combustible liquids.

The two Codes have been developed as complementary and coordinated documents in order to reduce to a minimum the possibility of conflict in their respective contents. In order to ensure their effective application, it is important that fire and building officials be fully conversant with the fire safety standards of both Codes. Such officials should be involved both in the review and approval of plans with respect to fire safety prior to granting a building permit and with inspection of buildings for fire safety purposes. This is the only way to ensure that all known hazards have been considered and that a satisfactory standard of fire safety has been achieved.

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*The extent of application of the NBC and the NFC to the upgrading of buildings to remove an unacceptable fire hazard should be based on the judgment of the authority having jurisdiction who must deal with each case on its merits.

PREFACE

The second edition of the National Fire Code of Canada has been changed in format and updated in content to provide a document that can be used by various levels of government to regulate matters of fire protection and fire prevention within their respective jurisdictions. Unlike the first edition, which was in the form of a model bylaw, this edition has been drafted as a set of technical standards providing minimum requirements for fire safety for adoption by whichever legislative body has the required authority.

The technical content of the Code is supported by a "Guide to Enforcement" which contains advice to the adopting authority in preparing the administrative requirements necessary for the enactment of the Code. It identifies various enforcement options and lists the relevant legislative considerations in adopting the document for legal use.

The National Fire Code is prepared under the direction of the Associate Committee on National Fire Codes which was appointed for this purpose by the National Research Council of Canada. This committee consists of approximately twenty members who are representative of all major fire prevention and fire protection interests in Canada, but who are appointed as individuals and not as direct representatives of any organization.

The Associate Committee is assisted in its work by the staff of the Division of Building Research of the National Research Council, who provide technical and secretarial support at the direction of the Associate Committee. The actual work of preparing the content of the document is delegated by the Associate Committee to special technical committees whose members share their experience in producing a document that is truly representative of good fire safety practice in Canada.

These Committees have attempted a more rational arrangement of the Code by regrouping into seven parts the various requirements for fire safety. **Part 1** now contains the definitions and stipulates how the Code applies. **Part 2** provides for the control of common fire hazards arising from smoking, open flames, storage and disposal of combustible materials, incinerators and fire in vertical shafts. It also contains general requirements applying to all buildings regarding the maintenance of fire separations, heating appliances and air-conditioning systems. In addition, this Part makes provision for the maintenance of fire department access and means of egress and the establishment of fire safety plans for fire emergency procedures. **Part 3** is concerned with property protection for industrial and commercial occupancies in which hazardous materials are stored or used. **Part 4** deals with requirements for the storage, handling and transporting of flammable and combustible liquids. **Part 5** contains requirements for the storage and handling of hazardous materials. **Part 6** is a new section on fire protection installations which includes the provision and maintenance of portable extinguishers and the inspection, testing and maintenance of fire alarm, standpipe, sprinkler and emergency power systems. **Part 7** covers the inspection, testing and maintenance of fire emergency systems in high rise buildings and is intended to complement the specific requirements provided in Part 3 of the National Building Code.

An important feature of the new Code is its close coordination with its companion document the National Building Code which is prepared under the direction of the Associate Committee on the National Building Code. To avoid duplication of requirements in the two Codes, and at the same time to provide for some flexibility in the application of requirements to existing buildings, the National Building Code requirements are called up by reference in the National Fire Code, and when applied to existing buildings to ensure a fire safe condition, are subject to the discretion of the authority having jurisdiction.

Both Associate Committees have agreed that the two Codes should not only be developed but should also be administered as complementary documents with both building and fire officials being involved in their enforcement. The statement on page vii, which has been included to encourage this approach, takes on a special significance in light of the current interest being shown by provincial governments in the documents as forming the basis for uniform standards for building safety within their respective jurisdictions.

The Associate Committee wishes to acknowledge the assistance provided by the many individuals who have contributed to the production of this edition and, in particular, to express its appreciation to the Canadian Standards Association, the Underwriters' Laboratories of Canada and the National Fire Protection Association International whose standards have served as a useful source of information to those responsible for preparing the contents of this Code.

Comments on the use of the Code and suggestions for its improvement are welcomed and should be sent to the Secretary, Associate Committee on the National Fire Codes, National Research Council of Canada, Ottawa, Ontario K1A 0R6.

Le Code national de prévention des incendies est disponible en français. On peut se le procurer en s'adressant au Sécretaire, Comité associé du Code national de prévention des incendies, Conseil national de recherches du Canada, Ottawa, Ontario K1A 0R6.

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GUIDE TO ENFORCEMENT

This edition of the National Fire Code is intended for use by lawmakers at various levels of government and, therefore, unlike the 1963 edition, is not in the form of a model municipal bylaw. Such a bylaw would be irrelevant for other legislative levels and might mislead municipalities into legislating on matters outside their jurisdiction.

Similarly, this Code no longer includes any model administration or enforcement provisions; instead, it identifies various enforcement options and lists the relevant legislative considerations for each option. This approach has been adopted for the following reasons:

1. powers of enforcement which are available to more senior levels of government are not generally available to municipalities,
2. municipalities vary even amongst themselves as to their powers of enforcement, and
3. in any event, the nature and extent of the enforcement powers to be employed by respective governments are not matters of technical standard, but are rather a policy issue for the appropriate government to decide, and accordingly there can be no "model."

ENFORCEMENT OPTIONS

There are four areas of concern in connection with the enforcement of prescribed fire safety standards: "inspection of premises," "approvals" (including licences and permits), "offences and penalties" and "remedial orders."

Senior levels of government have legislative powers to enact a wide variety of enforcement provisions within the above-mentioned areas of concern. Municipal governments, however, usually have somewhat narrower powers; accordingly, any municipality proposing to enact enforcement provisions should first obtain legal advice confirming that it has the requisite powers to do so. (This will not ordinarily be a problem in respect of "offences and penalties," since that is the usual mode of compelling compliance with a municipal bylaw.)

Authority Having Jurisdiction

The Code uses the phrase "authority having jurisdiction" with reference to the exercise of many enforcement functions and powers. A fire safety law should specifically identify the relevant authority or authorities having jurisdiction, either by substituting the appropriate officer's title for the phrase "authority having jurisdiction" wherever that phrase appears in the text, or by defining in one of the introductory provisions of the law the phrase "authority having jurisdiction" to mean the specific officer or officers who will be exercising such functions and powers.

Inspection of Premises

Fire safety laws usually include provision for the inspection of premises. The relevant issues in connection with inspection provisions are as follows:

1. whether all premises or only some may be entered upon by an inspector,
2. whether an inspector must have a warrant or a court order before entering upon premises without the consent of the owner or occupant,
3. for what purposes premises may be inspected,
4. at what times an inspector may inspect premises (for example, "at any time," or "at any reasonable time," or "during daylight hours"),
5. what persons, if any, may accompany the inspector,
6. whether the inspector should have power to conduct on the premises any tests relevant to the purpose of the inspection,

7. whether the inspector should have power to collect and take away for analysis anything relevant to the purpose of the inspection, and, if so, what obligation he may have with respect to the return thereof,
8. what obligation should be imposed upon persons such as the owner or the occupier of the premises to furnish information and assistance to the inspector, and
9. whether it should be an offence for any person to obstruct the inspector in the performance of his duties.

Approvals (including licences and permits)

The Code considers that some activities, materials, devices, processes, products or structures will require approval by an authority having jurisdiction. In some cases, it may be desirable that the approval process be formalized by providing for a licence or permit, in other cases, the approval may be less formal.

For those cases where the fire safety law will require an approval, the relevant considerations are

1. what formalities should be prescribed in connection with application for the approval,
2. what information or materials must accompany the application,
3. what criteria should be prescribed for approval in specific cases (for example, the minimum performance characteristics of an extinguisher, or the minimum length of apprenticeship required for a licencee to carry on a particular trade),
4. what conditions may be attached to the approval,
5. the circumstances, if any, in which an approval may be suspended or cancelled,
6. the rights of appeal, if any, in respect of a refusal, suspension or revocation of an approval, and
7. the legal consequences of not having an approval when so required by the fire safety law.

Parts 2 to 7 of this Code anticipate that approval in the form of a permit or licence will be required in the following circumstances:

— open fires that may constitute a hazard,
— the operation of service stations and bulk plants,
— the transportation of flammable and combustible liquids,
— fireworks displays, and
— the maintenance of fire alarm and detection systems.

Offences and Penalties

The most common kind of enforcement provision is the prescription of offences, with penalties upon conviction. The relevant issues in connection with "offence and penalty" provisions are as follows:

1. what conduct should be prescribed as an offence (usually, fire safety laws provide that any person who contravenes any provision of the law is guilty of an offence; in addition, where the fire safety law authorizes the making of remedial orders it will usually provide that any person who fails to comply with a lawful order is guilty of an offence),
2. whether the range of penalties should be uniform for all offences or should vary in severity, and
3. the nature and extent ot the penalty or penalties.

Remedial Orders

A possible enforcement option in respect of a contravention of the fire safety law is a provision authorizing persons to issue orders requiring premises to be closed or activities to cease, or even, in some cases, requiring that an act already done be undone. The relevant issues in connection with provisions for the making of remedial orders are

1. in what circumstances and by whom can a remedial order be made (it may be that the lawmaker will wish to draw a distinction between circumstances where an inspector may make an order and circumstances where an order can only be made by a court),
2. what can be ordered and in what circumstances,
3. in what circumstances, if any, an order shall take immediate effect,
4. except for those cases where an order is to take immediate effect, when the order should take effect,
5. what person may be required to comply with a remedial order,
6. the rights of appeal, if any, in respect of some or all remedial orders, and
7. the consequences of failure to comply with a remedial order.

PART 1

APPLICATION AND DEFINITIONS

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SECTION 1.1 APPLICATION

SUBSECTION 1.1.1. Unless otherwise specified the owner or his authorized agent shall be responsible for carrying out the provisions of this Code.

SECTION 1.2 DEFINITIONS OF WORDS AND PHRASES

SUBSECTION 1.2.1. Definitions of words and phrases that are not included in the list of definitions in this Part shall have the meanings which are commonly assigned to them in the context in which they are used in this Code, taking into account the specialized use of terms by the various trades and professions to which the terminology applies.

SUBSECTION 1.2.2. The words and terms used in this Code that are in italics have the following meanings:

Access to exit (see *exit, access to*).

Air-supported structure means a structure consisting of a pliable membrane which achieves and maintains its shape and support by internal air pressure.

Appliance means a device to convert fuel into energy, and includes all components, controls, wiring and piping required to be part of the device by the applicable standard referred to in this Code.

Approved means approved by the *authority having jurisdiction.*

Assembly occupancy means the *occupancy* or the use of a *building,* or part thereof, by a gathering of persons for civic, political, travel, religious, social, educational, recreational or like purposes, or for the consumption of food or drink.

Atmospheric storage tank means a *storage tank* designed to operate at pressures from atmospheric to 0.5 psig.

Authority having jurisdiction (Where this term is used in the Code, refer to the "Guide to Enforcement" on this subject.)

Boiler means an *appliance* intended to supply hot water or steam for space heating, processing or power purposes.

Breeching means a *flue pipe* or chamber for receiving *flue* gases from 1 or more *flue* connections and for discharging these gases through a single *flue* connection.

Building means any structure used or intended for supporting or sheltering any use or *occupancy.*

Building height (in *storeys*) means the number of *storeys* contained between the roof and the floor of the *first storey.*

Chemical plant means an *industrial occupancy,* other than a *refinery* or *distillery,* where *flammable* or *combustible liquids* are produced by chemical reactions or are used in chemical reactions.

Chimney means a primarily vertical shaft enclosing at least 1 *flue* for conducting *flue* gases to the outdoors.

Chimney liner means a conduit containing a *chimney flue* used as a lining of a masonry or concrete *chimney.*

Class A fire means a fire involving combustible materials such as wood, cloth and paper.

Class B fire means a fire involving a *flammable* or *combustible liquid,* fat or grease.

Class C fire means a fire involving energized electrical equipment.

Class D fire means a fire involving a combustible metal.

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

Closure means a device for shutting off an opening through a construction assembly, such as a door or a shutter, and includes all components such as hardware, closing devices, frames and anchors.

Combustible construction means that type of construction that does not meet the requirements for *noncombustible construction.*

Combustible dusts means dusts and particles ignitable and liable to explode, including those resulting from the handling or processing of grain, malt and the manufacturing of flour and feed.

Combustible fibres means finely divided combustible vegetable or animal fibres and thin sheets or flakes of such materials which in a loose, unbaled condition present a flash fire hazard, including cotton, wool, hemp, sisal, jute, kapok, paper and cloth.

Combustible liquid means any liquid having a *flash point* at or above 100°F and below 200°F.

Compressed gas means any contained mixture or material with either an absolute pressure exceeding 40 psi at 70°F or an absolute pressure exceeding 104 psi at 103°F or both, or any liquid having an absolute *vapour pressure* exceeding 40 psi at 100°F.

Corrosive liquid means a liquid which when contacting living tissue causes damage to the tissue, or when contacting organic matter and certain chemicals causes fire.

Distillery means an *industrial occupancy* where *flammable* or *combustible liquids* produced by fermentation are concentrated and where the concentrated products may be mixed, stored or packaged.

Drum means an *approved* container having a capacity of less than 50 gal. but more than 10 gal.

Dwelling unit means a room or suite of rooms operated as a housekeeping unit, used or intended to be used as a domicile by 1 or more persons and usually containing cooking, eating, living, sleeping and sanitary facilities.

Exit means that part of a *means of egress* that leads from the *floor area* it serves, including any doorway leading directly from a *floor area,* to a public thoroughfare or to an *approved* open space.

Exit, access to means that part of a *means of egress* within a *floor area* that provides access to an *exit* serving the *floor area.*

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

Fire damper means a *closure* which consists of a normally held open damper installed in an air distribution system or in a wall or floor assembly, and designed to close automatically in the event of a fire in order to maintain the integrity of the *fire separation.*

Fire-protection rating means the time in hours or fraction thereof that a *closure,* window assembly or glass block assembly will withstand the passage of flame when exposed to fire under specified conditions of test and performance criteria, or as otherwise prescribed in this Code.

Fire resistance means the property of a material or assembly to withstand fire or give protection from it; as applied to elements of *buildings,* it is characterized by the ability to confine a fire or to continue to perform a given structural function, or both.

Fire-resistance rating means the time in hours or fraction thereof that a material or assembly of materials will withstand the passage of flame and the transmission of heat when exposed to fire under specified conditions of test and performance criteria, or as determined by extension or interpretation of information derived therefrom as prescribed in this Code.

Fire separation means a construction assembly that acts as a barrier against the spread of fire and may not be required to have a *fire-resistance rating* or a *fire-protection rating.*

Fire stop means a draft-tight barrier within or between construction assemblies that acts to retard the passage of smoke and flame.

Fire stop flap means a device intended for use in horizontal assemblies required to have a *fire-resistance rating* and incorporating protective ceiling membranes, which operates to close off a duct opening through the membrane in the event of a fire.

Firewall means a type of *fire separation* of *noncombustible construction* which subdivides a *building* or separates adjoining *buildings* to resist the spread of fire and which has a *fire-resistance rating* as prescribed in this Code and has structural stability to remain intact under fire conditions for the required fire-rated time.

First storey (see *storey, first*).

Flame-spread rating means an index or classification indicating the extent of spread-of-flame on the surface of a material or an assembly of materials as determined in a standard fire test as prescribed in the National Building Code of Canada.

Flammable liquid means any liquid having a *flash point* below 100°F and having a *vapour pressure* not exceeding 40 psi (absolute) at 100°F.

Flash point means the minimum temperature at which a liquid within a container gives off vapour in sufficient concentration to form an ignitable mixture with air near the surface of the liquid.

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

Flue means an enclosed passageway for conveying *flue* gases.

Flue pipe means the pipe connecting the *flue collar* of an *appliance* to a *chimney.*

Furnace means a *space-heating appliance* using warm air as the heating medium and usually having provision for the attachment of ducts.

Grade (as applying to the determination of *building height*) means the average level of finished ground adjoining a *building* at all exterior walls, as determined by the *authority having jurisdiction* (see *storey, first*).

Hazardous location means a location which is or may become subject to conditions conducive to the rapid development of fire or explosion.

Heavy timber construction means that type of *combustible construction* in which a degree of fire safety is attained by placing limitations on the sizes of wood structural members and on thickness and composition of wood floors and roofs, by avoidance of concealed spaces under floors and roofs and by use of *approved* fastenings, construction details and adhesives for structural members.

High hazard industrial occupancy (see *industrial occupancy, high hazard*).

High occupant load means an *occupant load* where the number of persons in a room or *floor area* is such that the area of floor per person is not more than 12 sq ft.

Industrial occupancy means the *occupancy* or use of a *building* or part thereof for assembling, fabricating, manufacturing, processing, repairing or storing of goods and materials.

Industrial occupancy, high hazard (Group F, Division 1) means an *industrial occupancy* containing sufficient quantities of highly combustible and flammable or explosive materials which, because of their inherent characteristics, constitute a special fire hazard.

Institutional occupancy means the *occupancy* or use of a *building* or part thereof by persons harboured or detained to receive medical care or treatment, or by persons involuntarily detained.

Lower explosive limit means the minimum concentration of vapour in air at which the propagation of flame occurs on contact with a source of ignition.

Low pressure storage tank means a *storage tank* designed to operate at pressures from 0.5 psig to 15 psig.

Marine service station means a *service station* at which *flammable* or *combustible liquids* are put into the fuel tanks of watercraft.

Means of egress means a continuous path of travel provided by a doorway, hallway, corridor, exterior passageway, balcony, lobby, stair, ramp or other egress facility or combination thereof, for the escape of persons from any point in a *building, floor area,* room or contained open space to a public thoroughfare or other *approved* open space. (*Means of egress* includes *exits* and *access to exits.*)

Mercantile occupancy means the *occupancy* or use of a *building* or part thereof for the displaying or selling of retail goods, wares or merchandise.

Noncombustible construction means that type of construction in which a degree of fire safety is attained by the use of noncombustible materials for structural members and other *building* assemblies.

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

Occupancy, major means the principal *occupancy* for which a *building* or part thereof is used or intended to be used, and shall be deemed to include the subsidiary *occupancies* which are an integral part of the principal *occupancy.*

Occupant load means the number of persons for which a *building* or part thereof is designed.

Oxidizing material means a material, other than ordinary atmospheres, which by itself is not necessarily combustible, but which may, generally by yielding oxygen, cause or contribute to the combustion of another material.

Partition means an interior wall 1 *storey* or part-*storey* in height that is not loadbearing.

Portable container means an *approved* container that has a capacity of 10 gal. or less, but excludes a container which is integral with or permanently attached to any *appliance,* equipment or vehicle.

Prepackaged container means an *approved* container not intended for reuse.

Pressure vessel means a *storage tank* designed to operate at pressures greater than 15 psig.

Public corridor means a corridor that provides *access to exit* from individually rented rooms, suites of rooms or *dwelling units.*

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

Residential occupancy means the *occupancy* or use of a *building* or part thereof by persons for whom sleeping accommodation is provided but who are not harboured or detained to receive medical care or treatment or are not involuntarily detained.

Service station means any premises at which *flammable* or *combustible liquids* are put into the fuel tanks of vehicles and includes *marine service stations* and *self-service outlets.*

Self-service outlet means a *service station* where the public handles the dispensing apparatus.

Space heater means a *space-heating appliance* for heating the room or space within which it is located, without the use of ducts.

Space-heating appliance means an *appliance* intended for the supplying of heat to a room or space directly, such as a *space heater,* fireplace or unit heater, or to rooms or spaces of a *building* through a heating system such as a central *furnace* or *boiler.*

Spraying area means the area that is within 20 ft of any part of a *spray booth* and that is not separated therefrom by a vapour-tight separation.

Spray booth means a power-ventilated structure provided to enclose or accommodate a spraying operation so that spray vapour and residue can be controlled and exhausted.

Spray room means a separated area of a plant in which an entire finishing operation is housed.

Sprinklered (as applying to a *building* or part thereof) means that the *building* or part thereof is equipped with a system of automatic sprinklers.

Storage tank means a *closed container* installed in a fixed location and includes temporary arrangements on cradles or skids.

Storage tank, atmospheric (see *atmospheric storage tank*).

Storage tank, low pressure (see *low pressure storage tank*).

Storey means that portion of a *building* which is situated between the top of any floor and the top of the floor next above it, and if there is no floor above it, that portion between the top of such floor and the ceiling above it.

Storey, first means the *storey* with its floor closest to *grade* and having its ceiling more than 6 ft above *grade.*

Street means any highway, road, boulevard, square or other improved thoroughfare 30 ft or more in width, which has been dedicated or deeded for public use, and is accessible to fire department vehicles and equipment.

Supervisory staff means those occupants of a *building* who have some delegated responsibility for the fire safety of other occupants under the fire safety plan and may also refer to the local fire department where it assumes these responsibilities.

Tank vehicle means any vehicle, other than railroad tank cars and boats, with a cargo tank having a capacity of more than 100 gal. mounted or built as an integral part of the vehicle and used for the transportation of *flammable* or *combustible liquids* and including tank trucks, trailers and semi-trailers.

Tent means a shelter or structure the covering of which is made of pliable material.

Unstable liquid means a liquid, including *flammable* and *combustible liquids,* which is chemically reactive to the extent that it will vigorously react or decompose at or near normal temperature and pressure conditions or which is chemically unstable when subjected to impact.

Vapour pressure means the pressure exerted by a liquid as determined by ASTM D323-58 (1968), "Vapor Pressure of Petroleum Products (Reid Method)."

Vertical service space means a shaft oriented essentially vertically that is provided in a *building* to facilitate the installation of building services including mechanical, electrical and plumbing installations and facilities such as elevators, refuse chutes and linen chutes.

SECTION 1.3 ABBREVIATIONS

SUBSECTION 1.3.1. ABBREVIATIONS OF NAMES OF ASSOCIATIONS

1.3.1.1. The abbreviations in this Code for the names of associations shall have the meanings assigned to them in this Subsection. The addresses of such associations are shown in brackets following the name of each association.

ACNBC.....Associate Committee on the National Building Code (National Research Council of Canada, Ottawa, Ontario K1A 0R6)

ANSI .....American National Standards Institute (1430 Broadway, New York, New York 10018 U.S.A.)

API .....American Petroleum Institute (1801 K Street N.W., Washington, D.C. 20006 U.S.A.)

ASME.....American Society of Mechanical Engineers (345 East 47th Street, New York, New York 10017 U.S.A.)

ASTM.....American Society for Testing and Materials (1916 Race Street, Philadelphia, Pa. 19103 U.S.A.)

CGSB.....Canadian Government Specifications Board (c/o Department of Supply and Services, 88 Metcalfe Street, Ottawa, Ontario K1A 0S5)

CSA .....Canadian Standards Association (178 Rexdale Blvd., Rexdale, Ontario M9W 1R3)

NFPA.....National Fire Protection Association (470 Atlantic Avenue, Boston, Mass. 02210 U.S.A.)

ULC.....Underwriters' Laboratories of Canada (7 Crouse Road, Scarborough, Ontario M1R 3A9)

U.S. DOT.....United States Department of Transportation (400-7th Street S.W., Washington, D.C. 20590 U.S.A.)

SUBSECTION 1.3.2. ABBREVIATIONS OF WORDS AND PHRASES

1.3.2.1. The abbreviations of words and phrases in this Code shall have the meanings assigned to them in this Subsection.

cfm .....cubic foot (feet) per minute

cu ft .....cubic foot (feet)

deg. .....degree(s)

diam. .....diameter

°F.....degree(s) Fahrenheit

ft .....foot (feet)

ft/sec. .....foot (feet) per second

ft/min. .....foot (feet) per minute

gal. .....gallon(s)

gal./sq ft .....gallon(s) per square foot

gpm .....gallon(s) per minute

hr .....hour(s)

in. .....inch(es)

incl. .....inclusive
lb .....pound(s)
min. .....minute(s)
oz. .....ounce(s)
ppm .....parts per million
psf .....pound(s) per square foot
psi .....pound(s) per square inch
psig .....pound(s) per square inch gauge
qt .....quart(s)
sec. .....second(s)
sq ft .....square foot (feet)
sq in .....square inch(es)
SUS .....Saybolt Universal Second(s).

PART 2

BUILDING AND OCCUPANT FIRE SAFETY

TABLE OF CONTENTS

SECTION 2.1 GENERAL

SUBSECTION 2.1.1. APPLICATION

2.1.1.1.(1) Part 2 of this Code provides for the safety of the occupants in existing *buildings*, the elimination or control of fire hazards in and around *buildings*, the maintenance of certain life safety systems in *buildings* and for the establishing of a fire safety plan in those *occupancies* where necessary.

Evacuation of buildings

(2) When the occupants of a *building* or premises are endangered because of a hazardous condition, and the condition cannot be corrected within a reasonable period of time, the *authority having jurisdiction* may order the evacuation of the *building* or premises.

Deviations

2.1.1.2. Deviations from requirements shall be permitted where specific permission to do so is given elsewhere in this Part and provided the *authority having jurisdiction* is satisfied that the *building* as constructed provides an acceptable degree of life safety or, where necessary, alternative measures are taken to provide such safety.

SUBSECTION 2.1.2. CLASSIFICATION OF BUILDINGS OR PARTS OF BUILDINGS BY MAJOR OCCUPANCY

Classification of buildings or parts thereof

2.1.2.1. For the purpose of applying this Code, every *building* or part thereof shall be classified according to its *major occupancy* by the *authority having jurisdiction* in conformance with the National Building Code of Canada 1975.

Hazardous activities

2.1.2.2. Activities which create a hazard and which are not allowed for in the original design shall not be carried out in a *building* unless provisions are made to alleviate the hazard and permission is obtained from the *authority having jurisdiction* to carry out such activities.

Prohibited combinations of occupancies

2.1.2.3. No *major occupancy* of Group F, Division 1 shall be contained within a *building* with any *occupancy* classified as Group A, B or C.

SUBSECTION 2.1.3. CONSTRUCTION REQUIREMENTS FOR GROUP B AND GROUP F, DIVISION 1 BUILDINGS

2.1.3.1. *Buildings* containing a *major occupancy* classified as Group B, Division 1 and 2 or Group F, Division 1 shall be constructed in conformance with the requirements of the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

(The installation of an automatic sprinkler system may be considered as contributing to an acceptable degree of safety.)

SUBSECTION 2.1.4. FIRE SAFETY INSTALLATIONS

Fire protection systems

2.1.4.1. Fire protection systems, including fire alarms, standpipes and sprinklers shall be installed in *buildings* in conformance with the requirements of the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

Voice communication systems

2.1.4.2. An *approved* voice communication system or systems integrated with the general fire alarm system shall be provided in *buildings* in conformance with Subsection 3.2.6. of the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

SECTION 2.2 FIRE SEPARATIONS

SUBSECTION 2.2.1. MAJOR OCCUPANCIES

Separation of major occupancies

2.2.1.1. Where a *building* contains more than 1 *major occupancy,* those 2 or more *major occupancies* of different Groups or Divisions shall be separated from each other in conformance with the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

Damaged fire separations

2.2.1.2. Where *fire separations* between *major occupancies* are damaged in a manner so as to affect the integrity of their *fire-resistance rating,* such damaged *fire separations* shall be repaired.

SUBSECTION 2.2.2. ROOMS AND SPACES

Separation of high hazard industrial occupancies

2.2.2.1. Where rooms or spaces within a *building* contain a *high hazard industrial occupancy,* such *occupancy* shall be separated from the remainder of the *building* by *fire separations* in conformance with the requirements elsewhere in this Code and the National Building Code of Canada 1975.

Separation of rooms, corridors, shafts and other spaces

2.2.2.2. Rooms, corridors, shafts and other spaces shall be separated where practicable by *fire separations* conforming to the requirements in the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

Damaged fire separations

2.2.2.3. Where *fire separations* between rooms, corridors, shafts and other spaces are damaged so as to affect the integrity of their *fire-resistance rating,* such damaged *fire separations* shall be repaired.

SUBSECTION 2.2.3. CLOSURES

Closures in fire separations

2.2.3.1. Openings in *fire separations* shall be protected with *closures* in conformance with the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

Damaged closures

2.2.3.2. Where *closures* are damaged so as to affect the integrity of their *fire-resistance rating,* such damaged *closures* shall be repaired.

Replacement closures

2.2.3.3. Where *closures* in *fire separations* are replaced, the replacements shall be in conformance with the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

Protective guarding devices

2.2.3.4. Protective guarding devices shall be provided where necessary to prevent damage to the mechanical components of doors in *fire separations* and shall be so installed as not to interfere with the proper operation of the doors.

Maintenance of closures

2.2.3.5.(1) Defects that interfere with the operation of *closures* in *fire separations* shall be corrected, and such *closures* shall be maintained to ensure that they are operable at all times by

(a) keeping fusible links and other heat-actuated devices undamaged and free of paint and dirt,

(b) keeping guides, bearings and stay rolls clean and lubricated,

(c) inspecting door hardware and other ancillary components and making necessary adjustments or repairs to ensure proper closing and latching, and

(d) repairing or replacing inoperative parts of hold-open devices and automatic releasing devices.

2.2.3.6. *Closures* in *fire separations* shall not be blocked or wedged open.

2.2.3.7. Doors in *fire separations* shall be inspected at least monthly as specified in the fire safety plan prepared in conformance with Section 2.8 to ensure that they are properly maintained in accordance with Article 2.2.3.5. Inspection of doors in fire separations

2.2.3.8. Doors in *fire separations* shall be checked daily to ensure that they remain closed unless equipment is installed to close the door automatically.

2.2.3.9. Where practicable, metal clad doors incorporating wood cores and located in *fire separations* shall be inspected annually for dry rot.

2.2.3.10. *Fire dampers* and *fire stop flaps* shall be inspected annually in a sequence acceptable to the *authority having jurisdiction* to ensure that they will operate. Inspection of fire dampers and fire stop flaps

SECTION 2.3 INTERIOR FINISHING, FURNISHING AND DECORATIVE MATERIALS

SUBSECTION 2.3.1. GENERAL

2.3.1.1. The interior finish material that forms part of the interior surface of a floor, wall, *partition* or ceiling shall conform to the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

2.3.1.2. Movable *partitions* or screens, including acoustical screens, shall have a *flame-spread rating* equal to that required for the interior finish of the area in which they are located. Movable partitions and screens

SUBSECTION 2.3.2. FLAME SPREAD

2.3.2.1.(1) Drapes, curtains and other decorative textiles and films used in *buildings* shall meet the requirements for a high degree of flame resistance as described in Note 4 of CGSB 4-GP-2(1972), "Canadian Standard Textile Test Methods," Method 27.1, when such drapes, curtains and other decorative textiles are used in Flame resistance of materials

(a) any Group A or Group B *occupancy,*

(b) any lobby or *exit,* or

(c) any open *floor areas* in any Group D, E and F *occupancy* exceeding 5,000 sq ft, except when the *floor area* is divided into *fire compartments* not exceeding 5,000 sq ft in area and separated from the remainder of the *floor area* by *fire separations* having at least a 1-hr *fire-resistance rating.*

2.3.2.2. Flameproofing treatments shall be renewed as often as required to ensure that the material will pass the match flame test in NFPA 701-1975, "Standard Methods of Fire Tests for Flame Resistant Textiles and Films." Flameproofing treatments

SECTION 2.4 FIRE HAZARDS

SUBSECTION 2.4.1. COMBUSTIBLE MATERIALS

2.4.1.1. Combustible waste materials in *buildings* shall not be permitted to accumulate in quantities or locations which will constitute an undue fire hazard. Accumulation of combustible materials

2.4.1.2. Combustible materials shall not be permitted to accumulate in any part of an elevator shaft, ventilation shaft, stairway or fire escape.

Liquid spill absorption

2.4.1.3. Combustible materials shall not be used to absorb *flammable* or *combustible liquid* spills within *buildings.*

Precautions against spontaneous combustion

2.4.1.4. Greasy or oily rags or materials subject to spontaneous heating shall be deposited in a receptacle conforming to Article 2.4.1.9. or be removed from the premises.

Lint traps

2.4.1.5. Lint traps in laundry equipment shall be cleaned after each use of the equipment.

Waste materials in industrial occupancies

2.4.1.6. In a *building* of an *industrial occupancy* all combustible waste materials including shavings, excelsior, rubbish, sacks, bags, litter, hay, straw and waste paper shall be baled or stored in receptacles conforming to Article 2.4.1.9., except that in-process packaging materials are permitted where the *building* is *sprinklered.*

Storage of combustible waste

2.4.1.7. Where rooms are provided for the storage of combustible waste materials, such rooms shall conform to the National Building Code of Canada 1975.

Storage of ashes

2.4.1.8. All ashes shall be stored in receptacles conforming to Article 2.4.1.9., and combustible materials shall not be stored with ashes in the same container.

Receptacles for the storage of combustible materials

2.4.1.9. Receptacles required for the storage of combustible materials shall be constructed of noncombustible materials and have a close-fitting metal cover and, if the flooring material upon which it is placed is combustible, a flanged bottom or legs not less than 2 in. high.

2.4.1.10. Except as permitted in Article 2.4.1.9., noncombustible receptacles shall not be placed closer than 3 ft from combustible materials.

SUBSECTION 2.4.2. EXPOSURE TO COMBUSTIBLE MATERIALS

2.4.2.1. Combustible materials shall not be stored on a roof or adjacent to any *building* so as to create a fire hazard to the *building* or its occupants.

SUBSECTION 2.4.3. SMOKING

Smoking prohibited

2.4.3.1. Where conditions are such as to make smoking a fire or explosion hazard, smoking shall be permitted only in specifically *approved* smoking areas.

2.4.3.2. The areas where smoking is not permitted shall be identified by signs conforming to Article 2.4.3.3.

Signs

2.4.3.3. Signs prohibiting smoking shall have black lettering at least 2 in. high with a ½-in. stroke on a yellow background, except that symbols of at least 6 in. by 6 in. may be used in lieu of lettering.

SUBSECTION 2.4.4. OPEN FLAMES

Open flames prohibited

2.4.4.1. Open flames shall not be permitted in processions in *buildings* used for public assemblies in such quantities and in such a manner as to create a fire hazard and shall not be permitted in dining areas in Group B, Division 2 *occupancies.*

2.4.4.2. In Group B, Division 2 *occupancies,* flaming meals or drinks are not permitted, and in places of public assembly, meals or drinks shall be ignited only at the location of serving, except where otherwise *approved.*

Portable extinguishers for flaming meals and drinks

2.4.4.3. An *approved* portable extinguisher with a minimum rating of 2BC as described in Part 6 shall be available in the immediate area where flaming meals and drinks are being served.

2.4.4.4. Devices having open flames shall be securely supported in noncombustible holders and shall be located or protected so as to prevent accidental contact of the flame with combustible materials. Devices having open flames

SUBSECTION 2.4.5. USE OF HAZARDOUS MATERIALS

2.4.5.1. *Flammable liquids* shall not be used for cleaning purposes.

2.4.5.2. Flammable gases shall not be used to inflate balloons unless *approved.*

SECTION 2.5 FIRE DEPARTMENT ACCESS TO BUILDINGS

SUBSECTION 2.5.1. GENERAL

2.5.1.1. Fire department vehicles shall have direct access to at least 1 face of every *building* by means of a *street,* yard or private roadway in conformance with the requirements of the National Building Code of Canada 1975. Access above grade

2.5.1.2. Access panels or windows provided to facilitate access for fire fighting operations shall not be obstructed by vehicles, vegetation, signs or any form of construction. Maintaining access free of obstructions

2.5.1.3. *Streets,* yards and private roadways provided for fire department access shall be maintained so as to be ready for use at all times by fire department vehicles.

2.5.1.4. Vehicles shall not be parked to obstruct access by fire department vehicles and signs shall be posted prohibiting such parking. Vehicle parking

SECTION 2.6 SERVICE EQUIPMENT

SUBSECTION 2.6.1. HEATING, VENTILATING AND AIR-CONDITIONING

2.6.1.1. Heating, ventilating and air-conditioning *appliances* and equipment shall be installed in conformance with the ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2. Installation

2.6.1.2. Every defective *appliance* in a *building* shall be removed, repaired or replaced when such defective *appliance* creates a hazardous condition. Defective equipment

2.6.1.3. *Chimneys* and *chimney liners* that constitute a fire hazard shall be repaired or replaced.

2.6.1.4. Coal and wood bins shall be located at least 4 ft from the *appliance* served. Coal and wood bins

2.6.1.5. Hoods, filters and ducts subject to accumulations of combustible deposits shall be checked at least weekly and be cleaned where the accumulation of such deposits creates an undue fire hazard. Inspection and maintenance

2.6.1.6. Every *chimney, flue* and *flue pipe* shall be inspected and cleaned annually or as often as may be necessary to keep the *chimney* and *flue pipe* free from dangerous accumulations of combustible deposits.

2.6.1.7. Where *flue pipes* are removed, every *flue pipe* hole shall be closed with a tight-fitting noncombustible cover. Covers for flue pipe holes

2.6.1.8. *Chimneys, flue pipes* and *breechings* shall be maintained in a safe operating condition.

Disconnect switches

2.6.1.9. Except within *dwelling units*, disconnect switches for mechanical air-conditioning and ventilating systems shall be examined and tested at least annually to establish that the system can be shut down in an emergency.

Ventilation shafts

2.6.1.10. Ventilation shafts shall be used only for ventilating purposes.

Precautions during repairs or renovations

2.6.1.11. Work on ducts involving the use of heat producing devices for cutting, welding or soldering shall not be undertaken before the system has been shut down, the duct cleaned of any accumulations of combustible deposits and any combustible lining and covering material that could be ignited by such work has been removed.

2.6.1.12. Precautions shall be taken, where necessary, to ensure that there is no damage to fuel supply piping or equipment that would result in fuel leakage or a fire hazard during renovations or excavation.

Commercial cooking equipment

2.6.1.13. Commercial cooking equipment exhaust and fire protection systems shall be installed and maintained in conformance with NFPA 96-1973, "Installation of Equipment for the Removal of Smoke and Grease-Laden Vapors from Commercial Cooking Equipment," except as required by Sentence 3.5.3.1.(1) and Article 3.5.4.2. of the National Building Code of Canada 1975.

2.6.1.14. Instructions for manually operated fire extinguishing installations shall be posted conspicuously in the kitchen as part of the fire safety plan.

SUBSECTION 2.6.2. INCINERATORS

Indoor incinerators

2.6.2.1. The installation and alteration of indoor incinerators shall conform to the requirements of the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

Outdoor incinerators

2.6.2.2. The design, construction, installation, alteration and maintenance of outdoor incinerators shall conform to NFPA 82-1972, "Incinerators and Rubbish Handling," except that the *flue* venting an incinerator shall not also serve as the chute conveying waste material to the incinerator.

Spark arresters

2.6.2.3. Spark arresters installed in conformance with Articles 2.6.2.1. and 2.6.2.2. shall be inspected and cleaned at least annually or more frequently where accumulations of debris will adversely affect operations, and burnt-out arresters shall be repaired or replaced.

SECTION 2.7 SAFETY TO LIFE

SUBSECTION 2.7.1. MEANS OF EGRESS

Means of egress

2.7.1.1. *Means of egress* shall be provided in *buildings* in conformance with the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

Group D occupancies

2.7.1.2. All individual work areas in Group D *occupancies* shall be located adjacent to aisles described in Articles 2.7.1.3. and 2.7.1.4.

2.7.1.3. In *buildings* of Group D *occupancy* where 2 *exits* are required from *floor areas* which are not subdivided into rooms or suites of rooms served by corridors giving access to *exits*, at least 1 aisle with access to the 2 *exits* and having a minimum clear width of 44 in. shall be provided to serve the individual work areas where necessary.

2.7.1.4. Subsidiary aisles with a minimum clear width of 36 in. may branch off for a distance not exceeding 25 ft from the aisles described in Article 2.7.1.3.

2.7.1.5. The number of people permitted to enter a place of assembly shall not exceed the *occupant load* as posted in conformance with Article 2.7.1.6. Places of assembly

2.7.1.6. When the *occupant load* as determined in the National Building Code of Canada 1975 is more than 60 persons, it shall be posted in a conspicuous location near the main entrance to a place of assembly.

2.7.1.7. Nonfixed row seating provided in places of public assembly shall conform to the spacing requirements for fixed seating in the National Building Code of Canada 1975. Unfixed seating

2.7.1.8. Corridors used by the public and *exits,* including outside areas leading to an *approved* open space, shall be maintained free of obstructions. Obstructions

SUBSECTION 2.7.2. EXIT DOOR HARDWARE

2.7.2.1. Where required by the National Building Code of Canada 1975, *exit* doors shall be equipped with *approved* devices that will release to allow the door to swing wide open when a force of not more than 20 lb is applied. Fasteners on exit doors

2.7.2.2. Devices on any required *exit* door shall be such that the door may be readily opened from the inside without the use of keys, except that this requirement shall not apply to the doors of rooms where persons are under legal restraint.

SUBSECTION 2.7.3. EMERGENCY LIGHTING

2.7.3.1. Emergency lighting shall be provided in *buildings* in conformance with the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2. Emergency lighting

SECTION 2.8 EMERGENCY PLANNING

SUBSECTION 2.8.1. GENERAL

Introductory Note

(Adequately trained supervisory staff can be of great value in directing an orderly movement of people in the event of a fire and in carrying out appropriate fire control measures until the public fire department arrives. The supervisory staff referred to in this Section are assigned their responsibilities by the building owner, unless the public fire department is prepared to take on these responsibilities. It is not intended that supervisory staff should necessarily be in the building on a continuous basis, but that they should be available on notification of a fire emergency to fulfill their obligations as described in the fire safety plan.)

2.8.1.1. The requirements of this Section apply to every *building* containing a Group A or B *occupancy,* and to every *building* required by the National Building Code of Canada 1975 to have an *approved* fire alarm system. Application

2.8.1.2. *Supervisory staff* shall be instructed in the fire emergency procedures as described in the fire safety plan before they are given any responsibility for fire safety. Instructions in emergency procedures

2.8.1.3. Fire fighting procedures shall be prepared by the fire department in cooperation with the person in charge of the *building* for all *buildings* within the scope of Subsection 3.2.6. of the National Building Code of Canada 1975. Fire fighting procedures

SUBSECTION 2.8.2. FIRE SAFETY PLAN

2.8.2.1.(1) Where required by the *authority having jurisdiction,* a fire safety plan which includes the following measures shall be prepared in *buildings* regulated by Article 2.8.1.1.: Measures in a fire safety plan

(a) the emergency procedures to be used in case of fire including sounding the fire alarm, notifying the fire department, instructing occupants on procedures to be followed when the fire alarm sounds, evacuating endangered occupants and confining, controlling and extinguishing the fire,

(b) the appointment and organization of designated *supervisory staff* to carry out fire safety duties,

(c) the instruction of *supervisory staff* and other occupants so that they are aware of their responsibilities for fire safety,

(d) the holding of fire drills,

(e) the control of fire hazards in the *building*, and

(f) the maintenance of *building* facilities provided for the safety of occupants.

Institutional occupancies

2.8.2.2. In *institutional occupancies* there shall be at least 1 staff member on duty for every 15 patients.

Approval of fire safety plan

2.8.2.3. The fire safety plan shall be *approved* by the fire chief and kept in the *building* for fire department inspection and for reference by the *supervisory staff*.

High buildings

2.8.2.4.(1) In *buildings* within the scope of Subsection 3.2.6. of the National Building Code of Canada 1975, the fire safety plan shall, in addition to the requirements of Sentence 2.8.2.1.(1), include

(a) the instruction of *supervisory staff* on the use of the voice communication system,

(b) the procedures for use of elevators and for evacuation of non-ambulatory occupants,

(c) the action to be taken by *supervisory staff* in initiating any smoke control or other fire emergency systems installed in a *building* in the event of fire until the fire department arrives, and

(d) the procedures established to facilitate fire department access to the *building* and fire location within the *building*.

2.8.2.5. A record of the fire emergency systems installed in *buildings* within the scope of Subsection 3.2.6. of the National Building Code of Canada 1975 shall be maintained at the central alarm and control facility, and such records shall include instructions for the *supervisory staff* and fire department for the operation of the systems.

Posting of instructions

2.8.2.6. A copy of the fire emergency procedures and other duties for *supervisory staff* as laid down in the fire safety plan shall be given to all *supervisory staff*.

2.8.2.7. A minimum of 1 copy of the fire safety plan shall be prominently posted on each *floor area*.

2.8.2.8. In every hotel and motel bedroom, the fire safety rules for occupants shall be posted showing the locations of *exits* and the paths of travel to *exits*.

SUBSECTION 2.8.3. FIRE DRILLS

Procedures

2.8.3.1.(1) The procedure for conducting fire drills in *buildings* specified in Article 2.8.1.1. shall be determined by the fire department in consultation with the person in charge of the *building*, taking into consideration

(a) the *building occupancy* and its fire hazards,

(b) the safety features provided in the *building*,

(c) the desirable degree of participation of occupants other than *supervisory staff,*

(d) the number and degree of experience of participating *supervisory staff,* and

(e) the testing and operation of fire emergency systems installed in *buildings* within the scope of Subsection 3.2.6. of the National Building Code of Canada 1975.

Frequency

2.8.3.2.(1) Fire drills as described in Sentence 2.8.3.1.(1) shall be held at least once during each 12-month period for the *supervisory staff,* except that

(a) in day-care centres and in Group B, Division 2 *occupancies* such drills shall be held at least monthly,

(b) in schools attended by children, total evacuation fire drills shall be held at least 3 times in each of the fall and spring school terms, and

(c) in *buildings* within the scope of Subsection 3.2.6. of the National Building Code of Canada 1975, such drills shall be held at least every 2 months.

SECTION 2.9 TENTS AND AIR-SUPPORTED STRUCTURES

SUBSECTION 2.9.1. GENERAL

2.9.1.1. *Tents* and *air-supported structures* shall be in conformance with the National Building Code of Canada 1975.

SUBSECTION 2.9.2. MATERIALS

Tests

2.9.2.1. When required by the *authority having jurisdiction,* tests shall be carried out on samples of materials taken in the field in conformance with NFPA 701-1975, "Standard Methods of Fire Tests for Flame Resistant Textiles and Films."

SUBSECTION 2.9.3. FIRE HAZARDS AND CONTROL

Electrical equipment

2.9.3.1. The electrical system in a *tent* or *air-supported structure* shall be maintained and operated in a safe manner.

2.9.3.2. Portable electrical systems shall be inspected by the *authority having jurisdiction,* and defects shall be corrected before the *tent* or *air-supported structure* is occupied by the public.

2.9.3.3. The electrical system and equipment in a *tent* or *air-supported structure,* including electrical fuses and switches, shall be inaccessible to the public, and cables on the ground in areas traversed by the public shall be placed in trenches or protected by *approved* covers.

Combustible materials

2.9.3.4. Hay, straw, shavings or similar combustible materials other than that necessary for the daily feeding and care of animals shall not be permitted within a *tent* or *air-supported structure* used for an *assembly occupancy,* except that sawdust and shavings may be used if kept damp.

Smoking and open flames

2.9.3.5. Unless *approved,* smoking and open flame devices shall not be permitted in a *tent* or *air-supported structure* while it is occupied by the public.

Fire watch

2.9.3.6. A person shall be employed to watch for fires in *tents* and *air-supported structures* occupied by the public where the facilities are designed to accommodate more than 1,000 persons.

2.9.3.7. A person employed to watch for fires in accordance with Article 2.9.3.6. shall familiarize himself with all fire safety features, including the fire safety plan as provided in conformance with Section 2.8 and the condition of *exits,* and shall patrol the area to ensure that the *means of egress* are kept clear and that regulations are enforced.

Fire alarm and communication systems

2.9.3.8. Where *tents* and *air-supported structures* are designed to accommodate more than 1,000 persons, a fire alarm and emergency communication system acceptable to the *authority having jurisdiction* shall be provided.

Blower engines for air-supported structures

2.9.3.9. Internal-combustion engines used to power blowers required to be installed in conformance with the building regulations shall be operated and maintained in conformance with Section 6.7.

SECTION 2.10 DAY-CARE CENTRES

SUBSECTION 2.10.1. CONSTRUCTION

2.10.1.1. Day-care centres shall be constructed in conformance with the requirements of the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

SUBSECTION 2.10.2. SUPERVISION OF CHILDREN

Staff members

2.10.2.1. There shall be at least 1 staff member for each 10 children 2 years of age and older and, where children under the age of 2 years are cared for, there shall be at least 1 additional staff member for every 5 such children.

Handicapped children

2.10.2.2. Where handicapped children are cared for, sufficient staff shall be present during the period the children are in the centre to escort them to safety.

SUBSECTION 2.10.3. COMBUSTIBLE MATERIALS

2.10.3.1. Combustible materials such as artwork and teaching materials shall not exceed 20 per cent of the wall area.

Waste receptacles

2.10.3.2. Waste receptacles shall be made of noncombustible materials.

Flammable and combustible liquids

2.10.3.3. *Flammable* and *combustible liquids* shall be stored in conformance with Part 4 and in areas inaccessible to children.

SUBSECTION 2.10.4. FIRE PROTECTION MEASURES

Fire prevention inspections and reports

2.10.4.1. When required by the *authority having jurisdiction,* a member of the staff of day-care centres in which more than 10 children are cared for shall conduct monthly fire prevention inspections and complete an *approved* inspection report.

2.10.4.2. The latest completed fire prevention inspection report required in Article 2.10.4.1. shall be posted in a conspicuous place.

Portable extinguishers

2.10.4.3. Portable extinguishers shall be provided in conformance with Part 6 in all day-care centres.

SECTION 2.11 BOARDING AND LODGING HOUSES

SUBSECTION 2.11.1. GENERAL

2.11.1.1. *Buildings* altered or occupied for purposes of providing accommodation for boarders, lodgers or roomers shall conform to the requirements of the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted as described in Article 2.1.1.2.

SUBSECTION 2.11.2. FIRE PROTECTION MEASURES

2.11.2.1. At least 1 portable extinguisher having a 2A rating shall be installed in conformance with Part 6 on each *storey* of a *building* described in Article 2.11.1.1. Portable extinguishers

SECTION 2.12 HELICOPTER LANDING AREAS ON ROOFS

SUBSECTION 2.12.1. CONSTRUCTION

2.12.1.1. Helicopter landing areas on roofs shall be constructed in conformance with the regulations for Heliports established by Transport Canada.

SUBSECTION 2.12.2. FIRE SAFETY MEASURES

2.12.2.1. Areas or rooms communicating with the landing area shall be separated therefrom by a *fire separation* conforming to the National Building Code of Canada 1975. Adjacent rooms

2.12.2.2. Where a fire alarm system is installed, a manually operated fire alarm station shall be installed on the roof at each exit from a helicopter landing area. Emergency warning systems

2.12.2.3. Helicopter landing areas on roofs shall be provided with a telephone extension or an *approved* direct connection to the fire department headquarters.

2.12.2.4. Smoking shall not be permitted on helicopter landing areas on roofs, and signs conforming to Article 2.4.3.3. shall be placed at the *exits* from the rooftop and in the vicinity of the landing area. Smoking prohibited

2.12.2.5. Two persons knowledgeable in the use of fire fighting equipment shall be in attendance on the roof deck at each landing and departure. Attendants

2.12.2.6. Helicopter refueling, repair and maintenance operations shall not be carried out on helicopter landing areas on roofs, except when permitted by the *authority having jurisdiction* in an emergency situation. Emergency refueling, repair and maintenance

2.12.2.7. Where aviation fuel and oil separators are provided in the drainage system, such separators shall be inspected weekly and serviced when necessary to ensure proper operation. Inspection of separators

PART 3

PROPERTY PROTECTION FOR INDUSTRIAL AND COMMERCIAL OCCUPANCIES

TABLE OF CONTENTS

SECTION 3.1 GENERAL

SUBSECTION 3.1.1. Scope

3.1.1.1. This Part provides for property protection by requiring that certain fire-protection measures be applied in the case of specific *occupancies* where the use, storage and handling of hazardous materials or the stockpiling of combustible materials create a potentially serious fire hazard.

SECTION 3.2 WOOD PRODUCTS

SUBSECTION 3.2.1. WOODWORKING PLANTS

3.2.1.1. The outdoor storage of lumber shall conform to Subsection 3.2.2. — Lumber storage outdoors

3.2.1.2. Every machine that produces wood dust, particles or shavings shall be provided with a blower and exhaust system installed in conformance with NFPA 91-1972, "Blower and Exhaust Systems." — Exhaust systems

3.2.1.3. Operations that generate sparks or combustible vapours shall not be served by woodworking exhaust systems.

3.2.1.4. Loose shavings and sawdust shall be swept up at frequent intervals and deposited in receptacles described in Article 2.4.1.9. — Sawdust disposal

3.2.1.5. An *approved* portable extinguisher of 2A rating or a garden-type hose station installed in conformance with Part 6 shall be provided within 25 ft of any machine producing wood dust, particles or shavings. — Fire extinguishers

3.2.1.6. 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. — Indicator lights for appliances

3.2.1.7. Spray finishing operations using *flammable* or *combustible liquids* in woodworking plants shall conform to Part 5. — Flammable or combustible liquids

3.2.1.8. The storage and handling of *flammable* and *combustible liquids* shall conform to Part 4.

SUBSECTION 3.2.2. OUTDOOR STORAGE OF LUMBER AND FOREST PRODUCTS

Introductory Note

(As each individual property has its own special conditions of yard use, stock handling methods and topography, conformity to basic fire protection principles only is required. These requirements are intended to be applied by the authority having jurisdiction with due consideration of all local factors involved.)

3.2.2.1. Deviations from the requirements in this Subsection shall be permitted where the *authority having jurisdiction* is satisfied that the existing situation provides an acceptable degree of life safety, or where necessary, alternative measures are taken to provide such safety. — Deviations from requirements

3.2.2.2. Unless otherwise *approved,* the storage site for lumber ånd other forest products shall be level, solid ground, paved or surfaced with material such as cinders, gravel or crushed stone. — Surface of ground

(Soft storage beds may be used for logs where embedment of stones or cinders may cause damage to cutting knives.)

Surface under piling

3.2.2.3. Piling of forest products on refuse- or sawdust-filled land shall not be permitted except when the site is covered with a layer of compacted earth to a minimum depth of 6 in.

Clearance for yard storage areas

3.2.2.4. Yard storage areas for forest products shall be separated from mill operations and other structures to minimize fire exposure to the yard areas.

(Minimum separation should be by means of clear space permanently available for fire fighting operations. The width of this clear space 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.)

Clearance for stickered lumber piles

3.2.2.5. In retail and wholesale lumber storage yards, stickered lumber piles shall be located at least 50 ft from property lines or *buildings.*

(Large size timbers and flat-piled stock may be stored or piled on the perimeter of the yard to act as a barrier between stickered piles and adjoining properties or buildings.)

Clearance from vegetation

3.2.2.6. Storage yards shall be maintained free of combustible ground vegetation, including grass and weeds, for at least 15 ft from the stored material and at least 100 ft from brush and forested areas.

Wood waste disposal

3.2.2.7. Sawdust, chips and other waste material shall not be permitted to accumulate in piling areas in retail and wholesale lumber yards.

Separation of treated lumber piles

3.2.2.8. Lumber and timber treated with *combustible liquids* shall be stored in piles that are separated from other stored material so that the distance between piles is at least twice the height of the treated pile, but not less than 15 ft.

Storage beneath power lines

3.2.2.9. Stickered lumber piles shall not be stored beneath electrical power lines having voltages in excess of 750 volts or which supply power to fire emergency systems.

Pile heights

3.2.2.10. Pile heights for stickered lumber piles shall not exceed 20 ft.

3.2.2.11. Pile heights for randomly stacked or unranked piles shall not exceed 20 ft unless *approved* special extinguishing equipment, such as portable turrets, deluge sets and monitor towers, is installed.

Fire access

3.2.2.12. At least 2 fire department access routes comforming to Subsection 2.5.1. shall be provided to each lumber yard and located as remotely as possible from each other.

3.2.2.13. Where storage areas are fenced or otherwise enclosed, gates having a clear width of at least 10 ft shall be provided to permit entry of fire department vehicles.

3.2.2.14. Where practical, groups of lumber piles shall be arranged with a maximum width of 50 ft and a maximum length of 150 ft, with fire department access routes surrounding each group of piles.

3.2.2.15. The overnight parking of vehicles or stacking equipment in a fire department access route less than 25 ft in width shall not be permitted unless such parking is on one side only, and there is a minimum clear width of 15 ft for fire department vehicles.

Watchman rounds

3.2.2.16. Where watchman service is provided, rounds shall be made at least every 2 hr through the night and during all nonoperating periods, and the rounds shall be supervised by an *approved* central station, watchman's time detector or portable watch clock.

Burning of wood waste materials

3.2.2.17. Shavings, sawdust and refuse materials shall be burned only in *boilers* or *furnaces,* or in incinerators or refuse burners conforming to Subsection 2.6.2.

3.2.2.18. Except as required in Article 3.2.2.19., the refuse burners or incinerators required in Article 3.2.2.17. shall be located at least 50 ft from *buildings* or piles of logs or lumber.

3.2.2.19. The *authority having jurisdiction* may increase the clear space required in Article 3.2.2.18. on consideration of such factors as the size and design of the burner, the size and design of the spark arresting screen, the prevailing winds and the location and arrangement of yard storage.

3.2.2.20. A storage bin conforming to Article 2.4.1.9. shall be provided at each *boiler, furnace,* incinerator and refuse burner referred to in Article 3.2.2.17.

3.2.2.21. Salamanders, braziers or other open flames shall not be used in storage yards.

Smoking prohibited

3.2.2.22. Smoking shall be prohibited in lumber yards, except as permitted in Subsection 2.4.3.

Fire-alarm boxes and telephones

3.2.2.23. 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.*

Fire extinguishing provisions

3.2.2.24. Water barrels of at least 45-gal. capacity and 3 *approved* 10-qt pails or *approved* portable extinguishers having a 2A rating shall be provided, so that the maximum travel distance from any part of the yard to a barrel or extinguisher is 75 ft.

3.2.2.25. Portable extinguishers shall be provided in conformance with Part 6 in each *building* located in a lumber yard.

Hydrant systems and water supply

3.2.2.26. Except as required in Article 3.2.2.27., where a municipal hydrant system exists and is adjacent to the yard, the hydrant system 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.

3.2.2.27. Where the *authority having jurisdiction* is satisfied that adequate fire protection can be provided by municipal street hydrants and mobile pumping equipment, the requirements in Article 3.2.2.26. may be waived.

(Experience has shown that water supplies for a yard fire-hydrant system capable of supplying four 250 gpm hose streams simultaneously is sufficient to handle the demand created by a well equipped and manned fire department response. Hydrants with the same hose threads as the local fire department equipment, located at 250-ft intervals and equipped with 200 ft of 2½-in. hose assist fire fighters by permitting rapid hose lays to all parts of the piling areas. Large stream equipment such as portable turrets and deluge sets require 750 to 1,000 gpm for each unit. Monitor towers may require supplies in excess of 1,000 gpm for each unit. In large yards where the hazard is severe, many of these units may be operated simultaneously.)

SUBSECTION 3.2.3. OUTDOOR STORAGE OF WOOD CHIPS

Introductory Note

(As each individual property has its own special conditions of yard use, chip handling methods and topography, conformity to basic fire protection principles only is required. These requirements are intended to be applied by the authority having jurisdiction with due consideration of all local factors involved.)

Deviations from requirements

3.2.3.1. Deviations from the requirements in this Subsection shall be permitted where the *authority having jurisdiction* is satisfied that the existing situation provides an acceptable degree of life safety or, where necessary, alternative measures are taken to provide such safety.

Surface of ground

3.2.3.2. The storage site shall be level, solid ground or paved with asphalt, concrete or other hard surface material.

3.2.3.3. The ground surface between piles shall be kept free of all combustible material.

Vegetation removal

3.2.3.4. Weeds, grass and similar vegetation shall be removed from the yard.

(Buildings or other structures near chip piles may pose a serious hazard, so that spaces should be maintained between chip piles and exposing structures, yard equipment or stock, depending on the degree of exposure hazard. Greater clearance is desirable when piles are high and side slopes are greater than 60 deg.)

Pile dimensions

3.2.3.5. 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.

Fire access

3.2.3.6. Where storage areas are fenced or otherwise enclosed, gates at least 10 ft in width shall be provided to permit entry of fire department vehicles.

3.2.3.7. Access walkways at least 6 ft wide shall be provided to the top of piles so that hose streams may be directed on any part of the piles.

3.2.3.8. Piles exceeding 500 ft in length shall be provided with at least 2 access walkways on opposite sides of the pile and shall be surrounded by fire department access routes at least 30 ft wide.

Burning of Weeds

3.2.3.9. Portable open-flame weed burners shall not be used in chip storage yards.

Smoking prohibited

3.2.3.10. Smoking shall be prohibited in chip pile areas, except as permitted in Subsection 2.4.3.

Fire extinguishing provisions

3.2.3.11. Portable extinguishers for *Class A fires* shall be provided on all vehicles operating on chip piles in addition to the units for *Class B fires* normally required for the vehicles.

3.2.3.12. At least 2 portable extinguishers for *Class A fires* with 2A ratings shall be provided in hydrant houses installed at the perimeter of piles, and portable extinguishers in conformance with Part 6 shall be provided in all transfer houses.

3.2.3.13. At least two 2½-in. hose lines and a water supply capable of delivering water continuously at 500 gpm shall be provided for the protection of chip piles.

SECTION 3.3 WAREHOUSES

SUBSECTION 3.3.1. TIRE STORAGE WAREHOUSES

Application

3.3.1.1. This Subsection shall apply to *buildings* used primarily for the storage of tires in which the quantity of tires stored in 1 *fire compartment* exceeds 15,000 cu ft.

Tire pile dimensions

3.3.1.2. A single pile of tires in a tire storage warehouse shall occupy an area not greater than 5,000 sq ft with a maximum length of 100 ft.

3.3.1.3. The maximum piling height of tires shall not exceed the height used for the design of the fixed extinguishing system installed as required in Article 3.3.1.7., and this height shall be posted in conspicuous locations.

Pile clearances

3.3.1.4. A clearance of at least 36 in. shall be maintained between the tops of piles and sprinkler head deflectors.

3.3.1.5. Aisles between individual piles of tires shall be at least 8 ft wide, except that where individual piles do not exceed 2,500 sq ft, cross aisles may be 4 ft wide.

3.3.1.6. A clearance of at least 24 in. shall be maintained between piles of tires and columns and enclosing walls.

Warehouse fire extinguishing systems

3.3.1.7. A tire storage warehouse shall be classified as a Group F, Division 1 *occupancy* and, when the *floor area* exceeds 5,000 sq ft, shall be provided with an *approved* automatic fixed extinguishing system installed in conformance with NFPA 231D-1975, "Storage of Rubber Tires."

3.3.1.8. A standpipe and hose system shall be installed where required by and in conformance with the National Building Code of Canada 1975.

3.3.1.9. *Approved* portable extinguishers shall be provided in tire storage warehouses so that there is a dry chemical unit with a 20B rating for every 5,000 sq ft of *floor area.*

SUBSECTION 3.3.2. INDOOR GENERAL STORAGE

Application

3.3.2.1. This Subsection applies to the indoor general storage of combustible or noncombustible solids with combustible packaging or storage aids to a height of 21 ft, except that this Subsection does not apply to the storage of unpackaged grain, coal or similar commodities, or special hazard commodities covered elsewhere in this Code.

Storage pile dimensions

3.3.2.2.(1) The area of individual storage piles shall not exceed 5,000 sq ft in unsprinklered *buildings* and 10,000 sq ft in *sprinklered buildings.*

(2) Where storage consists essentially of noncombustible solids in combustible packages, the areas of individual piles shall not exceed twice the areas in Sentence (1).

3.3.2.3. Heights of storage piles shall not exceed 21 ft and the clearance between the lowest structural member or sprinkler head deflector and the top of piles shall be at least 36 in.

Fire access aisles

3.3.2.4. At least one main aisle having a width at least equal to ½ the height of the highest adjacent pile and extending the length of the structure shall be provided.

3.3.2.5. Aisles separating piles described in Article 3.3.2.2. shall be at least 8 ft wide.

3.3.2.6. Access aisles at least 3 ft wide shall be provided to the sides of the *building,* to *exits,* to fire department access panels and to fire protection equipment, including sprinkler control valves, fire hose stations, portable extinguishers and fire alarm stations.

Pile clearance at walls

3.3.2.7. Wall clearance of at least 2 ft shall be maintained where stored commodities may swell or expand with the absorption of water.

Palletized storage arrangements

3.3.2.8. Palletized storage shall be arranged so that unobstructed horizontal channels formed by the top and bottom of pallets shall not exceed 50 ft.

3.3.2.9. Except as permitted in Article 3.3.2.10., pallets and dunnage not in use shall be stored outdoors and be located so as to avoid an exposure hazard.

Pallet storage

3.3.2.10.(1) Indoor storage of pallets and dunnage may be permitted in unsprinklered areas provided piles do not exceed 8 ft in height, 25 ft in width and 2,000 sq ft in area, and provided separating aisles are at least 8 ft wide.

(2) Wood pallets shall not be stored indoors to a height greater than 8 ft except in areas *sprinklered* in conformance with Sentence (3).

(3) *Buildings* or compartments used for the storage of pallets shall be classified as Group F, Division 2 or 3 *occupancies,* depending on the amount of combustibles, and shall be *sprinklered* in conformance with the National Building Code of Canada 1975.

SECTION 3.4 INDUSTRIAL TRUCKS

SUBSECTION 3.4.1. GENERAL

3.4.1.1. Industrial trucks, including fork lifts, tractors and motorized hand trucks shall be permitted only in those areas for which they are *approved.*

SUBSECTION 3.4.2. FUEL-FIRED INDUSTRIAL TRUCKS

Truck storage

3.4.2.1. Fuel-fired industrial trucks shall be stored in detached *buildings* or in areas separated from the remainder of the storage *building* by a *fire separation* having a *fire-resistance rating* of at least 1 hr.

Fuelling of trucks

3.4.2.2. Except as provided in Article 3.4.2.3., industrial trucks shall be refuelled only at designated locations outside *buildings* in conformance with Part 4.

3.4.2.3. Industrial trucks which are fuelled by replaceable propane containers may have the containers exchanged indoors at an *approved* location at least 25 ft from all ignition sources, open pits and underground entrances.

3.4.2.4. Where replaceable propane containers are exchanged, an *approved* automatic quick-closing coupling shall be provided in the fuel line, or the valves at the containers shall be closed and the engine allowed to operate until the fuel in the system is consumed.

3.4.2.5. Propane cylinders shall be stored in conformance with CSA B149.2-1969, "Installation Code for Propane Burning Appliances and Equipment," and Supplement No. 2-1973.

SUBSECTION 3.4.3. BATTERY-POWERED INDUSTRIAL TRUCKS

Battery charging installations

3.4.3.1. Charging installations for battery-powered industrial trucks shall be located at least 5 ft from combustible materials, and battery-charging installations serving more than 2 trucks shall be located in well ventilated areas.

3.4.3.2. Battery-charging equipment shall not be located in *occupancies* where *combustible dusts* or *fibres* are present in hazardous quantities.

3.4.3.3. Facilities shall be provided at battery-charging installations for flushing and neutralizing spilled electrolyte and for protecting charging apparatus from mechanical damage.

Battery storage

3.4.3.4. Racks used for the support of batteries shall be constructed of or covered with materials which will not generate sparks.

Personnel restrictions

3.4.3.5. Only trained and authorized personnel shall be permitted to change or charge batteries.

Fire precautions

3.4.3.6. Precautions shall be taken to prevent open flames, sparks or electric arcs in battery-charging areas.

SECTION 3.5 SALVAGE SHOPS AND SALVAGE YARDS INCLUDING AUTOMOBILE WRECKING YARDS

SUBSECTION 3.5.1. GENERAL

3.5.1.1. The roof of a *building* located in a salvage yard shall not be used for storage purposes. Roof storage prohibited

3.5.1.2. Fires shall not be permitted in a salvage yard except when used for heating purposes or for operating machinery or equipment. Fires prohibited

3.5.1.3. Where storage areas are fenced or otherwise enclosed, gates having a clear width of at least 10 ft shall be provided to permit the entry of fire department vehicles. Fire access gates

SUBSECTION 3.5.2. PILING

3.5.2.1. Piles which include combustible salvage shall be at least 10 ft from property lines, and not more than 10 ft in height and 1,000 sq ft in area. Pile clearance and dimensions

3.5.2.2. Piles of salvage material shall be separated by a clear space of 10 ft, and this space shall be kept clear of all grass and weeds.

3.5.2.3. Tanks or *drums* shall be stored in piles separate from piles of other materials. Piles of tanks or drums

SECTION 3.6 CLEANING AND DYEING PLANTS

SUBSECTION 3.6.1. FLAMMABLE AND COMBUSTIBLE LIQUIDS

3.6.1.1. *Flammable liquids* shall not be used for any purpose in dry cleaning and dry dyeing plants. Flammable liquids prohibited

3.6.1.2. *Combustible liquid* solvents used in dry cleaning and dry dyeing plants shall be of an *approved* type. Use of combustible liquids

3.6.1.3. *Combustible liquids* shall be stored and handled in conformance with Part 4.

3.6.1.4. Where *combustible liquids* are used as cleaning solvents, all foreign materials shall be removed from the pockets and exterior of clothing in the receiving room.

3.6.1.5. *Combustible liquids* used as a local application to remove spots or stains shall not exceed 1 gal. and shall be dispensed from *approved* plunger-type safety cans, except that *combustible liquids* shall not be permitted where self-service dry cleaning equipment is installed.

SUBSECTION 3.6.2. VENTILATION

3.6.2.1. Where *combustible liquids* are used in a dry cleaning or dry 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. Maximum solvent concentrations in atmosphere

3.6.2.2. Ventilation systems shall shut down automatically when manual fire alarm boxes or automatic fire detectors are operated. Automatic shutdown of systems

Manual shutdown of systems

3.6.2.3. 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.

Ducts for combustion air

3.6.2.4. Combustion air for gas- or oil-fired equipment shall enter through ducts from a source outside the *building* when such equipment is located in a dry cleaning or dry dyeing room.

SUBSECTION 3.6.3. FIRE HAZARDS

Clearances of equipment from appliances

3.6.3.1. *Appliances* with open flames or with exposed electrical heating elements shall not be placed within 20 ft of dry cleaning or dry dyeing equipment in which *combustible liquids* are used unless such *appliances* are located in a separate enclosed room or cabinet which is independently ventilated.

Exhaust outlet location

3.6.3.2. The exhaust ventilation outlets shall be located at least 25 ft from any opening in a *building*.

Lint and refuse disposal

3.6.3.3. Lint and refuse shall be removed from all traps in the dry cleaning and dry dyeing system after each day's work and shall be disposed of safely.

SECTION 3.7 INDUSTRIAL OVENS FOR BAKING AND DRYING PROCESSES

SUBSECTION 3.7.1. APPLICATION

3.7.1.1. This Subsection applies to industrial baking and drying ovens which during operation contain flammable vapours given off by the products being baked or dried.

SUBSECTION 3.7.2. LOCATION

3.7.2.1. Ovens shall not be located in any *storey* of a *building* below *grade*.

SUBSECTION 3.7.3. CONSTRUCTION

Oven materials

3.7.3.1. Industrial ovens shall be constructed of noncombustible materials with smooth interior surfaces to permit cleaning.

Limiting temperature on combustible construction

3.7.3.2. 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 194°F at any combustible part of the *building* assembly.

Explosion vents

3.7.3.3.(1) Explosion vents having a venting ratio of 1 sq ft for each 15 cu ft of oven volume shall be provided for ovens where fuel or vapour hazards are present and shall be designed in conformance with NFPA 91-1972, "Installation of Blower and Exhaust Systems for Dust, Stock and Vapor Removal or Conveying."

(2) Openings or access doors equipped with *approved* explosion release hardware shall be accepted as explosion vents.

Duct and stack restrictions

3.7.3.4. Ducts, stacks and associated insulation in systems for the removal of flammable vapours shall be of noncombustible materials, shall not pass through *firewalls* and shall not discharge within 5 ft of windows or within 20 ft of other air intake openings.

SUBSECTION 3.7.4. VENTILATION

Oven ventilation

3.7.4.1. Ovens in which flammable vapours may be present or through which products of combustion are circulated shall be ventilated in accordance with NFPA 86A-1971, "Ovens and Furnaces."

3.7.4.2. In ovens where flammable vapours may be present, interlocks shall be provided to ensure that energy sources and ignition devices are de-activated when the ventilating fans stop or the excess temperature controls are activated. Fan interlocks

3.7.4.3. In continuous process ovens where flammable vapours may be present, interlocks shall be provided to ensure that all ventilating fans are operating before conveyors can be started and that the stopping of ventilating fans or activation of the excess temperature controls will stop the conveyors.

SUBSECTION 3.7.5. MAINTENANCE

3.7.5.1.(1) Ovens and associated ductwork shall be inspected, cleaned and maintained at intervals sufficient to prevent the accumulation of combustible deposits. Cleaning of ovens and ductwork

(2) Access doors or panels shall be provided to permit inspection, cleaning and maintenance of ovens and associated ductwork.

(3) Fixed noncombustible ladders, steps or grab rails shall be provided to permit access to the doors or panels required in Sentence (2).

SUBSECTION 3.7.6. FIRE PROTECTION

3.7.6.1. *Approved* portable extinguishers shall be provided in conformance with Part 6. Fire extinguishers

3.7.6.2. A standpipe and hose system shall be installed in conformance with the National Building Code of Canada 1975 and equipped with shutoff spray nozzles so that all parts of an oven structure can be reached by a hose stream. Standpipe and hose systems

3.7.6.3. Doors or other means of access shall be provided in ovens and associated ductwork so that portable extinguishers or hose streams may be used in all parts of the equipment. Fire access doors

(Ovens containing or processing sufficient combustible materials to sustain a continuously burning fire may be required to be equipped with automatic sprinklers or other fixed fire extinguishing systems as determined by the authority having jurisdiction.)

SECTION 3.8 BOWLING ALLEYS

SUBSECTION 3.8.1. RESURFACING

3.8.1.1. The *authority having jurisdiction* shall be notified when bowling alleys are to be resurfaced. Notification

3.8.1.2. Bowling alleys shall not be open to the public during the resurfacing of alleys. Closure to public

3.8.1.3. All mechanical exhaust systems, electric motors and other equipment which might be a source of ignition shall be shut down, and smoking and the use of open flames or lights shall be prohibited during the application of flammable finishes and for at least 1 hr after such application.

SUBSECTION 3.8.2. PIN REFINISHING

3.8.2.1.(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, floor and ceiling assemblies having at least a 1-hr *fire-resistance rating*.

(2) Smoking shall not be permitted in a refinishing room.

SUBSECTION 3.8.3. FLAMMABLE AND COMBUSTIBLE LIQUIDS

3.8.3.1. When more than 10 gal. of *flammable* or *combustible liquid* with a *flash point* below 140°F is stored in a bowling alley, such storage shall conform to Part 4. Storage

Waste receptacles

3.8.3.2. A receptacle conforming to Article 2.4.1.9. shall be provided for all waste rags and materials used in operations involving flammable finishes or solvents, and the contents shall be removed daily and disposed of as directed by the *authority having jurisdiction*.

PART 4

FLAMMABLE AND COMBUSTIBLE LIQUIDS

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SECTION 4.1 GENERAL

SUBSECTION 4.1.1. SCOPE

4.1.1.1. This Part provides for the storage, handling and use of *flammable* and *combustible liquids* in connection with the operation of tank farms, bulk plants, *service stations,* industrial plants, *refineries, chemical plants, distilleries* and piers, wharves and airports that are not subject to overriding federal control.

SUBSECTION 4.1.2. APPLICATION

4.1.2.1.(1) This Part shall not apply to

(a) the transportation of *flammable* and *combustible liquids* under the regulations of the Canadian Transport Commission,

(b) oil-burning *appliances* and equipment within the scope of CSA B139-1971, "Installation Code for Oil Burning Equipment,"

(c) liquefied petroleum gas-burning *appliances* and equipment within the scope of CSA B149.2-1969, "Installation Code for Propane Burning Appliances and Equipment," and Supplement No. 2-1973,

(d) the production, storage and handling of liquefied natural gas within the scope of CSA Z276-1972, "Production, Storage and Handling of Liquefied Natural Gas,"

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

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

(g) the storage, handling and use of *flammable* and *combustible liquids* that are solid at or above 100°F.

SUBSECTION 4.1.3. FLASH POINT

4.1.3.1.(1) Liquids having a viscosity less than 45 SUS at 100°F and a *flash point* below 200°F shall have their *flash points* determined in conformance with ASTM D56-70, "Flash Point by the Tag Closed Tester."

(2) Liquids having a viscosity of 45 SUS or more at 100°F or a *flash point* of 200°F or higher shall have their *flash points* determined in conformance with ASTM D93-73, "Flash Point by the Pensky-Martens Closed Tester."

SUBSECTION 4.1.4. ELECTRICAL EQUIPMENT

4.1.4.1. Electrical equipment in a location where *flammable* or *combustible liquids* are present shall conform to the appropriate requirements in CSA C22.1-1975, "Canadian Electrical Code, Part 1."

SUBSECTION 4.1.5. FIRE PREVENTION AND PROTECTION

4.1.5.1. Unless otherwise required in this Part, or as permitted by the *authority having jurisdiction,* all fire prevention and protection requirements for areas directly involved in the storage, handling and use of *flammable* and *combustible liquids* shall comply with this Subsection.

Portable extinguishers

4.1.5.2. *Approved* portable extinguishers shall be provided and maintained as required elsewhere in this Part and in Part 6.

Additional equipment

4.1.5.3. In addition to the extinguishers required in Article 4.1.5.2., fire protection equipment shall be provided as required by the *authority having jurisdiction* where there are special hazards of operation, dispensing or storage.

Open flames

4.1.5.4. Open flames and spark-producing devices shall not be used in a manner that will create a fire hazard in areas described in Article 4.1.5.1.

Smoking

4.1.5.5. Except in specifically *approved* smoking areas, smoking shall not be permitted in areas described in Article 4.1.5.1., and signs that conform to Article 2.4.3.3. shall be prominently posted in those areas.

Removal of combustibles

4.1.5.6.(1) Areas described in Article 4.1.5.1. shall be kept clean and free of ground vegetation and accumulations of combustible materials not essential to operations.

(2) Cleaning rags shall be stored in *approved* receptacles conforming to Article 2.4.1.9.

Liquid spills

4.1.5.7.(1) Maintenance and operating procedures shall be established and practised to prevent the escape of *flammable* and *combustible liquids* to areas where they would create a fire hazard.

(2) Spilled liquid shall be removed with the aid of an *approved* absorbent and disposed of in an *approved* manner or shall be flushed to a location conforming to Article 4.1.6.2.

Access paths

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

Welding and cutting

4.1.5.9. Welding and cutting operations shall conform to Part 5.

SUBSECTION 4.1.6. DRAINAGE AND WASTE DISPOSAL

4.1.6.1.(1) Except as permitted by the *authority having jurisdiction,* appropriate measures to prevent possible spills of *flammable* or *combustible liquids* from entering public sanitary and storm sewer systems and natural waterways shall be provided by grading the site or sloping the floor to divert the spill or by providing curbs or dikes of sufficient height to contain or divert the spill to a drainage system conforming to Article 4.1.6.2.

(2) When dikes are provided to contain accidental spillage in Sentence (1), such dikes shall conform to Subsection 4.3.8.

Drainage locations

4.1.6.2.(1) A drainage system designed to drain spills of *flammable* or *combustible liquids* shall terminate at a location which will not create a hazard to public health or safety by contaminating any potable water source, underground stream or waterway, or by entering any sanitary or storm sewer.

(2) Closed drainage systems shall be equipped with a trap.

SUBSECTION 4.1.7. VENTILATION

4.1.7.1. Ventilation shall be provided for hazardous areas and processes in conformance with the National Building Code of Canada 1975 and with the requirements of this Part.

(It is good practice to prevent the accumulation of vapour-air mixtures in concentrations over 1/5 of the lower explosive limit.)

SUBSECTION 4.1.8. HANDLING OF FLAMMABLE AND COMBUSTIBLE LIQUIDS

4.1.8.1. All *flammable* and *combustible liquids* shall be stored in *approved storage tanks* or containers.

4.1.8.2. Except in *service stations, flammable liquids* shall not be dispensed into metal containers unless the container is electrically connected to the fill stem, or the fill stem is bonded to the container during filling operations by means of a bonding wire. Grounding

4.1.8.3.(1) *Flammable liquids* shall be drawn from or transferred into containers or *storage tanks* within a *building* Transfer

(a) through a closed piping system,

(b) by means of an *approved* pump on the top of the container, or

(c) by gravity through an *approved* self-closing valve.

(2) The transfer of *flammable* or *combustible liquids* by means of non-inert gas pressure applied to a container or *storage tank* shall not be permitted.

SECTION 4.2 CONTAINER STORAGE OF FLAMMABLE AND COMBUSTIBLE LIQUIDS

SUBSECTION 4.2.1. APPLICATION

4.2.1.1.(1) This Section shall apply to the storage of *flammable* and *combustible liquids* in *drums, portable containers* and *prepackaged containers* not covered elsewhere in this Part, except that it shall not apply to the following:

(a) containers in *service stations,* bulk plants, *refineries, chemical plants* and *distilleries,*

(b) fuel tanks for motors or engines, and

(c) *prepackaged containers* of alcoholic beverages, foods and pharmaceutical products.

SUBSECTION 4.2.2. GENERAL

4.2.2.1. *Flammable* and *combustible liquids* shall not be stored in or adjacent to *exits,* elevators or principal routes that provide *access to exits.* Restricted storage

4.2.2.2. Upon discovery of a leak in a container of *flammable* or *combustible liquid,* the container shall be moved to an *approved* location and the spilled liquid shall be removed as described in Article 4.1.5.7. Leaking containers

4.2.2.3. An outside storage area for *flammable* or *combustible liquids* shall be fenced in an *approved* manner where necessary to prevent the entry of unauthorized personnel. Fencing

SUBSECTION 4.2.3. DRUMS, PORTABLE CONTAINERS AND PREPACKAGED CONTAINERS

4.2.3.1.(1) The storage, handling and use of less than 50 gal. of *flammable* or *combustible liquids* shall be permitted only in the following containers:

(a) metal *drums* and *prepackaged 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 CSA B252-1971, "Portable Metal Containers for Gasoline and other Petroleum Fuels," or CSA B144-1974, "Portable Plastic Containers for Petroleum Fuels," and

(c) safety cans conforming to ULC-C30-1974, "Metal Safety Containers."

Markings

4.2.3.2. Except as provided in Articles 4.2.3.1. and 4.2.3.3., all *drums* and *prepackaged containers* for *flammable* or *combustible liquids* shall be distinctly marked or labelled in easily legible type which is in contrast to any other printed matter on the label with a warning to indicate that the material in the container is flammable, that it should be kept away from heat, sparks and open flames and that it should be kept closed when not in use.

4.2.3.3. Markings referred to in Article 4.2.3.2. are not required when the *drum* or *prepackaged container* is labelled in conformance 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.

Glass and plastic containers

4.2.3.4. Except as permitted in Article 4.2.3.5., the storage, handling and use of *flammable* and *combustible liquids* in glass or plastic *prepackaged containers* shall be permitted only when reagents of electrolytic purity are required or when storage in metal containers would adversely affect their chemical purity or damage the container.

4.2.3.5. Unless otherwise *approved,* the storage and use of *flammable* and *combustible liquids* having a *flash point* less than 140°F in containers other than those in Clause 4.2.3.1.(1)(c) of more than 1-pint capacity in the case of *flammable liquids* and 1 gal. in the case of *combustible liquids* shall not be permitted within a *building.*

SUBSECTION 4.2.4. ASSEMBLY AND RESIDENTIAL OCCUPANCIES

Application

4.2.4.1. This Subsection shall apply to the storage and handling of *flammable* and *combustible liquids* in *buildings* classified as *assembly* or *residential occupancies,* except that it shall not apply to schools, universities and colleges covered in Subsection 4.2.6.

Quantities and storage areas

4.2.4.2.(1) Except as provided in Article 4.2.4.3., the storage of more than 10 gal. of liquid having a *flash point* at or above 140°F shall not be permitted in *buildings* described in Article 4.2.4.1.

(2) *Flammable* and *combustible liquids* permitted in Sentence (1) shall be stored in *portable containers* in a storage cabinet conforming to Subsection 4.2.10. or in a storage room conforming to Subsection 4.2.9. and having no openings that communicate directly with the public portions of the *building.*

(3) The storage cabinets and storage rooms in Sentence (2) shall not be located above the *first storey* unless otherwise permitted by the *authority having jurisdiction.*

(4) *Flammable* and *combustible liquids* permitted in Sentence (1) shall not be stored on balconies.

Dwelling units

4.2.4.3. No person shall store more than 1 gal. of *flammable liquid* in a *dwelling unit.*

SUBSECTION 4.2.5. MERCANTILE OCCUPANCIES

4.2.5.1. The storage of *flammable* and *combustible liquids* in mercantile areas accessible to the public shall be limited to quantities needed for display and merchandising purposes. Quantities and storage areas

4.2.5.2.(1) Except as provided in Sentences (2) and (3), *flammable* and *combustible liquids* shall be stored in a storage room conforming to Subsection 4.2.9.

(2) Up to 400 gal. of *flammable* and *combustible liquids* may be stored in areas other than those required in Sentence (1) provided such storage does not exceed

(a) 50 gal. of *flammable liquids,* and

(b) 200 gal. of *flammable* and *combustible liquids* with *flash points* below 140°F.

(3) Where *flammable* and *combustible liquids* are miscible in water, twice the quantities specified in Sentence (2) shall be permitted before a storage room is required.

4.2.5.3.(1) *Prepackaged containers* of *flammable* or *combustible liquids* having *flash points* less than 140°F shall not be stacked more than 3 ft high on floors or shelves. Stacking of containers

(2) Shelving in *mercantile occupancies* for the display of *flammable* or *combustible liquids* in Sentence (1) shall be designed so that displayed containers are not easily displaced. Shelving

SUBSECTION 4.2.6. BUSINESS AND PERSONAL SERVICES, EDUCATIONAL AND INSTITUTIONAL OCCUPANCIES

4.2.6.1. Except as required in Subsection 4.2.7., this Subsection shall apply to the storage and handling of *flammable* and *combustible liquids* in *business and personal services* and *institutional occupancies* and shall include nonresidential schools, universities and colleges. Application

4.2.6.2. The storage of *flammable* and *combustible liquids* in *buildings* described in Article 4.2.6.1. shall be limited to reasonable amounts of material essential for the operation of office equipment, maintenance, demonstration or experimental work, and such quantities and storage locations shall be subject to the approval of the *authority having jurisdiction.* Quantities

4.2.6.3. *Flammable* and *combustible liquids* in quantities in excess of those permitted in Article 4.2.6.2. shall be kept in *approved* closed metal containers and stored in an *approved* storage cabinet conforming to Subsection 4.2.10., or in an *approved* storage room conforming to Subsection 4.2.9. and having no openings communicating directly with the public portions of the *building.* Storage

SUBSECTION 4.2.7. LABORATORIES

4.2.7.1. This Subsection shall apply to all laboratories except those considered as *industrial occupancies* in Subsection 4.2.8. Application

4.2.7.2. Containers used for the storage of *flammable* or *combustible liquids* in laboratories shall not exceed a 1-gal. capacity and shall conform to Subsection 4.2.3. Quantities

4.2.7.3.(1) Except as provided in Sentence (2), *flammable* and *combustible liquids* kept in laboratories shall be stored in an *approved* storage cabinet conforming to Subsection 4.2.10. or in an *approved* storage room conforming to Subsection 4.2.9. Storage

(2) Not more than 10 gal. of *flammable liquids* and 50 gal. of *combustible liquids* shall be permitted in the open laboratory area.

SUBSECTION 4.2.8. INDUSTRIAL OCCUPANCIES

Warehouses

4.2.8.1.(1) *Buildings* used primarily for the storage of *flammable* or *combustible liquids* shall conform to the appropriate requirements in the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted where the *authority having jurisdiction* is satisfied that the *building* as constructed provides an acceptable degree of life safety or, where necessary, alternative measures are taken to provide such safety.

Table 4.2.8.A.
Forming Part of Article 4.2.8.2.

INDOOR STORAGE OF FLAMMABLE AND COMBUSTIBLE LIQUIDS IN CONTAINERS IN INDUSTRIAL OCCUPANCIES

Type of Liquid	Storage Level	Protected Storage[1]		Unprotected Storage[1]	
		Maximum Quantity per Pile, gal.	Maximum Height per Pile,[2] ft	Maximum Quantity per Pile, gal.	Maximum Height per Pile,[2] ft
Flammable with a *flash point* less than 73°F	*First storey*	2,250	3	540	3
	Floors other than *first storey*	(3)	(3)	(3)	(3)
Flammable with a *flash point* from 73°F to 100°F	*First storey*	4,500	6	1,125	6
	Floors other than *first storey*	(3)	(3)	(3)	(3)
Combustible with a *flash point* less than 140°F	*First storey*	13,500	6	3,375	6
	Floors above the *first storey*	2,250	6	540	3
	Basement or cellar	(3)	(3)	(3)	(3)
Combustible with a *flash point* at or above 140°F	*First storey* and floors above the *first storey*	45,000	15	11,250	12
	Basement or cellar	6,750	9	(4)	(4)
Column 1	2	3	4	5	6

Notes to Table 4.2.8.A.:

(1) Protected storage is protected by an *approved* automatic sprinkler system or equivalent fixed extinguishing system.

(2) Pile heights may be increased where *approved* in storage areas provided with an *approved* fixed extinguishing system.

(3) Storage not permitted in these locations.

(4) Subject to approval by the *authority having jurisdiction.*

(2) The storage areas for *flammable* and *combustible liquids* in *buildings* shall be classified as Group F, Division 1 *occupancies* and shall be separated from the remainder of the *building* in conformance with this Part and with Part 2. Storage areas in buildings

4.2.8.2.(1) The storage of *flammable* and *combustible liquids* in *industrial occupancies* described in Article 4.2.8.1. shall conform to Table 4.2.8.A. Storage in buildings

(2) Where containers for 2 or more liquids having different *flash points* are stored together in a single pile as described in Sentence (1), the maximum total quantity permitted in the pile shall be equal to that permitted for the liquid with the lowest *flash point.* Different liquids

(3) Not more than 2,000 gal. of *flammable liquids* shall be stored in an area described in Sentence (1) unprotected by sprinklers or other *approved* fixed extinguishing system. Unprotected storage

(4) Individual piles of containers for *flammable* and *combustible liquids* described in Sentence (1) shall be arranged so that each pile is separated from adjacent piles and from the walls of the *building* by aisles at least 4 ft wide and so as to provide a main aisle at least 8 ft wide running the length of the storage area and aisles at least 4 ft wide for access to doors, windows and to standpipe connections. Access

(5) Combustible materials shall not be stored in the same *fire compartment* with *flammable* or *combustible liquids* in *industrial occupancies* described in Sentence (1). Combustible materials

(6) The clearance between the top of piles described in Sentence (1) and the lowest structural member, sprinkler head deflector or other overhead fire protection system shall be at least 36 in. Overhead clearance

4.2.8.3.(1) Except as provided in Sentence (2), the storage of containers of *flammable* and *combustible liquids* not regulated by Article 4.2.8.2. shall be located Storage rooms and cabinets

(a) in *approved* storage rooms conforming to Subsection 4.2.9., or

(b) in *approved* storage cabinets conforming to Subsection 4.2.10.

(2) Containers in Sentence (1) need not be located in storage rooms or cabinets provided that the total quantity in any 1 room does not exceed Incidental storage

(a) 20 gal. of *flammable liquids* with a *flash point* below 73°F,

(b) 100 gal. of *flammable* and *combustible liquids* with a *flash point* between 73°F and 140°F, and

(c) 500 gal. of *combustible liquids* with a *flash point* greater than 140°F.

4.2.8.4. At least 1 portable extinguisher having a rating of at least 10B shall be located not less than 10 ft and not more than 25 ft from any *flammable* or *combustible liquid* storage area described in Sentence 4.2.8.3.(2). Portable extinguishers

SUBSECTION 4.2.9. ROOMS FOR CONTAINER STORAGE

4.2.9.1.(1) Where *flammable* or *combustible liquids* are kept in rooms required in this Part, the maximum quantities of such liquids shall not exceed those given in Table 4.2.9.A. Quantities

4.2.9.2.(1) Storage rooms in Article 4.2.9.1. shall be liquid-tight where the walls join the floor. Leak protection

Table 4.2.9.A.
Forming Part of Article 4.2.9.1.

Maximum Total Quantity of Liquid, gal.	Minimum *Fire Separation* Around Storage Room, hr	Maximum Density,(1) gal./sq ft
4,000(2)	2(2)	8(2)
2,000	2	4
600(2)	1(2)	4(2)
300	1	2
Column 1	2	3

Notes to Table 4.2.9.A.:
(1) Averaged over total room area.
(2) Protected by an *approved* fixed extinguishing system.

(2) Storage rooms in Sentence (1) shall be designed to accommodate possible spills of *flammable* and *combustible liquids* in conformance with Subsection 4.1.6.

Ventilation systems

4.2.9.3.(1) Every storage room in Article 4.2.9.1. shall be ventilated in conformance with the requirements in this Subsection and with Subsection 4.1.7.

(2) Mechanical ventilation shall be used if *flammable liquids* are dispensed within storage rooms in Sentence (1).

4.2.9.4. Mechanical ventilation in storage rooms in Article 4.2.9.1. shall provide at least 1 cfm of exhaust air per square foot of room area, but not less than 150 cfm.

Exhaust discharge

4.2.9.5.(1) Exhaust air from a ventilation system in Article 4.2.9.3. shall be discharged outdoors and shall be taken from a point within 12 in. of the floor near a wall, with at least 1 makeup air inlet located near the opposite wall.

Makeup air

(2) Where makeup air for a mechanical ventilation system in Article 4.2.9.3. is taken from within the *building*, the duct opening shall be provided with an *approved fire damper.*

(3) Makeup air for a gravity ventilation system in Article 4.2.9.3. shall be supplied directly from outside the *building* remote from any discharge in Sentence (1).

Ducts

4.2.9.6. Ducts used to ventilate a *flammable* and *combustible liquids* storage room in Article 4.2.9.1. shall be used solely for that purpose and shall conform to the National Building Code of Canada 1975.

Aisles

4.2.9.7. Storage in *flammable* and *combustible liquids* storage rooms in Article 4.2.9.1. shall be arranged to provide aisle widths of at least 3 ft.

Dispensing

4.2.9.8. Dispensing of *flammable* or *combustible liquids* from *drums* shall be by an *approved* pump or through an *approved* self-closing faucet.

Portable extinguishers

4.2.9.9. At least 1 portable extinguisher of 10B rating shall be located not more than 10 ft outside the door opening to a storage room in Article 4.2.9.1.

SUBSECTION 4.2.10. CABINETS FOR CONTAINER STORAGE

Quantities

4.2.10.1. *Flammable* and *combustible liquids* stored in cabinets required in this Part shall be stored in *portable containers* in quantities not exceeding 50 gal. of *flammable liquids* and 100 gal. of *combustible liquids.*

4.2.10.2. Not more than 1 cabinet in Article 4.2.10.1. shall be located in a *fire compartment,* except that where *approved,* up to 3 cabinets may be stored in such compartment. Number of cabinets

4.2.10.3. Cabinets in Article 4.2.10.1. shall be labelled in conspicuous lettering to indicate that the cabinet contains flammable materials and that open flames must be kept away. Labelling

4.2.10.4. Except as permitted in Articles 4.2.10.5. and 4.2.10.6., storage cabinets in Article 4.2.10.1. shall be constructed to limit the internal temperature rise to not more than 250°F above ambient temperature when the entire cabinet is subjected to a temperature equal to that set forth in ULC-S101-1971, "Fire Tests of Building Construction and Materials," for a period of 10 min. Cabinet construction

4.2.10.5.(1) Where acceptable to the *authority having jurisdiction,* metal storage cabinets constructed in conformance with Sentences (2) and (3) may be used in lieu of those described in Article 4.2.10.4.

(2) The top, bottom, sides and door of metal cabinets shall be double walled with a 1½-in. air space and shall be constructed of sheet steel at least 0.0418 in. thick with all joints riveted or welded.

(3) Doors on metal cabinets shall be provided with locking devices which latch at 3 points and with sills at least 2 in. above the bottom of the cabinet.

4.2.10.6.(1) Where acceptable to the *authority having jurisdiction,* wood storage cabinets constructed in conformance with Sentences (2) to (6) may be used in lieu of those described in Article 4.2.10.4.

(2) The top, sides and bottom of wood cabinets shall be constructed of an *approved* grade of plywood at least 1 in. thick.

(3) All joints on wood cabinets shall be rabbeted and fastened in 2 directions with flathead wood screws.

(4) When more than one door is used on wood cabinets, there shall be a rabbeted overlap of at least 1 in.

(5) Hinges on wood cabinets shall be mounted so as to maintain their holding capacity due to loosening or burning-out of the screws.

(6) Doors on wooden cabinets shall be provided with latches that will keep them securely closed.

SUBSECTION 4.2.11. OUTDOOR CONTAINER STORAGE

4.2.11.1. Except as provided in Article 4.2.11.4., the quantity of *flammable* and *combustible liquids* stored in *drums, portable containers* and *prepackaged containers* in outdoor storage areas shall conform to Table 4.2.11.A. Quantities

4.2.11.2. Where containers for 2 or more liquids of different *flash points* are stored outdoors in a single pile, the maximum total quantity permitted in the pile shall be equal to that permitted for the liquid with the lowest *flash point.* Different liquids

Table 4.2.11.A.
Forming Part of Article 4.2.11.1.

OUTDOOR CONTAINER STORAGE			
Type of Liquid	Maximum Total Quantity per Pile, gal.	Minimum Distance Between Piles, ft	Minimum Distance to a Property Line or to a *Building* on the Same Property, ft
Flammable, with a *flash point* less than 73°F	1,000	5	20
Flammable, with a *flash point* from 73° to 100°F	3,500	5	20
Combustible, with a *flash point* less than 140°F	7,000	5	20
Combustible, with a *flash point* at or above 140°F	17,500	5	20
Column 1	2	3	4

Access lanes

4.2.11.3. A lane at least 10 ft wide shall be provided in outdoor storage areas to permit the approach of fire department vehicles to within 200 ft of each container.

Clearances

4.2.11.4. The clearances required in Article 4.2.11.1. do not apply where not more than 1,000 gal. of *flammable* or *combustible liquids* are stored adjacent to a *building* on the same property provided the *building* is 1 *storey* in *building height* and is used for the storage or handling of *flammable* or *combustible liquids* or the exposed wall has a *fire-resistance rating* of at least 2 hr and has no opening within 10 ft of such outdoor storage.

Spill protection

4.2.11.5. Outdoor storage areas for *flammable* or *combustible liquids* shall be designed to accommodate possible spillage in conformance with Subsection 4.1.6.

SECTION 4.3 TANK STORAGE OF FLAMMABLE AND COMBUSTIBLE LIQUIDS

SUBSECTION 4.3.1. DESIGN, CONSTRUCTION AND USE OF STORAGE TANKS

Application

4.3.1.1.(1) This Section applies to *storage tanks* for the storage of *flammable* and *combustible liquids.*

(2) Tanks for the storage of *flammable* or *combustible liquids* shall be built of steel, except as provided in Articles 4.3.1.2. and 4.3.1.3. Steel tanks

4.3.1.2. Where *approved,* aboveground *storage tanks* may be built of materials other than steel provided that Other than steel tanks

(a) they are used only for the storage of *combustible liquids* having a *flash point* at or above 200°F,

(b) they are not exposed to a potential spill of a *flammable* or *combustible liquid* having a *flash point* below 200°F, and

(c) they are designed in accordance with good engineering practice.

4.3.1.3.(1) *Atmospheric storage tanks* shall be built in conformance with the following: Atmospheric storage tanks

(a) ULC-S601-1973, "Standard for Shop Fabricated Steel Aboveground Tanks for Flammable and Combustible Liquids,"

(b) ULC-S603-1973, "Standard for Steel Underground Tanks for Flammable and Combustible Liquids,"

(c) ULC-S603.1-1973, "Standard for Protected Steel Underground Tanks for Flammable and Combustible Liquids,"

(d) ULC-58A-1973, "Guide for the Investigation of Reinforced Plastic Underground Tanks for Petroleum Products,"

(e) API-12A-1951, "Specifications for Oil Storage Tanks with Riveted Shells," Seventh Edition,

(f) API-650-1973, "Welded Steel Tanks for Oil Storage," Fifth Edition,

(g) API-12B-1958, "Specification for Bolted Production Tanks," Eleventh Edition and Supplement 1, April 1962,

(h) API-12D-1957, "Specification for Large Welded Production Tanks," Seventh Edition, or

(i) API-12F-1968, "Specification for Small Welded Production Tanks," Sixth Edition.

(2) Tanks built in conformance with the standards in Clauses (1)(g), (h) and (i) shall be used only for the storage of crude petroleum at oil fields. Crude oil tanks

4.3.1.4.(1) *Low pressure storage tanks* shall be constructed in conformance with Low pressure storage tanks

(a) API-620-1973, "Recommended Rules for the Design and Construction of Large, Welded, Low-Pressure Storage Tanks," Fifth Edition, or

(b) "Code for Unfired Pressure Vessels," Section VIII, Division 1 of the ASME Boiler and Pressure Vessels Code, 1971 Edition.

4.3.1.5. *Pressure vessels* shall be constructed in conformance with CSA B51-1972, "Code for the Construction and Inspection of Boilers and Pressure Vessels." Pressure vessels

4.3.1.6. *Atmospheric storage tanks* shall not be used for the storage of *flammable* or *combustible liquids* at temperatures at or above their boiling points. Use

4.3.1.7. *Low pressure storage tanks* and *pressure vessels* may be used as *atmospheric storage tanks.*

4.3.1.8. The normal operating pressure of a *low pressure storage tank* shall not exceed its design pressure.

Protective coating

4.3.1.9. The outside of every aboveground *storage tank* for *flammable* or *combustible liquids* which is fabricated of any ferrous substance shall be thoroughly coated with rust-resisting material compatible with the tank.

SUBSECTION 4.3.2. INSTALLATION OF OUTSIDE ABOVEGROUND STORAGE TANKS

Clearances from buildings and property lines

4.3.2.1.(1) Every aboveground *storage tank* for the storage of *flammable* or *combustible liquids* shall be located in conformance with Table 4.3.2.A. with respect to property lines and *buildings.*

Table 4.3.2.A.
Forming Part of Article 4.3.2.1.

LOCATION OF ABOVEGROUND STORAGE TANKS	
Maximum Tank Capacity, gal.	Minimum Distance from *Storage Tank* to Property Line or to a *Building* on the Same Property, ft
30,000	10(1)(2)
50,000	10
100,000	15
500,000	30
1,000,000	40
over 1,000,000	50
Column 1	2

Notes to Table 4.3.2.A.:
(1) The minimum distance may be reduced to 3 ft when the tank contains only *combustible liquids.*
(2) At bulk plant rail loading and unloading facilities, the minimum distance may be reduced to 5 ft when permitted by the *authority having jurisdiction.*

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

(3) *Storage tank* spacing not conforming to the requirements of this Section and requiring special engineering design shall be subject to the approval of the *authority having jurisdiction.*

Tank spacing

4.3.2.2.(1) Except as required in Sentences (2) and (3), the minimum distance between aboveground *storage tanks* shall be ½ the diameter of the smaller of every 2 adjacent tanks where any 1 of the tanks has a capacity exceeding 50,000 gal., but in no case shall the distance be less than 3 ft.

(2) The minimum distance between any 2 *storage tanks* neither of which has a capacity exceeding 50,000 gal. shall be 3 ft.

Clearances from LPG containers

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

4.3.2.3. Diked storage areas for *flammable* and *combustible liquids* shall not contain liquefied petroleum gas cylinders or tanks, and the centre line of the dike shall be at least 10 ft away from such cylinders or tanks.

4.3.2.4. *Storage tanks* for *flammable* or *combustible liquids* shall be spaced in a manner acceptable to the *authority having jurisdiction* so that each *storage tank* is accessible for fire fighting purposes. — Access

SUBSECTION 4.3.3. SUPPORTS, FOUNDATIONS AND ANCHORAGE FOR ABOVEGROUND STORAGE TANKS

4.3.3.1.(1) *Storage tanks* shall rest on the ground, on foundations or on supports made of concrete, masonry, piling or steel in conformance with good engineering practice. — Construction

(Appendix E of API-650-1973, "Welded Steel Tanks for Oil Storage," and Appendices B and N of API-620-1973, "Recommended Rules for the Design and Construction of Large, Welded, Low Pressure Storage Tanks," contain information on supporting storage tanks and are considered to be good engineering practice.)

(2) Tank supports shall be installed on firm foundations designed to minimize uneven settling of the tank and to minimize corrosion of the part of the tank resting on the foundation.

(3) *Storage tanks* shall be separated from concrete foundation slabs by a minimum of 6 in. of sand, a layer of composite materials or by the use of wood or metal saddles.

(4) In areas subject to earthquake forces, *storage tank* supports and connections shall be designed to resist such forces in conformance with the National Building Code of Canada 1975.

4.3.3.2. Except for steel saddles that are less than 12 in. high at their highest point, supports for *storage tanks* shall provide a *fire-resistance rating* of at least 2 hr. — Fire resistance

4.3.3.3. Every aboveground *storage tank* shall be supported in a manner that will prevent the allowable design stress of the tank from being exceeded. — Stresses on tanks

4.3.3.4. When *storage tanks* are located in an area that may be subjected to flooding, the tanks shall be securely anchored to prevent floating. — Anchorage

SUBSECTION 4.3.4. NORMAL VENTING FOR ABOVEGROUND STORAGE TANKS

4.3.4.1. *Atmospheric* and *low pressure storage tanks* shall be vented to prevent a vacuum or pressure from developing in the tank sufficient to cause the design pressure to be exceeded as a result of filling or emptying or as a result of atmospheric temperature changes. — Vents

4.3.4.2. Normal vents shall be sized in accordance with the tank design standards listed in Article 4.3.1.3. or API-2000-1968, "Venting Atmospheric and Low Pressure Storage Tanks." — Vent sizing

4.3.4.3.(1) Except as permitted in Sentence (2), *storage tanks* for *flammable* and *combustible liquids* shall be equipped with venting devices which shall be normally closed, except when venting under pressure or vacuum conditions. — Closed vents

(2) *Storage tanks* for *combustible liquids* shall be equipped with vents conforming to Sentence (1), except that *storage tanks* of 105,000-gal. or less capacity containing crude petroleum at oil fields and *atmospheric storage tanks* under 800-gal. capacity containing *combustible liquids* may have open vents. — Open vents

4.3.4.4. The storage of crude petroleum in tanks having a capacity greater than 105,000 gal. shall not be permitted except in a producing oil field.

SUBSECTION 4.3.5. EMERGENCY RELIEF VENTING FOR FIRE EXPOSURE TO ABOVEGROUND STORAGE TANKS

Relief devices

4.3.5.1. Every aboveground *storage tank* for *flammable* or *combustible liquids* shall have a form of construction or device conforming to Article 4.3.5.2. or 4.3.5.3. to relieve internal pressure caused by exposure fires.

Pressure relieving construction

4.3.5.2. Pressure relieving construction for a vertical *storage tank* shall consist of a floating roof, lifter roof, a roof-to-side shell seam designed to break before the design stress of other parts of the shell is exceeded or other *approved* construction.

Venting capacity

4.3.5.3.(1) Where emergency relief is accomplished solely by pressure relieving devices, the total venting capacity including both normal and emergency vents shall be sufficient to prevent rupture of the *storage tank.*

(2) Except as provided in Sentence 4.3.5.4.(3), the total capacity of both normal and emergency venting devices shall be determined by good engineering practice, assuming the total venting requirement expressed as cubic feet of air per hour is equal to $833A\sqrt{P_t - P_a}$

where

A = the orifice area in square inches,

P_t = the absolute pressure inside the tank in inches of water,

P_a = the absolute atmospheric pressure outside the tank in inches of water.

(3) When *unstable liquids* are stored, the effects of heat or gas resulting from polymerization, decomposition, condensation or self-reactivity shall be allowed for in the determination of the total venting capacity.

Flow capacity tests

4.3.5.4.(1) The flow capacity of *storage tank* venting devices with up to 12 in. nominal pipe sizes shall be determined by a test of each type and size of vent used.

(2) The flow capacity of *storage tank* venting devices with nominal pipe sizes larger than 12 in. need not be subject to a test provided the adequacy of such vents has been calculated in conformance with good engineering practice and the start-to-discharge pressure is measured, and provided that the rating pressure, the corresponding free orifice area and a statement to the effect that the vent area has been calculated appears on the nameplate affixed to the tank.

(3) The total venting capacity for vents in Sentence (2) that have not been tested shall be 20 per cent greater than that determined by Sentence 4.3.5.3.(2).

SUBSECTION 4.3.6. VENT PIPING FOR ABOVEGROUND STORAGE TANKS

Materials and construction

4.3.6.1. Vent piping materials and construction shall conform to Section 4.4.

Outlet location

4.3.6.2. Vent pipe outlets for *storage tanks* of *flammable liquids* shall discharge outside *buildings* not less than 12 ft above the adjacent ground level at least 5 ft from any *building* opening and be located so that flammable vapours will not be trapped near any part of the *building.*

4.3.6.3. Vent pipe outlets for *combustible liquids* shall discharge outside *buildings* not less than 7 ft above the adjacent ground level and at least 5 ft from any *building* opening.

Manifolding vents

4.3.6.4.(1) Except as provided in Sentences (2) and (3), 2 or more *storage tanks* may be connected to a common vent pipe for normal relief venting provided the vent pipe size is designed to vent the combined vapours produced in the connected tanks without exceeding the allowable stresses of the tanks.

(2) *Storage tank* vent piping for *combustible liquids* with *flash points* at or above 200°F shall not be connected to vent piping serving *storage tanks* containing *flammable* or *combustible liquids* with *flash points* below 200°F.

(3) Vent piping for *storage tanks* for *flammable liquids* shall not be connected to vent piping for *storage tanks* for *combustible liquids* unless an effective arrangement is provided to prevent the vapours from the *flammable liquids* from entering the other tanks.

SUBSECTION 4.3.7. OPENINGS OTHER THAN VENTS IN ABOVEGROUND STORAGE TANKS

Valves and connections

4.3.7.1.(1) Connections to aboveground *storage tanks* at any level below the highest level to which the liquid will rise shall be provided with valves located as close as practical to the shell.

(2) Valves and their connections to a *storage tank* shall be made of steel, except that when the chemical characteristics of the liquid stored are incompatible with steel, materials other than steel may be used.

(3) Materials for valves and their connections to a *storage tank* shall be suitable for the pressures, stresses and temperatures that may be expected, including those of possible fire exposure.

Openings for liquid level measurements

4.3.7.2. Openings for measuring liquid levels in *storage tanks* for *flammable liquids* shall be equipped with caps or covers which shall be opened only when measuring the liquid level.

Connections for filling or emptying

4.3.7.3.(1) Connections used as part of normal operating conditions for filling or emptying *storage tanks* for *flammable* and *combustible liquids* with *flash points* below 200°F shall be located outside *buildings* at a location free of sources of ignition and at least 5 ft away from *building* openings.

(2) Connections for filling or emptying *storage tanks* in Sentence (1) shall be identified to indicate the product for which the connection is to be used and shall be kept closed to prevent leakage when not in use.

SUBSECTION 4.3.8. DIKES AND DRAINAGE FOR ABOVEGROUND STORAGE TANKS

4.3.8.1. The area surrounding a *storage tank* or group of *storage tanks* shall be designed to accommodate accidental spillage in conformance with Subsection 4.1.6.

Clearances

4.3.8.2.(1) Except as provided in Sentence (2), the distance between a *storage tank* shell and the centre line of a dike shall be at least 10 ft or ½ the tank height, whichever is greater.

(2) At bulk plant rail loading and unloading facilities the distance required in Sentence (1) may be reduced to 5 ft when permitted by the *authority having jurisdiction.*

Capacity of diked areas

4.3.8.3.(1) Except as provided in Sentence (3), where a diked area contains only 1 *storage tank,* the diked area shall be of sufficient size to contain a volume of liquid at least 10 per cent greater than the volume of the tank.

(2) Except as provided in Sentence (3), where a diked area contains more than one *storage tank,* the diked area shall be of sufficient size to contain a volume of liquid at least equal to the volume of the largest tank plus 10 per cent of the aggregate volume of all the other tanks, or 10 per cent greater than the volume of the largest tank, whichever is greater.

(3) Where a diked area contains a *storage tank* or group of *storage tanks* with fixed roofs containing crude petroleum with boil-over characteristics, the diked area shall be of sufficient size to contain a volume at least equal to the capacity of the largest *storage tank* served by the diked area.

Construction

4.3.8.4.(1) The base and walls of the dike in Article 4.3.8.3. shall be of earth, steel, concrete or solid masonry and shall be designed, constructed and maintained to provide maximum practicable impermeability.

Openings

(2) Openings shall not be permitted in dikes in Article 4.3.8.3., and where piping passes through such dikes, such passages shall be designed, constructed and maintained to prevent seepage from the diked area.

Dike design

4.3.8.5. The walls of every earth dike in Article 4.3.8.3. shall have a flat top at least 2 ft wide, a height of at least 2 ft and a slope consistent with the angle of repose of the material.

4.3.8.6.(1) Except when otherwise *approved*, the walls of a diked area in Article 4.3.8.3. shall not exceed an average height of 6 ft above the ground level within the enclosing dike.

(2) Dikes in Sentence (1) shall be designed to facilitate access to *storage tanks*, valves and other equipment, and safe egress from the diked area.

Provisions for fire fighting

4.3.8.7. When either the average height of a dike containing *flammable liquids* exceeds 12 ft, measured from the ground level of the interior of the diked area, 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 above the top of the dike, including the use of remotely operated valves and elevated walkways.

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

(2) Fixed fire extinguishing systems for *storage tanks* having a diameter greater than 150 ft shall consist of an *approved* system other than fixed foam protection.

Drainage

4.3.8.9.(1) Where provision is made for draining water from diked areas, drainage shall be provided in conformance with Subsection 4.1.6.

(2) Controls for the drainage system shall be accessible under fire exposure conditions and be located outside the diked area.

Prohibited material

4.3.8.10. *Drums, portable containers* and combustible material other than *approved* stiles or walkways shall not be permitted in a diked area.

SUBSECTION 4.3.9. INSTALLATION OF UNDERGROUND STORAGE TANKS

Location

4.3.9.1.(1) Underground *storage tanks* shall be located so that foundations of existing *buildings* will not be undermined during excavation and loads from *building* foundations and supports are not transmitted to the tank.

(2) Underground *storage tanks* shall be located at least 2 ft from adjacent tanks, 3 ft from a *building* or *street* line and 5 ft from other property lines.

Ground cover

4.3.9.2.(1) Except as required in Sentences (2) to (4), underground *storage tanks* shall be installed with at least 2 ft of ground cover over the tank.

Traffic areas

(2) Except as provided in Sentence (3), *storage tanks* subjected to vehicular traffic shall be installed at least 3 ft below finished ground level.

(3) A 6-in. reinforced concrete slab or an 8-in. unreinforced concrete slab with at least 18 in. of sand beneath them is permitted in lieu of the protection described in Sentence (2) provided the slabs extend at least 1 ft beyond the *storage tank*.

(4) *Storage tanks* installed partially below ground level shall be subject to acceptance by the *authority having jurisdiction* and shall be installed so that at least 50 per cent of the tank is below ground level. Partially buried tanks

(5) Where *storage tanks* are installed so that less than 75 per cent of the tank is below ground level, at least 3 ft of ground cover shall be provided over the tank.

4.3.9.3. Underground *storage tanks* in the process of being installed shall be inspected, and any damage to the protective coating shall be repaired before they are lowered into the excavation. Protective coating repairs

4.3.9.4.(1) Underground *storage tanks* shall be lowered into the excavation by the use of lifting lugs and hooks and also, where necessary, spreader bars to prevent damage to the protective coating. Installation

(2) Any method of handling that might result in damage to the protective coating of the tank shall not be used.

4.3.9.5.(1) Except as permitted in Sentence (2), *storage tanks* shall be supported on clean sand at least 6 in. deep and then shall be backfilled on all sides including the top with at least 12 in. of clean sand, free of cinders and stones and compacted in layers not greater than 12 in. thick. Support

(2) Where *approved*, stone dust or screenings may be substituted for the sand specified in Sentence (1).

4.3.9.6.(1) Underground *storage tanks* shall not be placed in direct contact with reinforced concrete slabs but shall be separated by the use of wood or steel saddles or by a minimum of 6 in. of sand or other suitable material to evenly distribute the weight of the tank to the supporting base.

(2) Wood or steel saddles used to support underground *storage tanks* shall be designed and located in accordance with good engineering practice.

4.3.9.7.(1) After being positioned in the excavation, *storage tanks* and their associated vents shall be pressure tested in conformance with Sentences (2) to (10). Pressure testing

(2) Except as permitted in Sentence (10), each underground *storage tank* and vent shall be subjected to a pneumatic pressure of not more than 5 psig, and this pressure shall be retained for at least 2 hr after the source of pressure has been removed.

(3) If a pressure drop occurs during the test in Sentence (2), the leak shall be repaired, except that in the case of a leaking tank, the tank shall be replaced.

(4) Test pressures in Sentence (2) shall be measured by an instrument calibrated in increments not greater than 0.1 psi.

(5) Records of the pressure tests in Sentence (1) shall be maintained for a reasonable period of time for examination by the *authority having jurisdiction*.

(6) Ballasting of *storage tanks* with a *flammable liquid* to assist in pressure testing shall not be permitted.

(7) When *storage tanks* are held in place with *combustible liquids* while being pressure tested, the 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 sealed.

(8) If spillage occurs when tanks are being filled with a *combustible liquid* in Sentence (7), resulting in damage to the tank coating, the damage shall be repaired and all sand contaminated by the spilled liquid shall be replaced.

(9) Damage to tank shells shall not be repaired on site.

(10) Where permitted by the *authority having jurisdiction*, hydrostatic testing of tanks may be carried out in lieu of pneumatic testing.

Anchorage

4.3.9.8.(1) Where a high water table is anticipated, underground *storage tanks* shall be anchored against uplift forces by anchor straps to concrete supports beneath the tanks, by the use of ground anchors or by the use of a concrete slab on top of the tanks.

(2) The anchorage required in Sentence (1) shall be designed to resist uplift forces due to hydrostatic forces when the tank is empty.

(3) The anchor straps and ground straps in Sentence (1) shall be installed in such a manner that they do not damage the protective coating on the tank.

SUBSECTION 4.3.10. CORROSION PROTECTION OF UNDERGROUND STEEL STORAGE TANKS

4.3.10.1.(1) Except as provided in Sentence (2), underground steel *storage tanks* and associated piping and fittings subject to corrosion shall be protected in conformance with ULC-S603.1-1973, "Standard for Protected Steel Underground Tanks for Flammable and Combustible Liquids."

(2) Steel *storage tanks* not conforming to ULC-S603.1-1973, "Standard for Protected Steel Underground Tanks for Flammable and Combustible Liquids," shall have corrosion protection conforming to good engineering practice based upon tests and the corrosion history of the area and shall be subject to the satisfaction of the *authority having jurisdiction.*

SUBSECTION 4.3.11. VENTS FOR UNDERGROUND STORAGE TANKS

Design

4.3.11.1. Underground *storage tanks* shall be provided with vent openings and piping of sufficient cross-sectional area designed to vent the tanks during the maximum filling or withdrawal rate without causing the allowable stress for the tank to be exceeded.

Construction

4.3.11.2. Vent piping materials and construction shall conform to Section 4.4.

Outlet locations

4.3.11.3.(1) Vent pipe outlets from underground *storage tanks* for *flammable liquids* shall be located higher than the fill pipe openings but not less than 12 ft above the adjacent ground level and not less than 25 ft from any dispensing unit and shall discharge outside *buildings* so that flammable vapours will not enter *building* openings or be trapped near any part of the *buildings.*

(2) Vent pipes from underground *storage tanks* for *flammable* or *combustible liquids* shall not be obstructed by any device that may cause excessive back pressure, except that vent pipes from underground *storage tanks* for *combustible liquids* may be fitted with return bends, coarse screens or other devices to minimize the entry of foreign material.

4.3.11.4. Vent pipe outlets from underground *storage tanks* for *combustible liquids* shall be located outside *buildings* at a height that is above the fill pipe opening but not less than 7 ft above finished ground level.

Vent piping installation

4.3.11.5. Vent piping shall enter the *storage tank* through the top of the tank and shall not extend into the tank more than 1 in. except when the vent is equipped with a vent alarm.

4.3.11.6. Vent piping shall be installed so that any nominally horizontal run shall slope towards the *storage tank,* shall be constructed without traps, shall be adequately supported to prevent sagging and, where necessary, shall be protected against mechanical damage.

Manifolding vent piping

4.3.11.7.(1) Except as permitted in Sentence (2), where vent piping connects 2 or more *storage tanks,* pipe sizes shall be designed to vent the combined vapours produced in the connected underground *storage tanks* without exceeding the allowable stresses of the tanks when being filled simultaneously.

(2) Where it is not possible to fill the connected *storage tanks* in Sentence (1) simultaneously, or where the connected vents have a vapour recovery system, the vent piping shall be sized to accommodate the maximum vapour flow possible in the system.

4.3.11.8. Vent piping for an underground *storage tank* containing *flammable liquid* shall not be connected to the vent piping for a *storage tank* containing *combustible liquid* unless an effective method is provided to prevent the vapours from the *flammable liquids storage tank* from entering the other tank.

SUBSECTION 4.3.12. OPENINGS OTHER THAN VENTS IN UNDERGROUND STORAGE TANKS

Connections

4.3.12.1. Connections for all openings in underground *storage tanks* shall be liquid and vapour tight.

Openings for liquid level measurements

4.3.12.2. Openings for measuring liquid levels in underground *storage tanks* if independent of the fill pipe shall be equipped with a vapour-tight cap or cover which shall be opened only when measuring the liquid level.

Fill and discharge piping

4.3.12.3.(1) Fill piping and discharge piping shall enter underground *storage tanks* only through the top of the tank and nominally horizontal piping shall be sloped toward the *storage tanks.*

(2) Remote fill outlets from an underground *storage tank* shall not be located higher than other outlets from the tank.

Connections for filling or emptying

4.3.12.4.(1) Connections used as part of normal operating conditions for filling or emptying *storage tanks* for *flammable* and *combustible liquids* with *flash points* below 200°F shall be located outside *buildings* at a location free of sources of ignition and at least 5 ft away from *building* openings.

(2) Connections for filling or emptying *storage tanks* in Sentence (1) shall be identified to indicate the product for which the connection is to be used and shall be kept closed to prevent leakage when not in use.

SUBSECTION 4.3.13. INSTALLATION OF STORAGE TANKS INSIDE BUILDINGS

4.3.13.1. *Storage tanks* shall not be permitted in other than *industrial occupancies,* except as otherwise permitted by the *authority having jurisdiction.*

SUBSECTION 4.3.14. VENTS FOR STORAGE TANKS IN BUILDINGS

4.3.14.1. Vents for *storage tanks* in *buildings* shall be provided in conformance with Subsections 4.3.4., 4.3.5., 4.3.6. and 4.3.11., except that emergency venting by the use of roof-to-side shell seams, designed to rupture before the allowable design stress of the *storage tank* is reached, shall not be permitted.

SUBSECTION 4.3.15. OPENINGS OTHER THAN VENTS IN STORAGE TANKS IN BUILDINGS

Connections

4.3.15.1.(1) Connections for all openings in *storage tanks* in *buildings* shall be liquid and vapour tight.

(2) Connections to *storage tanks* through which liquid can flow shall be provided with valves located as close as practical to the tank.

Openings for liquid level measurements

4.3.15.2.(1) Openings for measuring the liquid level in *storage tanks* containing *flammable* and *combustible liquids* with *flash points* below 140°F, if independent of the fill pipe, shall be equipped with a vapour-tight cap which shall be opened only when measuring the liquid level.

(2) Openings in Sentence (1) shall be protected against overflow and vapour pressure by means of a spring-loaded check valve or other *approved* device.

Fill pipes

4.3.15.3.(1) Fill pipes for *storage tanks* in *buildings* for the storage of *flammable liquids* with *flash points* below 73°F shall terminate within 6 in. of the bottom of the tank to minimize the possibility of generating static electricity.

(2) Fill pipes for *storage tanks* in *buildings* shall be installed to minimize vibration of the pipe.

Overflow prevention

4.3.15.4. *Storage tanks* in *buildings* shall be equipped with *approved* devices to prevent overflow such as 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 1 pipe size larger than the fill pipe and discharging by gravity back to the outside source of liquid or to an *approved* location.

SUBSECTION 4.3.16. IDENTIFICATION OF ABOVEGROUND STORAGE TANKS

4.3.16.1. Every aboveground *storage tank* shall be marked to identify clearly its contents on at least 2 sides in lettering of a size sufficient to ensure legibility from at least 15 ft or from outside a diked area, whichever is the greater.

SUBSECTION 4.3.17. LEAK TESTING OF STORAGE TANKS

4.3.17.1. Every *storage tank* shall be tested for leaks before being placed in service.

Static head

4.3.17.2.(1) A *storage tank* shall be designed, constructed and tested for the maximum static head which can be imposed when the vent or fill pipe is filled with liquid.

(2) The static head imposed on the tank built in conformance with Sentence (1) shall not exceed 10 psig at the bottom of the tank unless the tank is *approved* for greater pressures.

Piping

4.3.17.3. Underground piping connected to *storage tanks* shall be pressure tested in conformance with Subsection 4.4.6.

SECTION 4.4 PIPING AND PUMPING SYSTEMS

SUBSECTION 4.4.1. APPLICATION

4.4.1.1.(1) This Section applies to piping systems for *flammable* or *combustible liquids.*

(2) Except where otherwise stated in this Part, this Section shall not apply to the following:

(a) tubing or casings and piping for oil or gas wells,

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

(c) piping systems in *service stations* and *distilleries*,

(d) piping systems on piers and wharves, and

(e) piping within the scope of the applicable provincial boiler and pressure vessel Codes.

SUBSECTION 4.4.2. MATERIALS FOR PIPING, VALVES AND FITTINGS

4.4.2.1.(1) Materials for piping systems containing *flammable* or *combustible liquids* shall be suitable for the maximum anticipated working pressures and operating temperatures and for the chemical properties of the contained liquid.

Prohibited materials

(2) The use of materials for piping systems in Sentence (1) that are subject to failure from internal stress or rupture by mechanical damage and combustible or low-melting materials that are subject to failure even in moderate fires shall not be permitted.

Steel

4.4.2.2.(1) Except as provided in Sentence (2), where steel piping, including welded and seamless grades, is used, it shall meet the requirements of API-5L-1973, "Specifications for Line Pipe."

(2) Where service pressures exceeding 125 psig may occur, piping and fittings shall be designed in conformance with ANSI B31.3-1973, "Petroleum Refinery Piping."

Special materials

4.4.2.3. Where problems of corrosion, contamination, sanitation or standards of purity require special materials, such materials may be used subject to acceptance by the *authority having jurisdiction.*

SUBSECTION 4.4.3. CORROSION PROTECTION OF PIPING SYSTEMS

4.4.3.1. All exposed and underground piping, couplings, flanges and bolts for *flammable* or *combustible liquids* shall be protected where necessary against external corrosion.

SUBSECTION 4.4.4. IDENTIFICATION OF PIPING SYSTEMS

Markings

4.4.4.1. Pipelines for *flammable* or *combustible liquids* shall be marked with the contents of the line, and these markings shall be maintained in a clearly legible form.

Colours

4.4.4.2. Piping for *flammable* or *combustibe liquids* shall not be painted red.

(Red is the common colour for identifying piping systems used for fire protection purposes.)

Plans

4.4.4.3.(1) Plans showing piping systems for *flammable* or *combustible liquids*, including tank and pumping arrangements, shall be available to the fire department on request.

(2) Sets of plans shall be kept at 2 separate locations.

SUBSECTION 4.4.5. JOINTS IN PIPING SYSTEMS

Threaded joints

4.4.5.1. Threaded joints in piping systems for *flammable* or *combustible liquids* shall be made in accordance with good engineering practice using a joint compound *approved* for the material being handled.

Welded joints

4.4.5.2.(1) Welding of piping for *flammable* or *combustible liquids* shall conform to Part 5 and with provincial regulations or, in the absence of such regulations, with the requirements of CSA W47.1-1973, "Certification of Companies for Fusion Welding of Steel Structures."

Flanged joints

(2) Flanged joints for piping in Sentence (1) shall be provided in welded systems at intervals which will facilitate dismantling and avoid subsequent in-place cutting and welding operations.

4.4.5.3.(1) Except as permitted in Sentence (2), flanged joints for piping in Article 4.4.5.2. shall be made with forged or cast steel flanges designed and constructed in conformance with good engineering practice.

(2) Bronze flanges for 2 in. or smaller size piping in Article 4.4.5.2. may be used where copper and brass piping is permitted.

Bolting materials

4.4.5.4. Bolting materials for flanged connections in steel piping systems for *flammable* or *combustible liquids* shall be of alloy steel equivalent to ASTM A193-70, "Alloy-Steel Bolting Materials," Grade B-7.

Gaskets

4.4.5.5. Gaskets in flanged connections shall be of a material resistant to the liquid being carried and capable of withstanding temperatures of at least 1,200°F without damage, except as otherwise *approved.*

SUBSECTION 4.4.6. PRESSURE TESTING OF PIPING SYSTEMS

4.4.6.1.(1) All newly installed piping systems used for *flammable* or *combustible liquids,* including those in *service stations,* shall be pressure tested with air or water to at least 50 psig or 1½ times the maximum operating pressure, whichever is the greater.

(2) Where a pressure test in Sentence (1) requires a test pressure in excess of 100 psig, the test shall be conducted using water.

Air testing

(3) When piping of systems in Sentence (1) is pressure tested with air, the lines shall be soaped to assist in the detection of leaks and shall retain the pressure for a minimum period of 2 hr after the source of pressure has been removed.

Liquid testing

(4) When piping systems in Sentence (1) are pressure tested with liquid, the lines shall retain the pressure for a minimum of 6 hr after the source of pressure has been removed.

Instruments

(5) Pressure measurements in Sentence (1) shall be obtained by using an instrument calibrated in increments not greater than 0.5 psi.

Test records

(6) Records of the pressure tests in Sentence (1) on piping that has been proven tight shall be maintained for a reasonable period of time for examination by the *authority having jurisdiction.*

SUBSECTION 4.4.7. LOCATION AND ARRANGEMENT OF PIPING

Location

4.4.7.1.(1) Piping shall be installed outdoors whenever possible and located so it will not create a hazard to *buildings* or equipment.

(2) Where piping for *flammable* or *combustible liquids* is installed within a *building,* the length of piping shall be as direct and as short as practicable.

Aboveground outdoor piping

4.4.7.2.(1) Aboveground outdoor piping shall be supported and arranged to prevent excessive vibration and stress on equipment connected to it.

(2) Protective guarding devices acceptable to the *authority having jurisdiction* shall be provided to prevent vehicular impact or physical damage to piping in Sentence (1).

4.4.7.3.(1) Aboveground outdoor piping shall not be permitted to be located on the exterior of walls except on those of *noncombustible construction,* and in no case shall such piping be located above windows.

(2) Aboveground outdoor piping located above roofs shall not be permitted except above roofs of *noncombustible* and impermeable *construction,* with provision for accidental spillage provided in conformance with Subsection 4.1.6.

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

4.4.7.5. Piping passing through dike walls shall be designed to prevent excessive stress resulting from settlement or fire exposure.

(For example, piping may be installed on concrete supports so that it is about 1 ft above ground level.)

4.4.7.6.(1) Underground piping shall be located so it will not be damaged as a result of vibrations or settling of an adjacent *building* or structure. Underground piping

(2) Underground piping shall be located at least 1 ft away from the foundations of any *building* or structure, except where such piping enters the *building* as permitted in Article 4.4.7.9.

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

(4) Piping adjacent to railway tracks shall be installed in conformance with General Order No. 0-32, Part 5 of the Canadian Transport Commission.

4.4.7.7.(1) Underground piping shall be supported on undisturbed soil where practicable and shall be backfilled on the top and sides with at least 12 in. of clean sand, free of cinders and stones and compacted in layers not greater than 12 in. thick.

(2) Where it is not practicable to support piping in Sentence (1) on undisturbed soil, it shall be supported on at least 6 in. of clean sand.

4.4.7.8. Piping for *flammable* or *combustible liquids* shall not be located in service tunnels that may be used for pedestrian traffic or that contain other services. Piping in service tunnels

4.4.7.9.(1) Piping for *flammable* or *combustible liquids* when entering a *building* shall be located aboveground unless otherwise *approved.* Entrance to buildings

(2) Piping in Sentence (1) shall be provided with inside and outside control valves at the point of entrance.

(3) Where piping in Sentence (1) passes through a wall, a pipe sleeve shall be provided and any space surrounding the pipe shall be sealed.

4.4.7.10.(1) Indoor piping for *flammable* or *combustible liquids* shall be subject to the approval of the *authority having jurisdiction* and shall be supported overhead or be located in trenches conforming to Article 4.4.7.11. in which no other services are located. Indoor piping

(2) Piping in Sentence (1) shall not be installed under combustible flooring.

4.4.7.11.(1) Where indoor piping for *flammable* or *combustible liquids* is installed in trenches, trapped drains conforming to Subsection 4.1.6. shall be provided. Trenches

(2) When piping in Sentence (1) contains *flammable liquids,* the trench shall be provided with positive ventilation to the outdoors or shall be filled with sand.

4.4.7.12.(1) Overhead piping for *flammable* or *combustible liquids* shall be installed close to the ceiling or beams or along walls at least 6 ft above the floor to protect it against mechanical damage. Overhead piping

(2) Where practicable, overhead piping in Sentence (1) shall be supported from *building* framing members.

(3) In *buildings* of steel frame construction, piping in Sentence (1) shall be fastened to steel beams or columns by bolted clips or pipe hangers attached to the flanges with a retaining strap.

(4) Piping under concrete ceilings shall be suspended with the use of through bolts or expansion shields.

Supports

4.4.7.13.(1) Unsupported spans of pipe shall not exceed 12 ft for pipe up to 1¼-in. diam. and 15 ft for larger diameter pipe, and at least 1 *approved* hanger shall be provided for each length of pipe.

(2) Pipe hangers shall be designed to prevent lateral movement of the pipe.

Expansion shields

4.4.7.14. Anchors of the expansion shield type used to suspend piping shall not be used to suspend piping from unsound or lightweight concrete or from gypsum assemblies.

Protection

4.4.7.15. Exposed pipe risers shall be protected against mechanical damage by installing such risers adjacent to walls or pilasters, between flanges of steel columns or within securely anchored larger perforated pipe, and by providing mechanical guards where the risers are exposed to mobile equipment.

Expansion and contraction

4.4.7.16.(1) 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, welded elbows or other *approved* liquid-tight flexible joints.

Hose connectors

(2) *Approved* flexible hose connectors may be used where necessary in systems carrying *flammable* or *combustible liquids* to prevent excessive stresses resulting from vibration, settling or temperature change.

(3) Flexible hose connectors shall be constructed and tested in conformance with ULC-567-1969, "Standard for Pipe Connectors for Flammable Liquids and LP-Gas."

SUBSECTION 4.4.8. VALVES IN PIPING SYSTEMS

Design

4.4.8.1. Valves in piping systems for *flammable* or *combustible liquids* shall be of an *approved* type designed to accommodate the temperatures and pressures of the system.

Shutoff valves

4.4.8.2.(1) Shutoff valves shall be provided in all *flammable* or *combustible liquid* piping and pumping systems.

(2) Where practicable, valves in Sentence (1) shall be located outdoors or immediately adjacent to an interior wall accessible from outdoors.

(3) Steel shutoff valves shall be provided

(a) at connections to all aboveground *storage tanks*,

(b) on supply piping where it enters *buildings* or structures,

(c) on branch lines from the main supply line, and

(d) on supply lines at dispensing locations.

Isolating valves

4.4.8.3. Where valves are used to isolate one part of a piping system from another, they shall be made of steel, except as permitted in Article 4.4.8.4.

Special materials

4.4.8.4. Stainless steel, monel metal or lined steel bodied valves may be used when *approved* and when special conditions warrant the use of such materials.

4.4.8.5.(1) Diaphragm valves shall have no direct connections between the liquid and air section that might permit leakage of the liquid past the packing into the air lines. Diaphragm, globe and indicating-type valves

(2) Globe valves shall be arranged so that the packing is on the low pressure side.

(3) Rising stem or other indicating-type valves shall be used where necessary to determine whether the valves are open or shut.

4.4.8.6. Where cast iron meters are used, they shall be isolated by the use of steel valves. Cast iron meters

4.4.8.7.(1) All aboveground valves shall be identified so that Identification tags

(a) valves controlling *flammable liquids* are identified by an octagonal red tag, and

(b) valves controlling *combustible liquids* are identified by a circular tag coloured other than red, green or red-orange.

(2) Identification tags required in Sentence (1) shall be of enamelled metal, anodized aluminum, pressed fibre or solvent resistant plastic.

(3) Identification tags shall indicate the name of the product in clear, legible, permanent characters.

(4) Every identification tag shall be kept clean so that its colour and inscription are easily recognizable.

SUBSECTION 4.4.9. HEATING OF PIPING SYSTEMS

4.4.9.1. Heating equipment for piping systems containing *flammable* or *combustible liquids* shall be designed not to overheat or create an ignition source for the liquids being heated. Design

4.4.9.2.(1) *Flammable* or *combustible liquid* piping may be heated by steam lines provided the minimum steam temperature and pressure to make the liquid fluid are used and Sentences (2) and (3) are complied with. Steam lines

(2) A pressure regulator shall be provided in the steam line with a relief valve on the downstream side of the regulator.

(3) The piping and steam line in Sentence (1) shall be enclosed in insulation conforming to the requirements in the ACNBC Canadian Heating, Ventilating and Air-Conditioning Code 1975.

4.4.9.3. Electrical heating cables including electrical induction heating shall conform to Subsection 4.1.4. Electrical heating

4.4.9.4.(1) Where *approved*, thermal electrical conduction heating may be utilized by passing a low-voltage alternating current through the pipe.

(2) Systems permitted in Sentence (1) shall be installed and tested as complete units and shall conform to the following:

(a) unheated sections of piping shall be isolated from heated sections by means of nonconductive fittings,

(b) thermostatic controls, high temperature limit controls and fuses shall have the lowest practical rating to ensure satisfactory operation,

(c) all parts of the piping and fittings shall be enclosed by insulating coverings of a type which will prevent accidental grounding of the systems, and

(d) switches, transformers, contactors and other spark-producing equipment shall be located in an area not subject to flammable vapours.

Open flames

4.4.9.5. The use of open flames as a heat source shall not be permitted for heating piping for *flammable* or *combustible liquids*.

SUBSECTION 4.4.10. METHODS OF TRANSFER IN PIPING SYSTEMS

Outdoor pump locations

4.4.10.1. Pumps for *flammable* or *combustible liquid* piping systems installed aboveground and outside of *buildings* shall be located at least 10 ft from the property line and at least 5 ft from *building* openings.

Indoor pump locations

4.4.10.2.(1) Pumps located indoors shall be located in rooms that conform to the requirements of Subsection 4.2.9., except where the design or use of equipment specifically precludes such an arrangement.

(2) Pump houses and pump rooms shall not be used for any purpose other than to serve the pumping equipment.

Pits

4.4.10.3.(1) Pits for subsurface pumps for piping systems or for piping connecting submersible pumps shall be designed to withstand the forces to which they may be subjected without causing damage to the system.

(2) Pits provided in conformance with Sentence (1) shall not be larger than necessary for inspection and maintenance and shall be provided with a tight-fitting cover.

Control switches

4.4.10.4. Pumps for piping systems shall be provided with duplicate control switches to shut down the pumps in case of emergency, with one located in the vicinity of the pump and the other at an *approved* remote location.

Hydraulic transfer

4.4.10.5. Where *flammable* or *combustible liquids* are transferred by water pressure as a result of displacement, such system shall not be used for liquids that are miscible in water.

4.4.10.6. All pressure vessels for hydraulic transfer systems in Article 4.4.10.5. shall be constructed, installed and tested in conformance with Clause 4.3.1.4.(1)(b).

4.4.10.7.(1) Hydraulic transfer systems in Article 4.4.10.5. shall be designed to prevent water pressure in excess of the design pressure of the tank or piping.

(2) Operating pressures shall be controlled by a constant-level float valve or a pressure-regulating valve on the water supply side of the hydraulic transfer system in Article 4.4.10.5.

(3) Hydraulic transfer systems in Article 4.4.10.5. shall be arranged so that there is no water pressure on the system except when liquid is being discharged.

4.4.10.8. Check valves shall be provided for both water and *flammable* or *combustible liquid* piping to prevent back-flow in hydraulic transfer systems in Article 4.4.10.5.

Inert gas transfer

4.4.10.9.(1) Where *flammable* or *combustible liquids* are transferred as a result of displacement by the expansion of nitrogen, carbon dioxide or inert gas, all pressure vessels involved shall be constructed, installed and tested in conformance with Clause 4.3.1.4.(1)(b).

(2) Pressure regulators for inert gas transfer systems in Sentence (1) shall be provided in the gas line to control the pressure of the gas at the minimum pressure required to force the liquid through the piping system at the required rate.

(3) A relief valve with a slightly higher setting than the pressure required in Sentence (1) shall be provided on the downstream side of the regulator or on the tank.

4.4.10.10. 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 in Sentence 4.4.10.9.(1).

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

SUBSECTION 4.4.11. OPERATING PROCEDURES FOR PIPING SYSTEMS

4.4.11.1. Employees concerned with transfer operations involving *flammable* or *combustible liquids* shall be given instructions in the fire hazards and emergency procedures outlined in Articles 4.4.11.2 to 4.4.11.6. Employee training

4.4.11.2. Standard procedures for normal operation as well as for emergencies shall be given to operators and posted in printed form for convenient reference.

4.4.11.3. All employees shall be instructed in the importance of constant attendance during all loading or unloading operations.

4.4.11.4.(1) Employees engaged in the operation of equipment for the transfer of *flammable* or *combustible liquids* shall be instructed on the location, function and operation of valves used for the operation of fire protection equipment and manual emergency shutoff valves.

(2) Signs indicating the location of the valves described in Sentence (1) shall be posted in conspicuous locations.

4.4.11.5.(1) Employees in Sentence 4.4.11.4.(1) shall be trained in extinguishing procedures for fires involving *flammable* and *combustible liquids*.

(2) A 20-lb dry chemical portable extinguisher or two 10-lb units shall be provided in the vicinity of pumps and ancillary equipment used for the transfer of *flammable* or *combustible liquids*.

4.4.11.6. Employees shall be instructed in the *flammable* and *combustible liquid* colour coding and identification system in Article 4.4.8.7.

4.4.11.7. An *approved* checking system for the prompt detection of abnormal conditions shall be established and the necessary checks made at least once each shift. Inspection and maintenance

4.4.11.8.(1) A visual inspection shall be made for each day of operation of all aboveground piping systems to detect leakages, and any such leakage shall be repaired as quickly as practicable.

(2) Where necessary, flammable vapour indicators shall be used to detect leakages.

(3) Open flames and spark-producing devices shall not be used for testing purposes in Sentence (1).

4.4.11.9. To ensure proper operation, frequent inspections and tests shall be made of all safety shutoff valves and other fire safety devices with particular attention directed to normally open, fusible-link-operated valves, float valves and automatic controls.

4.4.11.10.(1) Maintenance shall not be carried out on piping systems while they are under pressure.

(2) If connections or piping are to be opened, the system shall be drained of *flammable* and *combustible liquids*.

(3) Where equipment for handling *flammable* or *combustible liquids* has to be repaired, it shall be removed and taken to maintenance areas when possible.

(4) Tags shall be attached to all valves on piping systems that are shut off for maintenance purposes to indicate that such valves are not to be opened.

(5) Piping previously used for the transfer of *flammable* or *combustible liquids* shall be removed or capped when it is no longer intended to be used.

SECTION 4.5 SERVICE STATIONS

SUBSECTION 4.5.1. APPLICATION

4.5.1.1. This Section applies to the storage, handling and use of *flammable* and *combustible liquids* at *service stations*.

SUBSECTION 4.5.2. STORAGE AND HANDLING

Capacities

4.5.2.1.(1) The storage capacity for *flammable liquids* at any *service station* shall not exceed 30,000 gal., except that not more than 50,000 gal. may be stored where the *service station* has direct access to any part of a highway that is a controlled access highway.

(2) The storage capacity for *combustible liquids* at any *service station* shall not exceed 20,000 gal. when the liquid has a *flash point* below 140°F.

(3) Individual underground *storage tanks* at *service stations* shall not exceed 10,000-gal. capacity.

(4) Not more than 45 gal. of *flammable liquids* and not more than 500 gal. of *combustible liquids* having a *flash point* below 140°F shall be stored aboveground at a *service station* where such liquids are stored less than 50 ft from *buildings* or less than 50 ft from those areas of the property to which the public has access.

Buildings

4.5.2.2.(1) Except as provided in Sentence (3), *flammable liquids* shall not be stored or handled within a *service station* unless the *building* meets the requirements of an inside storage room as stipulated in Subsection 4.2.9.

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

(3) Only *approved* pumping equipment shall be used to dispense *flammable liquids* inside *service stations*.

(4) The location of facilities for the dispensing of gasoline shall conform to the requirements of Article 3.3.7.8. of the National Building Code of Canada 1975.

Storage tanks in buildings

4.5.2.3.(1) Where *combustible liquids* with *flash points* above 140°F are stored and dispensed inside *buildings* from *storage tanks*, the individual tanks shall have a capacity of not more than 500 gal. and the aggregate capacity of all the tanks shall not exceed 2,000 gal.

(2) All fill pipes, vent piping and valves associated with the *storage tanks* referred to in Sentence (1) shall conform to Subsection 4.3.6. and 4.3.7. and shall be permanently marked to indicate the liquid in each tank and the equipment controlled by the valves.

4.5.2.4.(1) The dispensing area at *marine service stations* shall be at an *approved* location which will permit safe access by water craft. Dispensing at marine service stations

(2) Dispensing units in Sentence (1) shall be at least 25 ft from fixed sources of ignition.

4.5.2.5. All packaged *flammable* and *combustible liquid* products stored above-ground shall be in closed metal containers or in other *approved* containers distinctly marked with the generic name of the container contents. Packaged flammable and combustible liquids

4.5.2.6.(1) Where *flammable* or *combustible liquids* are sold in containers, such containers shall be

(a) *approved prepackaged containers* that are clearly marked with the name of the liquid they contain,

(b) *approved* red shipping containers conforming to Article 4.2.3.1., securely closed to prevent leaks or spills and clearly marked with the name of the liquid they contain, or

(c) *portable containers* meeting the requirements of Clause 4.2.3.1.(1)(b).

4.5.2.7.(1) Every container at a *service station* for dispensing *flammable* or *combustible liquids* shall be kept tightly closed when disconnected from its pumping apparatus. Dispensing containers

(2) Every container in Sentence (1) that is equipped with a pump shall have a vapour-tight connection between the pump and the container, and the pump shall be subject to the approval of the *authority having jurisdiction.*

4.5.2.8. The storage of empty containers which previously contained *flammable* or *combustible liquids* shall conform to Sentences 4.5.2.2.(1) and (2) and 4.5.2.7.(1).

4.5.2.9. *Portable containers* and *drums* shall not be filled beyond their safe filling level.

4.5.2.10. All piping associated with *flammable* or *combustible liquid storage tanks* shall be made of steel and shall conform to API-5L-1973, "Specifications for Line Pipe." Piping

4.5.2.11. Piping at *service stations* shall be provided with corrosion protection in a manner acceptable to the *authority having jurisdiction* commensurate with the exposure conditions.

4.5.2.12. Piping shall be firmly supported and protected by installing guards when necessary to prevent vehicle impact or other mechanical damage.

4.5.2.13. Pits for subsurface pumps or for piping connected to 2 or more submersed pumps shall conform to Article 4.4.10.3. Pits

SUBSECTION 4.5.3. DISPENSING SYSTEMS

4.5.3.1. Fixed dispensing equipment for *flammable* or *combustible liquids* shall conform to ULC-S607-1968, "Power-Operated Dispensing Devices for Flammable Liquids," and be acceptable to the *authority having jurisdiction* for its intended location.

4.5.3.2.(1) Fixed equipment for dispensing *flammable* or *combustible liquids* shall be installed outside of *buildings* unless otherwise *approved* and at least Clearances

(a) 10 ft from any right-of-way,

(b) 10 ft from any property line,

(c) 25 ft horizontally from any open flame,

(d) 25 ft from other ignition sources, except for electrical installations conforming to Article 4.1.4.1., and

(e) 15 ft from *building* openings, except for openings in *buildings* for the shelter of operating personnel in which electrical installations conform to Article 4.1.4.1.

Protection from collision

4.5.3.3. Fixed dispensing equipment shall be mounted on a concrete island or protected in an *approved* manner against collision damage.

SUBSECTION 4.5.4. SHUTOFF DEVICES

Nozzle brackets and switches

4.5.4.1.(1) When motorized dispensing equipment is installed, 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 a switch on the dispensing unit is actuated.

(2) A control provided in conformance with Sentence (1) shall stop the pump when all nozzles have been returned to their brackets.

Main switches

4.5.4.2.(1) Devices to shut off the power to all dispensing units shall be provided at a location remote from the dispensing units or shielded from any fire that might occur at the dispensing units.

(2) The shutoff devices required in Sentence (1) shall be clearly identified and easily accessible.

Valves

4.5.4.3. At *marine service stations* a readily accessible valve shall be provided in each pipeline at or within 6 ft of the pier to shut off the supply from shore.

SUBSECTION 4.5.5. DELIVERY HOSE AND NOZZLES

Lengths

4.5.5.1.(1) Except as permitted in Sentence (2), hose through which *flammable* or *combustible liquids* are dispensed at a *service station* shall be restricted to a maximum extended length of 15 ft.

(2) Where a retracting mechanism is used, a maximum extended length of 20 ft shall be permitted.

Nozzles

4.5.5.2.(1) Every hose through which a *flammable* and *combustible liquid* with a *flash point* below 140°F is dispensed by a motorized dispensing unit into a vehicle tank shall be equipped with an *approved* valved nozzle of nonmagnetic material so constructed that the valve

(a) can be kept open only by the continuous application of manual pressure, or

(b) is equipped with a device at the nozzle which will

(i) allow automatic dispensing,

(ii) automatically shut off when the vehicle tank is filled, and

(iii) release when the trigger of the nozzle is moved.

(2) Dispensing nozzles at *marine service stations* shall be of the automatic closing type without a hold-open device and shall be subject to the approval of the *authority having jurisdiction.*

SUBSECTION 4.5.6. REMOTE PUMPING SYSTEMS

4.5.6.1. This Subsection shall apply to systems for dispensing *flammable* or *combustible liquids* where such liquids are transferred from bulk storage to individual or multiple dispensing units by pumps located elsewhere than at the dispensing units. Application

4.5.6.2. Pumps, including associated control equipment, shall be designed so that the system will not be subject to pressures above the design working pressure. Design

4.5.6.3.(1) Pumps shall be securely anchored and protected against damage from vehicles. Protection against impact

(2) An *approved* impact valve incorporating a fusible element having a maximum temperature rating of 160°F shall be installed in the supply line at a level not higher than nor more than 1 in. below the base of the dispensing unit.

(3) Impact valves in Sentence (2) shall close automatically in the event of severe impact or fire exposure to the dispensing unit.

(4) The impact valve required in Sentence (2) shall be maintained in operating condition and serviced at least every 12 months.

4.5.6.4.(1) Pumps installed aboveground and outside *buildings* shall be located at least 10 ft from any property line and 5 ft from any *building* opening. Pump locations

(2) When an outside pump location is impractical, pumps may be installed inside *buildings* as provided in Article 4.5.2.2. or in pits as provided in Article 4.5.2.13.

4.5.6.5. After the completion of the installation, including paving, all underground lines connected to tanks shall be pressure tested in conformance with Article 4.4.6.1., except for Sentence 4.4.6.1.(3). Pressure testing

4.5.6.6.(1) Except as permitted in Sentence (2), tanks and pumps not integral with the dispensing unit at *marine service stations* shall be located on the shore or on a pier of the solid-fill type. Marine service stations

(2) Where shore locations would require excessively long supply lines to the dispenser, the *authority having jurisdiction* may permit the installation of *storage tanks* on a pier provided

(a) that applicable portions of Section 4.3.8. relative to spacing, diking and piping are complied with, and

(b) the quantity stored does not exceed 1,000-gal. aggregate capacity.

4.5.6.7.(1) No *storage tank* at a *marine service station* shall be located closer than 15 ft horizontally from the normal annual high-water mark.

(2) *Storage tanks* located on shore and supplying *marine service stations* may be located aboveground where rock or a high water table make underground tanks impractical.

4.5.6.8. Where *storage tanks* at a *marine service station* are at an elevation above the dispensing unit, the *storage tank* outlet shall be equipped with an *approved* automatic valve positioned adjacent to and outside the valve specified in Article 4.3.7.1. to prevent syphoning in the event of rupture of the supply line to the dispensing unit.

4.5.6.9. Piping between *storage tanks* located on shore and dispensing units at a *marine service station* shall conform to Section 4.4, except that where dispensing is from a floating structure, suitable lengths of *approved* flexible hose may be employed between the piping on shore and the piping on the floating structure to accommodate changes in water level.

SUBSECTION 4.5.7. DRAINAGE AND WASTE DISPOSAL

Protection against spills

4.5.7.1. Provision shall be made in areas where *flammable liquids* are dispensed to prevent spilled liquid from entering *buildings* or waterways by providing grading or curbing and drainage in conformance with Subsection 4.1.6.

Use of sewers prohibited

4.5.7.2. *Flammable* and *combustible liquids* shall not be dumped into sewers, but shall be stored outside in tanks or *drums* conforming to Article 4.5.7.3. until removed from the premises.

Waste oil

4.5.7.3. The storage and handling of waste oil shall conform to the appropriate requirements of this Part for the storage and handling of *flammable* and *combustible liquids*.

SUBSECTION 4.5.8. ATTENDANCE, SUPERVISION AND DISPENSING PROCEDURES

Attendants

4.5.8.1.(1) Except as provided in Sentence (2), every *service station* shall have at least 1 attendant on duty when the station is open for business.

(2) *Service stations* which do not serve the general public do not require an attendant.

4.5.8.2. Except as permitted at *self-service outlets*, a competent employee shall be in constant control of the dispensing of *flammable* and *combustible liquids* with *flash points* below 140°F into the fuel tanks of motor vehicles.

Self-service outlets

4.5.8.3. *Flammable* and *combustible liquids* with a *flash point* below 140°F shall not be dispensed at a *self-service outlet* unless the operation is *approved*.

4.5.8.4.(1) Special type dispensing devices including coin operated, card operated and remote preset units shall be permitted at *self-service outlets* provided there is at least 1 qualified attendant on duty for each 12 hoses which can be operated simultaneously while the outlet is open to the public.

(2) Special type dispensing units described in Sentence (1) shall be permitted in *service stations* which do not serve the general public.

(3) Instructions for the operation of dispensing units in *self-service outlets* shall be posted in a conspicuous location.

4.5.8.5.(1) Attendants on duty at a *self-service outlet* shall

(a) supervise the dispensing of *flammable* and *combustible liquids*,

(b) prevent the dispensing of *flammable* and *combustible liquids* into containers not conforming to Article 4.2.3.1.(1)(b),

(c) take appropriate measures to prevent sources of ignition from creating a hazard at the dispensing units, and

(d) take appropriate action in the event of a spill to reduce the risk of fire.

Dispensing into vehicles

4.5.8.6.(1) Except as provided in Sentence (2), *flammable* and *combustible liquids* shall not be dispensed into the fuel tank of a motor vehicle while the engine of the vehicle is running.

(2) Diesel fuel may be dispensed into the fuel tank of a vehicle while the engine is running provided it is dispensed at least 25 ft from gasoline dispensing units.

4.5.8.7. *Flammable* and *combustible liquids* with a *flash point* below 140°F shall not be dispensed at a *service station* to the fuel tank of a motor vehicle while any part of the motor vehicle or any vehicle attached to it is on a *street*.

4.5.8.8.(1) Every person dispensing *flammable* or *combustible liquids* shall

(a) take precautions to prevent overflow or spillage of the liquid being dispensed,

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

(c) in the event of spillage, immediately apply an *approved* absorbent material on the ground to soak up the spillage, and

(d) not dispense *flammable* and *combustible liquids* with a *flash point* below 140°F in proximity to open sources of ignition.

SUBSECTION 4.5.9. SMOKING

Smoking restricted

4.5.9.1. Smoking shall not be permitted within 10 ft of dispensing locations at *service stations*.

Signs

4.5.9.2.(1) At least 1 sign prohibiting smoking and conforming to Sentences (2) and (3) shall be provided for each dispensing location.

(2) Unless otherwise *approved*, the signs required in Sentence (1) shall

(a) be at least 8½ in. by 11 in. in size,

(b) indicate in clearly legible letters at least 1 in. high that smoking within 10 ft of the dispensing unit is not permitted and that the ignition must be turned off while the vehicle is being refuelled, and

(c) have black letters on a yellow background.

(3) Signs in Sentence (1) shall be installed in a location visible to all drivers approaching the dispensing location and at the dispensing unit.

SUBSECTION 4.5.10. LEAK TESTING

Liquid level measurements

4.5.10.1.(1) The liquid level in underground *storage tanks* at *service stations* shall be measured at least daily when the premises are open to the public.

(2) A record for each *storage tank* showing the daily measurements in Sentence (1) shall be retained for a period of at least 2 years.

(3) Measurements in Sentence (1) shall be compared with meter readings on a daily basis, and when a loss of liquid is apparent or when the level of water at the bottom of the tank exceeds 2 in., the *authority having jurisdiction* shall be notified within 24 hr.

Pressure testing

4.5.10.2.(1) When a leak is suspected in underground *storage tanks*, or when requested by the *authority having jurisdiction*, the following tests shall be conducted:

(a) pressure tests with the pressure recorded 4 hr and 12 hr from the commencement of the tests on underground *storage tanks* at a pressure of not greater than 5 psig for uncovered *storage tanks*, and not less than 5 psig and not more than 15 psig for covered *storage tanks*, and

(b) pressure tests on piping at pressures of at least 50 psig or 1½ times the operating pressure, whichever is greater, but not exceeding 100 psig.

(2) Pressure gauges used to test for leaks shall be calibrated in increments not greater than 0.1 psi for tank tests and 0.5 psi for piping tests.

4.5.10.3.(1) When pressures are applied in conformance with Article 4.5.10.2., measures shall be taken to guard against the hazards associated with pressure testing where explosive mixtures of vapours from *flammable* or *combustible liquids* and air may be present.

(2) All lines shall be disconnected from or shut off at the *storage tank* prior to the application of the line pressure test.

4.5.10.4. No pressure test shall be performed with a *flammable* or *combustible liquid* in the *storage tank* unless *approved*.

Leaking systems

4.5.10.5. Leaking systems shall be repaired as soon as practicable, and all reasonable steps shall be taken to recover escaped liquid and to remove contaminated soil.

SUBSECTION 4.5.11. FIRE PROTECTION

4.5.11.1. At every *service station* there shall be at least 2 portable extinguishers each having a rating of at least 10BC.

SECTION 4.6 BULK PLANTS

SUBSECTION 4.6.1. APPLICATION

4.6.1.1. This Section shall apply to that portion of a property where *flammable* or *combustible liquids* are received in bulk quantities and are stored or handled for the purpose of distributing such liquids by pipeline, tank vessel, *tank vehicle* or other container.

SUBSECTION 4.6.2. STORAGE

4.6.2.1. *Flammable* and *combustible liquids* shall be stored in *closed containers* or in *storage tanks* located outside *buildings* in conformance with Section 4.3.

Leak testing

4.6.2.2.(1) Testing of underground *storage tanks* and piping for leakage in bulk plants shall conform to Subsection 4.5.10., except that

(a) the liquid level in *storage tanks* shall be measured at least weekly, and

(b) the quantity of liquid determined in Clause (a) shall be compared with receipt and issue records at least weekly.

(2) Bulk *storage tanks*, piping, pumps, valves and associated components shall be designed, installed and maintained to accommodate shock pressure on the system.

Container storage

4.6.2.3.(1) Containers for *flammable* or *combustible liquids* stored indoors shall be arranged in conformance with Table 4.2.8.A.

(2) Containers for *flammable* or *combustible liquids* stored outdoors shall be stored in conformance with Table 4.2.11.A., except that the distance between the piles and property lines and the distance between piles need not apply when the containers are stored in an area that does not present a hazard to neighbouring property.

Spill protection

4.6.2.4. Outdoor storage areas shall be graded in conformance with Subsection 4.1.6. to prevent spillage of *flammable* or *combustible liquids* to adjacent properties.

Fencing

4.6.2.5.(1) Where the aggregate capacity of bulk *storage tanks* exceeds 120,000 gal., the area occupied by such tanks shall be surrounded by a firmly anchored fence.

(2) The fence required in Sentence (1) shall be substantially constructed to discourage climbing, with a minimum height of 6 ft and with 2 gates which shall be locked when the bulk plant is not in operation or when the enclosure is not manned.

SUBSECTION 4.6.3. HEATING

4.6.3.1.(1) Rooms in which *flammable liquids* are stored or handled shall not contain fuel-burning *appliances* or electric heating elements that could be exposed to the room air or to *flammable* or *combustible liquids*.

(2) Rooms containing heating *appliances* shall be located and ventilated to prevent the entry of flammable vapours.

SUBSECTION 4.6.4. VENTILATION

4.6.4.1.(1) Ventilation shall be provided for all rooms in which *flammable liquids* are pumped or dispensed.

(2) Natural ventilation shall be permitted where the pumping or dispensing equipment is part of a closed system.

(3) The design of the ventilation system shall take into account the relatively high specific gravity of the vapours.

(4) Natural ventilation may be provided by means of openings located at floor levels in outside walls and unobstructed except for louvres or coarse screens.

(5) Where natural ventilation is inadequate, mechanical ventilation shall be provided.

Basements or pits

4.6.4.2. *Flammable liquids* shall not be stored or handled within a *building* having a basement or pit unless the basement or pit is provided with mechanical ventilation designed to prevent the accumulation of flammable vapours.

Transfer operations

4.6.4.3. Where sufficient mechanical ventilation is provided to prevent dangerous quantities of vapour accumulation, the ventilation system shall be kept in operation while *flammable liquids* are being handled and shall be electrically interlocked with the lighting system and, where practical, to the dispensing equipment, so that the ventilation system will be actuated during dispensing operations.

SUBSECTION 4.6.5. DISPENSING

Interconnections

4.6.5.1. Dispensing systems for *flammable* or *combustible liquids* shall not be interconnected.

Dispensing into vehicles

4.6.5.2.(1) Apparatus serving the general public for dispensing *flammable liquids* into fuel tanks of vehicles shall not be located at a bulk plant unless separated by a fence or equivalent barrier from the area in which the bulk storage operations are conducted.

(2) The temporary use of moveable *storage tanks* for dispensing *flammable* or *combustible liquids* into the fuel tanks of vehicles or other motorized equipment on premises not accessible to the public shall be permitted only with the approval of the *authority having jurisdiction* for a period not exceeding 24 hr.

4.6.5.3. *Flammable liquids* shall be dispensed or transferred inside *buildings* only by the use of *approved* pumping equipment unless special provisions are made and *approved* to prevent the accumulation of flammable vapours.

4.6.5.4. *Flammable liquids* shall not be dispensed into metal containers unless the containers rest on a metallic floorplate or the fill system is bonded to the container by means of a bond wire.

SUBSECTION 4.6.6. LOADING AND UNLOADING FACILITIES

Clearances

4.6.6.1.(1) The distance from the fill stem of a *tank vehicle* or tank car loading or unloading facility to aboveground *storage tanks, buildings* and property lines shall be at least 10 ft, measured horizontally.

(2) *Buildings* for the shelter of personnel or pumps shall be considered a part of the loading or unloading facility.

Multi-purpose facilities

4.6.6.2. When piping and pumping systems for the transfer of *flammable* or *combustible liquids* at loading and unloading facilities have been used for the transfer of one class of liquid, the system shall be cleaned of flammable or combustible vapours before the other class of liquid is introduced.

Check valves

4.6.6.3. Systems through which tank cars or *tank vehicles* discharge by means of pumps into aboveground *storage tanks* shall be provided with *approved* check valves to prevent back flow, and such systems shall be designed, installed and maintained to keep leakage or spillage to as small an amount as practicable.

Control valves

4.6.6.4.(1) Valves installed to control the filling of *tank vehicles* shall be of the self-closing type when used for *flammable* or *combustible liquids* with a *flash point* below 140°F.

(2) Control valves in Sentence (1) shall be held open manually, except where automatic devices are provided for shutting off the flow when the vehicle is full or filled to a preset amount.

Static protection

4.6.6.5.(1) Bonding, grounding and isolation components for protection against static charges during the loading of *tank vehicles* or tank cars through open domes shall be provided

(a) when loading *flammable liquids*, and

(b) when loading *combustible liquids* into *tank vehicles* or tank cars which may contain vapours from previous cargoes of *flammable liquids*.

4.6.6.6.(1) Bonding required in Article 4.6.6.5. shall consist of a metallic bond wire connected to the fill stem or to some part of the rack structure in electrical contact with the fill stem in conformance with Subsection 4.1.4.

(2) Bonding wires for *tank vehicles* shall be provided with a pull-off connector attached so as to be in electrical contact with the cargo tank of the *tank vehicle.*

4.6.6.7. The bonding connection required in Article 4.6.6.5. shall be fixed to the *tank 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.

4.6.6.8.(1) Except as permitted in Sentence (2), where there is a possibility that *tank vehicles* or tank cars contain an explosive vapour-air mixture, or where the liquid being filled can form such a mixture, filling through open domes shall be by means of a downspout which extends to near the bottom of the tank and is shaped to minimize turbulence in the liquid during filling.

(2) The downspout required in Sentence (1) shall not be required when it is known that the liquid is one which is not subject to accumulation of static charges.

SUBSECTION 4.6.7. FIRE PROTECTION

4.6.7.1. At least 2 portable extinguishers having an effective total rating of 40BC and a minimum single rating of 10BC shall be provided at hazardous locations in bulk storage plants for *flammable* and *combustible liquids*, except that such portable extinguishers may be provided from each *tank vehicle* operated as part of the bulk plant.

SUBSECTION 4.6.8. DRAINAGE AND WASTE DISPOSAL

4.6.8.1. Facilities to control possible spills of *flammable* or *combustible liquids* shall be provided at loading and unloading points in conformance with Subsection 4.1.6.

4.6.8.2. *Flammable* and *combustible liquids* shall not be dumped into sewers but shall be stored in special tanks or *drums* until removed from the premises.

SECTION 4.7 PIERS AND WHARVES

SUBSECTION 4.7.1. APPLICATION

4.7.1.1. This Section applies to *flammable* and *combustible liquid* installations on piers and wharves, but does not include *marine service stations.*

SUBSECTION 4.7.2. GENERAL

Cargo transfer

4.7.2.1. Packaged cargo of *flammable* or *combustible liquids*, including full and empty *drums* and containers, bulk fuel and stores may be handled over piers and wharves during cargo transfer at such times and places as are *approved.*

Clearances

4.7.2.2.(1) Piers and 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 ft from any bridge over a navigable waterway, or from an entrance to a superstructure of any vehicular or railroad tunnel under a waterway.

(2) The termination of fixed piping for loading and unloading *flammable* or *combustible liquids* shall be at least 200 ft from a bridge or from an entrance to a tunnel.

Construction

4.7.2.3. The substructure and deck of a pier or wharf shall be designed for its intended use, and shall be constructed of heavy timber or material that will provide adequate flexibility, resistance to shock, durability, strength and fire resistance.

SUBSECTION 4.7.3. STORAGE TANKS

Locations

4.7.3.1. Except as permitted in Articles 4.7.3.2. to 4.7.3.4., *storage tanks* shall be located aboveground on shore in conformance with Subsections 4.3.2. to 4.3.8.

4.7.3.2. *Storage tanks* may be located in *buildings* on piers and wharves of solid-fill or *noncombustible construction* subject to the requirements of Subsections 4.3.13. to 4.3.15. and to the approval of the *authority having jurisdiction.*

4.7.3.3. Unenclosed *drums* and *storage tanks* not exceeding 50-gal. individual capacity may be used for fuel supplies to heating equipment on piers and wharves.

4.7.3.4. *Storage tanks* may be buried in piers and wharves of the solid-fill type subject to the requirements of Subsections 4.3.9. to 4.3.12.

SUBSECTION 4.7.4. PIPING, VALVES AND FITTINGS

Materials and installation

4.7.4.1. The method of installation and materials used for piping, valves and fittings shall conform to the requirements of Section 4.4.

Supports

4.7.4.2.(1) Piping shall be properly supported and arranged to prevent excessive vibration or strain on equipment connected to it.

(2) Piping supports shall be of steel, concrete or timber having no dimension less than 6 in.

(3) Where pipe is supported more than 4 ft above the pier deck, piping supports shall have a minimum *fire-resistance rating* of 2 hr.

Impact protection

4.7.4.3. In areas where general cargo is handled or where piping might be subject to mechanical damage from vehicles or water craft, the piping shall be protected by means of a guard arrangement.

Flexible joints

4.7.4.4. Piping between the shore and piers or wharves shall be provided with swing joints or *approved* flexible connections to permit the independent movement of the pier or wharf and shore piping without strain on the pipe.

Shutoff valves

4.7.4.5. A readily accessible valve to shut off the supply from shore shall be provided in each pipeline within 6 ft of piers and wharves.

Access openings

4.7.4.6.(1) Access openings for inspection purposes below deck shall be provided for valves in Article 4.7.4.5. and connections to pipelines, and suitable signs shall be posted indicating their locations.

(2) No freight or materials shall be placed on piers and wharves in such a manner as to obstruct the access openings required in Sentence (1).

Identification

4.7.4.7. 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.

Pressure testing

4.7.4.8. Piping systems shall be pressure tested in conformance with Subsection 4.4.6. before being put into service, and at least annually thereafter.

SUBSECTION 4.7.5. GROUNDING

Grounding railway tracks

4.7.5.1.(1) Railway tracks on piers and wharves shall be bonded throughout their length and permanently grounded in conformance with General Order 881 of the Canadian Transport Commission.

(2) Insulating joints shall be placed in all rails where entering upon the pier or wharf.

SUBSECTION 4.7.6. FIRE PREVENTION AND PROTECTION

Portable extinguishers

4.7.6.1. Portable extinguishers having a rated capacity of 20BC shall be provided in the vicinity of *flammable liquid* pumps and fueling equipment in conformance with the requirements of Part 6.

4.7.6.2. Portable extinguishers shall be kept in the pump house or other suitable location where they will be accessible in the event of an emergency, but not accessible to the public.

4.7.6.3.(1) Where vessels are loading or unloading *flammable* or *combustible liquids* or are being refuelled, suitable portable extinguishers with a rating of at least 20BC shall be placed on the pier or wharf in the vicinity of loading or unloading operations, so that they will be accessible in the event of a fire emergency.

(2) Portable extinguishers provided in conformance with Sentence (1) shall be in addition to those provided on board the vessels.

Personnel training

4.7.6.4. Operating personnel shall be provided with instructions on how to summon the nearest fire department in the event of fire.

SUBSECTION 4.7.7. BULK TRANSFER STATIONS

Location

4.7.7.1. Except as permitted in Article 4.7.7.2., the bulk transfer of *flammable* or *combustible liquids* shall be permitted only on piers and wharves used exclusively for that purpose.

4.7.7.2.(1) 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 in conformance with Part 3, Paragraph 16 of the Canada Shipping Act and shall be subject to the approval of the *authority having jurisdiction.*

(2) Where bulk transfer stations are located as permitted in Sentence (1), guards or fences shall be provided around pumping equipment to prevent the entry of unauthorized personnel. Guards and fences

4.7.7.3.(1) Where practicable, a sump pit or settling basin shall be provided at transfer stations to carry off possible leakage from hose couplings in conformance with the requirements of Subsection 4.1.6. Leak protection

(2) A flushing arrangement shall be provided to backwash hose contents into the ship or shore storage prior to disconnecting the hose.

4.7.7.4.(1) Except as provided in Sentence (2), hose connections on piping shall be of the bolted flange type, and all such connections shall be provided with shutoff valves. Piping systems

(2) The use of cam-locking connections up to 4 in. in size shall be permitted.

(3) Hose connections shall not project beyond the face of piers and wharves.

SUBSECTION 4.7.8. CARGO HOSE

4.7.8.1. The transfer of *flammable* or *combustible liquids* between tank vessels and piers or wharves shall be through *approved* flexible cargo hose or jointed tubing or piping suitable for the cargo to be transferred and designed to withstand the maximum design working pressure.

4.7.8.2. Cargo hose shall be maintained in satisfactory operating condition and be pressure tested at least annually.

4.7.8.3. Cargo hose shall be supported where it is not run on a solid foundation.

SUBSECTION 4.7.9. CARGO PUMPS

4.7.9.1. Cargo pumps shall be designed and installed in conformance with Subsection 4.4.10.

4.7.9.2. 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. Excess pressures

4.7.9.3. Except as permitted in Article 4.7.9.4., cargo pumps shall be located on shore or on piers and wharves either of *noncombustible construction* or of the solid-fill type and at least 10 ft from other *buildings* or structures. Location

4.7.9.4. Where it is not practicable to install cargo pumps as required in Article 4.7.9.3., when *approved,* they may be installed on piers and wharves of *combustible construction* if located in pump houses in conformance with Subsection 4.7.10., and provided such pump houses are at least 10 ft from other *buildings.*

SUBSECTION 4.7.10. PUMP HOUSES

4.7.10.1. Pump houses shall be of *noncombustible construction* with floors that are chemically resistant to the liquid being handled, liquid-tight and equipped with curbs or flashings around the base of the wall to at least 4 in. in height to contain any spilled liquid.

4.7.10.2. Ventilation and venting shall be provided in conformance with the requirements of Subsection 4.2.9.

SUBSECTION 4.7.11. TRANSFER OPERATIONS

4.7.11.1. Transfer operations shall be carried out only under the continuous supervision of a person qualified to supervise such operations.

Grounding

4.7.11.2.(1) Tank vessels shall be electrically connected to the shore piping prior to the connecting of cargo hose, except when cathodic protection facilities are operating.

(2) Electrical connections to tank vessels shall be maintained until the cargo hose has been disconnected and any spillage has been removed.

Transfer equipment

4.7.11.3.(1) The cargo hose shall be of adequate length to allow for the movement of the ship.

(2) Gaskets shall be used in all hose joints and pipe couplings to prevent leakage.

(3) Flanged joints shall be tightly bolted to prevent leakage.

(4) Drip pans shall be placed under hose connections on piers and wharves, except where a sump pit or settling basin is provided.

4.7.11.4. Cargo shall not be transferred to or from an unmanned vessel.

Precautions during transfer

4.7.11.5.(1) The person responsible for directing the operations shall

(a) prior to the transfer of cargo, ascertain that no unauthorized repair work is being carried out on the pier or wharf and that there are no open flames in the vicinity,

(b) during the transfer of cargo, maintain a constant check on the progress of the loading and unloading of cargo to prevent overflow, and

(c) check the hose and connections for leakage, and if leakage occurs stop the operations.

Precautions after transfer

4.7.11.6.(1) When transfer operations are completed, the valves on the hose connections shall be closed, the cargo hose drained into appropriate containers and then emptied in conformance with Subsection 4.1.6.

(2) Care shall be taken that no liquid is discharged on a pier or wharf or overboard during draining and emptying operations.

SECTION 4.8 INDUSTRIAL PROCESS PLANTS AND REFINERIES

SUBSECTION 4.8.1. APPLICATION

4.8.1.1. This Section applies to those plants or *buildings*, including *refineries*, which contain industrial processes involving *flammable* or *combustible liquids*.

(Certain areas in refineries will not meet all Code requirements because of extraordinary conditions. Design should be based on good fire protection engineering practice and such factors as extinguishers, daily inspections, automated transfer systems, location of processing units, special diking, piping and controls and special materials used.)

SUBSECTION 4.8.2. LOCATION

4.8.2.1. The location of outdoor processing equipment in industrial processing plants shall be based on its *flammable* or *combustible liquid* capacity as described in Article 4.8.2.2.

4.8.2.2.(1) Except as provided in Sentence (3), outdoor processing equipment having emergency relief venting and a working pressure of not greater than 2.5 psig shall be separated from property lines and *buildings* on the same property by distances Clearances

(a) equal to those in Table 4.3.2.A. for stable liquids, and

(b) 2½ times those in Table 4.3.2.A. for *unstable liquids*.

(2) Except as provided in Sentence (3), outdoor processing equipment having emergency relief venting and a working pressure greater than 2.5 psig shall be separated from property lines and *buildings* on the same property by distances

(a) 1½ times those in Table 4.3.2.A. for stable liquids, and

(b) 4 times those in Table 4.3.2.A. for *unstable liquids*.

(3) Where protection is not provided against fires or explosions in processing equipment, the distances in Sentences (1) and (2) shall be doubled.

SUBSECTION 4.8.3. PROCESSING BUILDINGS

4.8.3.1. *Buildings* containing processing equipment involving *flammable* or *combustible liquids* shall be constructed in conformance with the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted where the *authority having jurisdiction* is satisfied that the *building* as constructed provides an acceptable degree of life safety or, where necessary, alternative measures are taken to provide such safety. Construction

4.8.3.2. Exterior walls of *buildings* where *unstable liquids* or *flammable liquids* having *flash points* below 73°F are processed shall be constructed to accommodate pressures from explosion in conformance with good engineering practice to the extent that the principle load carrying members will remain intact.

4.8.3.3. Areas in *buildings* where *unstable liquids* are handled or where small scale unit chemical processes are carried on shall be separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of at least 2 hr.

4.8.3.4. *Buildings* where *flammable* and *combustible liquids* with *flash points* below 140°F are handled in chemical processes shall not have basements or covered pits.

4.8.3.5.(1) Enclosed processing *buildings* handling *flammable* or *combustible liquids* shall be ventilated as specified in Subsection 4.1.7. Ventilation

(2) 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 5 ft from such equipment.

(Examples of such equipment are dispensing stations, open centrifuges, plate and frame filters, open vacuum filters and surfaces of open equipment.)

SUBSECTION 4.8.4. FIRE PREVENTION AND PROTECTION

4.8.4.1. Processing 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. Spills

Explosion protection

4.8.4.2. Where space within chemical processing equipment may contain vapour in concentrations sufficiently high to explode, air within the space shall be displaced by inert gas, an automatic explosion suppression system shall be provided or the equipment shall be designed to withstand the explosion pressure without damage to the equipment.

Fire protection installations

4.8.4.3.(1) Where the process warrants such protection, industrial processing plants shall be supplied with

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

(b) hydrants installed in conformance with good engineering practice,

(c) hoses connected to a reliable water supply located so that all equipment containing *flammable* or *combustible liquids,* including pumps, can be reached with at least 1 hose stream,

(d) nozzles capable of discharging a water spray, and

(e) an *approved* automatic sprinkler system or other fixed extinguishing system.

Personnel training

4.8.4.4. *Approved* procedures shall be established for prompt notification of personnel within the plant and to the nearest responding fire department in the event of fire.

SECTION 4.9 DISTILLERIES

SUBSECTION 4.9.1. STORAGE

4.9.1.1. *Flammable* and *combustible liquids* regulated by the Excise Act of Canada shall be stored in conformance with that Act.

SUBSECTION 4.9.2. PIPING AND PUMPING SYSTEMS

4.9.2.1. Piping and pumping systems for *distilleries* shall be installed in conformance with good engineering practice in conformance with the regulations in the Excise Act of Canada.

SUBSECTION 4.9.3. LOCATION OF PROCESS UNITS

Fire department access

4.9.3.1. Process units shall be located so that they are accessible from at least 2 sides for the purpose of fire fighting.

Spill protection

4.9.3.2. 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 in conformance with Subsection 4.1.6., except that where permitted by the *authority having jurisdiction,* effluent from spills and fire fighting operations may be directed into a sewer system.

SUBSECTION 4.9.4. FIRE PROTECTION

4.9.4.1. Portable extinguishers shall be provided in the quantities and types required by the *authority having jurisdiction* for the particular hazard of operation and storage.

SECTION 4.10 WITHDRAWAL OF STORAGE TANKS FROM SERVICE

SUBSECTION 4.10.1. SCOPE

4.10.1.1. This Section applies to the procedures to be followed when *storage tanks* for *flammable* or *combustible liquids* are removed, abandoned or temporarily taken out of service.

SUBSECTION 4.10.2. RENDERING STORAGE TANKS TEMPORARILY OUT OF SERVICE

Periods up to 180 days

4.10.2.1.(1) When underground *storage tanks* will be out of service for a period not exceeding 180 days

(a) the *authority having jurisdiction* shall be notified as soon as practicable in writing,

(b) the liquid level in the *storage tank* shall be measured monthly and a record of such measurements shall be maintained for inspection,

(c) fill pipe covers and covers over openings to measure liquid levels, dispensing facilities and power controls shall be kept locked when not in use, and

(d) vent piping shall be kept open.

Periods greater than 180 days

4.10.2.2.(1) Except as provided in Article 4.10.2.3., when underground *storage tanks* will be out of service for a period exceeding 180 days

(a) the *authority having jurisdiction* shall be notified as soon as practicable in writing,

(b) the *storage tanks,* connected piping and dispensing facilities shall be emptied of *flammable liquid,*

(c) the *storage tanks,* piping and dispensing facilities shall be refilled with a *combustible liquid,* or at least 2 lb of dry ice for each 100 gal. of tank capacity shall be added to the *storage tank,*

(d) monthly measurements of the liquid level of each *storage tank* containing a *combustible liquid* shall be made, and a record of such measurements shall be maintained for inspection, and

(e) fill pipe covers and covers over openings to measure liquid levels, dispensing facilities and power controls shall be locked.

Seasonal operations

4.10.2.3.(1). Where underground *storage tank* facilities are operated on a seasonal basis

(a) the liquid level of each *storage tank* shall be measured at the close of each season of operation, a record of such measurements shall be maintained for inspection and all fill pipe covers and covers over openings for measuring liquid levels, dispensing facilities and power controls shall be locked,

(b) prior to the start of an operating season, the liquid level in each *storage tank* shall be measured, the measurements compared with those recorded at the close of the previous season, and when a loss of liquid or water intrusion is apparent, immediate action shall be taken to determine and correct the condition.

Reactivation

4.10.2.4.(1) When an underground *storage tank* is reactivated for the storage of *flammable* or *combustible liquids,* the *authority having jurisdiction* shall be notified.

(2) If the *storage tank* in Sentence (1) has been out of service for more than 12 months, the tank and piping shall be tested in conformance with Subsection 4.5.10.

4.10.2.5.(1) When an aboveground *storage tank* will be out of service for a period not exceeding 180 days

(a) all liquid and vapours shall be removed from the *storage tank* and connected piping,

(b) the piping from the tank shall be capped or the valves necessary to achieve similar isolation shall be closed and securely locked, and

(c) the tank shall be inspected and tested to the satisfaction of the *authority having jurisdiction* before reuse.

4.10.2.6.(1) Where an aboveground *storage tank* will be out of service for a period exceeding 180 days

(a) all liquid and vapours shall be removed from the *storage tank* and its connected piping, and

(b) the *storage tank* markings shall clearly indicate the tank is empty.

SUBSECTION 4.10.3. REMOVAL OF UNDERGROUND STORAGE TANKS

4.10.3.1.(1) When underground *storage tanks* will not be reused, or have been out of service for 5 years, whichever comes first

(a) the *authority having jurisdiction* shall be notified in writing,

(b) *flammable* and *combustible liquids* shall be removed from the *storage tanks,* connected piping and dispensing equipment,

(c) *storage tanks* shall be removed from the ground and purged of vapours,

(d) the piping shall be removed from the ground or shall be purged of *flammable liquids* and vapours, and the ends of the piping shall be permanently sealed by capping or plugging, and

(e) if the soil around and under the *storage tank* is contaminated with liquid, it shall be removed and the cavities filled to grade level with clean fill.

SUBSECTION 4.10.4. DISPOSAL OF STORAGE TANKS

Openings

4.10.4.1. Where *storage tanks* are to be disposed of, sufficient openings shall be cut in the tanks to render them unfit for further use.

Reuse

4.10.4.2.(1) *Storage tanks* may be reused or sold for reuse for the storage of *flammable* or *combustible liquids* only after having been

(a) cleaned, inspected for flaws and tested for leaks, and

(b) coated to at least the standard set forth in ULC-S603.1–1973, "Protected Steel Underground Tanks for Flammable and Combustible Liquids," and installed in the excavation in conformance with Subsection 4.3.9.

Rejection

4.10.4.3. Where inspection or tests of an excavated *storage tank* reveals excessive denting, pitting or gouging, causing any reduction of shell thickness in excess of 1/32 in., or any dents greater than 30 deg. from the normal configuration, the tank shall be rejected for use.

SECTION 4.11 VEHICLES FOR THE TRANSPORTATION OF FLAMMABLE AND COMBUSTIBLE LIQUIDS

SUBSECTION 4.11.1. APPLICATION

4.11.1.1. This Section applies to *tank vehicles* used for the transportation of asphalt and stable *flammable* and *combustible liquids* but does not apply to aircraft servicing vehicles or to fuel tanks used in the operation of motor vehicles.

(Additional safeguards may be necessary for tank vehicles used for the transportation of flammable or combustible liquids having properties which introduce unusual factors, such as high rates of expansion, instability, corrosion and toxicity. Attention is directed to the fact that some cutback asphalts have flash points below 100°F, and liquids having a flash point higher than 200°F, such as asphalt, may assume the characteristics of lower flash point liquids when heated.)

SUBSECTION 4.11.2. TRANSPORTATION OF CONTAINERS

4.11.2.1.(1) Except as provided in Article 4.11.2.2., *drums* for *flammable* or *combustible liquids* shall not be transported unless they conform to the requirements of Shipping Container Specifications 5, 5A, 5B, 5C, 5L or 5M of the Canadian Transport Commission.

(2) *Drums* for *combustible liquids* shall not be transported unless constructed of steel at least 0.045 in. thick.

4.11.2.2. Wooden barrels may be used as containers for *flammable* or *combustible liquids* when the liquids are nontoxic and require such containers as part of their conditioning process. Wooden barrels

4.11.2.3.(1) Except as provided in Sentence (2), containers of *flammable liquids* which are in excess of 10 gal. and are not permanently attached to the chassis of the vehicle shall be piled only a single tier high on the vehicle. Piling

(2) Wooden barrels containing potable *flammable* or *combustible liquids* may be transported 2 tiers high using pallets suitable for moving and stacking such barrels.

4.11.2.4. Containers for the transportation of *flammable* or *combustible liquids* having a capacity of 50 gal. or more shall conform to the requirements for the construction of cargo tanks on *tank vehicles.* Capacities of 50 gal. or more

4.11.2.5. Except for the transportation of empty tanks, tanks that are not permanently attached to the chassis of a vehicle shall be secured to a cradle or sill which is anchored to the chassis of the vehicle by means of hook-bolts or other *approved* devices. Attachments

SUBSECTION 4.11.3. TANK VEHICLE DESIGN

4.11.3.1. *Tank vehicles* shall be designed and constructed in conformance with good engineering practice taking into account the relationship between the cargo tank, the supporting members, the weight and temperature of the cargo, road performance, braking and durability.

(The metal thicknesses specified in tank design specifications are minimum thicknesses required for static conditions, and these thicknesses may have to be increased where the tank shell is to be subjected to additional stresses due to transportation.)

4.11.3.2. The design of the suspension system for *tank vehicles* shall incorporate features to ensure stability when turning. Suspension

Exhaust system

4.11.3.3. The exhaust system of *tank vehicles* used for transporting *flammable* or *combustible liquids* shall be located remotely from its fuel system and other combustible materials and shall terminate in such a position that heat from the exhaust system shall not create a hazard to the tank contents, the facility being refuelled or the facility from which the *tank vehicle* is being filled.

SUBSECTION 4.11.4. CONSTRUCTION OF CARGO TANKS

4.11.4.1.(1) Cargo tanks, piping and connections designed for transporting *flammable* or *combustible liquids* above their boiling points shall be constructed in conformance with U.S. DOT Specifications MC 307 or MC 331.

(2) *Tank vehicles* for transporting *flammable liquids* shall be constructed and marked in conformance with the requirements of U.S. DOT Specifications MC 306 or MC 307 and be *approved.*

(3) Every *tank vehicle* for carrying *combustible liquids* shall be constructed and marked in conformance with good fire protection engineering practice and the requirements of this Code.

Marking

4.11.4.2. The marking required in Article 4.11.4.1. shall be a plate indicating the capacity of the tank in gallons.

Pressure limitations

4.11.4.3. In the construction of *tank vehicles,* the pressure limitations of the provincial boiler and pressure vessels regulations shall apply.

Bottom loading

4.11.4.4. *Tank vehicles* which are filled by bottom loading shall be constructed in conformance with *approved* specifications.

Compartments

4.11.4.5. *Tank vehicles* with compartments carrying *flammable* or *combustible liquids* of different types 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.

4.11.4.6. Tanks conforming to U.S. DOT Specifications MC 302, MC 303, MC 304 or MC 305 and having a capacity greater than 3,500 gal. shall not be used to transport *flammable liquids* unless they are divided into compartments not exceeding 3,500 gal. and are provided with baffles.

Multi-use dispensing system

4.11.4.7. Where both *flammable* and *combustible liquids* are dispensed from the same *tank vehicle* through a reel and meter system, the *tank vehicle* shall be equipped with a separate unloading system for each type of liquid.

SUBSECTION 4.11.5. SHUTOFF VALVES

4.11.5.1.(1) Each compartment of a *tank vehicle* shall be equipped with a shutoff valve located at the outlet and inside the shell, or in the sump when the sump is an integral part of the shell.

(2) Valves required in Sentence (1) shall be designed and maintained to remain closed except during loading and unloading operations.

Secondary controls

4.11.5.2.(1) Operating mechanisms for shutoff valves required in Article 4.11.5.1. shall be provided with secondary controls that are

(a) readily accessible for use in case of accident or fire,

(b) located as far as practicable from any fill-opening or discharge-faucet, and

(c) provided with a fusible section which will cause automatic closing in case of fire.

4.11.5.3. All shutoff valves required in Article 4.11.5.1. shall be designed so that they are as close as possible to the shell of the tank. Design

4.11.5.4. A connection designed to separate upon impact or strain shall be provided immediately downstream from valves required in Article 4.11.5.1. so as not to damage the valve or separate it from the tank shell.

4.11.5.5. The location and design of emergency valves, manholes, vents, flexible connectors, sumps and manifolds on *tank vehicles* shall be subject to the approval of the *authority having jurisdiction.*

4.11.5.6. Drawoff valves and faucets shall be threaded at the discharge end or otherwise designed to provide a liquid-tight connection to the delivery hose.

4.11.5.7.(1) Compartment discharge control valves on *tank vehicles* shall be provided with a securely attached tag of anodized or enamelled metal, substantial fibre or petroleum-resistant plastic which describes in permanent legible letters the liquid contained in the tank or compartment from which the control leads. Identification tags

(2) Tags required in Sentence (1) for a *flammable liquid* shall be red in colour and octagonal in shape.

(3) Tags required in Sentence (1) for a *combustible liquid* shall be any colour other than red, green or red-orange shades, and shall be round in shape.

4.11.5.8. Tags in Article 4.11.5.7. shall be kept clean so that the colour and inscription are easily recognizable.

SUBSECTION 4.11.6. BONDING

4.11.6.1. Tanks and chassis of *tank vehicles* shall be constructed and maintained to provide electrical continuity between them.

4.11.6.2. All *tank vehicles* that may be loaded or unloaded through an open dome shall be provided with an *approved* electric bonding clip.

SUBSECTION 4.11.7. ACCIDENT DAMAGE PROTECTION

4.11.7.1. All valves, piping and associated connections shall be protected from damage in the event of a collision by means of substantial, strategically located guards and bumpers. Bumpers

4.11.7.2.(1) *Tank vehicles* used in the transportation of *flammable* or *combustible liquids* shall be equipped in the front and rear with heavy-duty bumpers.

(2) Fuel tanks for vehicles shall be located so that they are not over the engine and shall be equipped to vent while being filled.

SUBSECTION 4.11.8. BRAKES

4.11.8.1.(1) *Tank vehicles* shall be equipped with a parking brake in conformance with Article 4.11.8.2. or chock blocks adequate to prevent movement of the vehicle when parked on any grade. Parking brake

(2) The parking brake shall be set or the chock blocks shall be positioned whenever the *tank vehicle* in Sentence (1) is parked, including parking for loading and unloading.

4.11.8.2. The parking brake shall be designed, constructed and maintained so that once applied it shall remain in the applied condition in the event of failure of the source of energy and not be released unless adequate energy is available to reapply it immediately after release.

SUBSECTION 4.11.9. PORTABLE EXTINGUISHERS

4.11.9.1.(1) *Tank vehicles* shall be provided with at least 1 portable extinguisher having at least a 20BC rating and when more than 1 is provided, each extinguisher shall have at least a 10BC rating.

(2) Portable extinguishers shall be located in an accessible location on *tank vehicles.*

SUBSECTION 4.11.10. VEHICLE LIGHTING

4.11.10.1. Vehicle lighting and power circuits shall be maintained in operating condition and shall be fused and otherwise protected to reduce the possibility of short-circuits and sparking.

SUBSECTION 4.11.11. VEHICLE OPERATION

4.11.11.1.(1) *Tank vehicles* having one or more tanks mounted on the chassis shall not be operated unless

(a) designed to have good road stability,

(b) maintained in operating condition, and

(c) inspected before each use to ensure that the tank and its liquid carrying components are not worn or damaged.

Identification

4.11.11.2.(1) Vehicles for the transportation of *flammable* or *combustible liquids* shall be conspicuously and legibly marked on each side and on the rear with letters at least 3 in. high in a colour that contrasts sharply with the background to indicate that the transported liquid is flammable or combustible, or with the common name of the product being transported or with the name of the carrier if the name includes the common name of the product being transported.

(2) The marking requirements in Sentence (1) shall apply whether the vehicle is loaded or empty.

Smoking and open flames

4.11.11.3. Smoking and open flames shall not be permitted within 25 ft of *tank vehicles* while parked or while being loaded, unloaded or repaired.

Cutting and welding

4.11.11.4. Before *tank vehicles* undergo repair-work involving cutting or welding, the tanks shall be cleaned of flammable or combustible vapours.

Leaking containers

4.11.11.5. Containers or tanks that leak or that have become damaged shall not be used to transport *flammable* or *combustible liquids.*

SUBSECTION 4.11.12. LOADING AND UNLOADING

Grounding

4.11.12.1. Before loading or unloading *flammable liquids* through an open dome, or loading *combustible liquids* into a compartment which previously contained a *flammable liquid,* all static electricity shall be discharged from the *tank vehicle.*

4.11.12.2. A bond wire shall be provided from the loading or unloading facility to the bonding clip on the *tank vehicle* to prevent a difference in static electrical voltage between the *tank vehicle* and the ground.

Air spaces

4.11.12.3. Filled cargo tanks or compartments shall have an air space at least 1 per cent of the compartment volume.

Multi-use compartments

4.11.12.4. When a compartment for the storage of *flammable* or *combustible liquids* has been used to carry one class of liquid, the compartment, piping and accessory delivery equipment shall be cleaned of flammable or combustible vapours before the other class of liquid is loaded.

4.11.12.5. Before a *tank vehicle* is unloaded, the volume of liquid in the receiving tank shall be measured to ensure that the tank can accept the volume to be unloaded. Volumes

4.11.12.6.(1) When *tank vehicles* are being unloaded, the vehicle operators shall remain in close proximity to the discharge control valve. Attendance

(2) When tank vents are obstructed, the transfer of liquid shall be stopped.

4.11.12.7. While *tank vehicles* are being loaded, the person in charge shall be in a position so that in an emergency he can shut off the flow of liquid.

4.11.12.8. When bulk deliveries are being made by gravity into underground *storage tanks,* the engine ignition of the *tank vehicle* shall be shut off. Engine ignitions

4.11.12.9. Except where a *tank vehicle* compartment is in the same service continuously and will remain in that service, no meter air-release mechanism shall be vented back into that compartment. Meter air-release mechanisms

4.11.12.10.(1) Except as permitted in Sentence (2), *tank vehicles* shall not be used to refuel other vehicles. Refuelling other vehicles

(2) *Approved* vehicles may be used to refuel a contractor's construction equipment.

4.11.12.11. Except as provided in Article 4.11.12.12., when the outlet valves of *tank vehicles* are not in use, the valve handles shall be detached or, where the handles cannot be detached, the valves or cabinets containing the valves shall be kept locked. Outlet valves

4.11.12.12. Where stopping the pump by locking the ignition effectively prevents the escape of products, removal of the valve handle and locking the valve or cabinet required in Article 4.11.12.11. shall not be required.

4.11.12.13. *Tank vehicles* shall not be parked inside a *building* unless precautions are taken to ensure that there are no leaks in the tank, piping or valving, and unless *approved.* Parking

4.11.12.14. Dome covers shall be closed and secured at all times, except that 1 dome cover may be opened at any one time for filling or checking the contents of the compartments. Dome covers

PART 5

HAZARDOUS MATERIALS, PROCESSES AND OPERATIONS

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SECTION 5.1 GENERAL

SUBSECTION 5.1.1. SCOPE

5.1.1.1. This Part applies to materials, processes and operations that involve a risk from explosion or high flammability, or otherwise create a hazard to life safety or health.

SUBSECTION 5.1.2. MEANS OF EGRESS

5.1.2.1. Hazardous materials, processes and operations shall be located and the premises maintained so that the *means of egress* will not be obstructed in any manner that would interfere with evacuation of the *floor area* in the event of a fire.

SUBSECTION 5.1.3. ELECTRICAL INSTALLATIONS

5.1.3.1. Electrical installations shall conform to the requirements of CSA C22.1-1975, "Canadian Electrical Code, Part 1," except that deviations from these requirements shall be permitted in areas other than as described in Article 5.1.3.2. where the *authority having jurisdiction* is satisfied that the system as installed provides an acceptable degree of safety.

Hazardous locations

5.1.3.2. Where wiring or electrical equipment is located in areas in which flammable gases or vapours, combustible or electrically conductive dusts or combustible fibres or flyings are present in quantities sufficient to create a hazard, such wiring and electrical equipment shall conform to the requirements of CSA C22.1-1975, "Canadian Electrical Code, Part 1," Section 18.

SUBSECTION 5.1.4. VENTILATION

5.1.4.1. Ventilation shall be provided for *hazardous locations* and processes in conformance with the National Building Code of Canada 1975 and with the requirements of this Part.

SECTION 5.2 EXPLOSIVES AND FIREWORKS

SUBSECTION 5.2.1. EXPLOSIVES

Storage, handling and use

5.2.1.1. The storage, handling and use of explosives, blasting agents, detonators, propellant explosives, pyrotechnics and ammunition shall be in conformance with the federal "Explosives Act."

Fire emergency procedures

5.2.1.2.(1) Any person using, storing or handling explosives shall establish fire emergency procedures acceptable to the *authority having jurisdiction* which shall specify

(a) the location and identification of storage and use areas,

(b) methods to control a fire emergency safely and efficiently, and

(c) the names, addresses and telephone numbers of persons to be contacted in case of fire during nonoperating hours.

SUBSECTION 5.2.2. FIREWORKS

Manufacture, storage, transportation and sale

5.2.2.1. The manufacture, storage, transportation and sale of fireworks shall conform to the federal "Explosives Act" and "Explosives Regulations."

Handling and discharge

5.2.2.2. The handling and discharge of fireworks shall conform to the "Manual of Display Fireworks," as published by the Department of Energy, Mines and Resources.

SECTION 5.3 MATCHES

SUBSECTION 5.3.1. STORAGE

Labelling and packing

5.3.1.1. Matches shall be labelled and packed by the manufacturer in conformance with the specifications contained in the "Regulations for the Transportation of Dangerous Commodities by Rail," as published by the Canadian Transport Commission.

Storage compartments

5.3.1.2. Where the aggregate volume of piles of stored matches exceeds 100 cu ft, storage compartments shall be constructed in conformance with the requirements of the National Building Code of Canada 1975 for Group F, Division 1 *occupancies*.

Carton pile arrangements

5.3.1.3. In storage areas regulated by Article 5.3.1.2., shipping cartons containing matches shall be arranged in piles not exceeding 10 ft in height or 1,500 cu ft in volume, and separated by aisles at least 8 ft wide.

Mixed storage

5.3.1.4. In mixed storage areas, matches shall be stored in a specific area separated from the remainder of the storage by a clear space of at least 8 ft.

Storage restrictions

5.3.1.5. Matches shall not be stored within 10 ft of any elevator shaft opening, stairway or other vertical opening.

SECTION 5.4 CELLULOSE NITRATE PLASTICS

SUBSECTION 5.4.1. DISPLAYS

Advertising displays

5.4.1.1. All displays of cellulose nitrate plastic articles in stores that are not in showcases or show windows shall be displayed only when placed on tables or counters not more than 3 ft wide and 10 ft long, with the spaces underneath such tables or counters kept free of combustible materials.

Lighting fixtures

5.4.1.2. Lighting fixtures shall not be located adjacent to any cellulose nitrate plastic material so as to create a possible ignition hazard.

SUBSECTION 5.4.2. MANUFACTURE

Storage of raw materials

5.4.2.1. Raw materials used in the manufacture of cellulose nitrate plastics shall be stored only in areas reserved for that purpose.

5.4.2.2. Not more than 1,000 lb of raw material used for the manufacture of finished cellulose nitrate plastic goods shall be stored in cabinets in any one workroom, not more than 500 lb stored in any one cabinet and not more than 250 lb in any one compartment of the cabinet.

5.4.2.3. All raw material in excess of that permitted in Article 5.4.2.2. shall be kept in vented vaults not exceeding 1,500 cu ft capacity and protected with an automatic sprinkler system installed in conformance with the National Building Code of Canada 1975.

5.4.2.4. In factories manufacturing articles of cellulose nitrate plastics, *sprinklered* and vented cabinets, vaults or storage rooms shall be provided to prevent the accumulation of excessive quantities of such material in workrooms.

Stationing of operators

5.4.2.5. In the workrooms of factories where cellulose nitrate plastics are being processed, operators shall be stationed not closer than 3 ft apart.

5.4.2.6. Material for the manufacture of cellulose nitrate plastic articles that is not kept in containers may be placed on tables, workbenches or at machines provided the quantity does not exceed a ½ day's supply. Storage in work areas

5.4.2.7. In any one workroom the total amount of cellulose nitrate plastic materials including the material in containers and on tables shall not exceed 150 lb.

5.4.2.8. All waste cellulose nitrate plastic materials such as shavings, chips, turnings, sawdust, edgings and trimmings shall be kept under water in metal receptacles until removed from the premises. Waste material storage

SUBSECTION 5.4.3. STORAGE OF FINISHED PRODUCTS

5.4.3.1. Areas where cellulose nitrate plastic finished products are stored shall be ventilated so that any decomposition gases produced by the plastics will be vented outdoors to an area where they will not reenter the *building*. Ventilation

5.4.3.2. Rooms in which cellulose nitrate plastics are stored or handled shall not contain fuel-burning *appliances* or electric heating elements and shall not be stored within 2 ft of any steam pipe, radiator or *chimney*. Heating appliance restrictions

5.4.3.3.(1) Where cellulose nitrate plastics in excess of 25 lb are stored in any *fire compartment* in a *building*, a vented cabinet or vault constructed in conformance with NFPA 42-1967, "Pyroxylin Plastics in Factories," and Articles 5.4.3.4. and 5.4.3.5. shall be provided for its storage. Storage vaults

(2) Not more than 20,000 lb of cellulose nitrate plastics shall be stored in any vault.

5.4.3.4.(1) Up to 7,500 lb of cellulose nitrate plastics shall be permitted to be stored in a vault which

(a) has a *fire-resistance rating* of at least 1½ hr,

(b) is designed to resist an internal pressure of at least ½ psi,

(c) is not greater than 1,500 cu ft in volume,

(d) has explosion venting of at least 1 sq ft of venting area to the exterior for every 30 cu ft of vault volume, and

(e) is ventilated to the exterior to provide at least 140 sq in of ventilating area for each 150 cu ft of vault volume.

5.4.3.5.(1) More than 7,500 lb but not more than 20,000 lb of cellulose nitrate plastics shall be stored in a vault which

(a) has a *fire-resistance rating* of at least 4 hr,

(b) is designed to resist an internal pressure of at least 4 psi,

(c) has explosion venting of at least 1 sq ft of venting area for every 50 cu ft of vault volume, and

(d) is ventilated to provide 140 sq in of ventilating area for each 150 cu ft of vault volume.

SUBSECTION 5.4.4. CELLULOSE NITRATE MOTION PICTURE FILM

5.4.4.1. Cellulose nitrate motion picture film shall not be used, stored or handled in a place of public assembly. Restricted use

5.4.4.2. Cellulose nitrate motion picture film shall be stored and handled in conformance with NFPA 40-1967, "Storage and Handling of Cellulose Nitrate Motion Picture Film." Storage and handling

5.4.4.3. When not in use all cellulose nitrate motion picture film shall be kept in closed, single-roll containers.

SUBSECTION 5.4.5. FIRE PROTECTION

5.4.5.1. The manufacture and storage of articles of cellulose nitrate plastic in quantities exceeding 100 lb shall be only in *buildings* equipped with a system of automatic sprinklers installed in conformance with the National Building Code of Canada 1975.

SECTION 5.5 AMMONIUM NITRATE

SUBSECTION 5.5.1. APPLICATION

5.5.1.1. This Section shall apply to fertilizer grade that contains 60 per cent or more of ammonium nitrate by weight and in quantities exceeding 2,000 lb, but does not include fertilizer storage on railways regulated by the Canadian Transport Commission or on privately operated farms.

SUBSECTION 5.5.2. EXPOSURE

Clearances from storage facilities

5.5.2.1.(1) Except as provided in Sentences (2) and (3), the distance between an ammonium nitrate storage facility and the property line of another property shall be not less than 300 ft, except that the distance may be reduced to

(a) 100 ft where the other property contains a *building* classified as a Group F *occupancy, flammable liquid storage tanks,* flammable gas *storage tanks* or other tanks containing a hazardous substance, and

(b) 50 ft where the other property contains a warehouse for *flammable liquids* storage or a facility for loading or unloading *flammable liquids.*

(2) Storage facilities for up to 200 tons of ammonium nitrate shall be located not closer than 50 ft from a property containing a *building* classified as a Group F, Division 2 or 3 *occupancy,* except that this distance may be reduced to 25 ft when a 2-hr *firewall* is provided between the storage facility and the *building* it exposes.

(3) Storage facilities for more than 200 tons of ammonium nitrate shall be located not closer than 50 ft from a property containing a *building* classified as a Group F, Division 2 or 3 *occupancy* when a 2-hr *firewall* is installed between the storage facility and the *building* it exposes.

SUBSECTION 5.5.3. STORAGE BUILDINGS

Restrictions on buildings

5.5.3.1. Ammonium nitrate shall not be stored in *buildings* of *combustible construction* or in *buildings* which are more than 1 *storey* in *building height.*

5.5.3.2. Ammonium nitrate shall not be stored in *buildings* having cellars, basements, open floor drains, tunnels or other pockets that might trap molten ammonium nitrate in the event of fire.

Ventilation

5.5.3.3.(1) Ammonium nitrate shall not be stored in *buildings* having less than 1 sq ft of openable vent area for each 150 sq ft of storage area unless *approved* mechanical ventilation is provided by equipment protected from the storage room by a *fire separation* having a *fire-resistance rating* of at least 1 hr.

SUBSECTION 5.5.4. STORAGE

Pile dimensions

5.5.4.1. The height and width of piles of ammonium nitrate in warehouses shall not exceed 20 ft.

5.5.4.2. Bags of ammonium nitrate in warehouses shall not be stored within 30 in. of the walls and *partitions* and shall not be stacked closer than 36 in. from the roof, overhead supporting beams or sprinkler head deflectors. Pile locations

5.5.4.3. Where there is palletized storage of bagged ammonium nitrate in warehouses, pallet channels shall be at right angles to aisles. Pallet channels

5.5.4.4. Aisles at least 3 ft wide shall be provided in warehouses to separate piles of ammonium nitrate, and at least 1 aisle not less than 4 ft wide shall be provided for the entire length of the storage area. Aisles

5.5.4.5. Bulk storage of ammonium nitrate shall be located in warehouses, except that separate bin-type structures conforming to Article 5.5.4.6. may be used. Bulk storage

5.5.4.6. Bins in Article 5.5.4.5. shall not be subject to corrosion by ammonium nitrate and shall not contain materials that may contaminate that substance. Bins

5.5.4.7. Ammonium nitrate storage bins or piles shall be identified by signs of contrasting colours indicating the contents with letters at least 2 in. high. Identifying signs

SUBSECTION 5.5.5. FIRE HAZARDS

5.5.5.1. Smoking and the use of open flame shall be prohibited in *buildings* used for the storage of ammonium nitrate, and signs with letters at least 2 in. high indicating that ammonium nitrate is being stored and that smoking is not permitted shall be prominently displayed on the exterior of the *building* near each entrance. Smoking and open flames prohibited

5.5.5.2. Heating equipment shall be separated from any storage area in conformance with the requirements of the National Building Code of Canada 1975. Heating equipment

5.5.5.3. Mobile internal-combustion equipment may be used in storage *buildings* in conformance with Section 3.4, but shall not be stored or fueled in *buildings* where ammonium nitrate is stored. Restricted use of mobile equipment

5.5.5.4. Bags and containers used for ammonium nitrate shall comply with the "Regulations for the Transport of Dangerous Commodities by Rail," issued by the Canadian Transport Commission. Bags and containers

5.5.5.5. Ammonium nitrate shall not be stored at a storage facility where the temperature may exceed 130°F. Storage temperature

5.5.5.6. Spilled ammonium nitrate and empty bags shall be disposed of in an *approved* manner. Disposal

5.5.5.7. Explosives shall not be used to break up caked ammonium nitrate. Explosives prohibited

SUBSECTION 5.5.6. FIRE PROTECTION

5.5.6.1. Ammonium nitrate shall be stored only in *buildings* equipped with an automatic sprinkler system installed in conformance with the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted where the *authority having jurisdiction* is satisfied that the *building* as constructed provides an acceptable degree of life safety or, where necessary, alternative measures are taken to provide such safety. Sprinkler installations

5.5.6.2. Portable extinguishers shall be installed in conformance with Part 6. Portable extinguishers

SECTION 5.6 COMPRESSED GAS CYLINDERS

SUBSECTION 5.6.1. GENERAL

5.6.1.1. Cylinders containing *compressed gas* shall be transported in devices designed so that restraint is provided against movement in any direction. Restraint during transportation

Valve caps

5.6.1.2. Cylinders containing *compressed gas* shall be protected against mechanical damage and shall be stored on racks or by other *approved* devices designed to hold them securely in place.

5.6.1.3. Cylinders containing *compressed gas* which is in storage shall be equipped with valve caps.

Temperature limitations

5.6.1.4. Cylinders containing *compressed gas* shall be stored in areas where the ambient air temperature does not exceed 125°F.

Ventilation

5.6.1.5. Where cylinders containing *compressed gas* are stored indoors, storage areas or rooms shall be dry and ventilated.

SUBSECTION 5.6.2. STORAGE

Outdoor platforms

5.6.2.1. Where cylinders containing *compressed gas* are stored outdoors, they shall be supported on raised concrete or other noncombustible platforms protected from the weather by a noncombustible canopy in an enclosure surrounded by a firmly anchored fence and used for the sole purpose of such storage.

Fencing

5.6.2.2. The fence required in Article 5.6.2.1. shall be designed to discourage climbing and shall be substantially constructed with a minimum height of 6 ft with a gate which shall be kept locked when the enclosure is not manned.

Clearances from building openings

5.6.2.3.(1) Cylinders containing *compressed gas* and located outdoors shall be

(a) if not more than 6,000 cu ft aggregate capacity, at least 5 ft from any *building* opening,

(b) if over 6,000 cu ft but under 18,000 cu ft aggregate capacity, at least 25 ft from any *building* opening, and

(c) if over 18,000 cu ft aggregate capacity, at least 50 ft from any *building* opening.

Indoor storage of flammable compressed gases

5.6.2.4.(1) Except as provided in Sentences (2) and (3), cylinders containing flammable *compressed gas* stored indoors shall be located in a room that

(a) is separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of at least 2 hr,

(b) is located on an exterior wall of the *building*,

(c) can be entered only from the exterior,

(d) is constructed so that an exterior wall provides explosion venting in the ratio of 1 sq ft of vent area for each 15 cu ft of room volume,

(e) is provided with natural ventilation with non-closable louvred openings at the floor and ceiling in an outside wall,

(f) does not contain fuel-fired equipment or high temperature heating elements, and

(g) is used for no purpose other than for the storage of *compressed gas*.

Flammable compressed gases lighter than air

(2) Cylinders of flammable, lighter than air *compressed gas* may be stored in rooms other than those described in Sentence (1)

(a) in an unsprinklered *building* of *combustible construction* where the aggregate capacity of expanded gas is not more than 2,000 cu ft, and

(b) in a *sprinklered building* of *combustible construction* or in a *building* of *noncombustible construction* where the aggregate capacity of expanded gas is not more than 6,000 cu ft.

(3) Where a flammable *compressed gas* is heavier than air, only 1 cylinder of gas may be located in any 1 room of a *building*, and cylinders shall not be located in basements or other areas below *grade*. Flammable compressed gases heavier than air

5.6.2.5.(1) When stored indoors, cylinders containing poisonous *compressed gas* shall be located in a room that Poisonous compressed gases

(a) is separated from the remainder of the *building* by gas-tight *fire separations* having a *fire-resistance rating* of at least 1 hr,

(b) is located on an exterior wall, and

(c) can be entered only from outside the *building*.

5.6.2.6. Cylinders containing poisonous *compressed gas* shall not be stored in a room containing combustible or flammable material.

5.6.2.7. Cylinders of gases that may react with one another shall not be stored in the same area. Restricted storage

5.6.2.8. Cylinders of flammable gases shall not be stored with *oxidizing materials* or with cylinders containing gases that support combustion.

SECTION 5.7 REACTIVE SUBSTANCES

SUBSECTION 5.7.1. GENERAL

5.7.1.1. Reactive substances that ignite spontaneously in air shall be stored in a liquid that is inert to the material, in an inert atmosphere or in sealed containers. Storage

5.7.1.2. Reactive substances that may react with water shall be stored in closed containers in a dry location.

5.7.1.3. Reactive substances that are unstable and susceptible to detonation by heat, shock, vibration or sound waves shall be stored in a separate location in a manner that will prevent detonation.

5.7.1.4. Reactive substances described in Articles 5.7.1.1., 5.7.1.2. and 5.7.1.3. shall be stored in a cool, well-ventilated room separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of at least 1 hr. Storage rooms

SECTION 5.8 CORROSIVE LIQUIDS

SUBSECTION 5.8.1. GENERAL

5.8.1.1. A storage room for *corrosive liquids* shall be cool and well-ventilated. Storage rooms

5.8.1.2. *Corrosive liquids* shall be isolated from *oxidizing materials* in a room separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of at least 1 hr. Isolation from oxidizing materials

5.8.1.3. Spills and leakage of *corrosive liquids* that may occur during storage or handling shall be contained and neutralized or flushed to an *approved* location. Leakage

5.8.1.4. Containers for *corrosive liquids* shall be identified by label and kept closed when stored. Containers

SECTION 5.9 OXIDIZING MATERIALS

SUBSECTION 5.9.1. GENERAL

Storage areas

5.9.1.1. *Oxidizing materials* shall be stored in cool, ventilated, dry *buildings* or rooms separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of at least 2 hr.

Refrigeration

5.9.1.2. *Oxidizing materials,* including organic peroxides, shall be stored in refrigerated areas where such refrigeration is necessary to stabilize the materials.

Restricted storage

5.9.1.3. *Oxidizing materials* shall not be stored with any flammable, oxidizable or chemically reactive material and shall not be stored on combustible floors, platforms or pallets.

Pile dimensions

5.9.1.4. Containers of *oxidizing materials* shall be stored in piles not greater than 20 ft wide and 15 ft high, except that piles of organic peroxides shall be not greater than 5 ft high.

Aisles

5.9.1.5. The aisles between rows of containers of *oxidizing materials* shall be at least 4 ft wide.

Containers

5.9.1.6. *Oxidizing materials* shall be stored in *approved* containers.

Facilities for dispensing

5.9.1.7. Facilities shall be provided outside storage rooms for opening containers and dispensing organic peroxides.

SUBSECTION 5.9.2. FIRE PROTECTION

Sprinkler installations

5.9.2.1. *Oxidizing materials* shall be stored only in rooms that are *sprinklered* in conformance with the National Building Code of Canada 1975.

Portable extinguishers

5.9.2.2. Portable extinguishers shall be provided in conformance with Part 6.

SECTION 5.10 DUST PRODUCING PROCESSES

SUBSECTION 5.10.1. DUST COLLECTION

Mechanical exhaust systems

5.10.1.1. All machinery which produces, agitates or conveys *combustible dusts* shall have a mechanical exhaust system to the outside atmosphere and, where practicable, dust-tight casings or enclosures.

Vacuum cleaning equipment

5.10.1.2.(1) *Building* and machinery surfaces shall be kept clean by a vacuum apparatus *approved* for use in atmospheres containing *combustible dusts.*

(2) The vacuum cleaning machine required in Sentence (1) and ancilliary piping, suction hose and tools shall be electrically conductive and shall be grounded.

(3) Tools for vacuum cleaning machines shall be made of materials that will not create electrostatic charges.

(4) Compressed air or other compressed gases shall not be used to blow dust from surfaces inside *buildings.*

Dust-collecting equipment

5.10.1.3. Dust-collecting equipment shall be installed where necessary to keep the accumulation of dust at a safe concentration in the interior of *buildings.*

5.10.1.4. Dust-collecting systems shall be made of noncombustible material, and exhaust fans shall have non-ferrous blades.

5.10.1.5. Dust collectors shall be located outside *buildings* or shall be equipped with exhaust stacks or ducts leading to the outside.

5.10.1.6. All electrically conducting parts of duct systems, dust collectors and the machines they serve shall be grounded. Grounding

5.10.1.7. Except as provided in Article 5.10.1.11., manufacturing activities that create significant concentrations of *combustible dusts* shall be located only in *buildings* which have explosion venting to the outdoors of not less than 1 sq ft for each 50 cu ft of room or *building* volume, with the vents designed to release at a pressure of not more than 20 psf. Explosion venting

5.10.1.8. Dust collectors within *buildings* shall be designed with explosion venting to the exterior.

5.10.1.9. Equipment required to have a dust exhaust system shall not be capable of operating until the dust exhaust system is in operation. Interlocks

5.10.1.10. Dust collector systems shall be designed for an air velocity in the ducts of at least 3,500 ft/min. Air velocity

5.10.1.11. Permanently open vent stacks may be used to ventilate storage containers where mechanical dust collector systems are not practical provided that the vent stacks Vent stacks

(a) have a cross-sectional area not less than twice that of all spouts discharging into the container,

(b) are installed not more than 30 deg. from the vertical,

(c) extend from the top of the container to a point not less than 4 ft above the roof, and

(d) are designed to prevent the entry of snow and rain.

5.10.1.12. Magnetic or pneumatic separators shall be installed as necessary to prevent the entrance of foreign materials that may cause sparks in equipment such as shellers, crackers, crushers, grinding machines, pulverizers or similar machines which produce *combustible dusts.* Separators

5.10.1.13. All machinery and metal parts of the equipment in Article 5.10.1.12. and related conveying systems shall be electrically grounded. Grounding

5.10.1.14. Smoking, open flame and spark-producing equipment shall not be allowed in areas containing *combustible dust* producing operations. Ignition sources prohibited

SECTION 5.11 COMBUSTIBLE FIBRES

SUBSECTION 5.11.1. STORAGE

5.11.1.1. *Buildings* used for the storage and handling of baled *combustible fibres* shall comply with the height and area limitations of the National Building Code of Canada 1975 for Group F, Division 2 *occupancies,* except that deviations from these requirements shall be permitted where the *authority having jurisdiction* is satisfied that the *building* as constructed provides an acceptable degree of life safety or, where necessary, alternative measures are taken to provide such safety. Building sizes

5.11.1.2.(1) Up to 100 cu ft of loose *combustible fibres* may be kept in any *building* provided storage is in a metal-lined bin equipped with a self-closing metal-lined cover. Loose fibre storage

(2) Quantities of loose *combustible fibres* exceeding 100 cu ft but not exceeding 500 cu ft shall be stored in rooms separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of at least 1 hr.

(3) Quantities of loose *combustible fibres* exceeding 500 cu ft but not exceeding 1,000 cu ft shall be stored in rooms separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of at least 2 hr.

(4) Quantities of more than 1,000 cu ft of loose *combustible fibres* shall not be stored in an individual room unless the room is *sprinklered* and separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of at least 2 hr.

Baled fibre storage

5.11.1.3.(1) Baled *combustible fibres* shall be stored so that

(a) a single pile will not contain more than 25,000 cu ft,

(b) the maximum height of any single pile will not exceed 14 ft,

(c) piles are separated by aisles at least 5 ft wide, and

(d) the clearance between piles and *building* walls is not less than 3 ft.

Baled storage piles

5.11.1.4. The sides of baled storage piles shall be inclined back from the base of the pile with a slope of not less than 1 ft for each 10 ft of height.

5.11.1.5. The minimum clearance between the top of any pile and sprinkler head deflectors shall be 36 in.

Heating equipment

5.11.1.6. Storage areas for *combustible fibres* shall not contain fuel-fired *appliances* or electrical heating elements, and shields shall be provided that will prevent stored material from coming within 1 ft of any part of the heating system.

SUBSECTION 5.11.2. FIRE PROTECTION

Standpipe and hose system installations

5.11.2.1. *Combustible fibres* shall be stored only in warehouses which are protected by standpipe and hose systems installed in conformance with the National Building Code of Canada 1975.

Portable extinguishers

5.11.2.2. Portable extinguishers each containing at least 2 gal. of water shall be provided in conformance with Part 6.

Smoke vents

5.11.2.3. *Combustible fibres* shall not be stored in *buildings* in which automatic smoke venting hatches constitute less than 16 sq ft for each 2,500 sq ft of *floor area.*

SECTION 5.12 SPRAY BOOTHS FOR FINISHING OPERATIONS

SUBSECTIONS 5.12.1. LOCATION

5.12.1.1. Spray finishing operations shall be separated from the remainder of the *building* in conformance with the National Building Code of Canada 1975, except that deviations from these requirements shall be permitted where the *authority having jurisdiction* is satisfied that the *building* as constructed provides an acceptable degree of life safety or, where necessary, alternative measures are taken to provide such safety.

SUBSECTION 5.12.2. CONSTRUCTION

General

5.12.2.1.(1) A *spray booth* shall consist of a steel frame covered with sheet steel having a minimum thickness of 0.045 in. or be of equivalent *noncombustible construction.*

(2) The interior surfaces of a *spray booth* shall be smooth and continuous.

(3) The floor of a *spray booth* and the operators' working area shall be non-combustible, non-sparking material.

Baffle plates

5.12.2.2.(1) *Spray booth* baffle plates shall be of noncombustible material and be removable or arranged to facilitate cleaning.

(2) *Spray booth* baffle plates shall not be located in exhaust ducts.

5.12.2.3. Filters in ducts used to ventilate *spraying areas* shall be made from non-combustible material or have a rate of combustibility no greater than Class II filters conforming to ULC-S111-1970, "Air Filter Units." Filters in ducts

5.12.2.4. Fan blades and casings in exhaust blowers for *spray booths* shall be nonferrous. Fan blades and casings

SUBSECTION 5.12.3. VENTILATION

5.12.3.1. Mechanical ventilation shall be provided in all *spraying areas* with sufficient air movement to prevent dangerous flammable vapour or powder concentrations. Mechanical

5.12.3.2. Except as provided in Article 5.12.3.3., the exhaust air velocity at the face of the *spray booth* shall be at least 100 ft/min. Air velocity

5.12.3.3. Electrostatic spraying shall have an exhaust air velocity of at least 60 ft/min. at the face of the *spray booth.*

5.12.3.4. A separate exhaust duct shall be provided for each *spray booth,* except that a common duct may be used if it serves *spray booths* having a combined open frontal area of not more than 18 sq ft. Combined ducting

5.12.3.5. Air exhausted from spray operations shall not be recirculated. Exhaust air

5.12.3.6. Gauges or audible alarms that will ensure that the required air velocity will be maintained shall be installed at *spray booths.* Maintenance of air velocity

SUBSECTION 5.12.4. EXHAUST DUCTS

5.12.4.1. Exhaust ducts for *spray booths* shall be securely supported and constructed of sheet steel in conformance with Table 5.12.4.A. Duct support and construction

Table 5.12.4.A.
Forming Part of Article 5.12.4.1.

Maximum Dimension of Duct	Minimum Thickness of Sheet Steel, in.
Up to 8 in. incl.	0.022
Over 8 in. to 18 in. incl.	0.027
Over 18 in. to 30 in. incl.	0.034
Over 30 in.	0.045
Column 1	2

5.12.4.2. Except as provided in Article 5.12.4.3., a clearance of 18 in. shall be maintained between ducts venting *spray booths* and unprotected combustible material. Clearances

5.12.4.3. Where exhaust ducts pass through combustible roofs or *partitions,* metal collars shall provide at least a 4-in. clearance between the duct and combustible material, and the space between the duct and combustible material shall be sealed with noncombustible insulating material. Collars

5.12.4.4. Exhaust ducts for *spray booths* shall be provided with access doors for cleaning purposes. Access doors

5.12.4.5. Except for water-wash types, the exhaust outlet to atmosphere from all *spray booths* shall be at least 6 ft from any combustible exterior wall or roof and shall be located so that the air does not discharge toward any combustible surface or unprotected opening within 25 ft. Exhaust outlet location

SUBSECTION 5.12.5. ELECTRICAL EQUIPMENT

Hazardous locations

5.12.5.1. Except where separated from the *spraying area* by vapour-tight separations with no openings, all electrical equipment within the *spraying area*, including lighting fixtures, shall conform to Article 5.1.3.2.

Motors for exhaust fans

5.12.5.2. Electric motors for exhaust fans shall not be placed inside *spray booths* or ducts.

Grounding

5.12.5.3. All metal parts of *spray booths*, exhaust ducts and piping systems conveying *flammable* or *combustible liquids* shall be electrically grounded.

SUBSECTION 5.12.6. FLAMMABLE AND COMBUSTIBLE LIQUIDS

Storage and handling

5.12.6.1. *Flammable* and *combustible liquids* for use in *spraying areas* shall be stored and handled in conformance with Part 4, and at no time shall the amount of *flammable* and *combustible liquids* in the *spraying areas* exceed 1 day's supply.

Paint storage

5.12.6.2. Paint shall be kept in *closed containers* when not in use.

Thinners and solvents

5.12.6.3. Thinners and solvents shall be dispensed only from *approved* safety cans.

Pump discharge relief valves

5.12.6.4. Where *flammable liquids* are supplied to spray nozzles by positive displacement pumps, the pump discharge line shall be provided with a suitable relief valve discharging to the pump suction or to a safe remote location.

SUBSECTION 5.12.7. CONTROL OF FIRE HAZARDS

Interlocks

5.12.7.1. The spraying equipment for a *spray booth* shall be interlocked to shut down in the event of failure of the ventilation system, failure of the circulating water pump of a water-wash system or failure of the filter roll-down mechanism of a dry *spray booth.*

Residue disposal

5.12.7.2. Where *flammable* or *combustible liquid* finishes are being applied in a *spray booth,* deposits of combustible residue shall be removed from the *spraying area* and put in *approved* safety cans for daily disposal.

Filter pads and rolls

5.12.7.3. All discarded filter pads and filter rolls shall be removed to a safe location or placed in a water-filled metal container and disposed of after each day's operation.

Filters prohibited

5.12.7.4. Filters shall not be used when applying spray material that is highly susceptible to spontaneous heating.

Heating equipment

5.12.7.5. *Space-heating appliances,* steam pipes and other hot surfaces shall not be located in an area where deposits of combustible residue may accumulate.

Ignition sources

5.12.7.6. Open flame or spark-producing devices shall not be used closer than 20 ft to a *spraying area* unless separated by a *fire separation.*

SUBSECTION 5.12.8. FIRE PROTECTION EQUIPMENT

Portable extinguishers

5.12.8.1. Portable extinguishers shall be installed near all *spraying areas* in conformance with Part 6.

Sprinkler installations

5.12.8.2. Automatic sprinkler protection shall be provided throughout the *spray room* in conformance with the National Building Code of Canada 1975.

Sprinkler head protection

5.12.8.3. Sprinkler heads in *spray booths* shall be protected with lightweight paper or thin polyethylene bags which shall be replaced before they have accumulated excessive deposits.

SUBSECTION 5.12.9. DRYING OPERATIONS

5.12.9.1. *Spray booths, spray rooms* or other enclosures used for spraying operations shall not be used for drying by any arrangement which could cause an increase in the surface temperatures of such *spray booths, spray rooms* or enclosures. Spray booths used for drying

5.12.9.2. Except as provided in Articles 5.12.9.3. and 5.12.9.4., drying or curing equipment that utilizes open flames or that produces sparks shall not be installed in or near a *spraying area.* Location of equipment

5.12.9.3.(1) Equipment described in Article 5.12.9.2. may be installed in an area adjacent to the *spraying area* provided the adjacent area is equipped with a ventilating system arranged to

(a) purge the drying space before the heating system can be started,

(b) maintain a safe atmosphere at any source of ignition, and

(c) automatically shut down the heating system in the event of failure of the ventilating system.

5.12.9.4.(1) Automobile *spray booths* may be used for drying operations with portable electric infrared drying apparatus provided Automobile spray booths used for drying

(a) the interior of the enclosure is kept reasonably free of over-spray deposits,

(b) the drying apparatus, wiring and connections are removed from the enclosure during spraying operations, and

(c) interlocks are installed to

(i) prevent the use of spraying apparatus while the drying apparatus is in the enclosure,

(ii) provide for the purging of the enclosure of spray vapours for a minimum of 3 min. before the drying apparatus can be energized,

(iii) ensure that the ventilating system maintains a safe atmosphere within the enclosure during the drying process, and

(iv) ensure that the drying apparatus will automatically shut off in the event of failure of the ventilating system.

SECTION 5.13 DIP TANKS FOR FINISHING OPERATIONS

SUBSECTION 5.13.1. LOCATION

5.13.1.1. Dip tank operations involving flammable materials shall be conducted only in a room designed for the purpose and separated from other areas by a *fire separation* having a *fire-resistance rating* of at least 2 hr.

5.13.1.2. Dip tanks shall not be located in cellars or basements.

SUBSECTION 5.13.2. CONSTRUCTION

5.13.2.1. The floor of any room where dip tanks are located shall be waterproofed, provided with permanent curbs and drained to an *approved* place of safe discharge. Floors

5.13.2.2. All dip tanks and drain boards shall be constructed of noncombustible material with steel, reinforced concrete or masonry supports. Materials

5.13.2.3. The top of a dip tank shall be at least 6 in. above the floor of the room in which it is located. Height above floor

Covers

5.13.2.4. Dip tank covers as required in Articles 5.13.6.2. and 5.13.6.3. shall be of noncombustible material or be clad with metal having leakproof joints.

5.13.2.5. Dip tank covers shall overlap the sides of the tank by at least 1 in. and shall have a recess or flange extending down around the tank.

5.13.2.6. Dip tank covers shall be maintained in operating condition.

5.13.2.7. Dip tank covers shall be supported by chains or wire rope in areas where burning may interfere with the action of the closing device, and all associated equipment shall be of metal with noncombustible mountings.

SUBSECTION 5.13.3. OVERFLOW AND DRAIN PIPES

Liquid levels

5.13.3.1. The liquid level in a dip tank shall be kept at least 6 in. below the top of the tank.

Overflow pipes

5.13.3.2. Dip tanks having a capacity in excess of 120 gal. or having a liquid surface area in excess of 10 sq ft shall be equipped with a properly trapped overflow pipe that leads to a safe location outside the *building*.

5.13.3.3. The centre line of the overflow connection to a dip tank shall be at least 6 in. below the top of the tank.

5.13.3.4. Overflow pipe sizes for dip tanks shall conform to Table 5.13.3.A.

Table 5.13.3.A.
Forming Part of Article 5.13.3.4.

Size of Tank, gal.	Overflow Pipe Size Required, in.
0 – 10	2
10 – 35	2½
35 – 75	3
75 – 150	4
150 – 225	5
225 – 325	6
325 and over	8
Column 1	2

5.13.3.5. Overflow pipes shall be connected to dip tanks by a flared outlet.

Piping connections

5.13.3.6. Piping connections for drains and overflow lines shall be designed so as to allow for easy access to their interiors for cleaning purposes.

Bottom drains

5.13.3.7. Dip tanks of over 500-gal. liquid capacity shall be equipped with bottom drains capable of being operated both automatically and manually to drain the tank quickly in the event of fire.

5.13.3.8. Bottom drains from dip tanks shall be trapped and shall discharge to a closed vented salvage tank or to a safe outside location as described in Subsection 4.1.6.

5.13.3.9. Bottom drain sizes for dip tanks shall conform to Table 5.13.3.B.

Table 5.13.3.B.
Forming Part of Article 5.13.3.9.

Capacity of Dip Tank, gal.	Diameter of Bottom Drain Pipe, in.
500 – 750	3
751 – 1,000	4
1,001 – 2,500	5
2,501 – 4,000	6
4,001 and over	8
Column 1	2

5.13.3.10. Manual operation of drains shall be from an accessible location not affected by a fire in or around the dip tank. Manual operation of drains

5.13.3.11. Where gravity flow is not practicable, automatic pumps shall be installed on drain lines from dip tanks. Automatic pumps

5.13.3.12. Where salvage tanks are used, pumping arrangements shall be provided for the transfer of their contents for disposal.

SUBSECTION 5.13.4. SALVAGE TANKS

5.13.4.1. Salvage tanks shall be used only for temporary storage purposes. Use

5.13.4.2. The capacity of a salvage tank shall be greater than the capacity of the dip tank or tanks to which it is connected. Capacity

5.13.4.3. Salvage tanks shall be located underground in the yard or inside a *building* in an enclosure separated from the remainder of the *building* by a *fire separation* having a *fire-resistance rating* of at least 2 hr. Location

SUBSECTION 5.13.5. CONTROL OF FIRE HAZARDS

5.13.5.1. Ventilation shall be provided to confine all flammable vapour concentrations exceeding 25 per cent of the *lower explosive limit* to within 2 ft of the dip tank, drain board and freshly coated work. Ventilation

5.13.5.2. Ventilating systems shall be arranged so that the failure of any ventilation fan will automatically stop all dipping conveyor systems and sound an alarm. Interlocks

5.13.5.3. The heating system used in drying operations shall be interlocked so that it cannot be started until the associated ventilation system is in operation.

5.13.5.4. Conveyor systems utilized in conjunction with dip tanks shall be designed to stop automatically with the actuation of an automatic fixed extinguishing system or a manual fire alarm. Conveyor systems

5.13.5.5. Where there is a possible source of ignition in a drying operation, interlocks shall be installed to provide for purging before the heating system can be started and for automatic shut down if the ventilation system should fail. Purging interlocks

5.13.5.6. Where *flammable* and *combustible liquids* contained in dip tanks are heated or have a *flash point* below 110°F, the electrical installation shall conform to the requirements of CSA C22.1-1975, "Canadian Electrical Code Part 1" for Class 1, Division 1 locations, and for liquids having a *flash point* above 110°F, the electrical installation shall conform to Class 1, Division 2 locations. Electrical installations

Flammable and combustible liquids

5.13.5.7.(1) Storage and handling of *flammable* and *combustible liquids* shall be in conformance with Part 4.

(2) The total number of containers for *flammable* and *combustible liquids* in a dip tank area shall not exceed that required for 1 day's operation.

Ignition sources

5.13.5.8. Open flames, spark-producing devices and heated surfaces having a temperature sufficient to ignite vapours shall not be permitted in the vapour area of a dip tank.

Signs prohibiting smoking

5.13.5.9. Signs prohibiting smoking which conform to Article 2.4.3.3. shall be posted conspicuously in the vicinity of dip tanks.

SUBSECTION 5.13.6. FIRE PROTECTION

Automatic sprinklers

5.13.6.1. Dip tanks shall be located only in rooms protected by an automatic sprinkler system installed in conformance with the National Building Code of Canada 1975.

Tank covers and extinguishing systems

5.13.6.2. Dip tanks with over 120-gal. capacity or 10 sq ft liquid surface area shall be protected by an automatic closing cover actuated by a device which also permits manual operation, or by an *approved* automatic extinguishing system of a water spray, foam, carbon dioxide or dry chemical type.

5.13.6.3. Dip tanks containing either a *flammable* or *combustible liquid* with a *flash point* less than 110°F or a heated *flammable* or *combustible liquid* giving off flammable vapours shall conform to Article 5.13.6.2. when the capacity exceeds 10 gal. or when the liquid surface area exceeds 4 sq ft.

Portable extinguishers

5.13.6.4. Areas in the vicinity of dip tanks shall be provided with portable extinguishers in conformance with Part 6.

SECTION 5.14 SPECIAL PROCESSES INVOLVING FLAMMABLE AND COMBUSTIBLE LIQUIDS

SUBSECTION 5.14.1. QUENCH TANKS

Location

5.14.1.1. Quench tanks shall be located as far as practicable from annealing, hardening and tempering furnaces and shall not be located on or near combustible floors.

Hoods and vents

5.14.1.2. Quench tanks shall be provided with a noncombustible hood and vent exhausting to the outside of the *building*.

5.14.1.3. Vents for quench tanks shall conform to the requirements for *flue pipes* in Section 2.6.

High temperature limit switches

5.14.1.4.(1) A high temperature limit switch shall be provided to sound an alarm, shut off heat and stop conveyors when a *flammable* or *combustible liquid* reaches 50°F below its *flash point* in a quench tank.

(2) The temperature-sensing element for the high temperature limit switch in Sentence (1) shall be located close to the surface of the liquid and shall be protected from damage.

Electrical installations

5.14.1.5. Electrical installations conforming to the requirements for dip tanks in Article 5.13.5.6. shall be provided for quench tanks of over 420-gal. capacity or whose liquid surface area exceeds 25 sq ft.

Air pressure

5.14.1.6. Air under pressure shall not be used to fill or agitate oil in quench tanks.

5.14.1.7. A quench tank shall be designed so that the maximum workload is incapable of raising the working temperature of the cooling medium to within 50°F of its *flash point.* Working temperatures

SUBSECTION 5.14.2. FLOW-COATING OPERATIONS

5.14.2.1.(1) The requirements in Section 5.13 for dip tanks shall also apply to flow-coating operations. Application of dip tank requirements

(2) The sump area and any area on which paint flows shall be considered as the dip tank area for purposes of these provisions.

5.14.2.2. Mechanical ventilation shall be provided at the rate of 10,000 cu ft of fresh air per gallon of solvent used. Mechanical ventilation

5.14.2.3. Ventilation shall be arranged so that the flammable vapour concentration exceeding 25 per cent of the *lower explosive limit* will be confined to within 2 ft of the paint stream and drain area, freshly coated work and the drip tunnel bottom.

5.14.2.4. The ventilation system shall be interlocked to shut down the paint supply whenever fans are stopped. Interlocks

5.14.2.5.(1) Paint shall be supplied by Paint supply

(a) direct low pressure pumping arranged to shut down automatically by means of *approved* heat-actuated devices in the event of fire, or

(b) a gravity tank not exceeding 10 gal. in capacity.

SUBSECTION 5.14.3. ROLL-COATING PROCESSES

5.14.3.1. The requirements in Section 5.13 for dip tanks shall also apply to roll-coating processes. Application of dip tank requirements

5.14.3.2. All rotating parts shall be grounded and static collectors shall be installed where the material being coated leaves each rotating part. Grounding

5.14.3.3. Operations involving large quantities of materials which have been freshly coated with a liquid containing solvents having a *flash point* less than 110°F shall be located in *sprinklered* rooms which are separated from other *occupancies* by *fire separations* having a *fire-resistance rating* of at least 2 hr. Location

SUBSECTION 5.14.4. ELECTROSTATIC SPRAYING AND DETEARING EQUIPMENT

5.14.4.1. Except for high voltage grids and their connections, all electrical components including transformers, power packs and control equipment for electrostatic spray applications or for the electrostatic removal of excess coating material (detearing) shall be located in an area where the vapour concentration of *flammable* or *combustible liquids* cannot exceed 25 per cent of the *lower explosive limit.* Equipment location

5.14.4.2. Electrostatic spraying and detearing equipment shall be provided with automatic controls that will operate without a time delay to disconnect power to high voltage transformers and to signal the operator when Interlocks

(a) stoppage of the air supply, ventilating fan or the conveyor system occurs,

(b) there is a ground at any point on the high voltage system, or

(c) clearances are reduced below those specified in Article 5.14.4.4.

5.14.4.3. All insulators shall be kept clean and dry. Insulators

5.14.4.4.(1) A space equivalent to twice the sparking distance shall be maintained between articles being painted or deteared and electrodes or conductors. Clearances

(2) A sign shall be posted near an electrical assembly stating the maximum sparking distance.

Drip plates and screens

5.14.4.5. Drip plates and screens subject to paint deposits shall be removable for cleaning.

Insulating and grounding

5.14.4.6. All high voltage components including atomizing heads shall be insulated and protected against mechanical damage and accidental contact or grounding.

5.14.4.7. An automatic means shall be provided for grounding the electrode system when it is de-energized.

Operating distances

5.14.4.8. Items being electrostatically sprayed shall not be held by hand nor shall they be suspended in such a manner as to reduce the proper operating distance from the atomizing heads.

5.14.4.9. Electrostatic spraying equipment shall be located at least 5 ft from processing equipment and shall be isolated from other areas by grounded guards and fences of conducting material.

Surface temperatures

5.14.4.10. The surface temperature of equipment in a *spraying area* shall not exceed 150°F.

Precautions against shock

5.14.4.11. High voltage circuits shall be designed so that any discharge occurring will not ignite vapour-air mixtures or create a shock hazard.

Spray guns

5.14.4.12. The energy supply to the hand spray gun shall be controlled by a switch that also controls the coating material supply.

5.14.4.13. The spray gun handle shall be grounded and shall have a metallic connection which is in direct contact with the operator's hand during spraying.

Grounding

5.14.4.14. All electrically conductive objects in the *spraying area,* including paint containers, wash cans and other objects, shall be grounded, and a sign shall be posted indicating the need for such grounding.

5.14.4.15. Hooks and other supports for sprayed items shall be kept clean and free of paint.

Warning signs

5.14.4.16. Signs designating the *spraying area* as dangerous shall be posted.

Fixed extinguishing equipment

5.14.4.17. *Spraying areas* shall be located in rooms protected by *approved* automatic fixed extinguishing equipment.

SUBSECTION 5.14.5. AUTOMOBILE UNDERCOATING

5.14.5.1. Automobile undercoating spray operations shall conform to the requirements of Section 5.12 and to the requirements in this Subsection.

Undercoating materials

5.14.5.2.(1) Automobile undercoating materials shall have a *flash point* of not less than 100°F.

(2) Where the *flash point* of an automobile undercoating is less than 140°F, it shall be applied in a work area where

(a) there are no work pits,

(b) there is a fan with nonferrous blades which provides mechanical ventilation during the application, cleaning and drying cycles at the rate of at least 2,600 cfm per work station,

(c) air movement from the air intake and exhaust system is along the length of the vehicle being undercoated, and

(d) air is exhausted at a level approximately 3 ft above the floor.

5.14.5.3. Work stations in Article 5.14.5.2. shall have no source of ignition located within 20 ft horizontally of the work area or in the area above it, and signs prohibiting smoking which conform to Article 2.4.3.3. shall be posted at the outer limits of the area. Ignition sources

5.14.5.4. Except for overhead lighting that is totally enclosed and gasketted, all electrical wiring and equipment within the area of hazard described in Article 5.14.5.3. shall conform to Article 5.1.3.2. Electrical installations

5.14.5.5. Automobile undercoating material and solvents shall be stored and handled in conformance with Part 4. Flammable and combustible materials

5.14.5.6. Portable extinguishers shall be located so that there is one 10-lb dry chemical, one 2-gal. foam or one 20-lb carbon dioxide unit immediately accessible to each work station described in Article 5.14.5.2. Portable extinguishers

5.14.5.7. All areas where automobile undercoating is used shall be kept clean of undercoating deposits and refuse, which shall be placed in covered metal containers. Refuse disposal

SUBSECTION 5.14.6. DRY POWDER FINISHING

5.14.6.1.(1) Processes involving protective finishing material applied in dry powder form by powder spray guns, by electrostatic powder spray guns, by fluidized beds or by electrostatic fluidized beds shall be performed in rooms of *noncombustible construction*, in ventilated, enclosed, powder coating facilities, or in *spray booths* conforming to Article 5.12.2.1. Location of operations

(2) Electrostatic fluidized beds and associated equipment shall be installed in conformance with good engineering practice. Installation

5.14.6.2. With the exception of charging electrodes and their connections, transformers, power packs, control apparatus and all other electrical components shall be located outside the powder coating area. Location of electrical equipment

5.14.6.3.(1) Where a part to be coated is preheated prior to the application of the powder, the temperature of the part shall not exceed the ignition temperature of the powder being used. Working temperatures

(2) The surface temperature of electrostatic fluidized bed coating areas shall not exceed 150°F.

5.14.6.4.(1) Powder transport, application and recovery equipment shall be grounded. Grounding

(2) All electrically conductive objects within the charging influence of the electrodes of electrostatic fluidized beds shall be grounded, and a sign shall be posted indicating the necessity of such grounding.

5.14.6.5. High voltage circuits in electrostatic fluidized beds shall be so designed that any discharge produced when the charging electrodes of the bed are approached or contacted by a grounded object shall not be of sufficient intensity to ignite any powder-air mixture likely to be encountered or result in any appreciable shock hazard. Electrical discharges

5.14.6.6. Separators shall be used to prevent tramp iron or other spark-producing materials from being introduced into the powders being applied. Separators

5.14.6.7. All waste air-suspended powders shall be safely removed by exhaust ducts to a powder recovery system and shall not be released to the outside atmosphere. Recovery systems

5.14.6.8. Any accumulations of waste dust from dry powder finishes shall be removed by vacuum cleaning equipment. Vacuum cleaning

Contact points

5.14.6.9. Objects being coated shall be maintained in contact with the conveyor or other support.

5.14.6.10. Hangers for objects being coated shall be kept clean and areas of contact with such objects shall have sharp points or edges.

Signs prohibiting smoking

5.14.6.11. Signs prohibiting smoking which conform to Article 2.4.3.3. shall be conspicuously posted at all powder coating areas and powder storage rooms.

SUBSECTION 5.14.7. ORGANIC PEROXIDES AND DUAL COMPONENT COATINGS

Location of spraying operations

5.14.7.1. All spraying operations involving the use of organic peroxides and other dual component coatings shall be conducted in *sprinklered spray booths* as described in Section 5.12.

Initiator storage

5.14.7.2. Organic peroxide initiators shall be stored so that they will be kept away from contact with all other stored materials.

Handling equipment

5.14.7.3. Handling equipment, including spray guns, which are specifically designed for use with organic peroxides shall be used to apply such coatings.

Containers

5.14.7.4. Separate containers shall be used exclusively for the storage of resin and organic peroxide.

Pressure tank inserts

5.14.7.5. Organic peroxide pressure tank inserts shall be constructed of stainless steel, polyethylene or material that is equally inert to organic peroxide.

Elimination of foreign material

5.14.7.6. Precautions shall be taken to prevent any mixing of foreign materials with dusts or overspray residues resulting from the sanding or spraying of finishing materials containing organic peroxides.

Absorbents

5.14.7.7. Noncombustible absorbents shall be used to remove peroxide spills, and such absorbents shall be disposed of in an *approved* manner.

Handling

5.14.7.8. Organic peroxides shall be handled in conformance with Sections 5.8 and 5.9.

Daily use

5.14.7.9. Quantities of organic peroxides shall be withdrawn only as required on a daily basis, and unused material shall be disposed of on the completion of the day's work.

Ignition sources

5.14.7.10. Organic peroxides shall not be permitted to come in contact with ignition sources such as heating surfaces, open flames and sparks or be subjected to solar radiation.

Shock

5.14.7.11. Organic peroxides shall not be subjected to shock or friction during handling.

Catalysts

5.14.7.12. Organic peroxides shall not be mixed directly with any catalyst.

Ignition sources

5.14.7.13. Where organic peroxides are stored, mixed or applied, only nonsparking tools shall be used, and signs prohibiting smoking which conform to Article 2.4.3.3. shall be prominently displayed.

Trained personnel

5.14.7.14. Only trained personnel shall work with organic peroxides.

SECTION 5.15 RADIOACTIVE MATERIALS

SUBSECTION 5.15.1 APPLICATION

5.15.1.1. This Subsection applies to the storage and handling of radioactive material that emits ionizing radiation and that is present in quantities in excess of the "scheduled quantity" as defined in Appendix A of the federal "Atomic Energy Control Regulations."

SUBSECTION 5.15.2. STORAGE AND USE

5.15.2.1. Radioactive materials and equipment shall be returned to storage after use. Use

5.15.2.2. Radioactive materials shall be stored in the containers used for their transportation. Storage

5.15.2.3. Radioactive materials and equipment shall not be stored with flammable or corrosive materials.

SUBSECTION 5.15.3. EMERGENCY PROCEDURES

5.15.3.1. Persons using or storing radioactive materials shall establish fire emergency procedures in consultation with the public fire department including

(a) the location and identification of storage and use areas,

(b) methods to control a fire emergency and to recover radioactive materials and equipment containing radioactive materials safely and efficiently,

(c) the names, addresses and telephone numbers of primary and alternative sources of expert radiation safety advice and assistance, and

(d) the location of primary and alternative sources of radiation survey instruments.

SECTION 5.16 FUMIGATION AND THERMAL INSECTICIDAL FOGGING

SUBSECTION 5.16.1. APPLICATION

5.16.1.1.(1) This Section applies to the fumigation or thermal insecticidal fogging of *buildings,* including the fumigation of equipment or commodities within structures, tanks, bins or under tarpaulins.

(2) Industries that conduct frequent fumigation operations on a routine basis need not conform to the requirements in Articles 5.16.2.1. and 5.16.2.2. where prior approval to undertake such operations has been obtained from the *authority having jurisdiction.* Exceptions

SUBSECTION 5.16.2. SAFETY PRECAUTIONS

5.16.2.1. Except as permitted in Sentence 5.16.1.1.(2), the public fire department shall be notified in writing at least 24 hr before any *building* is to be closed for fumigation and shall be advised of the chemicals to be used, the proposed date and time of use, types of respiratory protective devices required and the degree of flammability of the fumigant or fog being used. Notification of fire department

5.16.2.2. Except as permitted in Sentence 5.16.1.1.(2), the occupants of any premises adjacent to that in which fumigation or thermal insecticidal fogging is to take place shall be given prior notice. Notification of neighbours

5.16.2.3. All flames and other sources of ignition shall be eliminated in a *building* undergoing fumigation or thermal insecticidal fogging. Ignition sources

5.16.2.4. Electric power supply shall be shut off to the premises undergoing fumigation or thermal insecticidal fogging. Power supply

5.16.2.5. The air temperature in the *building* undergoing fumigation or thermal insecticidal fogging shall be kept sufficiently low to prevent the actuation of any sprinkler system. Air temperature

Breathing apparatus

5.16.2.6. Protective breathing apparatus shall be made available at the premises undergoing fumigation or thermal insecticidal fogging.

Restricted entrance

5.16.2.7.(1) No person shall be permitted to enter a premise undergoing fumigation or thermal insecticidal fogging until the premise has been ventilated and is safe for human occupancy.

(2) Warning signs shall be posted in a conspicuous location near every entrance to the premises being fumigated.

Watchmen

5.16.2.8. During the period fumigation or thermal insecticidal fogging is in progress, one watchman shall be on duty at each entrance to premises being fumigated to prevent any person from entering until such premises have been ventilated in conformance with Sentence 5.16.2.7.(1).

SECTION 5.17 WELDING AND CUTTING

SUBSECTION 5.17.1. GENERAL

5.17.1.1. The protection of persons and property from injury or damage by fire or other causes arising from electric and gas welding and cutting equipment, its installation, operation and maintenance, shall conform to CSA W117.2-1974, "Code for Safety in Welding and Cutting," and to the requirements in this Section.

SUBSECTION 5.17.2. USE AND MAINTENANCE OF EQUIPMENT

Fuel gases

5.17.2.1. The operation of acetylene generating systems and the storage and generation of welding fuel gases shall conform to NFPA 51-1974, "Oxygen-Fuel Gas Systems for Welding and Cutting," Chapter 6.

Piping

5.17.2.2. Acetylene gas shall not be piped through copper tubing or piping.

Cylinder storage

5.17.2.3. Cylinders stored inside *buildings* shall conform to the requirements in Section 5.6.

5.17.2.4. Gas fuel cylinders, whether full or empty, whose valves are not in a recessed or protected location shall have their caps in place and their valves tightly closed when in storage.

Damaged equipment

5.17.2.5. Torches, regulators, hoses and other oxyacetylene welding and cutting equipment which have been damaged shall not be used.

Leak testing

5.17.2.6. All equipment in use shall be examined daily for defects, and welding and cutting equipment shall be tested for leaks with an *approved* leak test solution.

Equipment not in use

5.17.2.7. All valves shall be closed and lines bled when equipment is not in actual use.

5.17.2.8. Oil or grease shall not be used for lubrication of welding and cutting equipment.

SUBSECTION 5.17.3. PREVENTION OF FIRES

Location of operations

5.17.3.1.(1) Except as provided in Sentence (2), welding and cutting operations in *buildings* shall be carried out in areas free of combustible and flammable contents, with walls, ceilings and floors of *noncombustible construction* or lined with noncombustible materials.

(2) When it is not practicable to undertake welding and cutting operations in areas described in Sentence (1), combustible and flammable materials shall either be removed at least 35 ft from the work area or otherwise protected against ignition by sheet metal, asbestos blankets or other noncombustible material.

5.17.3.2. When welding or cutting is to be carried out near piping containing flammable gas, the section of the piping located within 3 ft of the torch shall be covered with wet noncombustible insulating material at least ¼ in. thick.

Work adjacent to piping

5.17.3.3.(1) Welding or cutting of metal containers shall not be undertaken until all containers and all compartments within such containers have been cleaned of flammable and combustible materials and checked with an *approved* explosion meter.

Work on containers

(2) Welding or cutting operations shall not be undertaken on a totally enclosed container.

PART 6

INSTALLATION, INSPECTION, TESTING, MAINTENANCE AND OPERATION OF FIRE PROTECTION EQUIPMENT

TABLE OF CONTENTS

SECTION 6.1 GENERAL

SUBSECTION 6.1.1. SCOPE

Scope

6.1.1.1. This Part provides for the installation inspection, testing, maintenance and operation of portable extinguishers and the inspection, testing, maintenance and operation of fire alarm systems, standpipe and hose systems, automatic sprinkler systems, special extinguishing systems, water supplies for fire protection and emergency power installations. (See also Part 7.)

Specialized installations

6.1.1.2. Specialized fire protection installations shall be inspected, tested, maintained and operated in accordance with *approved* standards.

Maintenance

6.1.1.3. Fire protection installations shall be maintained in operating condition.

Notification

6.1.1.4. Where tests, repairs or alterations are made to fire protection installations, the *authority having jurisdiction,* the fire department and the *building* occupants shall be notified.

SECTION 6.2 PORTABLE EXTINGUISHERS

SUBSECTION 6.2.1. GENERAL

6.2.1.1. The requirements of this Section are in addition to the requirements specified elsewhere in this Code.

(Guidance for the selection, purchasing, installation, approval and design of portable extinguishers is found in NFPA 10-1974, "Installation, Maintenance and Use of Portable Fire Extinguishers." This standard also provides guidance for the inspection, recharging, maintenance, testing and operation of portable extinguishers.)

6.2.1.2. A portable extinguisher shall not be installed unless it is *approved.*

Maintenance

6.2.1.3. Portable extinguishers shall be kept operable and fully charged.

Location

6.2.1.4. Portable extinguishers shall be located so that they are easily seen and shall be accessible at all times.

6.2.1.5. Portable extinguishers shall be located in or adjacent to corridors or aisles that provide *access to exits.*

6.2.1.6. In large *floor areas* and in locations where visual obstructions cannot be avoided, the location of portable extinguishers shall be prominently indicated.

6.2.1.7. Portable extinguishers in proximity to a fire hazard shall be located in an *approved* position so as to be accessible without exposing the operator to undue risk.

(Prominent cautionary labels on portable extinguishers, warning signs at entry points to confined spaces, provisions for remote application, extra-long-range extinguisher nozzles, special ventilation, provision of breathing apparatus and other personal protective equipment and the adequate training of personnel are among measures to be considered to minimize hazards.)

Instructions

6.2.1.8. All instructions for operating, maintaining and recharging portable extinguishers shall be permanently fixed to each unit.

Identification markings

6.2.1.9. Where identification markings are applied to a portable extinguisher to designate its class, such markings shall be located on the front of the shell above or below the extinguisher nameplate and shall be of a size and form to be identifiable at a distance of 3 ft.

Signs

6.2.1.10. A sign identifiable at a distance of 25 ft indicating the location and class of a portable extinguisher shall be installed in a fixed location in the vicinity of the extinguisher.

Temperature range requirements

6.2.1.11.(1) Where a portable extinguisher is to be located in an area subject to temperatures outside the range 40°F to 120°F

(a) it shall be placed in an enclosure where the temperature is maintained within this range, or

(b) it shall be of a type *approved* for the temperatures to which it will be exposed.

Corrosive atmospheres

6.2.1.12. Portable extinguishers subject to damage in a corrosive atmosphere shall not be installed where such an atmosphere exists without providing appropriate corrosion protection for the extinguisher.

Mounting brackets

6.2.1.13. When portable extinguishers are located on vehicles or in areas where they are subject to jarring or vibration, brackets designed to accommodate these effects shall be used.

Type restrictions

6.2.1.14. Portable extinguishers shall be of a type that does not constitute a hazard to health and safety in its maintenance and use.

Leaking or damaged extinguishers

6.2.1.15. Extinguisher shells, cartridges or cylinders which show leakage or permanent distortion in excess of specified limits, or which rupture, shall be removed from service.

SUBSECTION 6.2.2. CLASSIFICATION

6.2.2.1. For the purposes of this Section, fires are identified as *Class A, Class B, Class C* and *Class D fires.*

(Certain combustible metals and reactive chemicals require special extinguishing agents or techniques. NFPA 49-1972, "Hazardous Chemicals Data," may be used as a guide regarding such agents or techniques. Chemical reactions between burning metals and many extinguishing agents may cause explosions or increase the intensity of the fire, depending on the type, form and quantity of metal involved and the extinguishing agent used. Techniques for extinguishing fires in various metals are subject to the approval of the authority having jurisdiction.)

Rating of extinguishers

6.2.2.2. Portable extinguishers shall be rated and identified in conformance with ULC-S508-1975, "Classification, Rating and Fire Testing of Class A, B and C Fire Extinguishers and for Class D Extinguishers or Agents for Use on Combustible Metals."

SUBSECTION 6.2.3. SELECTION REQUIREMENTS

Multiple ratings

6.2.3.1. Where portable extinguishers have been tested and are rated as being acceptable for fighting more than one class of fire, each class of fire for which they are acceptable shall be designated on each extinguisher.

(Extinguishers equipped with metal extensions are not considered safe for use on fires in energized electrical equipment and, therefore, should not be used for fighting Class C fires.)

Extinguishers for Class D fires

6.2.3.2. Portable extinguishers and extinguishing agents for fighting *Class D fires* shall be of types *approved* for use on the specific combustible metal hazard.

SUBSECTION 6.2.4. INSTALLATION REQUIREMENTS

Where required

6.2.4.1. Except within *dwelling units, approved* portable extinguishers shall be installed in every *building.*

Distance above floor

6.2.4.2. Portable extinguishers with a gross weight greater than 40 lb shall be installed so that the top of the extinguisher is not more than 3½ ft above the floor when the extinguisher is not equipped with wheels.

6.2.4.3. Portable extinguishers having a gross weight of 40 lb or less shall be installed so that the top of the extinguisher is not more than 5 ft above the floor.

(Where portable extinguishers are provided, they should be of a size and weight suitable for use by those persons who are expected to use them.)

6.2.4.4. The bottom of a portable extinguisher shall be located at least 4 in. above the floor surface.

6.2.4.5. The operating instructions of portable extinguishers shall face outward when such extinguishers are located in cabinets, in wall recesses or on shelves. Operating instructions

SUBSECTION 6.2.5. GRADING OF HAZARDS

6.2.5.1. Where the quantity of combustible material present is such that fires of small size may be expected, such as in offices, schoolrooms, churches, assembly halls and telephone exchanges, the *occupancy* shall be graded as light hazard. Light hazard occupancy

6.2.5.2. Where the quantity of combustible material present is such that fires of moderate size may be expected, such as in *mercantile occupancies,* display rooms, auto showrooms, parking garages, light manufacturing, warehouses not classified as extra hazard and school shop areas, the *occupancy* shall be graded as ordinary hazard. Ordinary hazard occupancy

6.2.5.3. Where the quantity of combustible material present is such that fires of severe magnitude may be expected, such as in woodworking, auto repair, aircraft servicing, mercantile storage areas, warehouses with high-piled combustibles and processes incorporating *flammable liquids,* the *occupancy* shall be graded as extra hazard. Extra hazard occupancy

SUBSECTION 6.2.6. DISTRIBUTION

6.2.6.1. Portable extinguishers shall be provided for the protection of the *building* structure and *occupancy* hazards in conformance with this Subsection and as specified elsewhere in this Code.

6.2.6.2. Portable extinguishers provided for *building* protection shall be suitable for fighting *Class A fires* and be available for use at all times. Building protection

6.2.6.3. Portable extinguishers provided for *occupancy* hazard protection shall be suitable for fighting *Class A, B, C* or *D fires.* Occupancy protection

6.2.6.4. Where it is apparent that intense fires may occur because of the character or quantity of combustibles, the *authority having jurisdiction* may require additional portable extinguishers suitable for the high hazard in addition to those required by this Subsection. Additional extinguishers

(The anticipated rate of fire spread, the intensity and rate of heat development, the smoke contributed by the burning materials and the approachability of a fire with portable extinguishers are factors that are taken into consideration. Wheeled extinguishers contain additional agent, have greater range and provide additional protection where this is needed.)

6.2.6.5. Except as required in Article 6.2.6.6., portable extinguishers for *Class A fires* shall be provided in conformance with Table 6.2.6.A. Extinguishers for Class A fires

6.2.6.6. Where a *floor area* is less than that shown in Table 6.2.6.A., at least 1 portable extinguisher not less than the minimum size permitted shall be provided per *storey*, except within *dwelling units.*

Table 6.2.6.A.
Forming part of Article 6.2.6.5.

Basic Minimum Extinguisher Rating for Area Specified (1)	Maximum Travel Distance to Extinguisher, ft	Maximum Area to Be Protected per Extinguisher for *Class A Fires*, sq ft		
		Light Hazard *Occupancy*(2)	Ordinary Hazard *Occupancy*(2)	Extra Hazard *Occupancy*(2)
1A	75	3,0123	(3)	(3)
2A	75	6,0123	3,0123	(3)
3A	75	9,0123	4,5123	3,0123
4A	75	11,250	6,0123	4,0123
6A	75	11,250	9,0123	6,0123
10A	75	11,250	11,250	9,0123
20A	75	11,250	11,250	11,250
40A	75	11,250	11,250	11,250
Column 1	2	3	4	5

Notes to Table 6.2.6.A.:
(1) As determined in Article 6.2.2.2.
(2) Graded in conformance with Subsection 6.2.5.
(3) Not permitted, except as *approved*.

Hose stations in lieu of extinguishers

6.2.6.7. Up to ½ of the number of portable extinguishers required per *floor area* in Table 6.2.6.A. may be replaced by hose stations equipped with at least 75 ft of hose conforming to CGSB 20-GP-12a(1970), "Hose, Water: Braided or Knit Reinforcing," connected to an *approved* water supply and spaced so that the travel distance to the nearest hose does not exceed 75 ft.

6.2.6.8. The water supply piping and hose serving the hose stations referred to in Article 6.2.6.7. shall be at least ¾-in. diam. and the hose shall be equipped with an *approved* combination water-spray nozzle.

Extinguishers for Class B fires

6.2.6.9. Except as provided in Article 6.2.6.10., portable extinguishers for *Class B fires* shall be provided as required in Table 6.2.6.B.

6.2.6.10. Not more than 3 foam-type portable extinguishers rated for *Class B fires* may be used to satisfy the extinguisher rating specified in Table 6.2.6.B. provided the sum of the basic extinguisher ratings satisfies the requirements in Table 6.2.6.B.

Extinguishers for flammable and combustible liquids in open containers

6.2.6.11. Except as provided in Article 6.2.6.16., portable extinguishers for *Class B fires* shall be provided for *flammable* and *combustible liquid* hazards when such *flammable* or *combustible liquids* are stored in open containers to a depth greater than ¼ in., on the basis of at least 1 numerical unit of extinguishing potential for *Class B fires* per square foot of surface area of the largest open container within the area.

6.2.6.12. Not more than 3 foam-type extinguishers rated for *Class B fires* may be used to satisfy the requirements of Article 6.2.6.11. provided the total extinguishing potential is met.

Table 6.2.6.B.
Forming part of Article 6.2.6.9.

Grade of Hazard (1)	Basic Minimum Extinguisher Rating per Unit	Maximum Travel Distance to Extinguishers, ft
Light	5B 10B	30 50
Ordinary	10B 20B	30 50
Extra	20B 40B	30 50
Column 1	2	3

Note to Table 6.2.6.B.:
(1) Graded in conformance with Subsection 6.2.5.

6.2.6.13. Portable extinguishers shall be supplemented by other *approved* fire protection where a *flammable* or *combustible liquid* is stored in an open container so that the liquid surface area exceeds 4 sq ft unless personnel fully trained in extinguishing fires in such liquids are available on the premises. — Supplementary protection

6.2.6.14. Where trained personnel are not available, *flammable* or *combustible liquids* in open containers which have a surface area greater than 4 sq ft shall be protected by an *approved* fixed extinguishing system. — Fixed extinguishing systems

6.2.6.15. Alkali base powder portable extinguishers shall be provided to protect commercial cooking equipment. — Extinguishers for commercial cooking equipment

6.2.6.16. Except as provided in Article 6.2.6.17., where *approved* automatic fire protection systems have been installed for a *flammable* or *combustible liquid* hazard, additional extinguishers for *Class B fires*, as required in Article 6.2.6.11., may be waived by the *authority having jurisdiction.* — Waiver of portable extinguisher requirement

6.2.6.17. Where *approved* fixed extinguishing systems are provided, extinguishers for *Class B fires* shall be provided in conformance with Table 6.2.6.B. to protect areas adjacent to the *flammable* or *combustible liquid* hazards described in Article 6.2.6.11. — Protection of areas adjacent to flammable or combustible liquid hazards

(Pressurized flammable or combustible liquid and pressurized gas fires are considered to be a special hazard. Extinguishers for Class B fires are relatively ineffective for this type of fire. Selection of portable extinguishers for this type of fire is made on the basis of approval by the authority having jurisdiction. Specifically designed equipment and extinguishing agents are necessary to cope with such hazards. It is undesirable to attempt to extinguish this type of fire unless the source of fuel can be promptly shut off.)

6.2.6.18. Portable extinguishers for *Class C fires* shall be provided for fires in or near electrical equipment. — Extinguishers for Class C fires

6.2.6.19. Distribution of portable extinguishers for *Class C fires* shall conform to the applicable provisions for the distribution of extinguishers for *Class A* or *Class B fires* in the vicinity of the electrical equipment. — Distribution

SUBSECTION 6.2.7. INSPECTION, TESTING AND MAINTENANCE

6.2.7.1. Except as otherwise required in this Section, maintenance and testing of portable extinguishers shall be in conformance with NFPA 10-1974, "Installation, Maintenance and Use of Portable Fire Extinguishers."

Monthly examinations

6.2.7.2. Portable extinguishers shall be examined monthly to ensure that the extinguisher is in its proper location and has no apparent defects.

Defective extinguishers

6.2.7.3. Portable extinguishers having defects shall be repaired or recharged where necessary to ensure the extinguisher will operate effectively and safely.

Maintenance records

6.2.7.4. A permanent record containing the maintenance check date, the examiner's name and a description of any maintenance work or hydrostatic testing carried out shall be prepared and maintained for each portable extinguisher.

Tags

6.2.7.5. Each portable extinguisher shall have a tag securely attached to it showing the maintenance or recharge date, the servicing agency and the signature of the person who performed the service.

6.2.7.6. Where a portable extinguisher is serviced by persons employed by a licensed agent or by an owner with a permit to do so, the tag on the extinguisher shall show the licence or permit number.

Maintenance after use

6.2.7.7. After use, portable extinguishers shall be replaced and recharged in conformance with *approved* instructions given on the extinguisher nameplate.

Maintenance for dry chemical extinguishers

6.2.7.8. Except for non-refillable factory-sealed disposable containers, pressurized dry-chemical portable extinguishers that require a 12-year hydrostatic test shall be emptied and subjected to the prescribed maintenance procedures at intervals of not more than 6 years.

Powder and sand storage

6.2.7.9. Pails or drums of powder extinguishing agents or sand for metal fires shall be kept full and dry at all times.

(Damp or wet extinguishing powder or sand will not be free flowing and may cause a hazardous reaction if applied to certain metal fires.)

Recharging materials

6.2.7.10. Portable extinguishers shall be recharged only with the materials specified on the extinguisher nameplate.

(The use of recharging materials other than the prescribed type may impair the efficiency of the extinguisher, cause malfunction or result in its rupture. Some recharging materials deteriorate with age or exposure to excessive temperature or moisture, so that the storage of such recharging materials for long periods should be avoided.)

Pressure tests of extinguishers

6.2.7.11. When a portable extinguisher shows evidence of corrosion or mechanical damage, it shall be subjected to a hydrostatic pressure test in conformance with NFPA 10-1974, "Installation, Maintenance and Use of Portable Fire Extinguishers," or be replaced.

6.2.7.12. Except as provided in Articles 6.2.7.13. and 6.2.7.14., portable extinguishers shall be hydrostatically tested at intervals of not more than 5 years, except when otherwise *approved* for testing at less frequent intervals.

6.2.7.13. Portable extinguishers utilizing nitrogen or other inert gas shall be tested at intervals of not more than 10 years.

6.2.7.14. Hydrostatic pressure tests are not required on pump-type extinguishers using water or antifreeze and factory-sealed nonrefillable containers.

6.2.7.15. Retests shall be conducted at the original *approved* test pressure as stated on the nameplate.

6.2.7.16. Portable extinguishers equipped with a shutoff nozzle at the outlet of the hose shall have the hose with its couplings pressure-tested at a pressure of at least 300 psig for 1 min. for dry chemical and dry powder hose assemblies, and at 1,250 psig for 1 min. for carbon dioxide hose assemblies, at intervals *approved* for the unit on which the hose is installed. Pressure tests of hoses

6.2.7.17. A label shall be fixed to the extinguisher after testing indicating the month and year the hydrostatic pressure test was performed and including the test pressure used and the name of the person or agency performing the test. Test labels

SECTION 6.3 FIRE ALARM AND DETECTION SYSTEMS

SUBSECTION 6.3.1. MAINTENANCE

6.3.1.1. Fire alarm and detection system components shall be maintained at all times in operating condition by qualified personnel.

6.3.1.2. Access to fire alarm and detection system components requiring inspection or servicing shall be kept unobstructed. Access

SUBSECTION 6.3.2. INSPECTION AND TESTING

6.3.2.1. Unless otherwise specified, all components of a fire alarm and detection system shall be inspected and tested by qualified personnel at intervals of not more than 6 months for an electrically supervised system, and monthly for a system that is not electrically supervised. Intervals between tests

6.3.2.2. Details of inspections and tests shall be subject to the approval of the *authority having jurisdiction.*

6.3.2.3. *Approved* records shall be kept of the installation, maintenance, testing, failures, repairs and extension of any required fire alarm and detection system. Records

6.3.2.4. Automatic fire and smoke detection devices shall be tested in conformance with Articles 6.3.2.5. to 6.3.2.8. Detection devices

6.3.2.5. Where nonrestorable, spot-type heat detectors are used, at least 2 detectors out of every 100 or fraction thereof shall be removed and tested at an *approved* testing laboratory in the fifteenth year and every fifth year thereafter, and replaced with new detectors. Nonrestorable spot-type heat detectors

6.3.2.6. If any of the detectors fail when tested as required in Article 6.3.2.5., a sufficient number of additional detectors shall be removed and tested to ensure that all faults in the detector system are corrected.

6.3.2.7. Pneumatic line-type detectors shall be tested for leaks and proper operation at intervals of not more than 6 months. Pneumatic line-type detectors

6.3.2.8. Line-type fixed-temperature detectors shall have their loop resistance measured and recorded in the control cabinet at intervals of not more than 6 months. Line-type fixed-temperature detectors

6.3.2.9. Manual fire alarm boxes shall be tested at intervals of not more than 6 months. Manual fire alarm boxes

6.3.2.10. Except as provided in Article 6.3.2.11., tests for ground faults between ground and each side of each circuit in a fire alarm and detection system shall be made at least monthly. Control panel testing

6.3.2.11. Where fire alarm and detection system control panels are equipped with audible and visual ground detection equipment, the test required in Article 6.3.2.10. need not be performed, but the ground fault detection alarm equipment shall be tested at intervals of not more than 6 months.

Battery testing

6.3.2.12. Except as provided in Article 6.3.2.13., battery-terminal voltage shall be tested at least monthly at the maximum required amperage.

6.3.2.13. Where fire alarm and detection system control panels are equipped with audible and visual battery alarms, the test described in Article 6.3.2.12. need not be performed, but the battery alarm equipment shall be tested at intervals of not more than 6 months.

6.3.2.14. Batteries powering any fire alarm and detection system shall be tested at intervals of not more than 12 months and be shown to be capable of supplying the power for the fire alarm system for a period of 2 hr and then be capable of providing power for sounding the general alarm for 5 min.

6.3.2.15. During the period of testing for batteries as required by Article 6.3.2.14., a person familiar with the operation of the system shall be on duty to determine if the system is in danger of interruption through failure of the battery or any of its components.

6.3.2.16. Tests on fire alarm and detection systems having standby battery power shall be carried out by simulating failure of the normal power supply to the system.

Battery replacement

6.3.2.17. Wet-cell batteries providing power for fire alarm and detection systems shall be replaced when the voltage under maximum load has reached the minimum rated discharge voltage.

SECTION 6.4 STANDPIPE AND HOSE SYSTEMS

SUBSECTION 6.4.1. GENERAL

6.4.1.1. During alteration or demolition of a *building* required to have a standpipe and hose system, the system shall be installed or dismantled progressively so as to provide protection to all *floor areas*.

Out-of-service requirements

6.4.1.2. When a standpipe is to be out of service, prior notice shall be given to the fire department, and a sign shall be posted on each fire department connection indicating that the standpipe is out of service.

Piping identification

6.4.1.3. When piping for standpipe and hose systems is identified or colour coded, such identification shall conform to CGSB 24-GP-3a(1967), "Identification and Classification of Piping Systems."

SUBSECTION 6.4.2. MAINTENANCE AND INSPECTION OF HOSE CABINETS AND EQUIPMENT

Hose cabinets

6.4.2.1. Hose cabinets shall be inspected monthly to ensure that the hose is in proper position and that all of the equipment is in place and in operable condition.

6.4.2.2. Standpipe hose cabinets shall be used for fire protection equipment only.

6.4.2.3. Standpipe hose cabinets shall be conspicuously identified.

Hose valves

6.4.2.4. Hose valves shall be examined annually to ensure that they are tight.

(Leakage at the hose valves may be detected by inspection of the drips at the valves, and care should be taken to see that these drips are not clogged.)

6.4.2.5. Standpipe hose shall be removed and re-racked annually and after use, and any worn gaskets in the couplings at the hose valves and at the nozzle replaced. Hose

(Where couplings are polished, care shall be taken to see that the polish used does not touch the hose fabric. For further details, see NFPA 198-1969, "Care of Fire Hose.")

6.4.2.6. Each hose connection in a dry standpipe system shall be provided with a legible weatherproof sign designating that it is a dry standpipe for fire department use only. Dry standpipe identification

SUBSECTION 6.4.3. TESTING

6.4.3.1. Standpipe systems that have been modified, extended or are being restored to service after a period of disuse exceeding 1 year shall be tested in conformance with Articles 6.4.3.2. to 6.4.3.6. and, where standpipe connections are built in walls or *partitions*, the tests shall be made before the standpipes are concealed. Standpipe systems

6.4.3.2. Standpipe system piping shall be hydrostatically tested at a pressure of not less than 200 psig for 2 hr, or at 50 psig in excess of the normal hydrostatic pressure when the normal hydrostatic pressure is in excess of 150 psig.

6.4.3.3. Piping between the fire department connection and the check valve in the inlet pipe to the standpipe shall be tested in the same manner as the remainder of the system. Fire department connections

6.4.3.4. Underground mains and connections shall be tested for 2 hr at a hydrostatic pressure of 50 psig in excess of the maximum hydrostatic pressure in service but not less than 200 psig, and leakage shall not exceed 2 qt per hour per 100 joints for pipe laid with rubber gasketted joints, and 1 oz. per hour per inch of pipe diameter per joint for pipe laid with caulked lead or lead substitute joints. Underground mains

6.4.3.5. The leakage in underground piping shall be measured at the specified test pressure by pumping from a calibrated container.

6.4.3.6. *Approved* flow and pressure tests shall be conducted at the highest and most remote hose valve or hose connection to ensure that the water supply for standpipes is in conformance with the National Building Code of Canada 1975. Flow and pressure tests

6.4.3.7. Standpipe system piping which normally remains dry shall be tested in conformance with Article 6.4.3.2. at intervals of not more than 5 years. Dry standpipes

SECTION 6.5 AUTOMATIC SPRINKLER SYSTEMS

SUBSECTION 6.5.1. GENERAL

6.5.1.1. Sprinkler control valves shall not be closed in the event of a fire until the fire is extinguished or is considered to be under control by other means, as determined by the fire department. Closing sprinkler control valves

6.5.1.2. Changes in equipment or *occupancy* which might result in temperatures at sprinklers being more than 100°F or less than 40°F with wet pipe systems shall not be made without previously making provisions to alter the sprinkler system to prevent premature operation or freezing. Changes in equipment or occupancy

6.5.1.3. Sections of sprinkler systems subject to freezing shall be converted to a dry pipe or antifreeze system with a separate control valve for that part of the system. Precautions against freezing

6.5.1.4. No obstructions such as *partitions*, racks or piled stock shall be placed so as to interfere with the effectiveness of water discharge from spinklers. Obstructions

6.5.1.5. Sprinklers shall be protected by *approved* sprinkler guards where there is the possibility of mechanical damage. Sprinkler guards

SUBSECTION 6.5.2. SPRINKLER SYSTEM SHUTDOWNS

Notification

6.5.2.1. When any alterations, additions or repairs are to be made involving interruption to sprinkler protection, the fire department and any other *authority having jurisdiction* shall be advised in advance of such changes.

6.5.2.2. Sprinkler control valves and sprinkler water supplies shall not be shut down, disconnected or otherwise impaired without notifying the owner or his agent and obtaining prior approval from the *authority having jurisdiction* and the fire department.

Programmed repairs

6.5.2.3. Where operations require the temporary shutting down of sprinkler protection, such operations shall be programmed by the contractor working on the system to enable completion in the shortest possible time, and protection shall be restored as promptly as possible.

Additional protections during shutdowns

6.5.2.4. During an interruption of normal sprinkler protection, emergency hose lines and portable extinguishers shall be provided, extra watch service shall be placed on duty and temporary water connections shall be made to the sprinkler systems where practicable.

6.5.2.5. Full sprinkler protection shall be restored or the provisions of Article 6.5.2.4. maintained when work on the system is discontinued, as at night time or during holidays.

Identification of closed valves

6.5.2.6. Closed sprinkler control valves shall be tagged or identified in a manner acceptable to the fire department.

SUBSECTION 6.5.3. TESTING

Notification

6.5.3.1. Prior notification of waterflow or other tests to be made to a sprinkler system shall be given to all parties who could be affected by an alarm.

Water flow alarm tests

6.5.3.2. On wet sprinkler systems waterflow alarm tests using the most hydraulicly remote test connection shall be performed monthly.

6.5.3.3. On dry sprinkler systems waterflow alarm tests using the alarm test connection located at the dry-pipe valve shall be performed monthly.

Records

6.5.3.4. An *approved* record shall be kept of all tests and operations of each system, and this record shall be available for examination by the *authority having jurisdiction.*

Electrical supervisory signal testing

6.5.3.5.(1) Where an electrical supervisory signal service is provided for a sprinkler system, such service shall be tested by qualified personnel so that tests are made of all initiating and transmitting devices in conformance with Sentences (2) and (3).

(2) All transmitters and water flow actuated devices shall be tested at 2-month intervals.

(3) Gate-valve supervisory switches, tank water level devices, *building* and tank water temperature supervisory devices and other sprinkler system supervisory devices shall be tested at intervals of not more than 6 months.

Alterations to sprinkler systems

6.5.3.6. Sprinkler systems shall be tested in conformance with Articles 6.5.3.7. to 6.5.3.16. when alterations are made to existing systems.

Flushing of mains

6.5.3.7. When required in Article 6.5.3.6. underground mains and lead-in connections shall be flushed for sufficient time to remove foreign material using a minimum water flow as specified in Table 6.5.3.A.

Table 6.5.3.A.
Forming part of Article 6.5.3.7.

Size of Pipe, in.	Minimum Flow, gpm
6	5123
8	850
10	1,2123
12	1,7123
Column 1	2

6.5.3.8. All underground mains and connections shall be subjected to a 2-hr hydrostatic pressure test of 50 psig in excess of the maximum static pressure, but not less than 200 psig; and leakage shall not exceed 2 qt per hour per 100 joints for pipe laid with rubber gasketted joints, and 1 oz. per hour per inch of pipe diameter per joint for pipe laid with caulked lead or lead substitute joints. Pressure testing of underground mains

6.5.3.9. Except as permitted in Article 6.5.3.11., the sprinkler system shall be subjected to a hydrostatic pressure test of 200 psig, or 50 psig in excess of the maximum static pressure to which the system may be subjected if in excess of 150 psig, for a period of 2 hr without loss of pressure. Pressure testing of sprinkler systems

6.5.3.10. For dry-pipe systems the clapper of the differential type dry-pipe valve shall be held off its seat, and the ball drip in the intermediate chamber shall be replaced by a plug during the test. Dry-pipe system testing

6.5.3.11. At seasons of the year that will not permit hydrostatic pressure testing, the sprinkler system shall be pressure tested with air at 50 psig for 2 hr without loss of pressure, and the tests described in Articles 6.5.3.8. and 6.5.3.9. performed when hydrostatic pressure testing can be performed without danger of freezing. Air testing

6.5.3.12. Sprinkler system water pressure shall be tested with the main drain valve fully open. Drain testing

6.5.3.13. Drainage facilities shall be tested to ensure that the drains are capable of taking the full flow from the main drain pipe without overflowing.

6.5.3.14. Dry-pipe valves shall be tested to ensure that they are in operative condition. Dry-pipe valve testing

6.5.3.15. All mechanical and electrical alarms shall be tested to ensure that they are in operative condition. Alarm testing

6.5.3.16. If any device in a sprinkler system does not operate properly on test, it shall be repaired or replaced. Defective devices

SUBSECTION 6.5.4. MAINTENANCE

6.5.4.1. Except for electrically supervised valves, all valves controlling water supplies to sprinklers and alarm connections shall be checked weekly to ensure that they are in the open position. Sprinkler control valves

6.5.4.2. Sprinkler control valves shall be accessible and maintained in operable condition at all times.

6.5.4.3. Pits containing sprinkler control valves shall be kept free of water and protected against freezing.

6.5.4.4. After any sprinkler system control valve has been operated, a drain test shall be performed to ensure that the valve has been fully reopened.

Piping and hangers

6.5.4.5. Sprinkler piping and hangers shall be kept in good repair.

Dry-pipe system maintenance

6.5.4.6. In addition to other requirements in this Part, dry-pipe automatic sprinkler systems shall be maintained in conformance with Articles 6.5.4.7. to 6.5.4.12.

6.5.4.7. Air pressure shall be checked weekly by checking gauges provided on the system, and the system shall be maintained at the required operating pressure.

Trip testing of valves

6.5.4.8. Dry-pipe valves shall be tripped annually by means of the system test pipe to ensure that they operate satisfactorily and that the sprinkler alarms are in operating condition.

Winter drainage

6.5.4.9. Auxiliary drains shall be drained before each winter.

Protection against freezing

6.5.4.10. Dry-pipe valve rooms or enclosures in unheated *buildings* shall be checked daily during periods of freezing weather to ensure that adequate temperature is maintained to prevent freezing.

Priming water supply

6.5.4.11. The priming water supply for dry-pipe systems shall be maintained at the proper level above the dry-pipe valve.

Test flushing

6.5.4.12. Every 15 years dry-pipe systems shall be test flushed for obstructions in the sprinkler piping and, if necessary, the entire system flushed of foreign material.

Sprinkler head inspection

6.5.4.13. Sprinkler heads shall be inspected at least once per year to ensure that they are free from damage, corrosion, grease, dust, paint or whitewash and shall be replaced where necessary as a result of such conditions.

Sample sprinkler heads for testing

6.5.4.14. Except as otherwise required by the *authority having jurisdiction*, sample sprinkler heads from sprinkler systems which have been in service for more than 25 years shall be sent to an *approved* testing laboratory for testing.

6.5.4.15. When sprinkler heads are required to be tested in conformance with Article 6.5.4.14., at least 6 sprinklers of each type shall be tested, except that not less than 2 sprinklers per floor per individual system shall be tested.

6.5.4.16. All sprinkler heads shall be replaced in sprinkler systems from which sample heads have been tested and found defective.

Spare sprinkler heads

6.5.4.17.(1) Where sprinkler systems are installed, a supply of spare sprinkler heads and equipment shall be maintained in conformance with Sentences (2) to (5).

(2) Spare sprinkler heads shall be kept in a cabinet located where the temperature will at no time exceed 100°F.

(3) The stock of spare sprinkler heads to be kept on hand shall be as follows:

(a) for installations containing not more than 300 sprinklers, at least 6 heads,

(b) for installations containing from 301 to 1,000 sprinklers, at least 12 heads, and

(c) for installations containing more than 1,000 sprinklers, at least 24 heads.

(4) Spare sprinkler heads shall correspond to the types and temperature ratings of the sprinklers in use.

Sprinkler wrench

(5) A sprinkler wrench shall be kept in the cabinet where the spare sprinkler heads are stored.

SECTION 6.6 WATER SUPPLIES FOR FIRE PROTECTION

SUBSECTION 6.6.1. GENERAL

6.6.1.1. Water supplies for fire protection installations shall be maintained in such a manner as to provide the required flow under fire conditions.

Valve inspections

6.6.1.2. Valves controlling water supplies to fire protection systems shall be inspected weekly to ensure that they are wide open and are sealed or locked in that position.

Ice accumulations

6.6.1.3. Water supply systems for fire protection shall be kept free of ice accumulations.

Antifreeze pumping systems

6.6.1.4. Where antifreeze solutions are used to maintain pumping systems operable under freezing conditions, the specific gravity shall be such that the solution will remain unfrozen at a temperature of at least 15°F below the expected minimum temperature of the surrounding atmosphere.

SUBSECTION 6.6.2. TANKS

Tank inspections

6.6.2.1. An annual inspection shall be made of all tanks for fire protection, tank supporting structures and water supply systems including piping, control valves, check valves, heating systems, mercury gauges and expansion joints to ensure that they are in satisfactory operating condition.

Tank heating equipment

6.6.2.2. Tank heating equipment and accessories shall be checked daily during freezing weather to ensure that they are in operating condition and that heater valves are open.

Water temperature checks

6.6.2.3. A daily check of the temperature of the water contained in the tank shall be carried out during freezing weather to ensure that it does not fall below the freezing temperature.

Tank enclosure temperature checks

6.6.2.4. For tanks in *buildings* a daily check of the temperature of the tank enclosure shall be carried out during freezing weather to ensure that it does not fall below the freezing temperature.

Examinations for corrosion

6.6.2.5. All steel and iron work including the inside and outside of steel tanks and hoops and grillages for wooden tanks shall be examined for corrosion at intervals of not more than 2 years and scraped and repainted as required.

Examinations for sediment

6.6.2.6. Tanks shall be examined for accumulations of sediment at intervals of not more than 2 years and shall be cleaned as required.

Inspection of cathodic protection

6.6.2.7. Where cathodic protection equipment is installed to prevent corrosion of steel tanks, arrangements shall be made for annual inspections and maintenance of the equipment.

Water level in gravity tanks

6.6.2.8. The water level in gravity tanks shall be checked monthly by overflowing the tank.

Gravity tanks

6.6.2.9. Gravity tanks shall be inspected annually to ensure that the tank roof is tight and in good repair, that hatches or doors are kept closed and properly secured and that the frostproof casing of the tank riser makes a tight joint with the bottom of the tank.

6.6.2.10. The space between overflow pipes and the tops of gravity tanks, the valve pits at the bottoms of the risers and the entire area around the bases of the columns of tanks shall be kept free of rubbish and waste materials.

6.6.2.11. Gravity tank expansion joints shall be repacked and adjusted if binding or leaks develop.

Pressure tanks

6.6.2.12. The water level and air pressure for pressure tanks shall be checked weekly and maintained at the specified levels.

6.6.2.13. Relief valves on the air and water supply lines of pressure tanks shall be tested and operated weekly.

SUBSECTION 6.6.3. FIRE PUMPS AND RESERVOIRS

Fire pump reservoirs

6.6.3.1. The water level in the fire pump reservoir shall be checked weekly and maintained at the proper level.

Pump room temperature

6.6.3.2. The temperature of pump rooms shall be checked daily during freezing weather and maintained at an appropriate temperature to prevent freezing.

Fire pump tests

6.6.3.3. Fire pumps shall be started at least once per week at rated speed and the fire pump discharge pressure, suction pressure, lubricating oil level, operative condition of relief valves, priming water level and general operating conditions shall be checked.

Internal-combustion engine tests

6.6.3.4. Internal-combustion engine fire pumps shall be operated for a sufficient time to bring the engine up to normal operating temperature and the storage batteries, lubrication systems, oil and fuel supplies shall be checked and maintained at the correct levels.

Flow testing of pumps

6.6.3.5. Fire pumps shall be tested at least once per year at full rated capacity to ensure that they are capable of delivering the rated flow.

6.6.3.6. Records shall be kept of all fire pump flow tests and shall be available for inspection by the *authority having jurisdiction.*

SECTION 6.7 EMERGENCY POWER SYSTEMS

SUBSECTION 6.7.1. GENERAL

6.7.1.1. In addition to the requirements of this Section, all emergency power systems and unit equipment shall be subject to the requirements of CSA C22.1-1975, "Canadian Electrical Code, Part I."

Instructions for switching and starting

6.7.1.2. Where an emergency power generator is installed, instructions shall be provided for switching off nonessential loads and for starting the generator when this is not done automatically.

Inspections and testing

6.7.1.3. Except as otherwise specified in this Section, an emergency power system shall be inspected and tested monthly to ensure that it is in proper operating condition.

6.7.1.4. A written record of inspection, performance, test periods and repairs shall be maintained and shall be made available for inspection by the *authority having jurisdiction.*

SUBSECTION 6.7.2. INTERNAL-COMBUSTION ENGINE DRIVE

Checking of engine-driven equipment

6.7.2.1. Where emergency generator sets powered by internal-combustion engines are installed, daily checks of the generator room temperature, battery charger operation, fuel supply level, automatic controls and signal lamp operation shall be made.

Location of engines

6.7.2.2. Internal-combustion engines described in Article 6.7.2.1. shall be located in rooms maintained at temperatures of not less than 50°F or the engine water-jacket temperatures shall be maintained at not less than 70°F.

6.7.2.3. Provision shall be made to provide and maintain adequate air for cooling the radiators of recirculating water-cooled engines and to provide adequate engine combustion air. Air for cooling and combustion

6.7.2.4. The amount of fuel stored and connected to the emergency power system shall be sufficient to operate the engine for at least 8 hr. Minimum fuel supply

6.7.2.5. Emergency power generators shall be tested weekly for at least 30 min. under load conditions, and this test shall include a cold start by simulating a power failure and appropriate automatic and manual transfers of all emergency power loads. Generator testing

6.7.2.6. Exhaust piping shall be examined during the engine test period to ensure that all exhaust emissions are carried to a safe point outside the *building*. Disposal of exhaust emissions

6.7.2.7. A clearance of at least 8 in. shall be maintained between any combustible material and the engine exhaust pipe. Exhaust pipe clearance

6.7.2.8. The engine shall be kept clean, dry and well lubricated, and the proper oil level shall be maintained in the crankcase. Engine maintenance

6.7.2.9. Oil shall be changed at least once a year, except that shorter time intervals between oil changes shall be required when such shorter intervals are specified in the maintenance requirements for the engine. Oil changes

6.7.2.10. Storage batteries for starting engines shall be kept charged and inspected monthly to determine that the charger is operating correctly and that the level and the specific gravity of the electrolyte in the batteries is correct. Starting batteries

6.7.2.11. Gasoline *storage tanks* shall be drained and refilled with a fresh supply at least once a year. Gasoline tanks

6.7.2.12. Strainers in cooling water systems shall be checked monthly. Cooling water strainers

SECTION 6.8 SPECIAL EXTINGUISHING SYSTEMS

SUBSECTION 6.8.1. GENERAL

6.8.1.1. Where special extinguishing systems have been installed, inspection and maintenance as *approved* by the *authority having jurisdiction* shall be provided at least every 6 months. Inspection and maintenance

6.8.1.2. Written records shall be kept of all periodic tests carried out in conformance with Article 6.8.1.1., and such records shall be accessible for inspection by the *authority having jurisdiction*. Test records

6.8.1.3. Operating and maintenance instructions shall be posted in proximity to the equipment and shall be located near manual controls when such controls are provided. Operating and maintenance instructions

6.8.1.4. Valves and controls shall be marked to clearly indicate their function and shall be accessible at all times. Valves and controls

6.8.1.5. Extinguishing agent containers provided for special extinguishing systems shall be fully charged with the proper quantity of extinguishing agent and the necessary operating pressure maintained. Container maintenance

6.8.1.6. Discharge outlets for special extinguishing systems shall be kept free of dirt and residue. Discharge outlets

6.8.1.7. Piping and equipment shall be mechanically secure and accessible for cleaning and maintenance. Piping

Replacement equipment

6.8.1.8. No replacement equipment and devices provided for special extinguishing systems shall be used unless *approved* for the installation in which they are to be placed.

Increased hazard

6.8.1.9. An increase in a hazard for which a special extinguishing system has been designed shall not be permitted unless *approved* fire protection measures are made to accommodate the increased hazard.

PART 7

INSPECTION, TESTING AND MAINTENANCE OF FIRE EMERGENCY SYSTEMS IN HIGH BUILDINGS

TABLE OF CONTENTS

SECTION 7.1 GENERAL

SUBSECTION 7.1.1. GENERAL

Application

7.1.1.1. Part 7 provides for the inspection, testing and maintenance of the fire emergency systems installed in high *buildings* as defined in Subsection 3.2.6. of the National Building Code of Canada 1975.

Fire safety plan

7.1.1.2.(1) A fire safety plan as described in Part 2 shall be prepared, implemented and maintained for every *building* subject to the provisions of this Part.

Schematic diagrams

(2) Schematic diagrams acceptable to the *authority having jurisdiction* shall be prepared and maintained showing the type, location and operation of all *building* fire emergency systems.

(3) The fire safety plan and schematic diagrams required in Sentences (1) and (2) shall be kept at the central alarm and control facility and shall be available at all times.

Inspections

7.1.1.3. *Buildings* provided with fire emergency systems in conformance with Subsection 3.2.6. of the National Building Code of Canada 1975 shall be subject to periodic inspections by the *authority having jurisdiction.*

Testing fire emergency systems

7.1.1.4.(1) Except as provided in Sentence (2), fire emergency systems required to be installed in *buildings* in conformance with Subsection 3.2.6. of the National Building Code of Canada 1975 shall be tested in conformance with Sections 7.2 and 7.3.

(2) Any fire emergency system required by Subsection 3.2.6. of the National Building Code of Canada 1975 that does not conform to a specific Measure outlined in the ACNBC Publication, "Measures for Fire Safety in High Buildings," shall be tested in conformance with good fire protection engineering practice acceptable to the *authority having jurisdiction.*

(3) Deficiencies noted during the testing described in Sentences (1) and (2) shall be corrected to the satisfaction of the *authority having jurisdiction.*

Record of tests

7.1.1.5. A written record acceptable to the *authority having jurisdiction* shall be kept of all tests and corrective measures required by Article 7.1.1.4. and shall be made available upon request to the *authority having jurisdiction.*

Maintenance of fire emergency systems

7.1.1.6.(1) In addition to the requirements of Part 6, components of fire emergency systems shall be maintained in conformance with Sentences (2) to (6).

(2) The keys required to recall elevators and to permit independent operation of each elevator shall be kept in the location required by Subsection 3.2.6. of the National Building Code of Canada 1975.

(3) The fire fighters' elevator identification required in Subsection 3.2.6. of the National Building Code of Canada 1975 shall be maintained in an acceptable condition.

(4) Access to windows and panels required to vent *floor areas* and vents to vestibules permitted to be manually openable shall be kept free of obstruction.

(5) Windows and panels provided for venting *floor areas* shall be maintained so as to be openable without the use of keys.

(6) Vents to vestibules permitted to be manually openable shall be maintained in an operable condition.

SECTION 7.2 INSPECTION, TESTING AND MAINTENANCE

SUBSECTION 7.2.1. INTERVALS BETWEEN TESTS

7.2.1.1. Unless otherwise specifically prescribed in this Part, all tests shall be carried out at intervals of not more than 3 months.

SUBSECTION 7.2.2. ELEVATORS

Testing

7.2.2.1.(1) Elevator door-opening devices operated by means of photo-electric cells shall be tested to ensure that the devices become inoperative after the door has been held open for more than 10 sec. with the photo-electric cell covered.

(2) Key-operated switches located outside an elevator shaft shall be tested to ensure that actuation of the switch will render the emergency stop switch in each car inoperative and bring all cars to the *street* floor or transfer lobby by cancelling all other calls after the car has stopped at the next floor at which it can make a normal stop.

(3) Key-operated switches in each elevator car shall be tested to ensure that actuation of the switch will

(a) enable the elevator to operate independently of other elevators,

(b) allow operation of the elevator without interference from floor call buttons,

(c) render door protective devices inoperative, and

(d) control the opening of power-operated doors only by continuous pressure on the door opening buttons or switches, to ensure that if the "open" button or switch is released while the door is opening, the doors will automatically close.

SUBSECTION 7.2.3. VENTING TO AID FIRE FIGHTING

Testing

7.2.3.1.(1) The *closures* in vent openings into smoke shafts from each *floor area* shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that they will open as required by Chapter 3, Sentence (5) of the ACNBC Publication, "Measures for Fire Safety in High Buildings."

(2) A *closure* in an opening to the outdoors at the top of a smoke shaft shall be tested to ensure that it will open

(a) manually from outside the *building*,

(b) on a signal from the smoke detector in the smoke shaft, and

(c) when a *closure* in an opening between a *floor area* and the smoke shaft opens.

(3) In addition to the procedures described in Sentences (1) and (2), all elevators in an elevator shaft that is intended for use as a smoke shaft shall be tested to ensure that on activation of any fire alarm signal they will return to the *street* floor level and remain inoperative.

(4) Controls for air-handling systems used for venting in the event of a fire shall be tested to ensure that air is exhausted from each *floor area* to the outdoors as required in Chapter 3, Sentence (8) of the ACNBC Publication, "Measures for Fire Safety in High Buildings."

SUBSECTION 7.2.4. CENTRAL ALARM AND CONTROL FACILITY

Fan control

7.2.4.1.(1) Air moving fans in a system serving more than 2 *storeys* shall be tested to ensure that they will stop on activation of a switch at the central alarm and control facility.

Vestibule doors

(2) Doors to vestibules that are normally held open by a hold-open device connected to the *building* fire alarm system shall be tested to ensure that they will close on a signal from the central alarm and control facility.

Fire alarms

(3) Except as provided in Article 7.2.4.2., audible and visual fire alarms shall be tested to ensure that they can be controlled by signals from the central alarm and control facility and that such signals can be transmitted to and from each *floor area.*

Voice communication system

7.2.4.2.(1) Except in Group C *occupancies,* the voice communication system required in Subsection 3.2.6. of the National Building Code of Canada 1975 shall be tested weekly in conformance with Sentences (2) and (3).

(2) Voice communication systems from each *floor area* to the central alarm and control facility and to the mechanical control centre shall be tested to ensure proper operation.

(3) Loud speakers operated from the central alarm and control facility shall be tested to ensure that they can be heard in all parts of the *building.*

SUBSECTION 7.2.5. DOOR OPENING

Doors in means of egress

7.2.5.1. All doors in the path of *exit* travel shall be tested when the smoke control systems are being tested to ensure that they can be opened when the smoke control system is operating.

SECTION 7.3 INSPECTIONS AND TESTS FOR EQUIPMENT IN HIGH BUILDINGS

SUBSECTION 7.3.1. SCOPE

Tests

7.3.1.1. The test procedures described in Subsections 7.3.2. to 7.3.15., as appropriate to the fire safety measure being used, shall be carried out in addition to those required by Sections 7.1 and 7.2, unless other *approved* arrangements are included in the fire safety plan.

SUBSECTION 7.3.2. MEASURE A

Tests for Measure A

7.3.2.1.(1) Where Measure A is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings,"

(a) switches at the central alarm and control facility shall be tested to ensure that

(i) *closures* to vent openings in *vertical service spaces* that are required by Sentence (6)* of Measure A, open automatically and remain open, and

(ii) the mechanical air supply to below *grade* stairshafts is initiated as provided in Sentence (3)* of Measure A,

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*Sentence numbers refer to those contained in the ACNBC Publication, "Measures for Fire Safety in High Buildings."

(b) *closures* in openings to the outdoors in *vertical service spaces* that are required by Sentence (6)* of Measure A shall be tested to ensure that they will operate as required,

(c) *closures* in vent openings to the outdoors in above *grade* stairshafts shall be tested to ensure that they can be opened manually and will remain open as provided in Sentence (2)* of Measure A, and

(d) *closures* in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they will open automatically, if such means is provided, and remain open when air is being injected into the stairshaft.

SUBSECTION 7.3.3. MEASURE B

Tests for Measure B

7.3.3.1.(1) Where Measure B is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings,"

(a) switches at the central alarm and control facility shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that

(i) dampers in air-handling systems that serve more than 2 *storeys* close automatically and remain closed as provided in Sentence (8)* of Measure B, and

(ii) *closures* to vent openings in *vertical service spaces* that are required by Sentences (5)* and (6)* of Measure B open automatically and remain open,

(b) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to below *grade* stairshafts is initiated as provided in Sentence (3)* of Measure B,

(c) *closures* in openings to the outdoors in *vertical service spaces* that are required by Sentence (5)* of Measure B shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that they will operate as required, and

(d) *closures* in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they open automatically, if such means is provided, and remain open when air is being injected into the stairshaft as required by Sentence (3)* of Measure B.

SUBSECTION 7.3.4. MEASURE C

Tests for Measure C

7.3.4.1.(1) Where Measure C is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings,"

(a) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to below *grade* stairshafts is initiated as provided in Sentence (3)* of Measure C, and

(b) closures in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they open automatically, if such means is provided, and remain open when air is being injected into the stairshafts.

SUBSECTION 7.3.5. MEASURE D

Tests for Measure D

7.3.5.1.(1) Where Measure D is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings,"

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*Sentence numbers refer to those contained in the ACNBC Publication, "Measures for Fire Safety in High Buildings."

(a) switches at the central alarm and control facility shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that

(i) *closures* in vent openings to the outdoors in vestibules, *vertical service spaces* and elevator shafts open automatically and remain open as provided in Sentences (6),* (10),* (12)* and (13)* of Measure D, and

(ii) dampers in air-handling systems that serve more than 2 *storeys* close automatically and remain closed as provided in Sentence (16)* of Measure D,

(b) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to vestibules and below *grade* stairshafts is initiated as provided in Sentence (5)* of Measure D,

(c) *closures* in vent openings to the outdoors in *vertical service spaces* or at the top of elevator shafts as required by Sentences (10),* (12)* and (13)* of Measure D shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that they will operate as required,

(d) *closures* in vent openings to the outdoors in above *grade* stairshafts and at the *street* entrance floor of fire fighters' elevator shafts shall be tested to ensure that they can be opened manually and remain open as provided in Sentences (7)* and (11)* of Measure D, and

(e) *closures* in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they open automatically, if such means is provided, when air is being injected into the stairshafts as required by Sentence (8)* of Measure D.

7.3.5.2. Pressurized vestibules shall be tested in different seasons in a sequence acceptable to the *authority having jurisdiction* by a pressure sensor or by tracer smoke at not more than 2-year intervals and after any alteration to the *building* to ensure that movement of air is from the vestibules to the *floor areas* on all *storeys*.

SUBSECTION 7.3.6. MEASURE E

7.3.6.1.(1) Where Measure E is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings," Tests for Measure E

(a) switches at the central alarm and control facility shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that *closures* in vent openings to the outdoors in vestibules and fire fighters' elevator shafts that are required by Sentences (4)* and (9)* of Measure E will open automatically and remain open,

(b) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to vestibules and below *grade* stairshafts is initiated as provided in Sentences (4)* and (7)* of Measure E,

(c) *closures* in vent openings to the outdoors at the top of fire fighters' elevator shafts that are required by Sentence (9)* of Measure E shall be tested to ensure that they will operate as required,

(d) *closures* in vent openings to the outdoors in above *grade* stairshafts and at the *street* entrance floor of fire fighters' elevator shafts that are required by Sentences (6)* and (10)* of Measure E shall be tested to ensure that they can be opened manually and will remain open, and

*Sentence numbers refer to those contained in the ACNBC Publication, "Measures for Fire Safety in High Buildings."

(e) *closures* in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they will open automatically, if such means is provided, and remain open when air is being injected into the stairshafts as required by Sentence (7)* of Measure E.

7.3.6.2. Pressurized vestibules shall be tested in different seasons in a sequence acceptable to the *authority having jurisdiction* by a pressure sensor or by tracer smoke at not more than 2-year intervals and after any alteration to the *building* to ensure that movement of air is from the vestibules to the *floor areas* on all *storeys.*

SUBSECTION 7.3.7. MEASURE F

Tests for Measure F

7.3.7.1.(1) Where Measure F is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings,"

(a) switches at the central alarm and control facility shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that

(i) *closures* in vent openings to the outdoors in *vertical service spaces,* elevator shafts and below *grade floor areas* that are required by Sentences (6)* and (10)* of Measure F open automatically and remain open, and

(ii) dampers in air-handling systems that serve more than 2 *storeys* close automatically and remain closed as provided in Sentence (12)* of Measure F,

(b) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to stairshafts and elevator shafts is initiated as provided in Sentences (2),* (3)* and (4)* of Measure F,

(c) *closures* in vent openings to the outdoors in *vertical service spaces* or elevator shafts that are required by Sentence (12)* of Measure F shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that they will operate as required, and

(d) *closures* in vent openings to the outdoors in stairshafts shall be tested to ensure that they open automatically, if such means is provided, and remain open when the mechanical air supply to the stairshafts is initiated as provided in Sentences (2)* and (3)* of Measure F.

7.3.7.2. Pressurized stair and elevator shafts shall be tested in different seasons in a sequence acceptable to the *authority having jurisdiction* by a pressure sensor or tracer smoke at not more than 2-year intervals and after any alteration to the *building* to ensure that the movement of air is from the stair or elevator shafts to the *floor areas* on all *storeys.*

SUBSECTION 7.3.8. MEASURE G

Tests for Measure G

7.3.8.1.(1) When Measure G is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings,"

(a) switches at the central alarm and control facility shall be tested to ensure that

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*Sentence numbers refer to those contained in the ACNBC Publication, "Measures for Fire Safety in High Buildings."

(i) *closures* in vent openings to the outdoors in below *grade floor areas* that are required by Sentence (6)* of Measure G open automatically and remain open, and

(ii) the mechanical air supply to stairshafts and elevator shafts is initiated as provided in Sentences (2),* (3)* and (4)* of Measure G, and

(b) *closures* in openings to the outdoors in stairshafts shall be tested to ensure that they open automatically, if such means is provided, and remain open when the air supply to the stairshafts is initiated as provided in Sentences (2)* and (3)* of Measure G.

7.3.8.2. Pressurized stair and elevator shafts shall be tested in different seasons in a sequence acceptable to the *authority having jurisdiction* by a pressure sensor or tracer smoke at not more than 2-year intervals and after any alteration to the *building* to ensure that the movement of air is from the stair or elevator shafts to the *floor areas* on all *storeys.*

SUBSECTION 7.3.9. MEASURE H

Tests for Measure H

7.3.9.1.(1) Where Measure H is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings," switches at the central alarm and control facility shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that

(a) *closures* in vent openings to the outdoors or into smoke shafts on each floor will open automatically and remain open as provided in Sentence (6)* of Measure H,

(b) dampers in return air and exhaust ducts will close automatically and remain closed as provided in Sentence (5)* of Measure H,

(c) return air and exhaust fans are stopped and supply fans will provide air to all *floor areas* and stairshafts as provided in Sentence (3)* of Measure H, and

(d) *closures* in all openings in external walls and roofs will close automatically and remain closed as provided in Sentence (4)* of Measure H.

7.3.9.2. Pressurized vestibules at or near *grade* level shall be tested by a pressure sensor or tracer smoke in different seasons in a sequence acceptable to the *authority having jurisdiction* at not more than 2-year intervals and after any alteration to the *building* when the *building* is pressurized but without venting of the fire floor to ensure that the direction of air movement is from the *building* to the outdoors.

SUBSECTION 7.3.10. MEASURE I

Tests for Measure I

7.3.10.1.(1) Where Measure I is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings," switches at the central alarm and control facility shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that

(a) dampers in air-handling systems that serve more than 2 *storeys* will close automatically and remain closed as provided in Sentence (8)* of Measure I,

*Sentence numbers refer to those contained in the ACNBC Publication, "Measures for Fire Safety in High Buildings."

(b) *closures* in openings in the walls and roof of the central core and in shafts within the core will close automatically and remain closed as provided in Sentence (3)* of Measure I,

(c) return air fans are stopped and supply fans will provide air to the central core as provided in Sentence (2)* of Measure I,

(d) *closures* in vent openings to the outdoors and into smoke shafts from each *floor area* will open automatically and remain open as provided in Sentence (4)* of Measure I,

(e) air movement is initiated in an exhaust system used for venting as provided in Sentence (4)* of Measure I, and

(f) *closures* in vent openings to the outdoors in *vertical service spaces* outside the central core that are required by Sentence (6)* of Measure I will open automatically and remain open.

7.3.10.2. The pressurized core shall be tested at or near *grade* in different seasons in a sequence acceptable to the *authority having jurisdiction* by a pressure sensor or tracer smoke at not more than 2-year intervals and after any alteration to the *building* to ensure that movement of air is from the pressurized core to the outdoors on all *storeys*.

SUBSECTION 7.3.11. MEASURE J

Tests for Measure J

7.3.11.1.(1) Where Measure J is used to limit smoke movement in the ACNBC Publication, "Measures for Fire Safety in High Buildings," switches at the central alarm and control facility shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that

(a) *closures* in openings in the walls and roofs of the central core and in shafts within the core will close automatically and remain closed as provided in Sentence (3)* of Measure J, and

(b) return-air fans are stopped and supply fans will provide air to the central core as provided in Sentence (2)* of Measure J.

7.3.11.2. The pressurized core shall be tested at or near *grade* in different seasons in a sequence acceptable to the *authority having jurisdiction* by a pressure sensor or tracer smoke at not more than 2-year intervals and after any alteration to the *building* to ensure that the movement of air is from the pressurized core to the outdoors on all *storeys*.

SUBSECTION 7.3.12. MEASURE K

Tests for Measure K

7.3.12.1.(1) Where Measure K is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings,"

(a) switches at the central alarm and control facility shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that

(i) the mechanical air supply to vestibules is initiated as provided in Sentences (11)* and (15)* of Measure K, and

*Sentence numbers refer to those contained in the ACNBC Publication, "Measures for Fire Safety in High Buildings."

(ii) doors to vestibules, if these are normally held open, will close automatically and remain closed as provided in Sentence (1)* of Measure K, and

(b) *closures* in vent openings to the outdoors in above *grade* stairshafts and in vented vestibules shall be tested to ensure that they can be opened manually and will remain open as provided in Sentences (11)* and (13)* of Measure K.

7.3.12.2. Pressurized vestibules shall be tested in different seasons in a sequence acceptable to the *authority having jurisdiction* by a pressure sensor or tracer smoke at not more than 2-year intervals and after any alteration to the *building* to ensure that the movement of air is from the vestibules to the *floor areas* on all *storeys*.

SUBSECTION 7.3.13. MEASURE L

7.3.13.1.(1) Where Measure L is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings," Tests for Measure L

(a) switches at the central alarm and control facility shall be tested in a sequence acceptable to the *authority having jurisdiction* to ensure that

(i) doors to vestibules and areas of refuge, if these are normally held open, will close automatically and remain closed as provided in Sentence (8)* of Measure L, and

(ii) *closures* in vent openings to the outdoors in elevator shafts that are required by Sentence (16)* of Measure L will open automatically and remain open,

(b) switches at the central alarm and control facility shall be tested to ensure that the air supply to the areas of refuge, vestibules and below *grade* stairshafts is initiated as provided in Sentences (9),* (10),* (11)* and (14)* of Measure L,

(c) *closures* in vent openings to the outdoors in below *grade* stairshafts shall be tested to ensure that they open automatically and remain open when the air is being injected into the stairshaft, and

(d) vent openings to the outdoors in above *grade* stairshafts and at the *street* entrance floor of fire fighters' elevator shafts shall be tested to ensure that they can be opened manually and will remain open as provided in Sentence (13)* of Measure L.

7.3.13.2. Vestibules and areas of refuge shall be tested in different seasons in a sequence acceptable to the *authority having jurisdiction* by a pressure sensor or tracer smoke at not more than 2-year intervals and after any alteration to the *building* to ensure that the movement of air is from the areas of refuge or vestibules to the *floor areas* on all *storeys*.

SUBSECTION 7.3.14. MEASURE M

7.3.14.1.(1) Where Measure M is used to limit smoke movement as provided in the ACNBC Publication, "Measures for Fire Safety in High Buildings," Tests for Measure M

*Sentence numbers refer to those contained in the ACNBC Publication, "Measures for Fire Safety in High Buildings."

(a) switches at the central alarm and control facility shall be tested to ensure that the mechanical air supply to below *grade* stairshafts is initiated as provided in Sentence (3)* of Measure M, and

(b) vent openings to the outdoors in above *grade* stairshafts shall be tested to ensure that they can be opened manually and will remain open as provided in Sentence (2)* of Measure M.

SUBSECTION 7.3.15. MEASURE N

Tests for Measure N

7.3.15.1.(1) Where Measure N is used to limit smoke movement from one *building* to another of connected *buildings* as provided in Measure N of the ACNBC Publication, "Measures for Fire Safety in High Buildings,"

(a) switches to initiate the air supply to the vestibules shall be tested to ensure that the air supply is initiated as provided in Sentence (3)* of Measure N, and

(b) *closures* in vent openings to the outdoors in vestibules shall be tested to ensure that they will open as provided in Sentence (3)* of Measure N.

7.3.15.2. Pressurized vestibules shall be tested in different seasons in a sequence acceptable to the *authority having jurisdiction* by a pressure sensor or tracer smoke at not more than 2-year intervals and after any alteration to the *building* to ensure that the movement of air is from the vestibules to adjacent *floor areas* on all *storeys*.

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*Sentence numbers refer to those contained in the ACNBC Publication, "Measures for Fire Safety in High Buildings."

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