Liquefied Petroleum Gases Bulk Storage:
Guidelines for British Columbia's Provincial Industrial Railways

Guidelines Respecting the Design, Location, Construction, Operation and Maintenance of Stationary Bulk Storage Facilities for Liquefied Petroleum Gases

SHORT TITLE
1. These Guidelines may be cited as the Liquefied Petroleum Gases Bulk Storage Guidelines.

INTERPRETATION
2. In these Guidelines:
   “BCSA” means British Columbia Safety Authority,
   “design pressure” is synonymous with the term “maximum allowable working pressure” as used in the A.S.M.E. Boiler and Pressure Vessel Code for Unfired Pressure Vessels;
   “filling density” means the percentage figure obtained when the maximum weight of liquefied petroleum gas that may be in the container is divided by the water weight capacity of the tank and the result is multiplied by 100; all capacities shall be measured at a liquid temperature of 60°F;
   “liquefied petroleum gases” are gases derived from petroleum or natural gas; they are in the gaseous state at normal atmospheric temperature and pressure, but may be maintained in a liquid state by the application of moderate pressure; the following gases are those most commonly handled as liquefied petroleum gases: propane, normal butane, propylene, isobutane, butylenes;
   “main track” means a track extending through yards and between stations upon which trains are operated by timetable or train order, or both, or the use of which is governed by block signals or other method of control;
   “MOTI” means the provincial Ministry of Transportation and Infrastructure;
   “owning or operating company” means the person or company owning or operating the installation, erected with leave of the MOTI granted upon application made therefor by the railway company concerned, on behalf of such person or company;
   “private track” means a track outside of carrier’s right-of-way, yard and terminals, and of which the carrier does not own either the rails, ties, roadbed or right-of-way; or a track or portion of a track which is devoted to the purpose of its user, either by lease or written agreement, in which case the lease or written agreement is considered as equivalent to ownership;
   “shall” is used to indicate mandatory provisions;
   “should” is used to indicate recommendatory [provisions];
“Switch heater facility” means an installation comprising a liquefied petroleum gas heating appliance and attendant fuel storage and distribution systems, the purpose of which is to prevent the failure of a railway track switch due to snow or ice.

“team track” means a track on railway property which is used for loading and unloading purposes by more than one company or person.

APPLICATION
3. These Guidelines apply to the stationary bulk storage facilities for liquefied petroleum gases on the right-of-way owned or leased by any railway company subject to the jurisdiction of the MOTI.

4. (1) These Guidelines apply to new installations and additions or changes to existing installations.
   (2) Notwithstanding subsection (1), installations previously approved by an order of the MOTI shall be operated in accordance with these Guidelines and, if ordered by the MOTI, shall also be made to conform to those parts of these Guidelines pertaining to location, construction and design.

PART I

STORAGE INSTALLATIONS
Application of Part
5. This Part does not apply with respect to installations with a total storage capacity not exceeding 2,000 Imperial gallons of water measured at 60°F, if such installations otherwise comply with all other applicable requirements of these Guidelines.

Application for Leave
6. No person shall begin the construction of storage facilities for liquefied petroleum gases without leave of the MOTI granted upon an application made therefor through the railway company concerned.

7. The application shall be submitted to the MOTI together with four copies of all drawings, including plans and profiles, which shall comply with the requirements of sections 8 to 13.

8. The plan shall be drawn to a scale of not less than 50 feet to one inch and the profile to a scale of not less than 20 feet to one inch.

9. All drawings shall be dated and bear an identification number and the name of the applicant.

10. The plan shall show the distances between
    (a) the loading or unloading rack or point and
        (i) the gauge side of the nearest rail of the loading or unloading track,
        (ii) schools, stations, residential areas, hospitals and other similar places of public assembly within 250 feet of the said loading or unloading rack or point,
        (iii) all engine houses, railway shops, grain elevators and other similar buildings within 150 feet of the said loading or unloading rack or point;
    (b) the centre line of the loading or unloading track and
(i) the gauge side of the nearest rail of main track, and
(ii) the gauge side of the nearest rail of the nearest adjacent track not serving the installation;
(c) the storage tanks and
   (i) other storage tanks, pumphouses, warehouses, loading and unloading racks, and other structures on the site,
   (ii) the line of adjoining property,
   (iii) the gauge side of the nearest rail of the closest track,
   (iv) the gauge side of the nearest rail of the main track,
   (v) stations, schools, residential areas, hospitals or other similar places of public assembly within 450 feet of the said storage tanks, and
   (vi) all engine houses, railway shops, grain elevators or other similar buildings within 250 feet of the said storage tanks.

11. (1) The profile shall show the elevation of the installation in relation to the loading and unloading track and any main track within 200 feet of the nearest tank on the said installation.
(2) A second profile is required where it is necessary
   (a) to show the direction of drainage from the site; or
   (b) to give a clear picture of major features of the installation.

12. The drawing shall show the location of the railway right-of-way, property fences, dykes, pipelines under roadways or railways, sewers, ditches, watercourses, highways and other similar structures that are on the installation site.

13. The notes or legend on the drawing shall include the following information:
   (a) evidence that the Provincial Fire Commissioner or other authority having jurisdiction in the surrounding area has no objection to the proposed installation. This evidence may take the form of a plan signature by the authority concerned, or of a letter addressed to the owning or operating company by such authority;
   (b) a statement that the storage tank and vapourizer design shall be approved by the Boiler and Pressure Vessel Branch of BCSA prior to fabrication of the tanks;
   (c) size, contents and water capacity in Imperial gallons of all storage tanks;
   (d) type and construction of pumphouse, warehouse, compressor house, bottling house, vapourizer house and any other building on the site;
   (e) type of motive power to be used for pumps or compressors;
   (f) the type of heating to be used for vapourizer; and
   (g) whether the track or tracks serving the installation are team tracks or private tracks.

13.1 Where the MOTI has, pursuant to section 6, granted leave for the construction of a storage facility for liquefied petroleum gases, a copy of each of the drawings referred to in section 7 shall be kept by the railway company for the life of the storage facility and retained for at least two years thereafter.
PART II

DISTANCES

14.  (1) The distances prescribed in this section shall be measured from the gauge side of the nearest rail of the nearest adjacent track not serving the installation or the main track, as the case may be, to the centre line of the unloading or loading track.

(2) Loading or unloading tracks, at the loading or unloading site, shall be at least 50 feet from the main track.

(3) Loading or unloading tracks shall be not less than 20 feet from the nearest adjacent track not serving the installation. If the nearest adjacent track is a main track, the distance shall be 50 feet.

15.  (1) That portion of overhead loading or unloading structures or equipment over four feet above the top of rail shall be at least six feet from the gauge side of the nearest rail of the loading or unloading track. That portion of the structure four feet or less in height above the top of rail shall be at least three feet 7 3/4 inches from the gauge side of the nearest rail of the loading or unloading track. When the loading or unloading track is curved, the clearance distance shall be increased by one inch per degree of track curvature.

(2) Loading or unloading terminals or structures of an over-all height that is less than four feet above the top of rail shall be located not less than six feet from the gauge side of the nearest rail of the loading or unloading track.

16.  (1) The distances prescribed in this section shall be measured from the centre line of the loading and unloading rack or point to the nearest point of the building or property line, as the case may be.

(2) The loading or unloading racks or points shall be at least 200 feet from any station, office building or other similar place of public assembly on railway property.

(3) It is recommended that the distance of a loading or unloading rack from schools, hospitals, theatres, residential areas or other similar places of public assembly be not less than 200 feet.

(4) Except as provided in subsection (5), the distance of loading or unloading racks or points from engine houses, railway shops, grain elevators or other similar buildings shall be not less than 100 feet.

(5) The distance between a loading or unloading rack or point and any storage tank or building on the installation used exclusively by the owning or operating company shall be not less than 10 feet.

17.  (1) In no case shall a liquefied petroleum gas storage tank be located less than 20 feet from the gauge side of the nearest rail of any track, measured from the nearest point on the tank shell.

(2) The following minimum distances from the gauge side of the nearest rail of the main track to the nearest point on the tank shall be observed:

<table>
<thead>
<tr>
<th>Water Capacity (Imperial Gallons) at 60°F, Single Tank</th>
<th>Minimum Distance (Feet)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 2,000</td>
<td>20</td>
</tr>
<tr>
<td>2,001 to 10,000</td>
<td>75</td>
</tr>
<tr>
<td>10,001 to 25,000</td>
<td>100</td>
</tr>
</tbody>
</table>
(3) It is recommended that the distance of a storage tank from the right-of-way of a provincial highway be not less than half the distance prescribed in subsection (2).

18. (1) The distances prescribed in this section shall be measured from the nearest point on the tank shell to the nearest point of the building, property line, etc.

(2) A storage tank with a water capacity exceeding 2,000 Imperial gallons shall be not less than 50 feet from any location on another property which may be built upon.

(3) For a tank with a water capacity of 2,000 Imperial gallons or less, the distance from any location on another property which may be built upon shall be not less than that prescribed in the current edition of National Fire Protection Association Pamphlet No. 58.

(4) A storage tank with a water capacity exceeding 2,000 Imperial gallons shall be at least 400 feet from any station, office building, or other similar places of public assembly on railway property.

(5) It is recommended that the distance of a storage tank with a water capacity exceeding 2,000 Imperial gallons from schools, hospitals, theatres, residential areas or other similar places of public assembly be not less than 400 feet.

(6) For a tank with a water capacity of 2,000 Imperial gallons or less, the distance from any of the buildings mentioned in subsections (4) and (5) shall be not less than that prescribed in the current edition of National Fire Protection Association Pamphlet No. 58.

(7) Except as provided in subsection (9), a storage tank with a water capacity exceeding 2,000 Imperial gallons shall not be less than 200 feet from engine houses, railway shops, grain elevators or other similar buildings.

(8) For a tank with a water capacity of 2,000 Imperial gallons or less, the distance from any of the buildings mentioned in subsection (7) shall not be less than that prescribed in the current edition of National Fire Protection Association Pamphlet No. 58.

(9) Except as provided in subsection (11), the distance of a storage tank with a water capacity exceeding 100 Imperial gallons from any building on the installation site that is used exclusively by the company owning or operating the installation shall not be less than 10 feet.

(10) A tank with a water capacity of 100 Imperial gallons or less shall not be less than 5 feet horizontally from a building opening located at the same level as the tank vent or below it.

(11) When the construction or occupancy of a building is of such a nature as to constitute a hazard to the storage area, the distance between such a building and the closest tank with a water capacity exceeding 100 Imperial gallons shall not be less than 50 feet.

(12) The distance of any storage tank from the fence surrounding the installation shall not be less than 5 feet.

(13) The clear distance between two storage tanks with an individual water capacity exceeding 2,000 Imperial gallons shall not be less than 5 feet.

(14) The clear distance between a tank containing liquefied petroleum gas and a tank containing a flammable liquid shall not be less than 20 feet, except that liquefied petroleum gas installations with a storage capacity exceeding 150,000 Imperial gallons of water measured at 60°F shall be located not less than 100 feet from the above ground storage of flammable liquids.

(15) A liquefied petroleum gas storage tank shall not be located within a diked area containing a flammable liquid storage tank. The distance between a tank measured from the nearest point on the tank shell and the centre line of a dike shall not be less than 10 feet.

(16) The distance between any tank of one group and any tank of another group, as defined in section 22, shall not be less than 25 feet.

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19. (1) Pumphouses or compressor houses and outdoor pumps or compressors driven by internal combustion engines shall be located not less than 10 feet from any storage tank, loading or unloading point or building.
   (2) Subsection (1) does not apply to outdoor pumps or compressors driven by explosion proof motors marked or labelled Class I, Division I, Group D and wired in accordance with the Canadian Electrical Code for Class I, Division I, Group D locations.
   (3) The distance of pumphouses or compressor houses and outdoor pumps or compressors from a source of ignition or any location on another property which may be built upon shall not be less than 25 feet.

20. Where the distances prescribed in this Part cannot be obtained, lesser distances may be approved by the MOTI if suitable fire barrier walls and fire controlling systems are employed.

PART III

STORAGE TANKS

21. A cylinder or tank with a water capacity not exceeding 100 Imperial gallons and manufactured, filled, operated and maintained in accordance with a Canadian Transport or an Interstate Commerce specification, which is approved by either of these authorities for liquefied petroleum gas, is exempt from the provisions of this Part, except sections 23, 27 and 32.

22. (1) The water capacity of any storage tank located on carrier’s right-of-way and used for liquefied petroleum gas shall not exceed 25,000 Imperial gallons.
   (2) The aggregate water capacity of tanks assembled in a group shall not exceed 150,000 Imperial gallons. Groups of tanks shall be segregated as prescribed in subsection 18(16).

23. (1) Except as provided in subsection (7), storage tanks shall be securely installed on solid foundations of steel or concrete with reinforced concrete footings extending below the frost line, or resting on bedrock.
   (2) Except as provided in subsection (6), steel foundations shall be fireproofed with a material having a fire resistance of not less than 2 hours.
   (3) Foundations shall be of sufficient width and thickness to adequately support the tank and its contents.
   (4) Provision shall be made for the thermal expansion and contraction of a tank.
   (5) Only two saddles shall be used on horizontal tanks.
   (6) Steel saddles, which are welded to a tank, need not be fireproofed if the tank capacity does not exceed 500 Imperial gallons or if the over-all height of the saddle does not exceed 18 inches.
   (7) Footings for tanks with a water capacity less than 500 Imperial gallons need not be installed below frost line if adequate provision is made to protect the piping against the effects of setting.

24. (1) Storage tanks shall be constructed in accordance with the 1956, 1959 or 1962 issue of the A.S.M.E. Boiler and Pressure Vessel Code for Unfired Pressure Vessels to a design working pressure not less than 125 per cent of the vapour pressure of the liquefied petroleum gas at 100°F, but not less than 250 psig for liquefied propane. The factor of safety shall not be less than 4.
(2) The tank design drawings and specifications shall be approved by the Pressure Vessel Inspection Branch of the provincial government concerned prior to fabrication of the tank.

(3) Tank design drawings and specifications shall be in accordance with the requirements of Canadian Standards Association Pamphlet B-51.

(4) Welding to any parts of a tank subject to internal pressure shall be in accordance with the code under which the tank was fabricated. Non-code welding is permitted only on saddle plates, lugs or brackets attached to the container by the tank manufacturer.

25. (1) All tanks shall be inspected and tested prior to operation at the pressure specified by the A.S.M.E. Code by a qualified unfired pressure vessel inspector in accordance with the applicable laws of the province concerned.

(2) A copy of the tank test and inspection report shall be filed with the MOTI.

26. The storage tank shall be permanently marked or labelled as required by the A.S.M.E. Code under which the tank was manufactured and the Boiler and Pressure Vessel Branch of BCSA.

27. (1) Storage tanks shall not be installed inside buildings or in a location that would restrict the natural dispersal of fumes.

(2) Storage tanks shall not be installed one above the other.

28. Each storage tank exceeding 1,000 Imperial gallons water capacity shall be electrically grounded for protection against static electricity and lightning, as prescribed in National Fire Protection Association Pamphlet No. 77. The resistance to electrical discharge to ground should be as low as possible and preferably not more than 6 ohms.

29. The filing density for storage tanks of liquefied petroleum gas shall not exceed the maximum filing density prescribed in the current edition of Pamphlet No. 58 of the National Fire Protection Association.

30. (1) Unless filing is controlled by weighing, tanks shall be equipped with a fixed tube liquid level, a rotary tube, or an adjustable slip tube gauge, or other gauging device that will ensure that the maximum permitted filing density is not exceeded. If the gauging device is a float type or a pressure differential type, the container shall also be provided with a fixed dip tube, rotary tube or adjustable slip tube gauge.

(2) Gauge glasses of the columnar type shall be restricted to charging plants where the fuel is withdrawn in the liquid phase only. They shall be equipped with valves having metallic hand wheels; with excess flow valves and with extra heavy glass protected with a metal housing applied by the manufacturer. These gauges shall be shielded against the direct rays of the sun.

31. Each tank with a water capacity exceeding 2,000 Imperial gallons shall be equipped with a suitable pressure gauge graduated from 0 to 400 psi.

32. The below ground installation of liquefied petroleum gas tanks is not recommended.
PART IV

PIPING AND TRANSFER EQUIPMENT

33. Pumps and compressors used for transferring liquefied petroleum gas shall be of a type suitable for liquefied petroleum gas service, shall be designed for the maximum working pressure to which they will be subjected, and shall be so recommended and permanently marked or labelled by the manufacturer.

34. (1) Pipelines of 1/2 inch nominal diameter or under shall be wrought iron, steel, brass or copper pipe, or seamless copper, brass, steel or aluminium tubing. Copper tubing may be of the standard grade K or L or equivalent and shall have a minimum wall thickness of 0.032 inch. Aluminium tubing shall not be used in exterior locations or where it will come in contact with masonry or plaster walls or insulations.

(2) All piping and fittings over 1/2 inch nominal diameter shall be made of steel.

(3) Pipe joints may be screwed, flanged, welded, soldered or brazed with a material having a melting point exceeding 1,000°F. Joints on seamless copper, brass, steel or nonferrous gas tubing shall be made by means of approved gas tubing fittings, soldered or brazed with a material having a melting point exceeding 1,000°F. Welded joints or welding flanges are recommended for container connections exceeding 2 inches in diameter.

(4) Welding may only be done by a qualified welder recognized as such by the Boiler and Pressure Vessel Branch of BCSA.

(5) For working pressures of 125 psig or less, pipe and pipe fittings and tubing shall be designed for a pressure of at least 125 psig, and for working pressures above 125 psig, they shall be designed for the maximum pressure to which they may be subjected or 250 psig, whichever is the greater.

(6) For pressures of 250 psig or greater, extra heavy pipe and fittings shall be used for threaded piping. Tubing shall be of heavy walled seamless construction.

(7) The bursting strength of any pipe or tubing and fittings shall be not less than four times the design pressure of the tank to which they are connected and not less than four times that pressure to which in any instance they may be subjected in service by the action of a pump or other device.

35. (1) Except as provided in subsection (3), all openings in containers, except those for safety relief valves and those connections protected by an opening not larger than No. 54 drill size (0.0550 inch), shall be equipped with excess flow valves or other suitable automatic valves or devices which will automatically prevent loss of the tank contents in the event of a connection or line failure.

(2) Excess flow valves shall be designed with a by-pass not to exceed a No. 60 drill size (0.0400 inch) opening to allow equalization of pressure.

(3) An excess flow valve or other automatic device as prescribed in subsection (1) is not required for withdrawal connections of tanks with a water capacity of 1,500 Imperial gallons or less if the connection is protected by a controlling orifice not exceeding 5/16 inch diameter on vapour withdrawal and not exceeding 1/8 inch diameter on liquid withdrawal, a manually operated shut-off valve and pressure-reducing regulator, all of which are assembled to the connection as prescribed in 2.2(d), Division II of the 1958 edition of National Fire Protection Association Pamphlet No. 58.
(4) Excess flow valves shall be permanently marked or labelled by the manufacturer with their maximum working pressure, rated capacity, and the letters “LPG” to indicate suitability for use in liquefied petroleum gas service.

(5) Excess flow valves or other automatic devices, as referred to in subsection (1), shall be installed in such a manner that rupture of the line or connections will not adversely affect the protective device.

(6) The line or connection housing an excess flow valve shall have a greater capacity than the rated capacity of the excess flow valve.

36. All storage tank inlet and outlet connections, except those for safety relief valves, liquid level gauging devices and pressure gauges, shall be labelled to indicated whether they communicate with the vapour or liquid phase during normal operations.

37. All connections, except those for pressure or liquid level gauges, safety relief valves, or plugged openings, shall be provided with shut-off valves located as close to the storage tank as possible.

38. (1) All shut-off valves, throttling valves, gauges, fittings and accessory equipment shall be of a type suitable for liquefied petroleum gas service, and designed for not less than the maximum working pressure to which they will be subjected, except that the rated working pressure of valves, fittings, etc., subject to container pressure shall not be less than 250 psig.

(2) All valves, gauges, fittings and accessory equipment mentioned in subsection (1) shall be permanently marked or labelled with the “maximum working pressure” and “L.P.G.”; e.g. “250 L.P.G.”.

(3) Cast iron pipe, valves and fitting are prohibited in piping carrying liquefied petroleum gas in the liquid phase or on liquefied petroleum gas containers and their connections.

39. (1) Piping shall be carried on permanent supports of steel or concrete and supports for pipelines more than 4 feet above ground shall rest on footings that extend below the frost line.

(2) Pipelines shall be protected by guard rails against damage from moving vehicles and other traffic.

(3) Provision shall be made in the pipeline for expansion, contraction, jarring, vibration and settling.

40. (1) Hose and hose connections subject to container pressure shall be designed to have a bursting pressure not less than five times the maximum working pressure to which they may be subjected.

(2) The hose as assembled for use shall be tested for leaks at twice the maximum working pressure to which it may be subjected before being put into service and should be tested annually thereafter at 1 1/2 times the maximum working pressure.

(3) The hose shall be clearly and permanently marked or labelled “L.P. Gas” together with maximum working pressure, manufacturer’s name or symbol, and year of manufacture.

(4) Hose and hose connections shall be resistant to the action of liquefied petroleum gas under the service conditions to which they are subjected.

(5) Testing procedures as prescribed by the Underwriters’ Laboratories, Inc. Pamphlet Hose for Conducting L.P. Gas are recommended.

(6) Hose and hose connections located on the low pressure side of regulators or reducing valves shall be designed for a working pressure of not less than 125 psig and in no case less than five times the pressure setting of the safety relief devices protecting the system.
(7) Flexible hose connections to appliances shall be as prescribed in the current edition of National Fire Protection Association Pamphlet No. 58.

(8) Where hose is to be used for transferring liquid, wet hose is recommended. Such hose shall be equipped with a shut-off valve on the discharge end and provision shall be made to prevent excessive hydrostatic pressure in the hose.

(9) The use of hose is prohibited for inter-connecting stationary containers.

41. Provision shall be made in loading and unloading lines for relief of pressure before disconnection.

42. All piping, subject to external corrosion, shall be painted or otherwise protected.

43. (1) Pipelines running parallel to a track, except those between adjacent loading or unloading racks, shall not be closer than 10 feet to the gauge side of the nearest rail of that track and shall comply with subsection (2).

(2) Except for pipelines between adjacent loading or unloading racks, pipelines on the railway right-of-way and within 20 feet of a track shall be laid not less than 3 feet below ground, be enclosed in a reinforced concrete or steel trench, as prescribed in section 44, be carried on an overhead pipe bridge with a clearance above ground of not less than 13 feet or be enclosed by a suitable fence.

44. (1) Except as prescribed in subsections (2) and (3), below ground liquefied petroleum gas pipelines shall be laid not less than 3 feet below ground level or be enclosed in a reinforced concrete or steel trench with a recessed removable cover which shall be flush with the ground. The trench shall be of sufficient strength to support all traffic that may pass over it and shall be provided with drainage.

(2) Pipelines under railways shall be installed in accordance with Pipe Crossings Under Industrial Railways Guidelines under roadways on railway property shall be enclosed in an encasing pipe of sufficient strength to support all traffic which may pass over it and shall not be less than 3 feet below the surface of the road.

45. (1) The piping system shall be electrically grounded for protection against the build-up of static electricity, as prescribed in the latest edition of the National Fire Protection Association Pamphlet No. 77. The resistance to ground should be as low as possible and preferably not more than 6 ohms.

(2) All pipelines shall be bonded at the joints with a No. 6 electrical conductor where flow to ground is interrupted by a gasket, joint compound, etc.

46. (1) The use of stationary internal combustion engines for the operation of liquefied petroleum gas pumps, compressors or vapourizers is not recommended, but if necessary, the installation shall be in accordance with subsections (2), (3), (5), (6) and (7).

(2) If housed, an internal combustion engine shall be isolated from the pump or compressor by fireproof and vapourproof walls.

(3) Except for the frame, the building shall be constructed of non-combustible or fire restraint materials.

(4) The spark plugs and ignition system should be shielded and the engine equipped with a spark arrestor muffler.

(5) The entire system shall be maintained in good operating condition at all times.

(6) The exhaust shall terminate outside the building.

(7) The building shall be cross ventilated near the floor level with permanently open louvers.
NOTE: Electric motors used for the operation of liquefied petroleum gas pumps, compressors or vapourizers shall be explosion proof, as prescribed in section 69.

47. All materials such as joint compounds, gaskets, valve seats and packing shall be resistant to the action of liquefied petroleum gas under the service conditions to which they are subjected.

48. (1) All piping, valves and fittings shall be inspected and tested after assembly and prior to commencing operations for the first time and be proven gastight at a pressure not less than the working pressure of the tank, pump or device to which they are connected, or at 150 psig, if this is a higher pressure.

(2) The results of the test of subsection (1) shall be reported to the MOTI.

49. When loading or unloading racks are not employed for loading or unloading tank cars, the filling or discharge terminals shall be protected on all sides by a guard rail of metal or other material of equivalent strength and permanence. Guard rails shall be not less than 3 feet in height.

50. Loading or unloading lines shall be equipped with shut-off valves at the tank car end of the line. These valves shall not be used for throttling purposes but shall be either fully open or fully closed in order not to interfere with the operation of excess flow valves on the tank car.

PART V

SAFETY RELIEF DEVICES

51. A cylinder or tank with a water capacity not exceeding 100 Imperial gallons and manufactured, filled, operated and maintained in accordance with a Canadian Transport or an Interstate Commerce specification, which is approved by either of these authorities for liquefied petroleum gas use, is exempt from the provisions of this Part.

52. (1) Every storage tank and vapourizer (except as provided in Part VII) shall be provided with one or more safety relief valves of the spring loaded type or an equivalent type which have been approved for the intended service by the Boiler and Pressure Vessel Committee of the A.S.M.E. or the Compressed Gas Association, Inc. or Underwriters’ Laboratories.

(2) Such valves shall be of a size that will ensure a rate of discharge not less than specified in the current edition of National Fire Protection Association’s Pamphlet No. 58.

(3) The rate of discharge prescribed in subsection (2) shall be obtained before the pressure is in excess of 120 per cent of the maximum (not including the permitted plus tolerance of 10 per cent) permitted start to discharge pressure setting of the device.

(4) Safety relief valves shall be installed in a manner that will ensure that the full relief requirements are always satisfied.

(5) Storage tank and vapourizer safety relief valves shall be set to start to discharge at pressures as prescribed in the current edition of the National Fire Protection Association’s Pamphlet No. 58 for vessels designed according to the A.S.M.E. Code.

53. A safety relief valve venting to the outside atmosphere shall be installed between each pair of shut-off valves on liquefied petroleum gas liquid lines where liquid may be trapped. The start to discharge pressure setting shall not be in excess of 5000 psig. The minimum setting shall not be lower than 140 per cent of the container relief valve setting, except that for 1.C.C. or B.T.C. containers, the minimum setting shall not be lower than 400 psig.
54. (1) For tanks exceeding 2,000 Imperial gallons water capacity, the discharge from tank safety relief devices shall be vented vertically to the outside atmosphere at a point not less than 7 feet above the storage tank. Such discharge should be at least 100 feet and in no case shall it be less than 50 feet from any open flame or source of ignition.

(2) For tanks with a water capacity of 2,000 Imperial gallons or less, the discharge from safety relief devices shall be vented vertically to the outside atmosphere in a manner that will prevent the gases from impinging on the tank.

(3) The ends of relief valve discharge pipes shall be fitted with loose rain caps that cannot freeze in place.

(4) All storage tank relief devices shall be located on the storage tank and shall have direct communication with the vapour space of the storage tank.

(5) If the design of the safety relief system is such that liquid can collect on the discharge side of the disc, provision shall be made for drainage of the liquid.

(6) Return bends and restrictive pipe fittings are not permitted in relief valve piping.

(7) Safety relief devices shall be so arranged that the possibility of tampering will be minimized.

(8) External pressure settings or adjustments shall be sealed.

55. The safety relief device shall be permanently marked or labelled with the following information:
   (a) start to discharge pressure in psig;
   (b) full-open rate of discharge in c.f.m. of air at 60°F and 14.7 psia;
   (c) manufacturer’s name or symbol;
   (d) year of manufacture;
   (e) letters “LPG” to indicate suitability for liquefied petroleum gas service; and
   (f) A.S.M.E. or Compressed Gas Association or Underwriters’ Laboratories approval symbol.

56. Safety relief valves and devices shall be inspected and tested prior to being put into service and shall be tested periodically as prescribed in the Compressed Gas Association Pamphlet Safety Relief Device Standards for compressed Gas Storage Containers.

PART VI

LOADING AND UNLOADING

57. (1) The tank car, during loading and unloading operations, shall be protected on the connected end or ends of the siding by a sign of metal or other suitable material 12 inches by 15 inches in size and reading “STOP — TANK CAR CONNECTED”. The word “stop” shall be in letters at least 4 inches high and the other words in letters at least 2 inches high. Letters shall be white on a blue background.

(2) The “Stop” sign shall be placed on the tank car or on the loading or unloading track in a manner that will ensure it is always visible to the crew of an engine on the same track.

58. (1) During loading or unloading operations, tank car hand brakes shall be kept applied and the wheels at both ends of the tank car shall be blocked.

(2) Tank cars shall be disconnected from pipelines immediately after the completion of loading or unloading operations.

(3) At least one experienced operator supplied by the consignee or the consignor, as the case may be, shall supervise the loading or unloading operation. During the absence of the operator supervising the loading or unloading operation from the installation site, operations shall be discontinued.
(4) Gas or liquid shall not be vented to the atmosphere to assist in transferring the contents of one container to another.

(5) Loading or unloading operations shall only be carried out during the hours of daylight unless adequate permanent lighting installed in accordance with section 69 is provided.

59. The direct transfer of liquefied petroleum gas between tank trucks and tank cars on carrier’s right-of-way is prohibited.

60. All loading and unloading tracks shall be grounded and bonded at the loading and unloading site in accordance with the Electric Sparks Prevention Guidelines for Industrial Railways.

61. The loading and unloading of tank cars located on carrier’s tracks are subject to the following conditions:
   (a) except as provided in paragraph (c), tank car discharge connections shall be equipped with excess flow valves;
   (b) loading shall be piped directly to permanent storage tanks of sufficient capacity to receive the entire contents of the tank car; the tanks and all of the facilities associated with them shall be in accordance with all applicable provisions of these Guidelines;
   (c) tank cars of the I.C.C. 106A type may be loaded or unloaded on carrier’s track if written permission is obtained from the carrier concerned and equipment is provided for the safe loading or unloading of the unit tanks, but such tanks shall not be stored on carrier’s property except as provided in these Guidelines; and
   (d) when the carrier’s track is a team track, it is recommended that, where practicable, the tank car be protected during loading or unloading by a locked derail located at least one car length from the tank car on the connected end or ends of the team track.

62. Except as otherwise provided in this Part, vapourizer design, location, construction and operation shall be in accordance with the current edition of National Fire Protection Association Pamphlet No. 58.

63. Vapourizers, heating devices for vapourizers, and vapourizers buildings shall be separated from loading and unloading sites, tanks, location on an adjoining property which may be built upon or other buildings by distances not less than the following:
   (a) indirect fired vapourizers, 10 feet;
   (b) heating devices for indirect fired vapourizers, 25 feet;
   (c) direct fired vapourizers, with a capacity of 100 gallons per hour or less, 25 feet; and
   (d) direct fired vapourizers with a capacity exceeding 100 gallons per hour, 50 feet.

64. (1) Vapourizers, if housed, should be installed in detached buildings used exclusively for liquefied petroleum gas vapourization and if the vapourizer is installed in a lean-to, shed or room of a building, such building may only be used for liquefied petroleum gas operations.

   (2) The vapourizer building or room, as the case may be, shall be constructed of non-combustible or fire resistant materials, shall be cross-ventilated at the floor and ceiling levels by louvered openings, and should be provided with not less than 1 square foot of explosion relief venting on the open side per 40 cubic feet of inside space.

65. (1) A direct fired vapourizer or the heating device which supplies steam, hot water, or other fire-safe heating medium for an indirect fired vapourizer shall be separated from all other liquefied petroleum gas equipment, such as pumps or gas mixing devices by fireproof and vapourproof walls. Access to such vapourizer and heating device shall be from the outside
only. The firewall shall be of not less than 1 hour fire resistance. Other parts of the room housing the heating device shall be constructed of noncombustible or fire resistant material. Cross ventilation shall be provided by other means than doors and windows.

(2) This section does not apply to domestic water heaters which may supply heat for a vapourizer in a domestic system.

66. The use of a direct gas-fired tank heater or the mounting of any vapourizer on a liquefied petroleum gas storage tank is prohibited on the railway right-of-way.

PART VIII

GENERAL

67. The area within 25 feet of a tank with a water capacity exceeding 200 Imperial gallons, a loading or unloading rack, a pump, building, etc. shall be free of debris, and grass and weeds shall be kept cut to a height not exceeding 6 inches. The general housekeeping and maintenance of buildings, tanks, etc. shall be of the highest standard.

68. Defective piping, valves or fittings shall be repaired immediately.

69. (1) Installations with a total water capacity not exceeding 2,000 Imperial gallons that provide fuel directly to heating, cooking or welding appliances on the installation site are exempt from the requirements of this section.

(2) All electric motors, switches, motor controllers, circuit breakers, wiring and any other electrical facility inside a building housing a liquefied petroleum gas pump or other similar equipment, or within 25 feet of an outdoor liquefied petroleum gas storage tank, loading or unloading point, pump or other similar equipment, shall conform to the set forth in the latest edition of the Canadian Electrical Code for Class 1, Group D, Division I hazardous locations.

70. Smoking and the use of portable open flame lights or equipment shall be prohibited except in certain isolated and clearly designated safe areas, and signs to this effect shall be posted at the plant entrances and at the loading and unloading sites. (See Section 75 for restrictions applying to welding)

71. (1) Water, dry powder, carbon dioxide, or other fire extinguishers suitable for liquefied petroleum gas fires shall be available on installations with storage capacities exceeding 2,000 Imperial gallons. At least one fire extinguisher shall be kept on the outside premises.

(2) Each storage area with a capacity exceeding 2,000 Imperial gallons should be protected by at least one standard fire hydrant so located that a 2 1/2-inch hose stream may be used for controlling a fire on the site or cooling a tank in case of adjacent fires. Consultation with the local fire authority on these matters is recommended.

72. (1) Uninsulated liquefied petroleum gas storage tanks with water capacities exceeding 100 Imperial gallons, which are installed out-of-doors, shall be painted with a heat reflective paint. Paint should be white enamel or slow chalking, white paint rather than aluminium paint.

(2) The words “CAUTION-PROPANE” (or other liquefied petroleum gas name) not less than 6 inches high shall be painted on each outdoor storage tank with a water capacity exceeding 2,000 Imperial gallons.
(3) On application, the MOTI may approve means of identification other than those prescribed by subsections (1) and (2).

73. Each liquefied petroleum gas installation with a storage capacity exceeding 2,000 Imperial gallons of water shall be completely enclosed within a steel mesh fence not less than 5 feet high. The mesh shall be made from steel wire of not less than 0.10 inch diameter. The opening in the mesh shall not be greater than 6 inches. The fence gates shall be locked when the installation is unattended and at least two means of access through the fencing shall be provided.

74. (1) Except for the frame, all buildings, compartments, bottling rooms, lean-tos or platforms shall be constructed of non-combustible or fire resistant materials.
(2) All enclosures where liquefied petroleum gas is handled shall be provided with cross ventilation by means of permanently open louvers near floor level.
(3) Containers of flammable liquids or gases shall not be stored in a room occupied by liquefied petroleum gas equipment.
(4) Buildings shall be maintained in a clean and tidy condition.

75. Welding shall not be permitted within 150 feet of a loading or unloading site while loading or unloading operations are in progress. At other times, welding may only be allowed when carried out under close supervision and in accordance with the provisions of Canadian Standards Association Pamphlet W-117.

76. (1) All liquefied petroleum gases shall be effectively odourized by an approved agent of such character as positively indicates, by distinct odour, the presence of gas down to concentrations in air of not over one-fifth the lower limit of flammability. For propane the lower limit of flammability is 2.37 per cent.
(2) Exemption from the requirements of this section may be granted if it is established to the satisfaction of the MOTI that the odourant will be harmful in subsequent processing or use of the gas.
(3) The requirements of subsection (1) shall be deemed to be complied with if 1 pound of Ethyl Mercaptan, 1 pound of Thiophane, or 1.4 pounds of Amyl Mercaptan per 10,000 gallons of liquefied petroleum gas is used. The listing of odourants in this section is not intended to exclude the use of other odourants which meet the requirements of subsection (1).

77. Under ordinary circumstances, the diking of liquefied petroleum gas storage tanks is not required, except that the MOTI may require erection of a dike under those circumstances where a dike would provide protection for adjoining property.

78. All liquefied petroleum gas installations are subject to inspection at any time by any duly authorized officer of the MOTI.

79. The owning or operating company shall report immediately by wire to the railway company concerned and to the Railway Safety Manager of BCSA in New Westminster BC every fire resulting in damage to the installation, every explosion or major pipe line or tank failure occurring on the installation, and shall submit a detailed report by mail of such accident.

80. For further details, the following publications are suggested:
   (a) liquefied petroleum gas Pamphlets Nos. 58 and 59 published by the National Fire Protection Association, 60 Batterymarch Street, Boston 10, Massachusetts;
PART IX

SWITCH HEATER FACILITIES

81. This Part applies to switch heater facilities with a storage capacity of 2000 imp. gal. or less.

82. Switch heater facilities shall be designed, located, constructed, operated and maintained in full compliance with these Guidelines.

83. Foundations shall be built in accordance with sound engineering practice and in such a way as to prevent damage to the tank and piping system.

84. Copper tubes up to 3/4 inch nominal diameter may be used.

85. (1) The area within 25 feet of a tank and above ground piping shall be kept free of debris and combustible materials, other than ties that are in place on the track.

(2) The area within 10 feet of a tank and above ground piping shall be kept free of vegetation.

(3) The maintenance of the facilities shall be of the highest standard.

86. At the end of every year, the railway company shall, by mail, inform the Railway Safety Manager of BCSA of the location at which switch heater facilities were constructed during the year.