VICTORIA

# GOVERNMENT GAZETTE.

Published by Authority.

[*Registered at the General Post Office, Melbourne, for transmission by post as a newspaper.*]

**No. 38] FRIDAY, MAY 9 [1958**

## LIQUIFIED PETROLEUM GAS ACT 1957.

*At Government House, Melbourne, the eighth day of May*, 1958.

PRESENT:

His Excellency the Governor of the State of Victoria.

Mr. Reid | Mr. Porter.
Mr. Fraser |

## LIQUIFIED PETROLEUM GAS REGULATIONS.

IN pursuance of Section 5 of the *Liquified Petroleum Gas Act* 1957 and of all other powers hereunto him enabling His Excellency the Governor of the State of Victoria by and with the advice of the Executive Council hereof doth hereby make the following Regulations:—

1. (1) These Regulations may be cited as the Liquified Petroleum Gas Regulations 1958.

(2) Nothing in these Regulations shall extend or apply to installations or storages in refineries.

2. These Regulations are divided into Parts and Divisions as follows:—



No. 38.—3657/58.

## PART I.—INTERPRETATION.

3. In these Regulations unless inconsistent with the context or subject-matter:—

"Act." "Act" means the *Liquified Petroleum Gas Act* 1957.

"Air mixer." "Air mixer" means that portion of an injection (Bunsen) type burner into which the primary air is introduced.

"Air shutter." "Air shutter" means an adjustable device for varying the size of the primary air inlet or inlets.

"Appliance." "Appliance" means any device which utilizes gas to produce light, heat or power.

"Appliance automatically controlled." "Appliance automatically controlled" means an appliance equipped with automatic devices which—

(*a*) accomplish complete turn-on and shut-off of gas to the main burner or burners; or

(*b*) graduate the gas supply to the burner or burners, but do not effect complete shut-off of gas—

but does not include a thermostatically controlled cooking oven.

"Appliance flue way." "Appliance flue way" means the flue passages within an appliance.

"Approved." "Approved" means approved by the Minister.

"Automatic gas shut-off valve." "Automatic gas shut-off valve" means a device so constructed that the attainment of a temperature in the medium being heated in excess of some pre-determined limit acts upon a chemical or metallic element in such a way as to cause the gas to the appliance to be shut off and remain off.

"Automatic ignition." "Automatic ignition" means any device which provides for ignition of the gas at a burner when the gas burner valve controlling the gas to that burner is turned on, and will effect re-ignition if the flames on the burner have been extinguished by means other than the closing of the gas burner valve.

"Automatic pilot." "Automatic pilot" means an automatic pilot device and pilot burner assembled in fixed relationship.

"Automatic pilot device." "Automatic pilot device" means a device employed with gas burning equipment which will automatically shut off the gas supply to the burner being served by either direct or indirect means when the pilot flame is extinguished whether the pilot burner is constructed integrally with the device or not.

"Automatic pilot, complete shut-off type." "Automatic pilot, complete shut-off type" means an automatic pilot for shutting off, automatically, the gas supply to the main burner and pilot in the event of pilot or gas failure, and which prevents the gas from being turned into the main burner unless the pilot is lighted.

"Baffle." "Baffle" means an object placed in an appliance to change the direction of, or retard the flow of air, air gas mixtures, or flue gases.

"Branch line." "Branch line" means piping which conveys gas from a supply line to the appliance.

"B.Th.U." "B.Th.U." means a British thermal unit, which is the quantity of heat required to raise the temperature of one pound of water 1°F.

"Bunsen flame." "Bunsen flame" means the flame produced by pre-mixing some of the air required for combustion with the gas before it reaches the burner ports or points of ignition.

"Burner." "Burner" means a device for the final conveyance of the gas, or a mixture of gas and air, to the combustion zone.

"Central heating appliance." "Central heating appliance" means a self-contained gas-burning appliance for heating the air by secondary transfer of heat from the flue gases through metal to the air, usually located outside the room or rooms being heated.

"Container." "Container" means a storage tank but does not include a cylinder.

"Concealed gas piping." "Concealed gas piping" means piping used for carrying gas which, when in place in the finished building, will be hidden from view by the structure.

"Condensate." "Condensate" means the liquid which separates from a gas (including flue gas) due to reduction in temperature, and condensation shall have a corresponding interpretation.

"Control" means a device whether manual or automatic designed to regulate the gas, air, water and electrical supply to an appliance. "Control."

"Control cock" means a cock used in piping to control the gas supply to any section of a system of piping or to an appliance. "Control cock."

"Conversion burner" means a burner designed to supply gas to an appliance originally designed to utilize another fuel. "Conversion burner."

"Cubic foot (cu.ft.) of gas" means the amount of gas which would occupy 1 cubic foot when at a temperature of 60°F., saturated with water vapour and under a pressure equivalent to that of 30 inches of mercury. "Cubic foot (cu.ft.) of gas."

"Cylinder" means a storage vessel as defined by the Cylinder Code of the Standards Association of Australia. "Cylinder."

"Demand" means the maximum amount of gas required per unit of time for the operation of the appliance supplied. "Demand."

"Diversity factor" means the ratio of the maximum probable demand to the maximum possible demand. "Diversity factor."

"Draught diverter" means a device built into an appliance, or made a part of the flue or vent connector from an appliance which is designed to— "Draught diverter."

(*a*) insure the ready escape of the products of combustion in the event of no draught, back draught, or stoppage beyond the draught hood;

(*b*) prevent a back draught from entering the appliance; and

(*c*) neutralize the effect of stack action of the flue or vent upon the operation of the appliance.

"Duct furnace" means a furnace installed in distribution ducts of air conditioning systems to supply warm air for heating in which the air circulation depends on a blower not furnished as part of the furnace. "Duct furnace."

"Excess air" means air which passes through the combustion chamber and the appliance flueways in excess of that which is theoretically required for complete combustion. "Excess air."

"Exposed piping" means piping used for conveying gas which will be in full view in the finished structure. "Exposed piping."

"Flue or vent" means a conduit or passageway, vertical or nearly so, for conveying flue gases to the outer air. "Flue or vent."

"Flue collar" means that portion of an appliance designed for the attachment of the draught hood or flue or vent connector. "Flue collar."

"Flue or vent connector" means the pipe connecting an appliance with the flue or vent. "Flue or vent connector."

"Flue gases" means the products of combustion and excess air. "Flue gases."

"Fuel line" means the independent pipe inside a building from the meter or source of supply to an appliance. "Fuel line."

"Gas" means liquified petroleum gas. "Gas."

"Gas hose" means a gas conduit which depends for tightness on joint packing, or on any wall structure other than that formed by a continuous one-piece metal tubing member. "Gas hose."

"Heating value (total)" means the number of B.Th.U's produced by the combustion at constant pressure of 1 cubic foot of gas when— "Heating value (total)."

(*a*) the products of combustion are cooled to the initial temperature of the gas and air;

(*b*) the water vapour formed during combustion is condensed; and

(*c*) all the necessary corrections have been applied.

"Hotel and restaurant range" means an appliance of the floor type providing for top cooking, roasting, baking or grilling, or any combination of top cooking with any of these other functions and not designed primarily for domestic use. "Hotel and restaurant range."

"House riser" means the principal vertical pipe inside a building which conducts the gas from the meter or source of supply to the different floors of the building. "House riser."

"Incinerator" means an appliance used to reduce refuse material to ashes, and which is sold as a complete unit. "Incinerator."

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| "Individual main burner valve." | "Individual main burner valve" means a valve which controls the gas supply to an individual main burner. |
| "Industrial gas boiler." | "Industrial gas boiler" means an appliance designed primarily to furnish steam or hot water for use in some process, the nature of which is industrial or commercial but not for central heating. |
| "Limit control." | "Limit control" means a device responsive to changes in pressure or temperature or liquid level for turning on, shutting off or throttling the gas supply to an appliance. |
| "Liquified petroleum gas, L.P. gas." | "Liquified petroleum gas" or "L.P. gas" means a liquid which is a mixture of hydro-carbons basically consisting of butanes or butenes or propane or propene or any mixture of all or any of them. |
| "Luminous flame." | "Luminous flame" means the flame produced by burning gas, without any pre-mixing of air with the gas. |
| "Main burner." | "Main burner" means a device or group of devices essentially forming an integral unit for the final conveyance of gas or a mixture of gas and air to the combustion zone, and on which combustion takes place to accomplish the function for which the appliance is designed. |
| "Main burner control valve." | "Main burner control valve" means a valve which controls the gas supply to the main burner manifold. |
| "Manifold." | "Manifold" means the conduit of an appliance which supplies gas to the individual burners. |
| "Manual main shut-off valve." | "Manual main shut-off valve" means a manually operated valve or cock in the gas line for the purpose of completely turning on or shutting off the gas supply to the appliance, except to pilot or pilots which are provided with independent shut-off valves. |
| "Measured gas." | "Measured gas" means gas which has passed through a meter and the volume of which has been registered by the meter. |
| "Meter." | "Meter" means an instrument installed to measure the volume of gas delivered through it. |
| "Mixer." | "Mixer" means the combination of mixer head, mixer throat and mixer tube. |
| "Mixer face." | "Mixer face" means the air inlet end of the mixer head. |
| "Mixer head." | "Mixer head" means that portion of an injection (Bunsen) type burner, usually enlarged into which primary air flows to mix with the gas stream. |
| "Mixer throat." | "Mixer throat" means the portion of the mixer which has the smallest cross sectional area and which lies between the mixer head and the mixer tube. |
| "Mixer tube." | "Mixer tube" means that portion of the mixer which lies between the throat and the burner head. |
| "Orifice." | "Orifice" means the opening in a cap, spud or other device whereby the flow of gas is limited and through which the gas is discharged to the burner. |
| "Orifice cap." | "Orifice cap" means a movable fitting having an orifice which permits adjustment to the flow of gas by the changing of its position with respect to a fixed needle or other device. |
| "Orifice spud." | "Orifice spud" means a removable plug or cap containing an orifice and which permits adjustment of the flow of gas either by substitution of a spud with a different sized orifice or by the motion of a needle with respect to it. |
| "Pilot." | "Pilot" means a small flame which is utilized to ignite the gas at the main burner or burners. |
| "Pipe or piping." | "Pipe or piping" includes a tube or tubing. |
| "Portable incinerator." | "Portable incinerator" means an incinerator which is a complete unit in itself, and which does not become an integral part of the structure in which it is installed. |
| "Pressure relief valve." | "Pressure relief valve" means an automatic device which opens or closes a relief vent, depending on whether the pressure is above or below a pre-determined value. |
| "P.S.I.G." | "P.S.I.G." means pounds per square inch gauge. |
| "Purge." | "Purge" means to free a gas conduit of air, gas or a mixture of gas and air. |

"Recessed heater" means a self-contained space heater, complete with grills or equivalent, designed for incorporation in or permanent attachment to a wall, floor ceiling or partition, either taking air for combustion from the space to be heated, or having a sealed combustion system, the inlet and outlet of which communicate only with the outside air and furnishing heated air circulated by gravity or by a fan directly into the space to be heated through openings in the casing. "Recessed heater."

"Regulator" means a device for controlling and maintaining a uniform gas supply pressure. "Regulator."

"Relief device" means a safety device designed to forestall the development of a dangerous condition in the medium being heated, by relieving either pressure, temperature, or vacuum build-up in the appliance. "Relief device."

"Relief opening" means the opening provided in a draught hood to permit the ready escape to the atmosphere of the flue products from the draught hood in the event of no draught, back draught, or stoppage beyond the draught hood, and to permit inspiration of air into the draught hood in the event of a strong chimney updraught. "Relief opening."

"Room or space heater" means a self-contained gas-burning appliance installed in and for heating rooms but does not include unit heaters, central heating appliances, nor garage heaters. "Room or space heater."

"Schedule" means Schedule to these Regulations. "Schedule."

"Secondary air" means the air externally supplied to the flame at the point of combustion. "Secondary air."

"Semi-rigid tubing" means a conduit having a semi-flexible metal wall structure. "Semi-rigid tubing."

"Specific gravity" means as applied to gas, the ratio of weight of a given volume to that of the same volume of air, both measured under the same conditions. "Specific gravity."

"System" means an assembly of equipment consisting essentially of the container or cylinder and major devices such as vaporizers, relief valves, excess flow valves, regulators and piping connecting such parts. "System."

"Tail pipe" means a container placed at a low point in a system of piping to collect condensate and from which the condensate may be removed. "Tail pipe."

"Temperature relief valve (fusible plug type)" means a device which opens and keeps open a relief vent by the melting or softening of a fusible plug or cartridge at a predetermined temperature. "Temperature relief valve (fusible plug type)."

"Temperature relief valve (reseating or self-closing type)" means an automatic device which opens and closes a relief vent, depending on whether the temperature is above or below a pre-determined value. "Temperature relief valve (reseating or self-closing type)."

"Thermostat" means an automatic device actuated by temperature changes designed to control the gas supply to a burner, or burners, in order to maintain temperatures between pre-determined limits. "Thermostat."

"Type A flue or vent" means a flue or vent of masonry, reinforced concrete, or a metal smoke stack. "Type A flue or vent."

"Type B flue or vent" means a vent piping of noncombustible, corrosion-resistant metal of sufficient thickness, cross-sectional area, and heat insulating quality to avoid excess temperature on adjacent combustible material and approved by the Minister. "Type B flue or vent."

"Type C gas flue or vent" means a flue or vent piping of sheet copper of not less than No. 24 standard wire gauge, or of galvanized iron of not less than No. 24 standard Birmingham gauge, or of other approved corrosion-resistant material. "Type C gas flue or vent."

"Unit heater" means a self-contained gas-burning appliance of the fan type, designed for the delivery of warm air directly into the space in which the appliance is located. "Unit heaters."

"Unmetered gas" means gas which has not been passed through and the volume of which has not been registered by a meter. "Unmetered gas."

"Vacuum relief valve."

"Vacuum relief valve" means an automatic device which opens or closes a relief vent, depending on whether the vacuum is above or below a pre-determined value.

"Water heaters."

"Water heaters" includes—

(*a*) the type which heats the water as it is drawn, referred to as automatic instantaneous water heaters;

(*b*) the type which combines a water heating element and water storage tank, gas to the main burner being controlled by a thermostat, referred to as an automatic storage water heater;

(*c*) the manually controlled type usually connected to an ordinary hot water tank, referred to as a circulating or tank water heater.

## PART II.—STANDARDS FOR L.P. GAS.

4. L.P. gases shall conform with the relevant specification set out in the First Schedule.

## PART III.—GENERAL PROVISIONS *RE* INSTALLATIONS AND STANDARDS.

### Division 1—General.

5. No person shall make repair alter or open connexions in any gas installation or appliance except in accordance with these Regulations.

6. Installation of all gas piping or gas appliances shall be performed with the gas turned off.

7. Immediately after installation all piping and tubing shall be tested at 40 in. water gauge or twice the normal working pressure whichever is the greater and proved free of leaks for a period of not less than 15 minutes using a manometer or other graduated pressure device which will indicate a drop in pressure.

8. No test for leaks shall be made with a flame.

### Division 2—Location of Containers.

9. Subject to Regulation 85 containers and first stage regulating equipment shall be located outside of buildings other than buildings especially provided to house the containers and equipment.

10. Each above-ground tank shall be located, with respect to other facilities and lines of property which may be built upon, in accordance with Table 1:—

Table 1.

(*a*) From line of property which may be built upon—

| Water capacity of each container (gallons) | Minimum Distance (feet) |
|---|---|
| Less than 125 | none |
| 126 to 500 | 10 |
| 501 to 2,000 | 25 |
| 2,001 to 100,000 | 50 |
| 100,001 to 250,000 | 100 |
| 250,001 to 500,000 | 150 |
| Over 500,000 | 200 |

| | |
|---|---|
| (*b*) From L.P. gas tanks and other pressure storage tanks | 2 |
| (*c*) From regularly occupied important buildings, power transmission lines, truck loading docks, stationary internal combustion engines, and underground L.P. gas storage vessels. (Piping, pumps, and power supply used directly with the storage tanks are excluded) | 25 |
| (*d*) From navigable water and loading piers | 50 |
| (*e*) From tanks which operate at suubstantially atmospheric pressure and contain flammable liquids | 10 |

The distances mentioned in this Table are horizontal distances measured " through air ". A firewall can be used, between the tank and the object, to give the above distances measured as the horizontal flow of the vapour through the air. Firewalls must be built to not less than a height equal to that of the centre line of the tank above ground level.

11. Filling connexions for tanks filled on consumers' premises shall be located not less than fifteen feet (15′) from any opening into or under a building where such opening is below the level of the filling connexions.

12. Readily ignitible material shall not be permitted within ten feet (10′) from any container.

13. No cylinder-filling platform shall be located less than ten feet (10′) from any storage tank, nor less than twenty-five feet (25′) from the nearest building or line of adjoining property that may be built upon.

14. No containers while installed for use shall be stacked one above the other.

15. No bulk storage for gas shall be installed in a densely populated or congested area without the consent of the Minister.

16. No bulk storage for gas for industrial consumer purposes involving containers of or exceeding 10,000-gallons aggregate water capacity shall be installed except in accordance with plans and specifications approved by the Minister.

DIVISION 3.—INSTALLATION OF CONTAINERS.

17. All stationary tanks shall be installed on firm masonry or concrete foundations. Horizontal storage tanks shall have no more than two (2) points of support longitudinally. Where necessary, tanks shall be securely anchored or weighted to prevent floating.

18. Steel structural supports, when used, shall be encased in concrete or other material having a fire resistant rating of at least two hours within the meaning of chapter 14 of the Uniform Building Regulations 1945, when the distance between the lower surface of the tank and the top of the concrete or masonry foundation exceeds eighteen inches (18″).

19. Sufficient space shall be provided between tanks to permit fire fighting.

20. All tanks over twelve hundred gallons (1,200 gallons) capacity shall be installed in such a manner as to allow for the expansion and contraction of the tank.

21. (1) Every tank shall be so supported as to prevent the concentration of excessive loads on the tank at the points of support.

(2) Tanks installed in batteries shall be so installed that the top surfaces of the tanks are substantially in the same plane.

22. All foundations and fastenings shall be designed to provide reasonable safety under all imposed loadings, including wind and vibration.

23. All tanks located in public places shall be surrounded by a strong steel fence, or equivalent, to prevent tampering. The fence required by this section shall be at least six feet (6′) in height. All fenced areas shall be kept locked when unattended.

24. (1) Liquid and vapour lines shall be at least full-size, from the excess-flow valve in the tank to the point of discharge.

(2) In plants having two (2) or more tanks in battery, with common loading or unloading connexions, the common liquid and vapour lines shall also be fitted with excess-flow valves, or equivalent unless the common line has a cross-sectional area equal to, or in excess of, the combined areas of the individual tank lines, in which case the excess-flow valve in the tank shall suffice.

25. (1) Tanks and regulating equipment shall not be buried below ground unless written permission to do so has been obtained from the Minister and all of the following special conditions are complied with:—

(*a*) The exterior surfaces of the tank shall be covered with a corrosion-resistant material;

(*b*) The tank shall be set with the top at least twenty-four inches (24″) below the surface of the ground and rest on firm masonry or concrete foundations at least one foot (1′) above the bottom of the excavation;

(*c*) Before any backfilling is done, the installation shall be inspected by an engineer appointed by the Minister and shall comply with these Regulations;

(*d*) The backfilling shall be done in such a manner that there will be at least six inches (6″) of water-washed sand, free from soil, rocks, or gravel, immediately adjacent to the tank. The sand shall be well tamped into place during the backfilling operations;

(*e*) All buried tanks shall be constructed for underground service and shall be provided with means for lowering the vessel into place without damage to the vessel or corrosion-resistant coating;

(*f*) If the valves and fittings are located in a curb box, adequate provision shall be provided for proper drainage and ventilation of the curb box;

(*g*) No curb box shall be larger than necessary for the operation and maintenance of the valves and fittings located therein, nor more than three feet (3′) in depth.

(2) All buried tanks shall be completely uncovered for an inspection of all external surfaces at intervals of at least once every three (3) years. The intervals may be changed, at the discretion of the Minister, if a test plate is buried adjacent to the tank and shows no appreciable corrosion on inspection after three (3) years of service; provided, however, that every tank shall be uncovered at least every fifteen (15) years.

(3) The test plates shall be at least one-fourth (1/4th) of the tank diameter in length, and six inches (6″) wide, and shall be buried in the water-washed sand at least as deep as the lowest surface of the tank and shall not be coated.

(4) Test plates shall be provided in accordance with the following table:—

| | |
|---|---|
| Tanks ten feet (10′) or less in length .. .. | one (1) test plate. |
| Tanks more than ten feet (10′) but less than twenty feet (20′) in length | two (2) test plates—one on each side near opposite ends. |
| Tanks twenty feet (20′) or more in length.. .. | one (1) test plate for each ten feet (10′) of length, placed on alternate sides at ten foot (10′) intervals. |

(5) No tank used underground shall be installed aboveground until it has been inspected and found to be in compliance with requirements for aboveground installation. Underground tanks shall not be uncovered until they are free of all gas in liquid form.

(6) Where necessary, underground tanks shall be securely anchored or weighted to prevent floating.

### Division 4—Container Valves and Accessories.

26. (1) All valves, fittings and accessories connected directly to the container, including primary shut-off valves, shall have a rated working pressure of at least 250 p.s.i.g. and shall be of material and design suitable for use with L.P. gas.

(2) Cast iron shall not be used for container valves, fittings and accessories but container valves fittings and accessories may be made of malleable iron.

27. (1) Excess flow valves where required by these Regulations shall close automatically at the rated flows of vapour or liquid as specified by the manufacturer.

(2) The connexions or lines including valves and fittings being protected by an excess flow valve shall have a greater capacity than the rated flow of the excess-flow valve.

28. Liquid level gauging devices which are so constructed that outward flow of container contents shall not exceed that passed by a No. 54 drill size opening (i.e., .055-in. diameter opening) need not be equipped with excess-flow valves.

29. Openings from tanks or through fittings attached directly on tank to which pressure gauge connexion is made need not be equipped with shut-off or excess-flow valves if such openings are restricted to not larger than No. 54 drill size opening (i.e., .055-in. diameter opening).

30. Excess-flow and back-pressure check valves when required by these Regulations shall be located inside the container or at the point outside where the line enters the container; in the latter case, installation shall be made in such manner that any undue strain beyond the excess-flow or back-pressure check valve will not cause breakage between the container and such valve.

31. Excess-flow valves shall be designed with a by-pass, not to exceed a No. 60 drill size opening (i.e., .040-in. diameter opening) to allow equalization of pressures.

32. All connexions to containers except safety relief connexions, liquid level gauging devices and plugged openings shall have shut-off valves located as close to the container as practicable.

DIVISION 5—VAPORIZERS.

33. (1) No indirect fired vaporizer utilizing steam, water or other heated medium shall be installed unless it has been constructed in accordance with specifications approved by the Minister and conforms with the requirements of this Division.

(2) Every vaporizer having an inside diameter exceeding 6 inches shall be permanently marked as follows:—

(*a*) with the allowable working pressure and temperature for which the vaporizer is designed;

(*b*) with the sum of the outside surface area and the inside heat exchange surface area expressed in square feet;

(*c*) with the name or symbol of the manufacturer.

34. Vaporizers having an inside diameter of 6 inches or less shall have a design working pressure of not less than 250 p.s.i.g.

35. Heating or cooling coils shall not be installed inside a container.

36. Vaporizers may be installed in buildings, rooms, sheds, or lean-tos used exclusively for gas manufacturing or distribution, or in any other structure of non-combustible construction well ventilated near the floor line and roof.

37. Vaporizers shall have at or near the discharge a safety relief valve providing an effective rate of discharge in accordance with the Second Schedule.

38. Vaporizers shall be provided with suitable automatic means to prevent liquid passing from the vaporizers to the gas discharge piping.

39. The heat generating device used to supply the heat for evaporation in a vaporizer shall be separated from all compartments or rooms containing gas vaporizers, pumps and central gas mixing devices by a wall of fire resistant material and of vapour-tight construction. This requirement does not apply to domestic water heaters used to supply heat for a vaporizer in a domestic system.

40. Atmospheric vaporizers employing heat from the ground or surrounding air—

(*a*) shall be buried underground; or

(*b*) if the capacity of the unit does not exceed 1 quart, may be located inside the building close to the point at which the pipe enters the building.

41. Vaporizers of less than 1 quart capacity heated by the ground or surrounding air need not be equipped with safety relief valves.

42. Vaporizers designed primarily for domestic service shall be protected against tampering and physical damage.

43. Direct gas-fired vaporizers shall be—

(*a*) marked with the name of the manufacturer, rated B.Th.U. input to the burner, the area of the heat exchange surface of the vaporizer in square feet, and the maximum vaporizing capacity in gallons per hour;

(*b*) connected to the liquid section or the gas section of the storage container, or both; but in any case there shall be at the container a manually-operated valve in each connexion to permit completely shutting off when desired all flow of gas or liquid from container to vaporizer;

(*c*) if the capacity does not exceed 35 gallons per hour—located at least 5 feet from container shut-off valves;
if the capacity exceeds 35 gallons but does not exceed 100 gallons per hour—located at least 10 feet from the container shut-off valves; and
if the capacity exceeds 100 gallons per hour—located at least 15 feet from the container shut-off valves.

(*d*) equipped at or near the discharge with a safety relief valve providing an effective rate of discharge in accordance with the Second Schedule. The relief valve shall be so located as not to be subjected to temperatures in excess of 140°F;

(*e*) provided with suitable automatic means to prevent liquid passing from the vaporizer to the gas discharge piping of the vaporizer;

(*f*) equipped with means for manually turning off the gas to the main burner and pilot;

(*g*) equipped with automatic safety devices to shut off the flow of gas to main burners if pilot lights should fail. When flow through pilot exceeds 2,000 B.Th.U's. per hour, the pilot also shall be equipped with an automatic safety device to shut off the flow of gas to the pilot should the pilot flame be extinguished.

44. (1) Direct gas-fired tank heaters shall be—

(*a*) installed above ground;

(*b*) permanently marked with the name of the manufacturer the rated B.Th.U. input to the burner, and the maximum vaporizing capacity in gallons per hour;

(*c*) provided with a means for manually turning off the gas to the main burner and pilot;

(*d*) equipped with an automatic safety device to shut off the flow of gas to main burners, if the pilot light should fail and when the flow through the pilot exceeds 2,000 B.Th.U's. per hour the pilot also shall be equipped with an automatic safety device to shut off the flow of gas to the pilot should the pilot flame be extinguished;

(2) Tank heaters may be an integral part of a fuel storage container directly connected to the container liquid section, or vapour section, or both.

45. No direct fired vaporizer or tank heater shall be connected to a container that has a storage capacity in gallons less than ten times the hourly capacity of the vaporizer in gallons.

46. Pressure regulating and pressure reducing equipment if located within 10 feet of a direct fired vaporizer or tank heater shall be separted from the open flame by a substantially air-tight non-combustible partition or partitions.

47. Except as provided in Regulation 36 the following minimum distances shall be maintained between direct fired vaporizers or storage containers heated by direct fired tank heaters and the nearest substantial building or group of buildings or line of adjoining property which is now or may hereafter be built upon:—

(*a*) 10 feet for vaporizers having a capacity of 15 gallons per hour or less vaporizing capacity or for containers of less than 500 gallons water capacity;

(*b*) 25 feet for vaporizers having a vaporizing capacity exceeding 15 but not exceeding 100 gallons per hour or for containers exceeding 500 but not exceeding 1,200 gallons water capacity;

(*c*) 50 feet for vaporizers having a vaporizing capacity exceeding 100 gallons per hour or for containers of over 1,200 gallons water capacity.

48. Vaporizers shall not be provided with fusible plugs.

49. Vaporizer drains shall be protected and discharged in accordance with health regulations.

50. Vaporizer houses shall not have unprotected drains or sump pits.

DIVISION 6—SAFETY DEVICES.

51. (1) Every container and every vaporizer, whether heated by artificial means or not, shall be provided with one or more safety relief valves of spring-loaded or equivalent type.

(2) Such valves shall be arranged to afford free vent to the outer air with discharge not less than 3 feet horizontally away from any opening into the building which is below such discharge.

52. The rate of the discharge of such safety valves in the case of vaporizers shall be in accordance with the provisions of Schedules 2 and 3.

53. (1) Containers and vaporizers safety relief valves shall be set to start to discharge with relation to the design working pressure of the container.

(2) No container shall be used to store L.P. gas in any area where the prevailing temperatures are likely, having regard to the vapour pressure of the gas to be stored, to cause the safety valve to open unless the container is protected to the satisfaction of the Minister by spraying shading or other means.

54. Safety relief valves shall be so arranged that the possibility of tampering will be minimized; if pressure setting or adjustment is external, the relief valves shall be provided with approved means for sealing the adjustment.

55. No shut-off valves shall be installed between the safety relief valves and the container except that a shut-off valve may be used where the arrangement of this valve is such as always to afford full required capacity flow through the relief valves.

56. Safety relief valves shall have direct communication with the vapour space of the container.

57. Each container safety relief valve used with systems shall be plainly and permanently marked with—

(*a*) the size of the container on which the valve is designed to be installed;
(*b*) the pressure in p.s.i.g. at which the valve is set to start to discharge;
(*c*) the actual rate of discharge of the valve in cubic feet per minute of air at 60°F. and 14·7 pounds per square inch, absolute; and
(*d*) the manufacturer's name.

58. Safety relief valve assemblies, including their connexions, shall be of sufficient size to provide the rate of flow required for the container on which they are installed.

59. A safety relief valve shall be installed between each pair of shut-off valves on gas liquid piping so as to relieve into a safe atmosphere. The start-to-discharge pressure of such relief valves shall not be in excess of 500 pounds p.s.i.g.

60. The discharge from the safety relief device of a stationary container shall not terminate in any building.

DIVISION 7—INSTALLATION OF APPLIANCES.

61. In this Division "combustible construction" means a combustible surface constructed of wood composition or of wood lath and plaster.

62. Appliances shall only be installed in accordance with these regulations and in a location in which the ventilation permits satisfactory combustion of gas and proper venting, under normal conditions of use.

63. No appliances shall be installed in any location where inflammable vapours are likely to be present unless the design, operation and installation of the appliance is such as to eliminate the possible ignition of the inflammable vapours.

64. Appliances shall be adequately supported and so connected to the piping as not to exert undue strain on the connexions.

65. No device or attachment shall be installed on any appliance which may in any way impair the combustion of gas.

66. Any combination of appliances, attachments or devices used together in any manner shall comply with the standards which apply to each individual appliance attachment or device.

67. Non-portable appliances shall be connected with gas piping or tubing or combinations thereof as prescribed by these Regulations.

68. No devices employing or depending upon an electrical current shall be used to control or ignite a gas supply if of such a character that failure of the electric current could result in the escape of unburned gas or in failure to reduce the supply of gas under conditions which would normally result in its reduction unless other means are provided to prevent the development of dangerous temperatures or pressures or the escape of gas.

69. Gas piping shall not be used for an electrical earth nor shall electric circuits utilize gas piping, casing of controls, panels or other metal parts in lieu of wiring.

70. All appliances using electrical controls shall have the controls connected into a permanently live electrical circuit.

*Domestic Cookers.*

71. (1) Domestic cookers shall—

(*a*) be located so as not to constitute a hazard to persons or property having regard to the design and condition of the cooker and the combustibility of the floor or walls;

(*b*) be installed so that the cooking top and oven racks are level;

(*c*) if installed on combustible floors, be set on their own bases or legs;

(*d*) be installed with clearances not less than those shown in Table 2 hereunder; and

(*e*) have a vertical clearance above the cooker top of not less than 36 inches from any combustible construction:

Provided that where the underside of such combustible construction is protected with asbestos mill-board at least ¼ inch thick which is covered with sheet metal of not less than No. 28 gauge (·0156 inch) and such protection extends for 9 inches beyond the sides of the cooker the clearance shall be not less than 24 inches above the hot plates or 15 inches above the oven flue outlet whichever is the greater.

(2) Where a flue or vent connector is attached to a domestic gas cooker suitable provision shall be made for the protection of adjacent combustible construction from excessive temperatures.

TABLE 2.—MINIMUM CLEARANCE FOR DOMESTIC GAS COOKERS.

| Type of Cooker. | Spacing of Top Burner Opening from Side of Cooker. | Distance in Inches from Combustible Construction. | | | |
|---|---|---|---|---|---|
| | | Wall Not Extending Above Cooking Top. | Wall Extending Above Cooking Top. | Body of Cooker. | Projecting Flue Box. |
| A. Uninsulated .. | .. .. | 6 | 6 | 6 | 1 |
| B. Insulated .. | Less than 5 in. | 1 | 3 | 1 | 1 |
| Insulated .. | 5 in. or more | ½ | ½ | 1 | 1 |
| C. Flush to wall .. | Less than 5 in. | Flush | 3 | Flush | .. |
| Flush .. | 5 in. or more | Flush | Flush | Flush | .. |

*Water Heaters.*

72. (1) Water heaters—

(*a*) shall not be installed in bathrooms unless flued in compliance with these Regulations;

(*b*) shall be located as close as practicable to the flue and so as to provide short runs of piping to fixtures;

(*c*) shall be positioned in relation to combustible construction with a minimum clearance in accordance with Table 3 hereunder;

(*d*) shall not be installed in a closed system of water piping unless an approved water pressure relief valve is provided;

(2) Automatic instantaneous heaters and circulators shall not be installed in bathrooms without the approval of the Minister.

(3) Combustible floors under water heaters shall be protected with a fire-proof covering.

(4) The installations and adjustment of temperatures, pressure and vacuum relief valves or combinations thereof, and automatic gas shut-off valves shall be in accordance with these Regulations.

(5) The water supply to any automatic instantaneous water heater shall be such as to provide sufficient pressure to properly operate the water valve, when drawing hot water from a point on the top floor.

(6) The method of connecting a circulating water heater to the water tank shall assure proper circulation of water through the heater, and permit a safe and useful temperature of water to be drawn from the tank.

(7) The size of the water circulating piping, shall conform with the size of the water connexions of the heater.

(8) A suitable water valve or cock, through which sediment may be drawn off or the tank emptied, shall be installed at the lowest point of the heater.

TABLE 3.—MINIMUM CLEARANCE FOR WATER HEATERS.

| Type of Heater. | Distance from Combustible Construction—Inches. | |
|---|---|---|
| | Nearest Part of Jacket. | Flat Side. |
| Type A(1) .. .. .. | 6 | .. |
| Type B(2) .. .. .. | 2 | .. |
| Type C(3) .. .. .. | .. | Flush |

(1)Type A.—Miscellaneous (including circulating tank, instantaneous uninsulated underfired).
(2)Type B.—Underfired, insulated automatic storage heaters.
(3)Type C.—Type B units with one or more flat sides and tested for installation flush to wall.

73. (1) A room or space heater—

(a) shall be placed so as not to cause a hazard to floors walls curtains or furniture or to the free movement of persons within the room;

(b) if installed in sleeping quarters generally kept closed shall be vented to an effective flue.

(2) Room or space heaters designed and marked or labelled "for use in incombustible fire resistance fireplace only" or with words to the like effect shall not be installed elsewhere.

(3) Room or space heaters shall be installed with clearances not less than those specified in Table 4 hereunder.

(4) Room heaters of a circulating type having an outer jacket surrounding the combustion chamber, arranged with openings at top and bottom so that air circulates between the inner and outer jacket and without openings in the outer jacket to permit direct radiation, shall have clearances at sides and rear of not less than 12 inches.

(5) Room heaters of the radiating type other than those described above as of circulating type shall have clearances at sides and rear of not less than 6 inches; except that heaters which make use of metal, asbestos or ceramic material to direct radiation to the front of the appliance shall have a clearance of 36 inches in front, but if constructed with a double back of metal or ceramic may be installed with a clearance of 6 inches at sides and 6 inches at rear.

TABLE 4.—MINIMUM CLEARANCES FOR ROOM HEATERS.

| Type. | Distance from Combustible Construction—Inches. | |
|---|---|---|
| | Jacket, Sides and Rear. | Projecting Flue Box or Baffle. |
| Warm Air Circulators .. .. .. | 6 | 2 |
| Radiant Heaters .. .. .. | 6 | 2 |
| Wall Heaters .. .. .. .. | Flush | .. |
| Gas, Steam, and Hot Water Radiators .. | 6 | 2 |

*Wall-type Room Heaters.*

74. Wall heaters shall not be installed in walls of combustible construction unless the walls are protected by non-combustible material.

75. Suspended-type gas fire unit heaters shall be safely and adequately suspended having regard to their weight and vibration characteristics.

76. (1) Unit heaters shall be installed with minimum clearances of 6 inches between the appliance, projecting flue box or baffle and combustible construction and shall be mounted on a raised steel plate with a ventilated air space or on a concrete tiled or asbestos base. Such plate or base shall extend for 3 inches on all sides of the heater. The control side of a unit heater shall be spaced not less than 18 inches from any wall or partition.

(2) The location of any unit heater or the duct work attached thereto shall be such that a negative pressure will not be created in the room in which the unit heater is located.

(3) A unit heater shall not be attached to a warm air duct system unless specifically approved for such installation.

*Gas Refrigerators.*

77. Gas refrigerators shall be provided with adequate clearances for ventilation at the top and back and be fitted with an automatic shut-off device. They shall be installed in accordance with the manufacturer's instructions. If such instructions are not available, at least 2 inches shall be provided between the back of the refrigerator and the wall and at least a 12-inch clearance above the top.

*Hot Plates.*

78. (1) Hot plates, excluding ranges, when installed on combustible surfaces shall be set on their own legs or bases. They shall be installed with minimum horizontal clearances of 6 inches from combustible construction. Combustible surfaces under domestic hot plates shall be protected by a fireproof and insulating base.

(2) The vertical distance between tops af all domestic hot plates and combustible construction shall be at least 24 inches.

*Hotel and Restaurant Ranges, Deep Fat Fryers and Unit Grillers.*

79. (1) Hotel and restaurant ranges, deep fat fryers and unit grillers, when set on their own bases or legs, may be installed on unprotected combustible floors unless marked " For use only in fireproof locations " or with words to the like effect.

(2) All hotel and restaurant ranges, deep fat fryers and unit grillers shall be installed level on a firm foundation.

(3) Adequate means shall be provided to properly ventilate the space in which hotel and restaurant equipment is installed to permit proper combustion of the gas. When exhaust fans are used for ventilation, special precuations shall be taken if necessary to prevent interference with the operation of the equipment.

80. (1) Hotel and restaurant ranges, deep fat fryers, and unit grillers which are not constructed for mounting on a combustible floor shall be mounted on fire-resistant floors or be mounted in accordance with one of the following paragraphs which is applicable, or in some manner substantially equivalent thereto.

(2) Where the appliance is set on legs so as to provide not less than 8 inches open space under the base of the appliance, or where it has no burners and no portion of any oven or griller within 8 inches of the floor, it may be mounted on a combustible floor without special floor protection provided there is at least one sheet metal baffle between the burner and the floor.

(3) Where the appliance is set on legs so as to provide not less than 8 inches open space under the base of the appliance, it may be mounted on combustible floors, provided the floor under the appliance is protected with asbestos mill-board not less than 3/8-inch thick which is covered with sheet metal of a thickness of not less than ·0156 inches. The above specified floor protection shall extend not less than 6 inches beyond the appliance on all sides.

(4) Where the appliance is set on legs so as to provide not less than 4 inches open space under the base of the appliance, it may be mounted on combustible floors, provided the floor under the appliance is protected with hollow masonry not less than 4 inches in thickness covered with sheet metal of a thickness of not less than 0·156 inches. Such masonry course shall be laid with ends unsealed and joints

matched in such a way as to provide for free circulation of air through the masonry. The hollow masonry shall be kept in place by a holding strip fastened to the floor on all four sides. The ends of hollow masonry shall be not less than 3 inches from any wall or obstruction.

(5) Where the appliance does not have legs at least 4 inches high, it may be mounted on combustible floors, provided the floor under the appliance is protected by 4-inch hollow clay tile or equivalent with courses laid at right angles and with ends unsealed and joints matched in such a way as to provide for free circulation of air through such masonry course and covered with steel plate not less than 3/16th-inch in thickness. The tile shall be kept in place by a holding strip fastened to the floor on all four sides. The ends of the tile shall be not less than 3 inches away from any wall or obstruction.

(6) Such appliances shall be installed at least 6 inches from combustible construction and at least a 2-inch clearance shall be maintained between the flue box or draught hood and combustible construction. Appliances designed and marked " For use only in fire-proof locations " or words to the like effect shall not be installed elsewhere.

*Gas Counter Appliances.*

81. (1) A vertical distance of not less than 48 inches shall be provided between the top of all commercial hot plates and griddles and any combustible construction.

(2) Gas counter appliances, such as commercial hot plates and griddles, food and dish warmers, coffee brewers and urns, waffle bakers and hot water immersion sterilizers, when installed on combustible surfaces shall be set on their own bases or legs and shall be installed with a minimum horizontal clearance of 6 inches from combustible construction.

*Portable Gas Baking and Roasting Ovens.*

82. Portable gas baking and roasting ovens shall be installed at least 6 inches from combustible construction and at least a 2-inch clearance shall be maintained between the flue box or draught hood and combustible construction. Appliances designed and marked " For use only in fire-proof locations " or words to the like effect shall not be installed elsewhere.

83. Notwithstanding anything hereinbefore contained every appliance shall be installed so that—

(*a*) the requirements of the appliance for combustion air shall be met; and

(*b*) the appliance is readily accessible for operation and servicing.

## PART IV.—SPECIAL PROVISIONS RELATING TO THE INSTALLATION OF AND STANDARDS FOR VARIOUS SYSTEMS.

### DIVISION 1.—CYLINDER SYSTEMS.

84. This Division applies to single cylinders or cylinders coupled together having a total capacity of less than 100 gallons water capacity.

*Location of Cylinders and Regulating Equipment.*

85. Notwithstanding anything in these regulations cylinders together with the regulating equipment and the outlet from any safety relief device may be used indoors—

(*a*) if temporarily used for demonstration purposes and the container has a maximum water capacity of 25 pounds; or

(*b*) if used with a completely self-contained gas hand torch or similar equipment and the container has a maximum water capacity of 10 pounds.

86. No cylinder or regulating equipment or outlet from any safety relief device shall be located less than 3 feet horizontally away from any opening into a building where such opening is below the level of possible discharge.

87. Cylinders shall not be buried below ground but may be installed in a compartment or recess below ground level, such as a niche in a slope or terrace wall which is used for no other purpose,

providing that the cylinders and regulating equipment are not in contact with the ground and the compartment or recess is drained and ventilated horizontally to the outside air from its lowest level, with the outlet at least 3 feet away from any building opening which is below the level of such outlet.

88. Cylinders shall be set upon a firm foundation or otherwise firmly secured and the possible effect on the outlet piping of settling shall be guarded against by a flexible connexion or special fitting.

*Cylinder Valves and Accessories.*

89. Valves in the assembly of multiple cylinder systems shall be arranged so that replacement of cylinders can be made without shutting off the flow of gas in the system but an automatic change-over device need not be provided.

90. Regulators and low-pressure relief devices shall be rigidly attached to the cylinder valves, cylinders, supporting standards or the building walls or otherwise rigidly secured and shall be so installed that weather conditions will not affect their operation.

91. When cylinders whether full or empty are not connected to the system the outlet valves shall be kept tightly closed or plugged with a cap or plug designed for this purpose.

92. Cylinders over 10-lbs. water capacity which are recharged at the installation shall be provided with excess-flow or back-flow check valves to prevent the discharge of cylinder contents in case of failure of the filling or equalizing connexions.

93. When delivery pressure from the final stage regulator is not more than 5 p.s.i.g, the low-pressure side shall be equipped with a relief valve, set to start to discharge at not less than twice, and not more than three times the delivery pressure, but not more than 5 p.s.i.g., in excess of the delivery pressure. When the delivery pressure is more than 5 p.s.i.g., the relief valve shall be set to start to discharge at not less than one and a quarter times and not more than twice the delivery pressure.

94. This requirement does not apply to liquid feed systems utilizing tubing specified in Regulation 153. When a regulator or pressure relief valve is used inside a building for other than purposes outlined in Regulation 85, the relief valve and the space above the regulator and relief valve diaphragms shall be vented to the outside air with the discharge outlet located not less than 3 feet horizontally away from any building opening which is below such discharge. These provisions do not apply to individual appliance regulators when protection is otherwise provided. In buildings devoted exclusively to gas distribution purposes, the space above the diaphragm need not be vented to the outside.

*Use of Gas for Industrial Applications.*

95. (1) Where portability of cylinders is necessary making their location outside the building or structure impracticable, cylinders may be located for use but not for storage inside a building or structure, if—

(*a*) the gas is to be used for industrial processing or repair work in an industrial building or structure being employed for industrial purposes; or

(*b*) the gas is to be used in the construction, repair or improvement of buildings or structures or their fixtures or equipment.

(2) Such installations shall be subject to the following additional rules:—

1. The regulator employed may be connected directly to the cylinder valve or located on a manifold which is connected to the cylinder valve. The regulator shall be of a type suitable for use with L.P. gas.
2. The aggregate capacity of the cylinders connected to each portable manifold shall not exceed 300 pounds of gas by weight, and not more than one such manifold with cylinders may be located in the same room unless separated by at least 50 feet.
3. Manifolds and fittings connecting cylinders to the pressure-reducing regulator inlets shall be designed to withstand without rupture at least 500 p.s.i.g.

4. Cylinders, regulating equipment and manifolds shall be located where they are not subjected to excessive rise in temperature, physical damage or tampering by unauthorized persons.

(3) Notwithstanding anything in these Regulations the method of decanting liquified petroleum gas from 20-lb. minimum capacity cylinders into cylinders of 10-lb. maximum capacity by means of liquid level gauges shall be as follows:—

1. Decanting apparatus shall always be located outside the building and shall also be located in accordance with Regulation 86.
2. Decanting apparatus shall be clearly marked "Inflammable Gas" "No Smoking".
3. Decanting apparatus shall be located at least 15 feet away from any stored inflammable materials.
4. Maximum capacity of bulk cylinders for decanting under this Regulation shall be 100 pounds of gas.

DIVISION 2.—GAS SYSTEM FOR ANY PURPOSE OTHER THAN MOTIVE POWER IN MOBILE VEHICLES INCLUDING CARAVANS.

96. Cylinder systems under this Division shall include: housing, cylinder brackets or supports, cylinders, valves, manifold valve assembly (two-cylinder systems), regulator and relief valves.

97. The requirements of this section shall apply to all systems using L.P. gas in vehicles for purposes other than motive power.

*Location of Cylinders and Systems.*

98. No cylinder shall be installed, transported or stored at any time inside any vehicle covered by this Division.

99. Cylinders, control valves and regulating equipment enclosed in a housing, and comprising a complete system shall be mounted on the chassis of the vehicle as close to the tow-bar as practicable.

100. Systems may be installed in a recess that is vapour-tight to the inside of the vehicle and accessible from and vented to the outside.

101. There shall be no fuel connexion between vehicle units which can be detached such as from a tractor to a trailer.

102. The cylinder or the cylinder carrier shall be secured in place on the vehicle by fastenings designed and constructed with a minimum safety factor of four to withstand loading in any direction equal to four times the filled weight of the cylinder.

103. Shut-off valves on the cylinders shall be protected in transit, in storage, and while being moved into position for use by being set into a recess in the cylinder to prevent possibility of their being struck if the cylinder is dropped.

*System Design and Service Line Pressure.*

104. The system shall be of the vapour-withdrawal type.

105. Vapour, at a pressure not over 14-in. water column shall be delivered from the system into the service piping supplying the appliances in domestic caravans.

*System Enclosure and Mounting.*

106. Housing or enclosures shall be designed to provide proper ventilation.

107. Hoods, domes or portions of cabinets required to be removed for replacement of cylinders shall incorporate means for clamping them firmly in place, and for preventing them from working loose during transit.

108. Provision shall be incorporated in the assembly to hold the cylinders firmly in position and prevent their movement during transit.

109. Cylinders shall be mounted on a substantial support or base secured firmly to the vehicle chassis.

110. (1) In the case of caravans, when the cylinder support is inside the frame members, the maximum depth of the system shall not exceed 7 inches from the top of the chassis.

(2) In the case of commercial vehicles the system shall be installed with as much road clearance as possible and never less than the minimum road clearance of the vehicle under maximum spring deflection.

*Piping, Tubing and Fittings for Mobile Vehicles.*

111. Regulators shall be of lightweight construction and connected directly to the cylinder valve inlet, or mounted securely by means of a support bracket and connected to the cylinder valve or valves with a high-pressure flexible connexion.

112. An expansion loop in the gas service piping or flexible connexion of a type approved by the Minister shall be used between the regular outlet and the gas service piping.

113. Piping, tubing and fittings shall meet the specifications prescribed herein and the use of aluminium tubing is prohibited. Steel pipe or tubing shall have a minimum wall thickness of 0.049 inches and shall be adequately protected against exterior corrosion. For caravans, only seamless drawn-copper tubing having an outside diameter not less than ¼ inch and a wall thickness of not less than 0.036 inch, shall be used for gas service lines.

114. Gas tubing fittings shall be of compression or capillary design manufactured from drawn stock or by hot pressing.

115. The fuel line shall be firmly fastened in a protected location under the vehicle and outside and below any insulation or false bottom. Fastenings shall be such as to prevent abrasion or damage to the fuel line from vibration. Where the fuel line passes through structural members or floors, a rubber grommet or equivalent shall be installed to prevent chafing.

116. The fuel line shall be installed to enter the vehicle through the floor directly below or adjacent to the appliance which it serves. When a branch line is required, the tee connexion shall be in the main fuel line and located under the floor and outside the vehicle.

117. All parts of the system shall be so designed and secured as to preclude such parts working loose during transit.

*Appliances for Vehicles.*

118. In the case of caravans, all gas-fired space heaters and water heaters shall be of the full-vented type, vented to the outside of the trailer with the exception of portable space heaters not having an input exceeding 5,000 B.Th.U's per hour. In the case of commercial vehicles which do not contain living quarters and where the gas-fired space heater is used to protect the cargo, such space heating equipment may be of the unvented type, but provision shall be made to dispose of the products of combustion to the outside.

119. Provision shall be made to ensure an adequate supply of air for combustion.

120. All space heaters and water heaters shall be equipped with a device designed to shut off the flow of gas to the main burner and to the pilot in the event of the pilot flame being extinguished where the flame is not visible when in use.

121. Appliances shall be constructed or protected to reduce to a minimum possible damage or impaired operation resulting from cargo shifting or handling.

122. Appliances shall be so located inside a vehicle that a fire at an appliance will not obstruct the escape of persons from the vehicle.

123. A permanent caution plate shall be provided on the outside of the system enclosure and adjacent to the consuming appliances on caravans. It shall include the following items:—

Be sure all appliance valves are closed before opening cylinder valve.

Check connexions at the appliances, regulators and cylinders periodically for leaks with soapy water or its equivalent.

Never use a match or flame when checking for leaks.

Close cylinder shut-off valves of caravan systems when the vehicle is in transit.

DIVISION 3—L.P. GAS SYSTEMS FOR COOKING OR HEATING IN BOATS.

124. Cylinders and auxiliary equipment in a boat shall be located—

(*a*) in a recess that is vapour tight to the inside of the boat and is accessible from and ventilated to the outside of the boat; or

(*b*) on deck and situated not less than three (3) feet from any opening to below deck level.

125. In systems in boats—

(*a*) all fittings shall be

(i) of the compression type; and

(ii) manufactured by the hot pressing process or from extruded bar;

(*b*) all tubing shall be of annealed copper tubing not less than .036-in. wall thickness;

(*c*) all appliances shall be installed so as to have an adequate supply of air for combustion;

(*d*) the fuel line shall be—

(i) firmly fastened in a protected location outside any installation or false bottom;

(ii) fastened so as to prevent abrasion or damage to the fuel line from vibration;

(iii) protected by a rubber grommet or equivalent protection at all points at which it passes through structural members or floors;

(iv) installed to enter directly below or adjacent to the appliance which it serves; and

(*e*) all parts shall be so designed and secured as to preclude such parts working loose when the boat is in motion.

## PART V—FLUING OF APPLIANCES.

### DIVISION 1—GENERAL.

126. (1) The following appliances shall be flued:—

(*a*) Any domestic appliance with input rating in excess of 50,000 B.Th.U's. per hour;

(*b*) any appliance with input rating in excess of 5,000 B.Th.U's. per hour, if the input rating exceeds 30 B.Th.U's. per hour per cubic foot of room or space in which the appliance is installed:

Provided that domestic gas ranges and domestic clothes dryers are excepted from the provisions of paragraphs (*a*) and (*b*) of this sub-regulation and their input rating shall not be included in arriving at the ratio of input rating to space or room content;

(*c*) all room heaters in sleeping quarters for use of transients or in institutions, such as Homes for the Aged, Sanitoriums, Convalescent Homes, or Orphanages. Such heaters shall be equipped with an automatic pilot;

(*d*) all space heating steam and hot water boilers and warm air furnaces, floor furnaces, recessed heaters, unit heaters and duct furnaces; except as provided by paragraph (*b*) of this sub-regulation;

(*e*) incinerators.

(2) Where two or more appliances are installed in the same room or space, then the aggregate input rating of unvented appliances shall not exceed 30 B.Th.U's per hour per cubic foot of such room or space except as provided in paragraph (*b*) of the last preceeding sub-regulation.

(3) Where the room or space in which the appliance or appliances are installed is directly connected to another room or space by a doorway, archway or other opening of comparable size, which cannot be closed, then the volume of such adjacent room or space may be included in the calculations for the purposes of this Regulation.

DIVISION 2—TYPES OF FLUES OR VENTS.

127. (1) Type A flues or vents shall be employed for venting—

(a) all incinerators;

(b) all appliances which may be converted readily to the use of solid or liquid fuels;

(c) all boilers and warm-air central heating furnaces except in any particular case where the Minister approves the use of the Type B gas flues or vents.

(2) Type B flues or vents shall be used only with appliances which produce flue gas temperatures not in excess of 550°F. at the outlet of the draught diverter when burning gas at the manufacturer's normal input rating and not required by these Regulations to be vented to Type A flues or vents.

For the purpose of this sub-regulation appliances, with the exception of incinerators and conversion burners may be deemed to produce flue gas temperatures not in excess of 550°F. at the outlet of the draught diverter.

(3) Type C gas flues or vents shall be used only for runs directly from the space in which the appliance is located through the roof or exterior wall to the outer air. Such flues or vents shall not pass through any attic or concealed space nor through any floor. Installation with reference to clearance from combustible construction and passage through wall or roof shall comply with provisions of Regulations 134 and 136.

128. The material used for the flue or vent connector shall be resistant to corrosion and be of sufficient thickness to withstand damage.

129. The flue or vent connector shall be installed so as to avoid short turns or other constructional features which would create excessive resistance to the flow of flue gases.

130. The flue or vent connector shall maintain a pitch or rise from the appliance to the flue or vent. A rise as great as possible, and of at least ¼ inch to the foot (horizontal length) shall be maintained. The horizontal run shall be free from any dips or sags.

131. Wherever sufficient headroom is available, appliances having a horizontal flue outlet shall be provided with a vertical run of flue or vent connector before the horizontal run. To minimize frictional resistance in the connector, 45° elbows shall be used wherever practicable.

132. The horizontal run of the connector shall be as short as possible and the appliance shall be located as near the flue or vent as practicable. The maximum length of horizontal run shall not exceed 15 per cent. of the height of the flue or vent.

133. Flue or vent connectors shall be securely supported.

134. Where flue or vent connectors pass through partitions of combustible construction, ventilated thimbles shall be used. Flue or vent connectors to appliances referred to in Table 5 shall be installed with minimum clearances from combustible construction in accordance with Table 5. For all other appliances the minimum clearance from combustible construction shall be 9 inches for metal flue or vent connectors except for incinerators where the minimum clearance shall be 18 inches.

TABLE 5.—FLUE OR VENT CONNECTOR CLEARANCES FOR APPLIANCES.

| Appliance. | Minimum Distance from Combustible Construction. | |
|---|---|---|
| | Metal Flue or Vent Connectors. | Type B Flue or Vent Connectors. |
| Boiler | 6 in. | 1 in. |
| Warm Air Furnace | 6 in. | 1 in. |
| Water Heater | 6 in. | 1 in. |
| Space Heater | 6 in. | 1 in. |

135. The clearance from metal flue or vent connectors to combustible construction may be reduced as specified in Table 6 where the combustible construction is protected in accordance with that Table.

TABLE 6.—CLEARANCES WITH SPECIFIED FORMS OF PROTECTION.

| Type of Protection. | Where the Required Clearance with No Protection is— | | |
|---|---|---|---|
| | 6 inches Clearance Reduced to— | 9 inches Clearance Reduced to— | 18 inches Clearance Reduced to— |
| ¼-in. asbestos millboard spaced out 1 in. with non-combustible spacers .. .. .. | 3 in. | 6 in. | 12 in. |
| 28-gauge sheet metal on ¼-in. asbestos millboard | 2 in. | 4 in. | 12 in. |
| 28-gauge sheet metal spaced out 1 in. with non-combustible spacers .. .. .. | 2 in. | 4 in. | 9 in. |

136. Flue or vent connectors, other than Type B, shall not pass through any combustible walls or partitions unless they are guarded at the point of passage by ventilated metal thimbles not smaller than the following:—

(*a*) for appliances, except floor furnaces and incinerators—4 inches larger in diameter than the flue or vent connector, unless there is a run of not less than 6 feet of flue or vent connector in the open, between the draught diverter outlet and the thimble, in which case the thimble may be 2 inches larger in diameter than the flue or vent connector;

(*b*) For floor furnaces and all appliances except incinerators—6 inches larger in diameter than the flue or vent connector;

(*c*) For incinerators—12 inches larger in diameter than the flue or vent connector.

137. (1) The flue or vent connector—

(*a*) shall not be smaller than the size of the flue collar or the size of the outlet of the draught diverter supplied by the manufacturer of the appliance;

(*b*) shall not be connected to a chimney flue having a fireplace opening unless the opening is permanently sealed;

(*c*) shall be examined before connexion to ascertain that it is properly constructed, clear and capable of conducting the products of combustion to the open air.

(2) Where an appliance has more than one flue outlet the flue or vent connector shall have an area equal to the combined area of the flue outlets for which it acts as a common connector to the flue or vent.

138. No manually operated damper shall be placed in any flue or vent connector. Fixed baffles ahead of draught hoods are not dampers for the purpose of this Regulation.

139. No forced draught or exhaust system or high-pressure burner shall be installed except in accordance with plans and specifications which have previously been approved by the Minister.

140. The flue or vent to which the flue or vent connector is connected shall be of a size not less than specified. In no case shall the area be less than the area of 3-inch. diameter pipe. An elliptical flue or vent may be used, provided its flue gas venting capacity is equal to the capacity of round pipe for which it is substituted.

141. The flue or vent shall extend at least 2 feet above the roof and be free from all obstructions or shall comply with such other requirements as are approved by the Minister in any particular case.

142. In entering a chimney flue, the connexion shall be above the extreme bottom to avoid stoppage. Means shall be employed which will prevent the flue or vent connector from entering so far as to unduly restrict the space between its end and the opposite wall of the chimney. A thimble or slip joint may be used to facilitate removal of the flue or vent connector for cleaning.

143. Cleaning-eyes shall be constructed so that they will remain tightly closed when not in use.

144. When a flue or vent is installed on the outside of a building, it shall be securely supported. A capped "tee" shall be installed at the base on the riser, with an opening to drain off condensate. A suitable cowl which does not obstruct or reduce the effective cross-sectional area of the flue or vent outlet shall be placed on top of the riser.

DIVISION 3.—DRAUGHT DIVERTERS.

145. (1) Every flued appliance, except fires, incinerators and units designed for power burners or for forced venting, shall have a draught diverter installed.

(2) If the draught diverter is not a part of the appliance or supplied by the appliance manufacturer, it shall be of the same size as the appliance flue collar.

146. Where the draught diverter is a part of the appliance or is supplied by the appliance manufacturer it shall be installed without alteration in accordance with the manufacturer's instructions. In the absence of manufacturer's instructions, the draught diverter shall be attached to the flue collar of the appliance or as near to the appliance as conditions permit. In no case shall a diverter be installed in a false ceiling, in a different room, or in any manner that will permit a difference in pressure between the draught diverter opening and the combustion air supply.

147. A draught diverter shall be installed in the position for which it was designed with reference to the horizontal and vertical planes and shall be so located that the relief opening is not obstructed by any part of the appliance or adjacent construction.

## PART VI.—PIPES, TUBING AND GAS HOSES.

DIVISION 1.—INSTALLATION OF PIPING AND TUBING.

148. Pipe joints may be screwed flanged welded soldered or brazed with a material having a melting point exceeding 1,000°F.

149. Fittings shall be designed to withstand—

if the operating pressure will not exceed 5 p.s.i.g.—a pressure of at least 125 p.s.i.g.;

if the operating pressure will exceed 5 p.s.i.g. but will not exceed 125 p.s.i.g.—a pressure of at least 250 p.s.i.g.

150. Fittings shall not be made of cast iron but may be made of malleable iron.

151. Joints on seamless copper, brass steel or non-ferrous gas tubing shall be made by means of fittings specifically designed for this purpose or soldered or brazed with a material having a melting point exceeding 1,000°F.

*Piping, Tubing and Fittings.*

152. Piping in the low-pressure side of a regulator shall be wrought iron or steel (black or galvanized) brass or copper pipe, or seamless copper, brass or steel and shall be suitable for a working pressure of not less than 125 p.s.i.g. Copper tubing shall be of at least standard grade, and shall have a minimum wall thickness of 0·036 inches.

153. In systems where the gas in liquid form without pressure reduction enters the building only heavy walled seamless steel or copper tubing with an internal diameter not greater than ¾ inch, and a wall thickness not less than 3/64 inch shall be used. This requirement shall not apply to research and experimental laboratories, or to buildings, or separate fire divisions of buildings used exclusively for housing internal combustion engines, and to commercial gas plants or bulk stations where containers are charged, or to industrial vaporizer buildings.

154. Gas appliances shall be connected with seamless metal fittings meeting the following requirements, except that these requirements shall in no way restrict or otherwise affect the use of copper tubing or any other piping when material, fittings, and installation comply with all other requirements of these regulations.

The connecting fitting shall be screw type or union type permanently attached.

The method of attaching fittings to the house piping and the gas appliance shall conform with Regulation 148.

Provision shall be made for expansion, contraction, jarring and vibration, and for settling. This may be accomplished by flexible connexions.

Piping or tubing shall be well supported and protected against physical damage.

Where condensation may occur, the piping shall be pitched back to the container, or suitable means shall be provided for vaporization of the condensate.

Compounds used in making up joints shall be resistant to the action of L.P. gases.

155. Tubing shall not be run inside walls or partitions unless protected against physical damage by means of a conduit. This Regulation does not apply to tubing which is run through walls or partitions providing there is no joint within the wall or partition.

156. (1) Piping shall be of such size and so installed as to provide a supply of gas sufficient to meet the maximum demand without undue loss of pressure between the source and the appliance or appliances, having due regard to—

(*a*) allowable loss in pressure from source to appliance;

(*b*) maximum gas consumption to be provided for;

(*c*) length of pipe and number of fittings; and

(*d*) specific gravity of the gas.

(2) Piping or tubing shall be free of loose scale, dirt, dust, or other foreign material at the time of appliance installation.

(3) Defective pipe or tubing or fittings shall not be repaired but such section or fittings shall be replaced.

(4) Pipe, fittings, valves, &c. removed from any existing installation shall not be again used until they have been thoroughly cleaned, inspected and ascertained to be suitable for the service.

(5) Pipe with threads which are stripped, chipped, corroded or otherwise damaged shall not be used. If a weld opens during the operation of cutting or threading, that portion of the pipe shall not be used.

(6) Gas pipe or tubing inside any building shall not be run in or through any air duct, clothes chute, chimney or flue, ventilating duct, dumb waiter or elevator shaft, but shall be run through proper ducts provided for that purpose.

(7) Each outlet, including a valve or cock outlet, shall be securely closed gas-tight with a positive plug or cap of a suitable design if the appliance is not to be connected at that time.

(8) When an appliance is removed from an outlet and the outlet is not to be reconnected at that time, it shall be securely closed gas-tight. In no case shall the outlet be closed with a tin cap, wooden plug, cork or the like.

(9) No device shall be placed inside the gas pipe or fittings that will reduce the cross sectional area or otherwise obstruct the free flow of gas.

(10) Before turning gas under pressure into any piping, all openings from which gas can escape shall be closed.

(11) Gas piping shall not be used as an earth for any electrical system, nor shall piping be located in the same conduit as electrical wiring. The distance between any gas pipe and any electrical wiring shall be not less than 2 inches.

157. All material such as valve seats, packing, gaskets, diaphragms, &c., shall be of such quality as to be resistant to the action of L.P. gas under the service conditions to which they are subjected.

158. (1) Piping outside buildings may be buried or above ground, or partly one and partly the other, but shall be well supported and protected against physical damage. Where soil conditions make it necessary, all piping shall be protected against corrosion. Where condensation may occur, the piping shall be pitched back to the container or suitable means shall be provided for evaporation of the condensate.

(2) Where air or oxygen pressure is used in connexion with the gas supply, effective means, i.e. non return valve, shall be provided to prevent air or oxygen from passing back into the gas piping.

### Division 2—Gas Hoses.

159. (1) Only appliances which are fully portable in nature shall be connected with gas hose.

(2) Appliances equipped with a control valve or valves which permit complete shut-off of the gas supply shall not be connected with gas hose. This requirement does not apply to hand torches, gas irons and other equipment which require both the mobility possible only with flexible connexions and frequent and accurate burner control at the point of use.

(3) Gas hose does not include tubing or appliance connectors of flexible metal tubing and fittings.

(4) Gas hose shall be of adequate capacity, gas tight, and so designed as to permit the secure attachment to the nozzle of fully-portable appliances which do not require mobility during operation and to hose end valves connected with the hose piping.

(5) Only gas hose of a type suitable for use with L.P. gas shall be used.

(6) Gas hose shall not be used where it is likely to be subject to temperatures above 125°F.

160. Flexible hose where permitted by these regulations to be used on the low-pressure side of the system shall only be used as follows:—

(*a*) where gas hose is used, it shall be of the minimum practical length and shall not exceed 9 feet in length except when used for industrial purposes and shall not extend from one room to another nor pass through any walls, partitions, ceilings or floors. Under no circumstances shall gas hoses be concealed from view or used in a concealed location;

(*b*) where the gas hose is equipped with rubber slip end connexions, the gas shut-off valve at the house piping shall be a hose end valve or shall have a standard hose end nozzle attached to it;

(*c*) where a gas shut-off valve constitutes the only means of gas control it shall be easily accessible and within convenient reaching distance when operating the burner of the appliance, and the handle of the valve shall be self latching in the gas "off" position;

(*d*) the shut-off except in the case of industrial equipment shall be in the solid connexion of piping only, and not at the appliance end of the hose;

(*e*) the hose shall be securely attached at each end;

(*f*) where flexible hose is used in domestic premises a shut-off shall be of the self-latching type;

(*g*) a wall outlet to which an appliance is to be connected with flexible hose shall be so placed as to reduce to a minimum the passing to and fro across the hose;

(*h*) where an appliance, such as a gas iron for industrial work, is always used in the same location, but its operation demands a flexible hose, the flexible hose shall be permanently attached at the supply end by a threaded or other secure metal connexion, and the appliance end shall be provided with a secure metal joint, which can be conveniently made and separated;

(*i*) where the hose is likely to be subjected to excessive temperatures, either through accident or because of the special nature of the appliance, only hose properly protected or made up of non-combustible material shall be used.

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## FIRST SCHEDULE.

### Specifications for Liquified Petroleum Gases.

In these specifications methods of tests identified by the prefix letters N.G.A.A. refer to the relevant tests described in the publication No. 2140-57 of the Natural Gasoline Association of America published in the month of January 1957 and the methods of tests identified by the prefix letters I.P. refer to the tests identified by the relevant numbers in the publication "Standard Methods for Testing Petroleum and its Products" 16th edition published by the Institute of Petroleum of 26 Portland-place, London.

All L.P. Gas shall conform to the following specifications:—

*Specification* 1.

Calorific Value:—The gross calorific value of the product shall be not less than 21,000 B.Th.U's per pound avoirdupois of the gas after vaporization, as calculated from the results of gas chromatographic analysis.

Residue on Complete Vaporization:—The residue shall not be more than two milligrams per 100 millilitres as determined by the test described in Appendix A of these Specifications.

Volatile Sulphur:—The gas shall not contain Volatile sulphur in excess of 15 grains per 100 cubic feet as determined by the N.G.A.A. Volatile Sulphur Test for L.P.G. and of this not more than two grains shall be mercaptan sulphur as determined by the test I.P. 104/53T.

Corrosive Compounds:—The product shall be free of corrosive compounds as determined by the N.G.A.A. L.P.G. Corrosion Test.

Hydrogen Sulphide:—The gas shall be free of hydrogen sulphide when tested in accordance with the provisions of paragraph B of the Second Schedule to the Gas Regulation Act 1933.

Odour Level:—The gas shall have an odour which is distinct, unpleasant and non-persistent and which, when the gas is discharged from a cylinder, throughout its discharge, indicates the presence of gas down to one-fifth of the lower explosive limit. The odour intensity shall be determined by using equipment of the type in which a stream of the gas is mixed with pure air and the proportion of gas to air is determined at its threshold odour level. The odorant shall be a material proved in practice to be suitable for the odorization of L.P. gas and shall be added before the gas is loaded for transit on a public highway, provided however, that odorization shall not be required whenever it would be harmful in the further processing of the gas or would interfere seriously with a specific industrial use.

Toxicity:—The gas shall not contain any substance which, if the gas is used for cooking, lighting, heating or refrigeration or any other rational purpose is toxic or harmful to human health or human safety.

Impurities:—The gas shall not contain impurities other than those specified herein and shall not contain any methane as determined by gas chromatographic analysis.

If the gas is composed predominantly of propane and/or propene as determined by the vapour pressure test I.P. 161/57T. and the N.G.A.A. Commercial Propane Residue Test (Mercury Freeze Method), it shall conform to Specification 2 in addition to Specification 1.

*Specification* 2.

Vapour Pressure:—The vapour pressure at 130°F. shall not be more than 300 pounds per square inch gauge pressure as determined by the test I.P. 161/57T.

Residue:—The residue as determined by the N.G.A.A. Commercial Propane Residue Test (Mercury Freeze Method) shall not be more than 2 per cent. by volume.

Dryness:—The product shall be dry as determined by the N.G.A.A. Commercial Propane Dryness Test. Either the Cobalt Bromide Method or the Dew Point Method or both shall be used and if the product conforms with one of these tests it shall be considered dry.

If the gas is composed predominantly of butanes and/or butenes as determined by the vapour pressure test I.P. 161/57T. and the N.G.A.A. Weathering Test for Butane and Butane-Propane Mixtures, it shall conform to Specification 3 in addition to Specification 1.

*Specification* 3.

Vapour Pressure:—The vapour pressure at 130°F. shall not be more than 105 pounds per square inch gauge pressure as determined by the test I.P. 161/57T.

95 per cent. Boiling Point:—The temperature at which 95 per cent. by volume of the product has evaporated shall be 34°F. or less when corrected to a barometric pressure of 740 m.m. of mercury, as determined by N.G.A.A. Weathering Test for Butane and Butane-Propane Mixtures.

Dryness:—The product shall not contain free entrained water as determined by the method described in Appendix B of these Specifications.

If the gas is composed predominantly of mixtures of butanes and/or butenes with propane and/or propene as determined by the vapour pressure test I.P. 161/57T. and the N.G.A.A. Weathering Test for Butane and Butane-Propane Mixtures it shall conform to Specification 4 in addition to Specification 1.

*Specification* 4.

Vapour Pressure:—The vapour pressure at 130°F. shall not be more than 300 pounds per square inch gauge pressure as determined by the test I.P. 161/57T.

95 per cent. Boiling Point:—The temperature at which 95 per cent. by volume of the product has evaporated shall be 34°F. or less when corrected to a barometric pressure of 740 m.m. of mercury, as determined by N.G.A.A. Weathering Test for Butane and Butane-Propane Mixtures.

Dryness:—If the vapour pressure at 130°F. exceeds 250 pounds per square inch gauge pressure the product shall be dry as determined by the N.G.A.A. Commercial Propane Dryness Test. Either the Cobalt Bromide Method or the Dew Point Method or both shall be used and if the product conforms with one of these tests it shall be considered dry. If the vapour pressure at 130°F. is equal to or less than 250 pounds per square inch pressure the product shall be free of entrained water as determined by the method described in Appendix B of these Specifications.

Product Designation:—Products conforming with Specification 4 shall be designated by the vapour pressure at 130°F. in p.s.i.g. To comply with the designation the vapour pressure shall not exceed the vapour pressure specified and it shall not be less than that pressure by an amount exceeding five p.s.i. For example: A product specified as 150 pound L.P. gas shall have a vapour pressure of at least 145 p.s.i.g. but not more than 150 p.s.i.g. at 130°F.

APPENDIX A.

*Method of Test for Residue in Liquified Petroleum Gases on Complete Vaporization.*

Scope.

This method of test is intended for the determination of the residue when L.P. gas is evaporated to dryness.

*Apparatus.*

(1) *Evaporation Assembly.*—The evaporation assembly shall be as shown in figure 1, and shall contain the following items of equipment:—

(*a*) Contact Column: The contact column shall be of glass tubing 1½" in diameter and 30" in length, filled ⅔ full with ¼" Raschig rings. It shall be connected to the flask and to the rest of the system by ground-glass joints.

(*b*) Flask: The flask shall be a 1-litre round-bottomed flask of heat-resisting glass.

(*c*) Steam Coil: The steam coil shall be arranged to boil the contents of the flask.

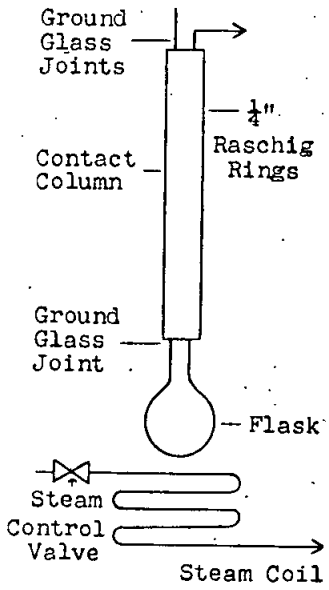


FIGURE 1.

(2) *Sample Container.*—The sample container hereafter referred to as the container shall be 2·5-quart capacity meeting all the requirements of the Standards Association of Australia for steel cylinders for L.P. gas or meeting all the requirements of the Interstate Commerce Commission of the United States of America for the storage and transfer of L.P. gas. Provision shall be made for opening and inspection of the inside of the container which shall be fitted with valves at both ends, a tube extending to the bottom and a dip leg to provide a minimum of 20 per cent. outage.

(3) *Evaporating Dish.*—The evaporating dish shall be an anti-creeping beaker.

*Solvent*

The solvent shall be either chemically pure carbon tetrachloride or chemically pure chloroform.

*Spot Samples.*

(1) In all sampling and transferring operations it is *imperative* that extreme precautions be taken to avoid open flames or static electrical discharges that might cause fires.

(2) Before use the container shall be opened and inspected; and when necessary the inside shall be scoured to remove any foreign matter or scale. The container shall be assembled and tested for leaks and, if no leaks are found, it shall be rinsed with alcohol and dried in an oven.

(3) At the source of sample, the container shall be attached to the main supply in such a manner that the sample will be taken from the liquid contents of the original vessel. The valves at both ends of the container shall be opened and it shall be flushed with the sample until it is cold and the liquid sample emerges from the dip leg. All valves shall be closed and the container shall be disconnected from the source of supply.

(4) With the container in an upright position, the valve attached to the dip leg shall be opened slowly and shall remain open until liquid ceases to emerge. The valve shall be closed and the protective covers shall be placed in position.

*Composite Samples.*

(1) If it be desired to take a sample representative of L.P. gas flowing for an extended period, the container shall be cleaned as usual, tested for leaks, filled with brine, and both valves shall be closed.

(2) At the sampling point, the connecting line shall be purged with the liquid sample. The container shall be connected to the source of sample, making the connexion to the dip leg of the container. (This is the reverse of the usual procedure.) The valves on the sample source and the dip leg shall be opened but the valve on the discharge end of the container shall remain closed.

(3) Periodically the valve attached to the tube running to the bottom of the container shall be opened and a measured amount of brine shall be run out. The valve shall be closed and the procedure shall be repeated at set intervals of time throughout the sampling period. (Note that by carrying out this procedure, the pressure inside the sample container will be kept equal to that of the main sample source and the container will receive the liquid sample. The L.P. gas will rise to the top of the container, thereby displacing a corresponding amount of brine through the tube which reaches to the bottom.)

(4) At the conclusion of the sampling period all valves shall be closed and the container shall be disconnected. The container shall be shaken thoroughly and then allowed to stand for a short period to settle the contents. The valve attached to the tube extending to the bottom of the container shall be opened and the brine shall be bled off so far as possible.

(5) When the liquified sample emerges from the opening the valve shall be closed. The valve attached to the dip leg shall be opened and allowed to remain open until no more liquid is discharged. The valve shall then be closed.

*Procedure.*

(1) The apparatus shall be set up in a sheltered place outside the laboratory. A portion of the liquid sample shall be purged through the valve attached to the tube extending to the bottom of the container. The valve shall be attached to a metal coil which shall be immersed in an acetone bath. The bath shall be chilled by any convenient means such as the addition of solid carbon dioxide "ice" until the temperature of the liquid is not higher than minus 80°F.

It is *imperative* that this test be conducted in an isolated place outside the main laboratory building because of the extreme fire and explosion hazard should the glass flask containing the sample break during the test. Wherever the apparatus is assembled provision shall be made for the safe disposal of the vapours.

(2) When the temperature of the bath is below minus 80°F. the 1-litre round-bottomed flask shall be immersed therein and allowed to come to the temperature of the bath. The flask shall be removed, wiped free of any liquid adhering to the outside, mounted in a cork ring on a trip scale, and shall be weighed to the nearest 0·1 gram. This weight shall be recorded. The liquid sample shall be admitted into the cold flask until it is about two thirds full. The flask shall be weighed again and the difference in weight shall be recorded as the weight of the sample taken for testing. The flask shall be attached to the contact column as shown in Figure 1. All the operations in the foregoing paragraph shall be conducted without delay.

(3) Steam shall be admitted to the steam coil so that the liquid in the flask is just simmering. These conditions shall be maintained until the inside of the flask is practically dry. This operation should require approximately one to two hours.

(4) When the inside of the flask is practically dry the steam supply shall be shut off, the top of the contact column shall be opened, and about 75 ml. of the solvent shall be poured in and allowed to drain into the flask. The column shall be removed from the flask, the bottom of the column shall be closed, and an additional 50 ml. of the solvent shall be added to the column. The inside of the column shall be rinsed thoroughly with this liquid, which shall then be added to the flask.

(5) The combined solvent washings shall be filtered into a tared anti-creeping beaker which shall be placed on a steam bath until the solvent has evaporated. When evaporation is complete the beaker shall be removed, and the outside wiped with a clean dry cloth. The beaker shall then be dried in an air oven for exactly 5 minutes at 105°C., cooled in a desiccator and re-weighed. The increase in weight of the beaker shall be noted and recorded.

*Calculation.*

(1) The weight of the sample shall be converted to the corresponding volume by dividing by the specific gravity of the liquid.

(2) The amount of residue in the sample shall be computed by means of the equation:

$$R = \frac{W \times 100}{S}$$

where

W=Weight of the residue in milligrams.

S=Volume of sample in millilitres, as determined in the preceding paragraph.

R=Residue in mg. per 100 ml. of liquid sample.

*Report.*

The residue shall be reported as "————mg. residue per 100 ml."

*Safety Precautions.*

(1) As stated previously, this test must not be conducted in any room where other technicians are working, or in any area where smoking or open flames of any kind are permitted.

(2) During the test the sample shall be heated at such a rate that the liquid in the glass flask will be just simmering.

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APPENDIX B.

The method of testing L.P. gas for the presence of free entrained water shall be by visual inspection of a sample in a clear glass Dewar flask at atmospheric pressure. The sample shall be taken from the bottom of the liquified petroleum gas in a container containing that gas and precautions shall be taken to exclude atmospheric moisture from the Dewar flask. A cloudy appearance of the sample in the flask shall be regarded as proof of the presence of free entrained water.

SECOND SCHEDULE.

Minimum required rate of discharge in cubic feet per minute of air at 120 per cent. of the maximum permitted start to discharge pressure for safety relief valves to be used on containers and cylinders other than cylinders constructed in accordance with the Standards Association of Australia L.P. Gas Cylinder Code or imported cylinders acceptable under that Code.

| Surface Area in square feet. | Flow Rate of Air in cubic feet per minute. | Surface Area in square feet. | Flow Rate of Air in cubic feet per minute. | Surface Area in square feet. | Flow Rate of Air in cubic feet per minute. |
|---|---|---|---|---|---|
| 20 | 626 | 170 | 3,620 | 600 | 10,170 |
| 25 | 751 | 175 | 3,700 | 650 | 10,860 |
| 30 | 872 | 180 | 3,790 | 700 | 11,550 |
| 35 | 990 | 185 | 3,880 | 750 | 12,220 |
| 40 | 1,100 | 190 | 3,960 | 800 | 12,880 |
| 45 | 1,220 | 195 | 4,050 | 850 | 13,540 |
| 50 | 1,330 | 200 | 4,130 | 900 | 14,190 |
| 55 | 1,430 | 210 | 4,300 | 950 | 14,830 |
| 60 | 1,540 | 220 | 4,470 | 1,000 | 15,470 |
| 65 | 1,640 | 230 | 4,630 | 1,050 | 16,100 |
| 70 | 1,750 | 240 | 4,800 | 1,100 | 16,720 |
| 75 | 1,850 | 250 | 4,960 | 1,150 | 17,350 |
| 80 | 1,950 | 260 | 5,130 | 1,200 | 17,960 |
| 85 | 2,050 | 270 | 5,290 | 1,250 | 18,570 |
| 90 | 2,150 | 280 | 5,450 | 1,300 | 19,180 |
| 95 | 2,240 | 290 | 5,610 | 1,350 | 19,780 |
| 100 | 2,340 | 300 | 5,760 | 1,400 | 20,380 |
| 105 | 2,440 | 310 | 5,920 | 1,450 | 20,980 |
| 110 | 2,530 | 320 | 6,080 | 1,500 | 21,570 |
| 115 | 2,630 | 330 | 6,230 | 1,550 | 22,160 |
| 120 | 2,720 | 340 | 6,390 | 1,600 | 22,740 |
| 125 | 2,810 | 350 | 6,540 | 1,650 | 23,320 |
| 130 | 2,900 | 360 | 6,690 | 1,700 | 23,900 |
| 135 | 2,990 | 370 | 6,840 | 1,750 | 24,470 |
| 140 | 3,080 | 380 | 7,000 | 1,800 | 25,050 |
| 145 | 3,170 | 390 | 7,150 | 1,850 | 25,620 |
| 150 | 3,260 | 400 | 7,300 | 1,900 | 26,180 |
| 155 | 3,350 | 450 | 8,040 | 1,950 | 26,750 |
| 160 | 3,440 | 500 | 8,760 | 2,000 | 27,310 |
| 165 | 3,530 | 550 | 9,470 | .. | .. |

Surface Area:—Total outside surface area of container in square feet. When the surface area is not stamped on the name plate or when the marking is not legible, the area can be calculated by using one of the following formulae:—

(1) Cylindrical container with hemispherical heads:
Area = Over-all length × outside diameter × 3·1416.

(2) Cylindrical container with semi-ellipsoidal heads.
Area = (Over-all length + 0·3 outside diameter) × outside diameter × 3·1416.

(3) Spherical container.
Area = Outside diameter squared × 3·1416.

Flow Rate — C.F.M. Air = Required flow capacity in cubic feet per minute of air at standard conditions, 60°F. and atmospheric pressure (14·7 pounds per square inch absolute).

The rate of discharge may be interpolated for intermediate values of surface area. For containers with total outside surface area greater than 2,000 square feet, the required flow rate can be calculated using the formula, Flow Rate — C.F.M. = $53{\cdot}632A^{0{\cdot}82}$

Where

A = total outside surface area of the container in square feet.

Valves not marked "Air" have flow rate markings in cubic feet per minute of L.P. gas that were calculated by using the factors listed below. These same factors may be used to reconvert to cubic feet per minute of air for use in this Schedule.

*Air Conversion Factors*:—Container Type.

| 100 | 125 | 150 | 175 | 200 |
|---|---|---|---|---|
| 1.162 | 1.142 | 1.113 | 1.078 | 1.010 |

THIRD SCHEDULE.

Minimum required rate of discharge for safety relief valves for gas vaporizers (Steam heated, water heated and direct fired).

The minimum required rate of discharge for relief valves shall be determined as follows:—

1. Obtain the total surface area by adding the surface area of vaporizer shell in square feet directly in contact with gas and the heat exchange surface area in square feet directly in contact with L.P. gas.
2. Obtain the minimum required rate of discharge in cubic feet of air per minute, at 60°F. and 14·7 pounds per square inch absolute from the Second Schedule for this total surface area.

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And the Honorable Murray Victor Porter, for and on behalf of Her Majesty's Chief Secretary for the State of Victoria, shall give the necessary directions herein accordingly.

A. MAHLSTEDT,
Clerk of the Executive Council.

By Authority: W. M. Houston, Government Printer, Melbourne.