# THE STATIC AND MOBILE PRESSURE VESSELS (UNFIRED) RULES, 2016

# Table of Contents

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## NOTIFICATION

**New Delhi, the 1st December 2016**

G.S.R. 1109(E): Whereas the draft notification for the Static and Mobile Pressure Vessels (Unfired) Rules, 2015 was published, vide Notification of the Government of India in the Ministry of Commerce and Industry, (Department of Industrial Policy and Promotion), number G.S.R. 778 (E), dated the 13th October, 2015 in the Gazette of India, Extraordinary, Part II, Section 3, Sub-section (i), inviting objections and suggestions from all persons likely to be affected thereby, before the expiry of a period of forty five days from the date on which copies of the Gazette containing notification were made available to the public;

And whereas, the copies of the said notification were made available to the public on the 13th October 2015;

And whereas, objections and suggestions received from the public on the said draft Rules have been duly considered by the Central Government;

Now, therefore, in exercise of powers conferred by sections 5 and 7 of the Explosives Act, 1884 (4 of 1884) and in supersession of the Static and Mobile Pressure Vessels (Unfired) Rules, 1981, except as respects things done or omitted to be done before such supersession, the Central Government hereby makes the following rules, namely:

## CHAPTER I

## PRELIMINARY

**1. Short title and commencement**

(1) These rules may be called the Static and Mobile Pressure Vessels (Unfired) Rules, 2016.

(2) They shall come into force on the date of their publication in the Official Gazette.

**2. Definition**

In these rules, unless the context otherwise requires,

(i) "Act" means the Indian Explosives Act, 1884 (4 of 1884);

(ii) "approved" means a drawing, design, specification or code approved by the Chief Controller;

(iii) "Auto LPG" means liquefied petroleum gas meant for automotive fuel conforming to IS:14861;

(iv) "Auto LPG dispensing station" means premises used for storing and dispensing Auto LPG as automotive fuel to the motor vehicles;

(v) "Auto LPG dispensing operator" means a company recognised by the Chief Controller for management and operations of Auto LPG dispensing station having qualification and experience specified in Schedule II;

(vi) "bottling plant" means a premise where cylinders are filled with compressed gas;

(vii) "Chief Controller" means the Chief Controller of Explosives;

(viii) "competent person" means a professional organisation comprising of at least two persons recognised by the Chief Controller, for such gases and vessels and for such period as may be specified as competent for carrying out tests, examination, inspections, certification for installations and transport vehicles as stipulated in these rules, if the constituent members of the organisation possess the qualifications and experience and other requirements as set out in Appendix IIA to these rules and the recognition is granted as per procedure laid down in rule 12:

Provided that the Chief Controller may relax the requirements of qualifications in respect of a competent person if such person is exceptionally experienced and knowledgeable but not the requirements in respect of the facilities at his command;

(ix) "Compressed Gas" means any permanent gas, liquefiable gas, or cryogenic liquid under pressure or gas mixture which in a closed pressure vessel exercises a pressure exceeding one atmosphere (gauge) at the maximum working temperature and includes Hydrogen Fluoride. In case of vessel without insulation or refrigeration, the maximum working temperature shall be considered as $55^0$ C;

(x) "Controller of Explosives" includes the Joint Chief Controller of Explosives, Deputy Chief Controller of Explosives, Controller of Explosives and Deputy Controller of Explosives;

(xi) "corrosion" means all forms of wastage, and includes oxidation, scaling, mechanical abrasion and corrosion;

(xii) "critical temperature" means the temperature above which gas cannot be liquefied by the application of pressure alone;

(xiii) "cryogenic liquid" means liquid form of permanent gas having normal boiling point below minus 150°C;

(xiv) "cryogenic pressure vessel" means a pressure vessel intended for storage or transportation of cryogenic liquid and includes cold converters, vacuum insulated evaporators, vacuum insulated storage or transport tanks and thermosyphon tanks and includes a permanently installed cryogenic pressure vessel of 1000 litre water capacity or less for storage of cryogenic liquid;

(xv) "Gas Cylinder" or "Cylinder" means any closed metal container having a volume exceeding 500 ml but not exceeding 1000 litres intended for the storage and transport of compressed gas, including any liquefied petroleum gas (LPG) container or compressed natural gas (CNG) cylinder fitted to a motor vehicle as its fuel tank but not including any other such container fitted to a special transport or undercarriage and includes a composite cylinder and cryogenic container, however, the water capacity of cylinders used for storage of CNG, nitrogen, compressed air, etc., may exceed 1000 litres up to 3000 litres provided the diameter of such cylinder does not exceed 60 cm;

(xvi) "design" includes drawings, calculations, specifications, codes and all other details necessary for the complete description of the pressure vessel and its construction;

(xvii) "design pressure" means the pressure used in the design calculations of vessel for the purpose of determining the minimum thickness of the various component parts of the vessels;

(xviii) "dispenser" means an equipment installed in liquefied petroleum gas dispensing station, meant for dispensing liquefied petroleum gas as automotive fuel to motor vehicles;

(xix) "district authority" means,

(a) in towns having a Commissioner of Police, the Commissioner or a Deputy Commissioner of Police; and

(b) in any other place, the District Magistrate;

(xx) "filling density" means the ratio of weight of liquefiable gas allowed in a pressure vessel to the weight of water that the vessel will hold at $15^0$ C;

(xxi) "fill point" means the point of the inlet pipe connection of a vessel where hose is connected for filling the compressed gas into the vessel;

(xxii) "fittings" means the safety fittings that are directly fitted on the pressure vessel including safety relief valves, excess flow valves, level measuring, temperature measuring and pressure measuring devices;

(xxiii) "flammability range" means the difference between the minimum and maximum percentage by volume of the gas in mixture with air that forms a flammable mixture at atmospheric pressure and ambient temperature;

(xxiv) "flammable compressed gas" means gas 13 percent or less of which when mixed with air forms a flammable mixture or whose flammable range with air is greater than 12 per cent;

(xxv) "Form" means the Form appended to these rules;

(xxvi) "gas free" in relation to a pressure vessel means the concentration of flammable or toxic gases or both in a pressure vessel is within the safe limits specified for a person to enter and carry out hot work in such vessel;

(xxvii) "gas tanker degassing station" means premises holding consent of State Pollution Control Board to facilitate de-gassing, evacuation and making gas free the flammable and, or, toxic and or corrosive gases present in a Compressed Gas Mobile Tanker to carry out external and internal inspections, NDT and Hydraulic test as required under the rules and purge and render the Tanker for safe re-fill, and shall meet the requirements given in Appendix-IIB;

(xxviii) "Inspector" means a professional organisation recognised by the Chief Controller for certifying pressure vessels and their fittings after carrying out stage wise inspection during fabrication as stipulated in the rules so as to ensure that the pressure vessels are designed and constructed in accordance with IS:2825 or any other Code approved by the Chief Controller, if the constituent members of the organisation possesses the qualification and experience and other requirements as set out in Appendix IIA to these rules and the recognition is granted as per procedure laid in rule 12;

(xxix) "installation" means any place which has been specially prepared for the storage of compressed gas in pressure vessels;

(xxx) "liquefiable gas" means any gas that may be liquefied by pressure above at $-10^0$ C; but will be completely vaporised when in equilibrium with normal atmospheric pressure (760 mm Hg) at $30^0$ C;

(xxxi) "liquefied petroleum gas" includes hydrocarbon gases in liquefied state at normal ambient temperature by the application of pressure, and conforming to the Indian Standard Specification No. IS:4576;

(xxxi(a)) "LNG" means liquefied natural gas;

(xxxii) "motor vehicle" means a vehicle having the meaning assigned to it in sub-section (28) of Section 2 of the Motor Vehicle Act 1988 (59 of 1988);

(xxxiii) "mounded vessel" means a storage vessel sited above ground and completely covered by a mound of earth or similar inert material except for nozzles, manhole covers, inspection covers fitted on vessel;

(xxxiv) "NDT" means Non-Destructive Testing methods like Dye Penetration Inspection, Magnetic Particle Inspection, Ultrasonic thickness checks, Ultrasonic Flaw Detection, Radiography and other relevant Inspection procedures carried out to detect the defects in the welds and parent metal of the pressure vessel;

(xxxv) "petroleum service station" means a premise used for storage of petroleum for the purpose of fuelling motor vehicles, and licenced in Form–XIV of Petroleum Rules, 2002;

(xxxvi) "permanent gas" means a gas whose critical temperature is lower than $-10^0$C;

(xxxvii) "pressure vessel" means any closed metal container of whatever shape, intended for the storage and transport of any compressed gas which is subjected to internal pressure and whose water capacity exceeds one thousand litres and includes inter connecting parts and components thereof upto the first point of connection to the connected piping and fittings, but does not include containers wherein steam or other vapour is or is intended to be generated or water or other liquid is or is intended to be heated by the application of fire or the products of combustion or by electrical means, heat exchangers, evaporators, air receivers, steam type digestors, steam type sterilizers, autoclaves, reactors, calorifiers, pressure piping components such as separators or strainers and vessels containing a liquid under a blanket of compressed inert gas;

(xxxvii(a)) 'proforma' means a specific proforma prescribed for a particular purpose under these rules by an office order of the Chief Controller, which is hosted in public domain of the official website of PESO for information of public and includes a prescribed proforma;

(xxxviii) "safety relief device" means an automatic pressure relieving device actuated by the pressure upstream of the valve and characterized by fully opened pop action, intended to prevent the rupture of a pressure vessel under certain conditions of exposure;

(xxxix) "source of ignition" means naked lights, fires, exposed incandescent materials, electric welding arcs, lamps, other than those specially approved for use in flammable atmosphere, or a spark or flame produced by any means;

(xl) "tank truck loading or unloading gantry" or "hard stand" means the position of parking of tank truck or mobile pressure vessel for loading or unloading of compressed gas into or from it;

(xli) "transport" means the transport of a pressure vessels filled with any compressed gas from one place to another but does not include movement of the vessel from one place to another in the same premises;

(xlii) "vehicle" means a mechanically propelled carriage designed to transport by land compressed gas in a pressure vessel mounted thereon, and shall not include a vessel forming the barrel of a rail tank wagon;

(xliii) "vessel" means a pressure vessel and includes a cryogenic pressure vessel;

(xliv) "water capacity" means capacity in litres of the pressure vessel when completely filled with water at $15^0$C.

**3. General exemptions**

Nothing in these rules shall apply to vessel(s) which form part of a processing plant. For the purpose of this rule, vessels forming part of a processing plant shall mean vessel(s) in which a unit process or unit operation is carried out and vessel(s) which contain, as a process requirement, compressed gas received from and consumed in the same processing plant, provided that the water capacity of the vessel(s) shall be such that the gas stored therein at the maximum working pressure shall not exceed the requirement for feeding the consuming point(s) for a period not exceeding sixteen hours at the designed flow rate.

**4. Restriction on filling, manufacture and import of pressure vessels including fittings and vapouriser**

(1) No person shall fill any compressed gas in any vessel or transport any vessel filled with any compressed gas unless such vessel has been manufactured in accordance with a type or standard or code as specified under rule 13 and fitted with fittings approved by the Chief Controller.

(2) No person shall manufacture any vessel and fitting thereof, under sub-rule (1) including vaporiser without the prior approval of the Chief Controller.

(3)

(i) Any person seeking approval of his fabrication shop for fabrication of pressure vessels, vaporisers or fittings under sub-rule (2) shall submit,

(a) the particulars specified in Appendix–I to these rules;

(b) copy of ISO-Certification or equivalent certification in respect of the fabrication shop;

(c) a scrutiny fee as specified in clause B of Schedule I,

(ii) The Chief Controller on receipt of documents mentioned in clause (i) shall get the fabrication shop inspected by a Controller for assessment of the capability of fabrication of pressure vessels, vapourisers or fittings and shall either approve the shop or reject the application depending on the assessment report. The approval shall remain valid initially for a period of one year. Subsequently based on the satisfactory performance report, the approval may be periodically renewed for five years. The fee for renewal shall be as specified in clause B of Schedule I;

(iii) Any person seeking approval of design of a pressure vessel, vaporiser or fitting to be fabricated by him in his shop approved under clause (ii), shall submit to Chief Controller,

(a) two copies of design calculations as per fabrication code, accepted by the Chief Controller, and duly vetted by an Inspector;

(b) two copies of fabrication drawings prepared as per fabrication code and design calculations duly vetted by an Inspector;

(c) a scrutiny fee specified in clause B of Schedule I.

(4) No person shall import any vessel without prior approval from Chief Controller.

(5) Any person seeking the approval of the Chief Controller under sub-rule (4) shall submit to him,

(a) duly filled in application in Form AS-3;

(b) a test and inspection report of the vessel from the manufacturer and inspection certificate duly endorsed by the inspecting agency of the country of origin;

(c) two copies of design drawing showing the design details of the vessel, its fittings and particulars of specifications of the materials used in construction thereof duly endorsed by third party inspecting agency; and

(d) a scrutiny fee as specified in clause B of Schedule I.

**5. Restriction on delivery and despatch**

(1) No person shall deliver or despatch any compressed gas filled in a vessel to any person other than the holder of a storage licence issued under these rules or to a port authority or a railway administration.

(2) No compressed gas delivered or despatched under sub-rule (1) shall exceed the quantity which the person to whom it is delivered or despatched is authorised to store under the licence held by him.

**6. Repair and modification to pressure vessels**

(1) No person shall carry out any repairs or modifications to any vessel unless the prior approval of repairs or modifications, procedure and their method of execution is obtained from the Chief Controller or Controller authorised by him on payment of a scrutiny fee as specified in clause B of Schedule I. Any such repairs or modifications shall be carried out in the manner and by practices acceptable under the design code referred

to in rule 13 including NDT and pressure testing under stage wise inspection of inspector recognised by the Chief Controller:

Provided that nothing in this rule shall apply to the replacement of any of the fitments of the vessel which does not involve any heating.

(2) Before any repairs, additions or alterations are carried out to any vessel, the same shall be completely emptied and purged with an inert gas.

(3) Complete record of repairs, additions or alterations referred to in sub-rule (1) shall be maintained and made available to the Chief Controller or Controller authorized by him and his permission shall be obtained before recommissioning of the vessel.

**7. Purging of pressure vessels used for flammable gases**

(1) Before using any new vessel or before the refilling of any existing vessel which has been made gas-free, air contained therein shall be purged by an inert gas or by the gas for which the vessel is to be used.

(2) If the vessel is purged by means of a flammable gas, the flammable mixture so formed shall be vented from the vessel only after taking adequate precautions to prevent its ignition.

**8. Prohibition of employment of children and intoxicated persons**

No person under the age of eighteen years or who is in a state of intoxication shall be employed for the loading, unloading or transport of any vessel containing compressed gas, or in any premises licensed under these rules.

**9. Supervision and Operation within the licensed premises**

The operation of the licensed premises shall be under the supervision of persons having knowledge of the equipments being used in the premise and who are trained in handling the compressed gas, and other operators shall be conversant with the hazards associated with the compressed gas and fire-fighting operation.

**10. Special precautions against accidents**

(1) No person shall smoke, or bring any matches, fire or articles capable of causing ignition or commit or attempt to commit any act which may tend to cause a fire or explosion in or about any place where any compressed gas is stored, handled or transported in a vessel.

(2) All empty vessels which had contained, any flammable or toxic gases, shall, except when they are opened for the purpose of filling or cleaning, or for rendering them gas-free, but kept securely closed until they have been cleaned or freed of the gas, as the case may be.

(3) Every person storing compressed gas in a vessel and every person in charge of, or engaged in the storage, handling and transport of such gas in vessels, shall at all times;

(i) comply with the provisions of these rules and the conditions of any licence issued there under;

(ii) observe all precautions for the prevention of accident by fire or explosion; and

(iii) prevent any person from committing any act referred in sub-rule (1).

**11. Procedure for payment of fees**

All fees as specified in Schedule-I under these rules shall be paid through crossed demand draft on any nationalised or scheduled bank in favour of the Chief Controller of Explosives or Controller of Explosives authorised by him or paid On-line as and when notified by the Chief Controller.

**12. Procedure for grant and revocation of recognition to competent person and inspector**

(i) Any organisation intending to be recognised as competent person or Inspector shall submit to the Chief Controller an application in the form prescribed in Appendix III. Every application shall be accompanied by a scrutiny fee as specified in Schedule I(B). The Chief Controller shall register such application and within a period of ninety days from the date of receipt of the application either,

(a) prima facie after having satisfied himself with regard to competence and professional ethics, for recognition of the applicant as a competent person or an Inspector, as the case may be, shall call the applicant for an interview by a team of officers nominated by Chief Controller for assessing the technical and practical knowledge and capability of the applicant; or

(b) if the applicant does not prima facie meet the requirement for recognition shall reject the application with reasons; or

(ii)

(a) if the applicant in the interview conducted under this rule is found to have adequate knowledge and capability for the recognition applied for, the Chief Controller shall grant the recognition under the rules.

(b) in case any applicant is not found suitable, the Chief Controller shall reject the application specifying the reasons.

(iii) Initially the recognition granted under clause (ii) shall be valid for a period of one year. Subsequently, based on performance report and submission of certificate of physical fitness obtained from a government hospital, validity of recognition may be renewed for a further period of two years at a time up to attaining the age of seventy years.

(iv) The maximum age limit for recognition of competent person or Inspector shall be attainment of seventy years of age by the constituent members of the competent person or Inspector as the case may be.

(v) The certificates for inspection and testing under rule 13, 18, 19, 33 and 43 shall be issued in the proforma prescribed by the Chief Controller and shall be generated through Petroleum and Explosives Safety Organisation's online system. The signed copy of the certificates so issued shall also be submitted to the licensing or approving or renewing authority, as the case may be, along with the application for the grant or renewal or amendment of licence, whichever is applicable.

(vi) The Chief Controller may after giving an opportunity to the Inspector or Competent Person of being heard revoke the recognition,

(a) if he has reason to believe that an Inspector or Competent Person as the case may be, has violated any condition stipulated in the letter of recognition or has carried out a test, examination and inspection or has acted, in a manner inconsistent with the intent or the purpose of these rules; or

(b) for any other reason to be recorded in writing.

## CHAPTER II

## CONSTRUCTION AND FITMENTS OF PRESSURE VESSELS

### 13. Design code

(1) Vessels shall be designed, constructed and tested in accordance with IS 2825; ASME Section VIII Division 1 or Division 2, PD5500, EN 13458, EN 13530, AD:2000 code as amended from time to time, or such other standard or code accepted by the Chief Controller.

(2) A test and inspection certificate issued by the Inspector and countersigned by the approved fabricator in the prescribed proforma that the vessel meets with the requirements of the standard or code referred to in sub-rule (1) shall be furnished to the Chief Controller or Controller authorised by the Chief Controller.

### 14. Design pressure

(i) The design pressure of a vessel shall not be less than,

(a) the vapour pressure of the gas in the vessel at $55^0$ C, if the vessel is meant for the storage of liquefiable gases:

Provided that if the vessel is insulated, the vapour pressure of the gas in the vessel shall correspond to the maximum temperature that is likely to be attained by the gas in the vessel;

(b) the developed pressure of the gas in the vessel at $55^0$ C, if the vessel is meant for the storage of a permanent gas;

(c) the maximum allowable service pressure with additional allowances for vacuum and static head or surge due to acceleration or deceleration, as the case may be, in respect of the cryogenic liquid proposed to be stored or transported.

(ii)

(a) The static head (higher of the water column or the compressed gas column) shall also be considered for static pressure vessels.

(b) The wind load, seismic loads shall also be considered for vertical cylindrical vessels and Horton spheres.

### 15. Design of vessels for gases at low temperature

(1) Refrigerated vessels,

(i) vessels used for storage of refrigerated gases shall be designed in accordance with low temperature requirements under the design code referred to in sub-rule (1) of rule 13;

(ii) the capacity of the refrigeration system shall be adequate to maintain the gas in the vessel at a temperature so that its vapour pressure does not exceed the design pressure of the vessel and shall also remain below the pressure-setting of the relief valve on the vessel.

(2) Insulated vessels,

(i) the shell of the vessel and its manhole nozzle shall be insulated with a material approved by the Chief Controller. The entire insulation may be covered with a metal jacket and flashed around all openings so as to be weather-tight;

(ii) the insulation shall be of sufficient thickness so that the thermal conductance at 15 C (expressed in calories or square centimeter per hour per degree centigrade temperature differential) shall not exceed the limit prescribed by the Chief Controller.

(3) Cryogenic pressure vessels,

(i) design service temperature of the cryogenic pressure vessels shall not be higher than the normal boiling point of the cryogenic liquid;

(ii) material of construction of the inner vessel, its piping and fittings shall be suitable for the service temperature and shall be compatible for the specific cryogenic liquid;

(iii) outer vessel shall be made of steel not less than 3mm nominal thickness or of aluminium not less than 4mm nominal thickness and shall have required structural strength and capable for supporting the inner vessel together with cryogenic liquid, insulation and other fittings. The outer vessel of vacuum insulated cryogenic tanks shall be designed for a minimum collapsible pressure of one atmosphere (gauge). The suitable protecting coating shall be provided on the outer vessel to avoid corrosion. The outer vessel shall also be provided with suitable lifting arrangement and supports for installation and mounting;

(iv) inner supports between the inner vessel and the outer vessel shall be of non-inflammable materials and capable of supporting the inner vessel together with the maximum allowable cryogenic liquid. The supports shall be able to withstand expansion or contraction within the operating temperature range. Cryogenic pressure vessels meant for transport purpose, shall be able to withstand maximum static loading of all the following individual,

(a) Vertical downward of two (2);

(b) Vertical upward of one and half (1 ½);

(c) Longitudinal of one and half (1 ½); and

(d) Lateral of one and half (1 ½)

times the weight of liquid container. The factor of safety of the supports shall be as per the design code;

(v) air in the annular space between the inner and outer vessel shall be evacuated and the space shall be filled with suitable insulating material compatible with the particular cryogenic liquid.

**16. Filling capacity and filling pressure**

(1) The Maximum quantity of liquefiable gas filled into any vessel shall be limited to the filling density of the gas and shall be such that the vessel shall not be liquid-full due to expansion of the contents with rise of the temperature to $55^0$ C. If vessel is un-insulated, or to the highest temperature which the contents are likely to reach in service. If the vessel is refrigerated or insulated, this requirement shall be applicable irrespective of the ambient temperature of the product at the time of filling.

(2) No vessel shall be filled with any permanent gas in excess of its design pressure.

(3) The water capacity of the cryogenic pressure vessel shall be rated in terms of gross water capacity and the allowable water capacity in litres at 15°C. The usable water capacity shall not exceed 95% of the gross water capacity. An overflow pipe shall be provided at the maximum allowable capacity level as a safeguard against filling the vessel beyond the maximum usable capacity.

**17. Markings and Painting of pressure vessels**

(a) Every vessel shall have a metal plate permanently fixed to it showing the following particulars which shall be visible from the ground level, namely:

(i) manufacturer's name,

(ii) Chief Controller's approval number;

(iii) vessel identification number as per the inspection certificate issued under rule 13(2);

(iv) the standard or code to which the vessel is constructed;

(v) official stamp of the Inspector;

(vi) design pressure in $Kg/Cm^2$;

(vii) date of initial hydrostatic test and the subsequent test;

(viii) hydrostatic test pressure in $Kg/Cm^2$;

(ix) water capacity in liters;

(x) gas capacity, if filled with liquefiable gas; and

(xi) name or chemical symbol of the gas for which the vessel is to be used;

(xii) design temperature in $^0C$.

(b) Above ground vessel shall be adequately painted externally to prevent corrosion and shall have a reflecting surface.

**18. Fittings**

(1) General

(i) Fittings: Each vessel shall be provided with each of the following fittings all of which should be suitable for use with the gas at pressures not less than the design pressure of the vessel to which they are fitted and for temperatures appropriate to the characteristics of the gas and operating conditions, namely;

(a) Pressure relief valve connected to the vapour space;

(b) Drains;

(c) Contents gauge or maximum level indicator;

(d) Pressure gauge connected to the vapour space;

(e) Means of measuring the temperature of the contents of the vessel.

(ii) Vessel connections: Connections of vessels shall be designed and attached to the vessels in accordance with the design code referred to in rule 13. All static vessels for storage of corrosive, flammable or toxic gas in liquefied state shall not have more than one pipe connection to the bottom for inlet or outlet, apart from the drainage. The drainage pipe, if provided, shall be extended beyond the shadow of the vessel and provided with two shut-off valves. No drainage pipe shall be provided direct from spherical vessel. The bottom inlet or outlet pipe for spherical vessel or for any vessel intended for storage of flammable or toxic or corrosive gas exceeding 50 tonnes or 100 M3 water capacity shall be integrally welded to the vessel and extended up to three metres beyond the shadow of the vessel, at the end of which, combination of manually operated valve for positive isolation and quick shut-off remote operated valve shall be provided.

(2) Pressure relief

(i) every vessel shall be provided with two or more pressure relieving devices in accordance with the provisions of the Design Code referred to in rule 13;

(ia) for cryogenic pressure vessels, the outer vessel shall be provided with a vacuum valve and safety relief device (disc) to release internal pressure. The discharge area of such device shall be at least 0.34 sq.mm/litre of water capacity of the inner vessel but not exceeding 5000 $mm^2$. The relief device shall function at a pressure not exceeding the internal design pressure of the outer vessel;

(ii) the relief valves shall be spring loaded and shall be set-to-discharge and reach full flow conditions as required by the Design code referred to in rule 13;

(iii) weight loaded relief valves shall not be permitted;

(iv) the relief valves be so designed that they cannot be inadvertently loaded beyond the set pressure;

(v) the design of the valves shall be such that the breakage of any part will not obstruct free discharge of the liquid under pressure;

(vi) safety relief valves on any vessel shall be set to start-to-discharge at a pressure not in excess of 110 percent of the design pressure or maximum working pressure of the vessel and shall have a total relieving capacity sufficient to prevent the maximum pressure in the vessel of more than 120 percent of the design or maximum working pressure;

(via) in case of cryogenic pressure vessels, the safety relief devices shall be set to discharge in such a manner that at least one such device shall be set at a pressure not higher than the maximum allowable working pressure and the other device may be set at a pressure not higher than 110 percent of the maximum allowable working pressure."

(vii) each safety relief valve shall be plainly and permanently marked with the pressure in $Kg/Cm^2$ at which it is set to discharge, with the actual rate of discharge of the device in cubic meters per minute of the gas at $15^0$ C and at atmospheric pressure, and with manufacturer's name. The rated discharge capacity of the device shall be determined at a pressure of 120 percent of the design pressure or maximum working pressure of the vessel;

(viii) connections of safety relief devices shall be of sufficient size to provide the required rate of discharge through the safety relief valves;

(ix) safety relief valves shall be so arranged that the possibility of tampering is minimised and if the pressure setting or adjustment is external, the safety relief valve shall be provided with suitable means of sealing adjustment;

(x) each safety relief valve for static vessel shall be provided with angle type approved safety valve with shut-off valve between it and the vessel. The arrangement of the shut-off valve installed between the safety relief valve and the vessel shall be so designed as to afford full required capacity flow through at least one of the safety relief valves. In case of cryogenic vessel the safety relief valve may be provided with multi-way flow diverter valve;

(xi) safety relief valves shall have direct communication with the vapour space of the vessel;

(xii) for static vessels for storage of flammable, toxic or corrosive gases, relief valves shall be fitted with extended vent pipes adequately supported and having outlets at least 2 metres above the top of the vessel and atleast 3.5 metres above the ground level and the vent pipes shall be fitted with loose-fitting rain caps;

(xiii) relief valves shall be tested by a Competent Person for correct operation at least once in a year and a record of such test shall be maintained. The test certificate shall be issued in the prescribed proforma;

(xiv) Safety relief valves of road tankers carrying flammable, toxic or corrosive gases shall not have isolation valve between the vapour space and the relief valve. Such relief valves shall be provided in a recessed cup formation with suitable rain caps. The relief valves of such tankers shall be replaced with new valves every ten years

or whenever found defective during operation or periodic testing, whichever is earlier.

(3) Shut-off, emergency shut-off valves and excess flow valves,

(i) all liquid and vapour connections on vessels, except those for relief valves, plugged openings, and those where the connection is not greater than 1.4 mm diameter opening shall have shut-off valves located as close to the vessel as practicable;

(ii) all liquid and vapour connections on vessels, except those for relief valves, and drainage connections of small diameter, shall have an emergency shut off valve such as, an excess flow valve, an automatically operated valve or remotely controlled valve. The emergency shut off valve shall be in addition to the shut-off valve referred to in clause (i) unless the emergency shut off valve is a remotely controlled valve which can be operated from a safe area and shall be of a type which shall not fail:

Provided that the emergency shut-off valves is not required in cases where the connection to a vessel is not greater than 3 mm diameter for liquid and 8 mm diameter for vapour, or for vessels meant for storage of noncorrosive, non-flammable or non-toxic gas;

(iii) where the emergency shut off valve is of the excess flow type, it shall operate at a designated differential pressure and flow rate for size and service as approved by the Chief Controller and its closing rate of flow shall be below the rate which is likely to result from a fracture of the line it is protecting, calculated under the most adverse weather conditions likely to be experienced. Excess flow valves shall have a rated flow capacity sufficiently above normal flow requirement to prevent valve chatter;

(iv) compressed gas road tankers used for flammable, toxic and corrosive compressed gases shall be provided with internal valve having dual function comprising of primary shut off valve and excess flow valve of appropriate rating in liquid and vapour line. Internal valve shall have a spring-loaded fusible link in its actuation lever to shut off in case of fire beneath. Further, the internal valve shall have a shear section and be designed such that in the event of accident, the lower section of the valve is sheared off, the valve seat (soft seat–which ensures zero leakage) remains inside the tank and is closed by self-stored energy (spring).

(v) for static vessels, operational fitness examination of excess flow valves shall be carried out during periodic hydraulic test under rule 19 to check physical condition of the parts and its proper operations. For compressed gas tankers operational fitness examination of excess flow valves/internal valves shall be done once in a year. Closing flow rate testing of excess flow valves/internal valves of compressed gas tankers shall be done during the periodic hydraulic test. The excess flow valves/internal valves shall be repaired/replaced by a new ones if found defective on examination or during operation.

(4) Liquid level gauging device

(i) a vessel used for liquefiable gas or dissolved gas shall be equipped with a liquid level gauging device to afford ready determination of the amount of liquid in the vessel at any time;

(ii) all liquid level indicators shall be suitable for operation at the design pressure of the vessel;

(iii) every vessel shall, in addition, be equipped with a fixed maximum level indicating device depending upon the liquefiable gas or dissolved gas filled in the vessel;

(iv) gauging devices that require bleeding of the contents of the vessel such as a rotary tube, fixed tube and slip tube shall be designed in such a manner that the same cannot be completely withdrawn in normal gauging operations.

(5) Pressure gauge: Every vessel shall be provided with at least one pressure gauge.

**19. Periodic testing of pressure vessels in service**

(1)

(a) Except specifically otherwise provided in this rule, all vessels shall be hydraulically tested by a competent person at a pressure marked on the vessel at intervals of not more than five years after the date of first test, provided that in the case of vessels, containing corrosive or toxic gases, the periodic test shall be done at an interval of two years. Internal inspection along with residual thickness measurement shall be carried out during the periodic testing.

(b) Vessels of more than 100 KL water capacity meant for flammable, corrosive and toxic gases shall also be subjected to Non-Destructive Test for weld inspection in addition to hydraulic test referred in clause (a).

(2) In case of vessels which are so designed, constructed or supported that they cannot be safely filled with water or liquids for hydraulic testing or which are used in services where traces of water cannot be tolerated, the Chief Controller may permit pneumatic testing along with non-destructive tests instead of hydraulic testing, as per procedure laid down in vessel fabrication code; after satisfying himself about the adequacy of the safety precautions undertaken.

(3)

(a) Cryogenic pressure vessel and vessel for liquid Carbon Dioxide made of stainless steel shall be periodically tested with pneumatic pressure at 1.1 times of maximum allowable working pressure.

(b) Carbon Dioxide storage and transport vessels made of carbon steel shall be subjected to hydraulic testing (instead of pneumatic testing) at the marked test pressure as per design and fabrication code. It shall be ensured that the vessel after testing is thoroughly dried of water and made moisture free before taking into service.

(4) The mounded and underground vessel shall be periodically inspected as specified in Schedule III.

(5)

(a) Ammonia Horton sphere shall be subjected to first periodic inspection after two years of its installation and the inspection shall consist of detailed Non-destructive Testing of the vessel.

(b) The second periodic inspection shall be carried out after three years of first inspection and shall involve Non-destructive Testing and hydro testing of the sphere.

(c) Subsequent periodic inspection including Non-destructive Testing and hydro testing shall be carried out every five years.

(d) If any major repair is carried out on a Horton sphere, the vessel shall be subjected to Non-destructive Testing and hydro testing in accordance with original code of construction and procedure approved by Chief Controller and the vessel shall be treated as a new vessel for subsequent periodic inspection as per the procedure noted above.

(e) The Non-destructive Testing shall be as per the procedure approved by the Chief Controller.

(6) Notwithstanding anything mentioned in clause (a) of sub-rules (3), sub-rules (4) and (5) above; the Licensee is at liberty to carry out Hydraulic Test as per the design code during the periodic inspection under rule 19.

(7) The competent person carrying out the test as required under sub-rule (1) to sub-rule (6) above shall issue online certificate of test in the prescribed proforma along with the Annexures giving the details of NDT inspections prescribed above.

**20. Precautions to be observed in carrying out periodic test**

In carrying out the periodic test referred to in rule 19, the following precautions shall be observed, namely:

(i) before the test is carried out, each pressure vessel shall be thoroughly cleaned and examined externally, and as far as practicable, internally also for surface defects, corrosion and foreign matter. During the process of cleaning and removal of sludge, if any, all due precautions shall be taken against fire or explosion, if such sludge is of pyrophoric nature or contains spontaneously combustible chemicals;

(ii) evacuation or degassing of transport vessels used for flammable, toxic or corrosive gases shall be carried out at a gas tanker degassing station or licensed premises equipped with degassing or evacuation facilities approved by Chief Controller;

(iii) as soon as the test is completed, the vessel shall be thoroughly dried internally and shall be clearly stamped with the marks and figures indicating the person by whom the test has been carried out and the date of test and a record shall be kept of all such tests;

(iv) any vessel which fails to pass the hydraulic test or which for any other reason is found to be unsafe for use shall be destroyed or rendered unsuitable under intimation to the Chief Controller.

## CHAPTER III

## STORAGE

**21. General**

(1) Except specifically provided in these rules, all vessels meant for storage of compressed gas shall be installed entirely above-ground, that is to say, no part of the vessel shall be buried below the ground level.

(2) Vessels and first stage regulating equipment shall be located in the open.

(3) Vessels shall not be installed one above the other.

(4) Vessels within a group shall be so located that their longitudinal axes are parallel to each other.

(5) No vessel shall be located within the bonded area of petroleum or other flammable liquid storages.

(6) Sufficient space shall be provided between two vessels to permit fire-fighting operations.

(7) Two or more vessels installed in batteries shall be so installed that the top surface of the vessels are on the same plane.

(8) Vessels with their dished ends facing each other shall have screen walls in between them.

(9) Notwithstanding anything contained in sub-rules (1) to (8) above, vessels for storage of liquified petroleum gas and other liquefied compressed gases, can be placed underground or covered by earth (mound) conforming to the national or international standard accepted by the Chief Controller and the requirements specified in Schedule III.

(10) Aboveground vessel for storage of corrosive, flammable or toxic gas in liquefied state shall be provided with enclosure wall all around the ground. The minimum distance between vessel and enclosure wall shall be the diameter of the vessel or five meters, whichever is less. The ground shall be graded to form a slope away from pumps, compressors or other equipments. The height of the enclosure wall shall be thirty centimeters on the upper side and gradually increasing to maximum sixty centimeters on the lower side, at the end of which a shallow sump for collection of the spilled liquid, if any, shall be provided:

Provided that no outlet shall be provided to the sump to release the spilled liquid in common or rain water drain.

(11) The minimum separation distance between the vessel and the sump shall be,

(a) diameter of the vessel, in case of vessels with water capacity not exceeding forty thousand litres;

(b) fifteen metres, if the water capacity of the vessels exceeds forty thousand litres.

(12) A corrosion allowance of minimum 1.5 mm shall be provided for vessels made of carbon steel.

(13) Operations in the licensed premises during the night shall be carried out under supervision of technically qualified and experienced personnel with adequate artificial lighting of approved type.

(14) The mounded and underground vessel installation shall conform to the requirements specified in schedule III.

(15) The LNG installation shall conform to the requirements specified in Schedule IV.

**22. Location of pressure vessels**

(1) Each vessel shall be located with respect to the nearest building or group of buildings or line of adjoining property which may be built on and with respect to other vessels and facilities in accordance with the distances specified in the Tables below:

**TABLE-1**

**MINIMUM SAFETY DISTANCES FOR CORROSIVE, TOXIC OR PERMANENT FLAMMABLE GASES**

| Sl. No. | Water capacity of vessel (in litres) | Minimum distance from building or group of buildings or line of adjoining property | Minimum distance between pressure vessels |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| (i) | Not above 2000 | 5 metres | 1 metre |
| (ii) | Above 2000 but not above 10,000 | 10 metres | 1metre |
| (iii) | Above 10,000 but not above 20,000 | 15 metres | 1.5 metres |
| (iv) | Above 20,000 but not above 40,000 | 20 metres | 2metres |
| (v) | Above 40,000 | 30 metres | 2 metres |

**TABLE-2**

**MINIMUM SAFETY DISTANCES FOR NON-CORROSIVE, NON-FLAMMABLE OR NON-TOXIC GASES**

| Sl. No. | Water capacity of vessel (in litres) | Minimum distance from building or group of buildings or line of adjoining property | Minimum distance between pressure vessels |
|---|---|---|---|

| 1 | 2 | 3 | 4 |
|---|---|---|---|
| (i) | Not above 2000 | 3 metres | 1 metre |
| (ii) | Above 2000 but not above 10,000 | 5 metres | 1metre |
| (iii) | Above 10,000 but not above 20,000 | 7.5 metres | 1.5 metres |
| (iv) | Above 20,000 but not above 40,000 | 10 metres | 2metres |
| (v) | Above 40,000 | 15 metres | 2 metres |

**TABLE-3**

**MINIMUM SAFETY DISTANCES FOR LIQUEFIED FLAMMABLE GASES**

| Sl. No. | Water capacity of vessel (in litres) | Minimum distance from building or group of buildings or line of adjoining property | | Minimum distance between vessels | |
|---|---|---|---|---|---|
| | | Above ground | Underground or aboveground vessels covered with earth(mound) | Above ground | Underground or aboveground vessels covered with earth(mound) |
| 1 | 2 | 3 | 4 | 5 | 6 |
| (i) | Not above 2000 | 5 metres | 3 metres | 1 metre | 1 metre |
| (ii) | Above 2000 but not above 7,500 | 10 metres | 3 metres | 1 metre | 1 metre |
| (iii) | Above 7,500 but not above 10,000 | 10 metres | 5 metres | 1.5 metres | 1 metre |
| (iv) | Above 10,000 but not above 20,000 | 15 metres | 7.5 metres | 2 metres | 1 metre |
| (v) | Above 20,000 but not above 40,000 | 20 metres | 10 metres | 2 metres | 1 metre |
| (vi) | Above 40,000 but | 30 metres | 15 metres | 2 metres or | 1 metre |

| | | | | | |
|---|---|---|---|---|---|
| | not above 3,50,000 | | | 1/4th of the sum of diameter of adjacent vessel or ½ the diameter of the two adjacent vessels, whichever is greater | |
| (vii) | Above 3,50,000 but not above 4,50,000 | 40 metres | 15 metres | | 1 metre |
| (viii) | Above 4,50,000 but not above 7,50,000 | 60 metres | 15 metres | | 1 metre |
| (ix) | Above 7,50,000 but not above 38,00,000 | 90 metres | 15 metres | | 1 metre |
| (x) | Above 38, 00, 000 | 120 metres | 15 metres | | 1 metre |

**TABLE-4**

**MINIMUM SAFETY DISTANCES (IN METERS) BETWEEN FACILITIES ASSOCIATED WITH STORAGE OF LIQUEFIED FLAMMABLE GAS IN PETROLEUM REFINERY, GAS PROCESSING PLANTS, STORAGE TERMINALS AND BOTTLING PLANTS**

**(A) FOR TOTAL STORAGE ABOVE 100 TONNES**

| From/To | Storage Vessel | Property line/buildings not associated with storage and operation | Sheds for filling, storage and evacuation of cylinders | Tank Truck loading/ unloading gantry | Tank Wagon gantry | Pump/ compressor or Shed | Fire Water Pump room |
|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Storage Vessel | Table 3 | Table 3 | 30 | 30 | 15 | 50 | 60 |
| Property line/buildings not associated with storage and operation | Table 3 | ---- | 30 | 30 | 50 | 30 | --- |
| Sheds for filling, storage and | 30 | 30 | 15 | 30 | 50 | 15 | 60 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| evacuation of cylinders | | | | | | | |
| Tank Truck loading/unloading gantry | 30 | 30 | 30 | 30 | 50 | 30 | 60 |
| Tank Wagon gantry | 50 | 50 | 50 | 50 | 50 | 30 | 60 |
| Pump/ compress or Shed | 15 | 30 | 15 | 30 | 30 | --- | 60 |
| Fire Water Pump room | 60 | --- | 60 | 60 | 60 | 60 | --- |

**(B) FOR TOTAL STORAGE NOT ABOVE 100 TONNES**

| From/To | Storage Vessel | Property line/buildings not associated with storage and operation | Sheds for filling, storage and evacuation of cylinders | Tank Truck loading/ unloading gantry | Fire Water Pump room |
|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | 6 |
| Storage Vessel | Table 3 | Table 3 | Table 3 | 15 | 30 |
| Property line/buildings not associated with storage and operation | Table 3 | ---- | 15 | 15 | --- |
| Sheds for filling, storage and evacuation of cylinders | Table 3 | 15 | 15 | 15 | 30 |
| Tank Truck loading/unloading gantry | 15 | 15 | 15 | 15 | 30 |
| Fire Water Pump room | 30 | --- | 30 | 30 | --- |

**TABLE-5**

**MINIMUM SAFETY DISTANCES (IN METRES) BETWEEN FACILITIES ASSOCIATED WITH STORAGE AND DISPENSING OF LIQUEFIED PETROLEUM GAS IN LIQUEFIED PETROLEUM GAS DISPENSING STATION AS AUTOMOTIVE FUEL TO MOTOR VEHICLES**

| To/From | LPG Storage Vessels | Fill point of LPG Storage vessel and Centre of LPG Tank-Truck unloading hard stand | LPG Dispenser | Property line | Petroleum Class A or B service Station licensed in Form XIV of Petroleum Rules 2002 | | |
|---|---|---|---|---|---|---|---|
| | | | | | Fill point of petroleum class A/B tanks | Vent pipe of petroleum class A/B tanks | Petroleum Class A/B dispensing pump |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| LPG Storage Vessels | Table 3 | 9 (aboveground/ mounded vessels exceeding 7,500 litres capacity) 6 (aboveground/mouded vessels not exceeding 7,500 litres capacity) 3 (underground vessel) | 9 (above- ground vessels not exceeding 20,000 litres capacity or underground/mounded vessels) 15(above- ground vessels exceeding 20,000 litres capacity) | Table 3 | 9 | 9 | 9 |
| Fill point of LPG Storage vessel and Centre of LPG Tank Truck unloading hard stand | 9 (aboveground/ Mounded vessels Exceeding 7,500 litres capacity) 6 (aboveground/ Mounded vessels not exceeding 7,500 litres capacity) 3 (underground vessel) | --- | 6 | 9 | 6 | 6 | 6 |
| LPG Dispenser | 9 (aboveground | 6 | --- | 6 | 6 | 6 | 6 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | vessels not exceeding 20,000 litres capacity or underground/mounded vessels) 15 (aboveground Vessels exceeding 20,000 litres capacity) | | | | | | |
| Property line | Table 3 | 9 | 6 | -- | 3 | 4 | 6 |

**TABLE-6**

**MINIMUM SAFETY DISTANCE FOR NON-FLAMMABLE, NON-TOXIC, CRYOGENIC LIQUIDS AND LIQUEFIED NITROUS OXIDE**

| Water capacity of vessel (litres) | Between two vessels (meter) | Between vessel and any building or adjoining property line or pedestrian passage (meter) | Between vessel and flammable structure, naked flame, pipeline containing flammable fluids, electric installation or places of public assembly or drain (meter) |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
| Up to 1,000 | 0.5 | 2 | 3 |
| Above 1,000 but not above 10,000 | 1 | 3 | 5 |
| Above 10,000 | 1 | 3 | 7.5 |

**TABLE-7**

**MINIMUM SAFETY DISTANCES FOR LIQUID CARBON DIOXIDE**

| Water capacity of vessel in litres | Between two vessels | Between vessel and any building or adjoining property line or places of public assembly or drain |
|---|---|---|

| 1 | 2 | 3 |
|---|---|---|
| Not exceeding 50,000 | 1 metre | 2 metres |
| Exceeding 50,000 | 2 metres | 4 metres |

(2) If the aggregate water capacity of a multi-vessel installation covered under tables 1, 2 and table 3 above is 40,000 litres, the minimum safety distances from any vessel to the property line/group of buildings shall not be less than,

(a) thirty metres for corrosive, toxic or flammable gases for above ground vessel and fifteen meters for underground and mounded vessel;

(b) fifteen metres for non-corrosive, non-toxic or non-flammable gases.

(3) The number of above ground storage vessels in one group shall not exceed six. Spherical, cylindrical, mounded and underground vessels shall be installed in separate groups. Minimum separation distance between two such groups of vessels shall be the distance from the vessel to property line in accordance as mentioned in Tables under this rule as the case may be, or thirty metres whichever is less. Each such group of vessels shall be covered under separate licence under these rules.

(4) The distances specified above may be relaxed by the Chief Controller in cases where he is of the opinion that the additional safety measures have been provided.

Explanation: The distances specified above are required to be measured from the nearest point on the periphery of the vessel.

**23. Foundations for pressure vessels**

(1) General: The materials, principles, methods and details of design and construction of foundations and supports of vessels shall comply with approved specifications, standards or codes.

(2) Ground conditions: A thorough knowledge of the ground condition shall be obtained by the person installing the vessel with particular reference to establishing an allowable bearing pressure, total and differential settlements expected, risk of floatation and possible deterioration of original conditions.

(3) Materials

(i) The choice of materials for construction shall be determined by the ground conditions, loading and detailed design constructions.

(ii) The materials may be of,

(a) brick-work masonry;

(b) re-in forced concrete; or

(c) steel plate, steel pipe or structural steel.

(4) Loading: The greatest combined effect of static and imposed loading shall be used for design as under,

(a) Static loading: weight of vessel and its contents;

(b) test loading if tested by water;

(c) wind loading;

(d) operational loading such as vibration or thermal (natural and operational);

(e) Seismic loading for foundation.

(5) Settlement: Any particular differential settlement shall be limited to prevent excessive stress in the connected pipe work and vessel shell.

(6) Vessel supports

(i) the design of supports for vessels shall follow the standard or code to which the vessel is constructed;

(ii) the spacing of vessel support shall be decided after close consideration of vessel-shell stressing and transmission of the loadings to the ground;

(iii) the design of supports for vessels shall provide flexibility to allow for movement of the vessel as a result of pressure and thermal expansion;

(iv) the vessel shall be securely anchored or weighed or provided with adequate pier height to avoid floatation due to flood water;

(v) in case of structural steel supports such supports, excluding vessel saddles or supporting feet 45 cm or less in height, shall be encased in fire-resisting materials of adequate thickness.

(7) Underground and mounded vessels: Foundation supports, and installation methodology shall conform to Schedule III.

**24. Cleanliness and restriction of unauthorised person**

(1) The area within the safety distance of the installation shall be kept free from ignitable materials, such as weeds, dry grass.

(2) The area where vessels, pumping equipment, loading and unloading facilities and indirect heated vaporisers are provided, shall be enclosed by an industrial type fence at least 2 metres high along the perimeter of the safety zone.

(3) Every fence shall have at least two means of exit and the gates of such exits shall open outwards and shall not be self-locking.

(4) A permanent notice with letters at least five centimetres in height prohibiting smoking and naked lights shall be fixed to the fence surrounding the area where flammable or oxidising gases are stored, and such notice shall be visible from outside.

**25. Earthing**

(1) All vessels used for storage of flammable compressed gases shall be electrically connected with the earth in an efficient manner.

(2) Pipelines conveying flammable liquids shall be adequately prepared for electrical continuity and connected with the earth in an efficient manner.

**26. Fire protection**

All vessels used for the storage of flammable compressed gases shall be protected against fire hazards as under,

(i) provision shall be made for an adequate supply of water and fire protection in the storage area in accordance with the provision of the rules and the regulation applicable in that area. The application of water may be by hydrants, hoses and mobile equipments, fixed monitors or by fixed spray systems which may be automatic. Control of water flow should be possible from outside any danger area. The fire water system shall be designed with medium velocity sprinklers for above ground storage vessels, filling sheds, loading or unloading area, and pump sheds having minimum spray density of 10 litre per minute per square meter for the single largest risk area and with additional requirements for hydrant points. In plants referred to in Table 4(A) of rule 22, the quantity of water available shall be sufficient for four hours of fire-fighting, and in plants referred to in Table 4(B) of rule 22, the same shall be for two hours of fire-fighting. For other installations not covered under Tables 4(A) and 4(B), the fire water storage shall be as approved by the Chief Controller;

(ii) hydrants, where provided, shall be readily accessible at all times and so spaced as to provide for the protection of all vessels;

(iii) sufficient length of fire hose shall be provided and shall be readily available. The outlet of each hose line shall be equipped with a combination jet and fog nozzle. The hoses should be maintained well and periodically inspected;

(iv) mobile equipment, fixed monitors or fixed spray systems shall be designed to discharge water at a rate sufficient to maintain an adequate film of water over the surface of the vessel and supports under fire conditions;

(v) consideration shall be given to the provision of mobile or fixed water spray systems giving suitable and effective protections for vehicle loading and unloading areas;

(vi) at least two dry chemical powder type fire extinguishers of 9 kg. capacity each shall be installed at each point of access to the installations;

(vii) In liquefied Petroleum Gas dispensing station for fuelling motor vehicles, having only underground or earth covered (mounded) liquefied petroleum gas storage vessels, two numbers seventy kilograms dry chemical type fire extinguishers shall be provided. In dispensing stations having above ground liquefied petroleum gas storage vessels, hydrants with minimum water pressure of seven kilograms per square centimetre shall be provided at convenient positions for around coverage of storage vessels and handling area, and water sprinklers with spray density of ten litres per minute per square metre shall be provided. The fire water pump shall be preferably diesel engine driven with capacity to deliver water at the rate and pressure specified above. The minimum fire water storage at the premises shall be that needed for fighting fire at least for one hour.

**27. Loading and unloading facilities**

(1) Pumps

(i) pumps may be centrifugal or positive displacement pumps;

(ii) design materials and constructions of pumps shall be suitable for the type of gas to be handled and they shall be designed for the maximum outlet pressure to which they will be subjected to in operation;

(iii) positive displacement pumps shall have a by-pass valve or other suitable protection against over pressure.

(2) Compressors

(i) the design, material and construction of compressors shall be suitable for the type of gas which they are to handle, and they shall be designed for the maximum outlet pressure to which they will be subjected to in operation;

(ii) compressors other than multi-stage compressors shall take suction from the vapour space of the vessels being filled.

(3) Transfer systems

(i) transfer systems shall be so designed that the risk of a gas of a higher vapour pressure being transferred to equipment designed for gas of a lower vapour pressure is minimised;

(ii) there shall be positive means of rapidly shutting off flow, located at a safe distance from the vessel which is being filled or emptied;

(iii) automatic alarm device to indicate the approach to maximum permissible height or automatic shut-off valves shall be used to prevent over filling.

(4) Hoses

(i) the hoses for liquid transfer shall be designed to withstand not less than four times the maximum operating pressure they will carry in service;

(ii) the hoses shall be mechanically and electrically continuous.

(5) Tank truck loading or unloading

(i) in the tank-truck loading or unloading gantry, number of bays for parking tank-trucks shall not exceed eight, and number of such gantries in a premise shall not exceed two;

(ii) centre of tank truck loading or unloading gantry shall maintain safety distances,

(a) in case of LPG bottling plants and terminals- as specified in table 4(A) or 4(B), as applicable;

(b) in case of LPG, LNG and other flammable or toxic or corrosive gas installations- 9 M from property line and as well as from storage vessel;

(c) in case of non-toxic, non-flammable gas (including cryogenic liquids) installations-4.5 M from property line. The robust crash barrier shall be provided in between storage vessel and hard stand at a distance of 2 meter (Minimum) from the storage vessel in order to protect fill point as well as pressure vessel;

(d) in case of non-toxic, non-flammable cryogenic liquid installations (water capacity of vessel not exceeding 1000 litres)–3.0 M from property line. The distance between the road tanker fill point and the storage vessel fill point shall not be less than 2 M. A robust crash barrier shall be provided in between storage vessel and hard stand in order to protect fill point as well as pressure vessel;

(e) in case of mounded installations consisting of vessel of water capacity up to 100 KL each, the centre of tank truck hardstand and fill point shall be minimum 4.5 M from the edge of the vessel and 9 M from property line or fencing. In case of vessel of water capacity exceeding 100 KL each, the centre of tank truck hardstand and fill point shall observe minimum 9 M from the edge of the vessel and 9 M from property line or fencing.

(6) Rail tank wagon loading or unloading shall be restricted to a maximum of half a rake (six hundred tonnes). If full rake handling is required, it shall be placed in two separate gantries with fifty meters distance in between them. Safety distances for rail tank wagon loading or unloading shall be as per table 4(A) under rule 22.

(7) All valves on the vessel and pipelines in the premises shall be permanently marked in a manner clearly indicating the direction of opening and closing.

**28. Transfer operations**

(1) Before transfer of gas,

(i) every vehicle shall be carefully examined at the installation to ensure that it complies in all respects with the requirements of these rules and shall be completely emptied before it is passed for filling;

(ii) a visual check shall be made of the surroundings for unusual or dangerous situations before any filling or discharging procedure is commenced;

(iii) warning notices, as necessary, shall be displayed;

(iv) the receiving vessel shall be checked to ensure that it has sufficient ullage to receive quantity of gas being transferred to it;

(v) the inter-connecting system, that is pipe work-fittings, valves or hoses, shall be checked to ensure that it is in safe working condition and that only valves and other fittings required in the transfer operations or any other operations proceeding simultaneously, are open.

(2) During transfer, the receiving vessel shall be checked to ensure that it is not being filled above its safe filling capacity or beyond its design pressure.

(3) On completion of transfer before the vehicle is allowed to leave the licensed premises, it shall be weighed over a weigh-bridge to ascertain the quantity of the compressed gas filled therein if the vehicle is filled with a liquefiable gas.

(4) When filling the vessels on vehicles with compressed gas, the following procedure shall be complied with in addition to the other requirements, namely:

(i) the place where the vehicle is parked shall be properly levelled;

(ii) the vehicle shall be prevented from accidental movement during the transfer operation. The parking brake of the vehicle shall be on and the engine shall remain stopped, except when it is necessary to drive the pump. Where necessary, wheel chock blocks shall be used;

(iii) any driving units or electrical equipment not required and not specifically designed for the transfer operation shall be stopped or isolated;

(iv) the vessel mounted on a vehicle shall be electrically bonded to the fixed installation before any flammable liquefied gas transfer operations is carried out;

(v) before a vehicle is moved, the electrical and the liquid and vapour connections shall be disconnected, care being exercised to avoid spillage. Where wheel chock blocks have been used they shall be removed. The vehicle shall be checked to ensure that it is in safe working order and the surrounding areas checked to ensure that any liquefied flammable gas that may have leaked or has to be vented has safely dispersed.

(5) For keeping attention during operations

(i) a skilled and trained person with requisite knowledge and experience shall remain in attendance during all the operations connected with the transfer and ensure that all the requirements of these rules are complied with;

(ii) if it is necessary to discontinue a vehicle loading operation temporarily, the loading hose, shall be disconnected from the vehicle for the period of such discontinuance.

(6) The person in-charge of transfer operations shall ensure that transfer operations are stopped in the event of,

(i) any leakage;

(ii) a fire occurring in the vicinity;

(iii) a severe electrical storm occurring in the vicinity in the case of an operation which involves venting of flammable gas.

**29. Dispenser for auto LPG dispensing station**

The dispenser and connected fittings used for dispensing auto LPG in motor vehicles provided in the auto LPG dispensing station shall be designed, constructed, tested and maintained in accordance with the requirement laid down in Schedule II of these rules and be of a type approved in writing by the Chief Controller.

**30. Special Provisions for filling fuel tanks of motor vehicles and unloading of tank-truck in Auto LPG dispensing station**

(1) Auto LPG shall not be filled in fuel tank of motor vehicle while the engine of the vehicle is running.

(2) During the period of unloading of Auto LPG from tank-truck to the storage vessels, operation of dispensing Auto LPG to motor vehicles shall not be carried out.

**31. Electrical apparatus and installations**

(1) No electrical wire shall pass over any storage vessel.

(2) All electrical wires installed within the safety zone of any storage vessel for the storage of flammable compressed gases shall consist of insulated cables of approved type. The cables shall be mechanically continuous throughout and effectively earthed away from the vessels.

(3) For pump rooms used for pumping flammable compressed gases,

(i) all electrical motors, distribution boards, switches, fuses, plugs, sockets and other instrumentation shall be of explosion protection construction complying with the requirements of IS/IEC 60079-1 to 11 as amended from time to time and the frames shall be effectively earthed;

(ii) all electrical fixed lamps shall be enclosed in a well glass flameproof fitting conforming to IS/IEC 60079-1 amended from time to time.

(4) All electrical portable hand lamps and other instrumentation shall be of a type approved by the Chief Controller.

(5) Vaporisers for liquefiable gases shall be indirect heating type or atmospheric heating type. The vaporizers for flammable, toxic and corrosive gases shall be of a type approved by the Chief Controller.

**32A. Classification of hazardous area for flammable gases**

(1) A hazardous area for flammable gases shall be deemed to be,

(a) a zone '0' area if inflammable gases or vapours are expected to be continuously present in the area; or

(b) a zone '1' area, if inflammable gases or vapours are expected to be continuously present in the area under normal operating conditions; or

(c) a zone '2' area, if inflammable gases or vapours are expected to be continuously present in the area only under abnormal operating conditions or failure or rupture of an equipment.

(2) If any question arises as to whether hazardous area is a zone '0' area or a zone '1' area or a zone '2' area, the decision thereon of the Chief Controller shall be final.

**32B. Extent of hazardous area**

(1) The extent of hazardous area for liquefied petroleum gas dispenser shall be as under,

(i) Entire space within the dispenser enclosure cabinet and forty-six centimeters horizontally from the exterior of enclosure cabinet and up to an elevation of one hundred and twenty-two centimeters above dispenser base and the entire pit or open space beneath the dispenser shall be zone '1'.

(ii) Upto forty-six centimeters vertically above the surrounding ground level and horizontally beyond forty-six centimetres up to six meters on all sides of the dispenser enclosure cabinet shall be zone '2'.

(2) Extent of hazardous area in storage premises of flammable gases shall be as per IS:5572 or any other relevant code accepted by the Chief Controller.

**33. Certificate of safety**

A certificate of safety in the proforma prescribed by the Chief Controller and signed by a competent person shall be furnished to the licensing authority before any vessel is used for the storage of any compressed gas or whenever any addition or alteration to the installations or foundations for the vessel is carried out.

## CHAPTER IV

## TRANSPORT

**34. Application**

The rules in this Chapter shall apply to the transport of compressed gas by vehicles.

**35. Vehicles for transport of compressed gas**

(1) Every vehicle for the transport of compressed gas shall be of a type approved, in writing, by the Chief Controller.

(2) Where approval is sought to a vehicle under sub-rule (1), three numbers of detailed vehicle mounting drawing drawn to scale and a scrutiny fee as specified in clause B of Schedule I shall be forwarded to the Chief Controller.

(3) If the Chief Controller, after receipt of the drawing under sub-rule (2) and after making such further inquiries as he deems necessary, is satisfied that the vehicle or the special safety fittings, as the case may be, meets with the requirements laid down in these rules, he shall approve the drawing and return to the applicant one copy thereof duly endorsed.

**36. Design**

(1) Every vessel used for the transportation of compressed gas shall be constructed and tested in accordance with the requirements of rule 13 and shall meet with the requirements of sub-rules (2), (3), (4), (5), (6), (7) and (8) of this rule.

(2) The design stress shall include an allowance to enable the vessel to withstand shocks normally encountered by movements on road, such as, acceleration and deceleration for a minimum of 3g. when the vessel is self-supporting, the vessel design shall provide for carrying the additional stresses normally carried by the chassis frame. Provision shall be made for distributing the localised stresses arising from attachments to the vessels.

(3) Minimum corrosion allowance and wear and tear allowance of 0.5mm in case of non-toxic non-flammable and flammable gas vessels and 1.5mm in case of toxic and corrosive gas vessels shall be added to the minimum calculated thickness arrived as per the fabrication code. In addition, minimum 10 per cent thinning allowance in case of formed heads shall also be considered.

(4) Mounting of vessels on the chassis or under-frame shall be done in such a manner as to keep the vibrations to the minimum.

(5) All attachments to the vessel shall be protected against accidental damage which may result from collision, over-turning or other operational cause.

(6) All vessels shall be designed to withstand the most severe combined stresses to which they may be subjected to by the pressure of the gas, the pumping pressures and shock loading caused by transport conditions.

(7) The loading and unloading rate of the liquefied gas from a road tanker shall be as per the designated differential pressure and flow rate of excess flow valve or internal excess flow valve as the case may be for the size and service as approved by the Chief Controller.

(8) If the cabin height is less than the height of the vessel and the fittings on top of it, a height barrier of adequate strength shall be provided all along with the width of the cabin within the height regulation of road transport authority.

**37. Protection of valves and accessories**

(1) All valves and accessories shall be safeguarded against accidental damage or interference.

(2) Valves and accessories shall be mounted and protected in such a way that risk of accidental rupture of the branch to which the valve or accessory is connected is minimised.

(3) Valves or accessories situated at the rear of a vehicle shall be protected by the rear cross member of the frame of the vehicle against damage and shall comply with sub-rule (2).

**38. Equipment**

(1) Piping, fittings, pumps and meters

(i) all piping, fittings, pumps and meters permanently mounted on the vehicle shall be designed to withstand the most severe combined stresses imposed by the following, namely:

(a) the maximum designed pressure of the vessel;

(b) the super imposed pumping pressure of the shock loading caused by road movements;

(ii) the materials used for vessel equipment shall be sufficiently ductile to withstand rough usage and accidental damage. Brittle materials such as cast iron shall not be used.

(2) Protection of piping and equipment

(i) all piping and equipment shall be adequately protected to minimise accidental damage which may be caused by rough usage, collision or over-turning;

(ii) any equipment or section of piping in which liquid may be trapped shall be protected against excessive pressure caused by thermal expansion of the contents.

(3) Marking of connections: All connections on the vehicle which require manipulation by the operator of the vehicle should be clearly marked to prevent incorrect operation. The form of this marking should correspond with the operating procedure laid down for the vehicle.

**39. Vehicle design considerations**

(1) General: The vessels shall be securely attached to the chassis of the vehicle in such a manner as to take care of the forward movement of the vessel due to sudden deceleration of the vehicle.

(2) Design safety requirements–Mechanical:

(i) the engine of the vehicle shall be of an internal combustion type;

(ii) where the fuel system is gravity-fed, a quick action cut-off-valve shall be fitted to the fuel feed pipe in an easily accessible and clearly marked position;

(iii) the engine and exhaust system together with all electrical generators, motors, batteries, switch-gears and fuses shall be efficiently screened from the vessel or the body of the vehicle by a fire-resisting shield or by enclosure within an approved fire-resisting compartment;

(iv) when the equipment referred to in clauses (i), (ii) and (iii) are mounted forward of the back of the driving cab, the cab can be considered to act as an acceptable shield, provided the back, the roof and the floor of the cab, are of fire-resisting construction for the full width of the cab, without any openings in the back or roof, and that the back extends downwards to the top of the chassis;

(v) when the cab construction does not conform to the equipments mentioned above, a separate fire resisting shield should be installed extending upwards without any openings from the top of the chassis to the top of the vessel;

(vi) in any case, where windows are provided in the shield, they should be fitted in fire-resisting framing with wired glass or other heat-resisting material and shall not be capable of being opened;

(vii) when the equipment referred to in clauses (i), (ii) and (iii) are mounted to the rear of the back of the cab, it shall be contained wholly within an approved fire-resisting compartment;

(viii) in any case where the fuel used to propel a vehicle gives off a flammable vapour at a temperature less than $65^0$ C, the fuel tank shall not be behind the shield unless the following requirements are complied with, namely:

(a) the fuel tank is protected from blows by stout steel guards or by the frames of the vehicle;

(b) the fill pipe of the fuel tank of the vehicle is provided with a cover having locking arrangement;

(c) the fuel feed apparatus placed in front of the fire-resisting shield is used to lift the contents of the fuel tank.

(ix) where a transfer pump is driven by the engine of the vehicle, provision shall be made to stop the engine from outside the cab.

(3) Design safety requirements–Electrical:

The following requirements shall be complied with in connection with the electrical and antistatic properties of the vehicle, namely:

(i) The Electrical system shall have,

(a) the battery in an easily accessible position;

(b) readily accessible cut-off switch of not less than 300 Amps rating;

(c) wiring so fixed and protected as to minimise accidental damage or undue wear.

(ii) The vessel shall be electrically continuous with the chassis.

(iii) The vehicle shall be provided with a bonding point or bonding cable.

(iv) Tyres shall be of the “anti-static” type.

(4) Design safety requirements–General:

(i) There shall be a clear space of at least 15 cm between the back of the cab and the front of the vessel.

(ii) The rear of the vessel shall be protected by a robust steel bumper and this bumper shall be,

(a) attached so that collision stresses will be transmitted to the frame work of the vehicle or, in the case of an articulated vehicle to the frame work carrying the wheels of the vessel;

(b) situated at least 7.5 cm to the rear of the rear-most part of the vessel;

(c) extended on each side of the vehicle to at least the maximum width of the vessel.

(iii) the maximum weight of the liquefied gas for which the vehicle is designed should not exceed the difference in weight between the unladen weight of the vehicle and the maximum gross weight permitted for that class of vehicle under the appropriate transport regulations.

(5) Suitable emergency kit shall be provided in each road tanker for each type of compressed gas.

**40. Marking of vehicle**

All vehicles shall be conspicuously marked on the vessel to show the product which is being carried.

**41. Fire protection**

(1) Two serviceable fire extinguishers of suitable size and type shall be provided on each vehicle, one on each side and should be accessible from outside the cab.

(2) A person, while in, or attending, any vehicle conveying flammable gas, shall not smoke or use matches or lighters.

(3) No fire, artificial light or article capable of causing fire or explosion shall be taken or carried on any vehicle carrying flammable gas.

**42. Operations**

(1) Drivers shall be carefully selected and given appropriate training in driving and safe handling of the equipment and the compressed gas carried in the vehicle.

(2) When loading or discharging of a vehicle takes place within the operator's own premises, a skilled and trained person with requisite knowledge and experience shall be present throughout the operations.

(3) When discharge is in progress, at customers premises, the driver shall remain with his vehicle in such a position so as to be able to stop the discharge immediately in an emergency.

(4) Every vehicle shall be constantly attended to by at least one person who is familiar with the rules in this Chapter:

Provided that nothing in this sub-rule shall apply to vehicles which are left in places previously approved for the purpose by the Chief Controller or Controller authorised by him.

(5) In the event of an over-night stop away from home base, prior arrangements shall be made for the safe parking of the vehicle overnight. In an emergency, a driver may seek the co-operation of the local police in finding suitable parking facilities for his vehicle.

**43. Certificate of Safety**

A certificate of safety in prescribed proforma signed by a competent person shall be furnished to the licensing authority before any vehicle is used for the transportation of any compressed gas to the effect that the vehicle meets with the provisions of the rules in this Chapter.

**44. Inspection and maintenance of vehicles**

It shall be the sole responsibility of the licensee for any vehicle to ensure that it is at all times road-worthy, and that it is in a fit condition to fill, transport and discharge its load safely.

## CHAPTER V

## LICENCES

**45. Licence for storage of compressed gas**

No person shall store any compressed gas in any vessel except under and in accordance with the conditions of a licence granted under these rules.

**46. Prior approval of specification and plans of vessels and premises proposed to be licensed**

(1) Every person desiring to obtain a licence to store any compressed gas in any vessel shall submit to the Chief Controller or Controller authorised by him,

(i) specifications and plans drawn to scale in triplicate clearly indicating,

(a) the manner in which the provisions prescribed in these rules shall be complied with;

(b) the premises proposed to be licensed, the area of which shall be distinctly coloured or otherwise marked;

(c) the surrounding area lying within 100 metres from the edge of all facilities which are proposed to be licensed; however, for major installations of flammable or toxic gases including LNG exceeding total capacity of product 50 metric tons or 100 m3 water capacity of each vessel, whichever is less, area lying within 500 metres along with Hazard and Operability (HAZOP) study and a risk analysis report prepared by a reputed agency;

(d) the position, capacity, materials of construction and ground and elevation views of all vessels, all valves and fittings, filling and discharge pumps and fire-fighting facilities where provided and all other facilities forming part of the premises proposed to be licensed;

(e) piping and instrumentation diagram for the vessels, equipments and system proposed to be installed;

(f) any other documents specified by the Chief Controller or Controller; and

(ii) a scrutiny fee as specified in clause (B) of the Schedule I

(2) If the Chief Controller or Controller authorised by him, after scrutiny of the specifications and plans and after making such inquiries as he deems fit, is satisfied that compressed gas can be stored in the premises proposed to be licensed, he shall return to the applicant one copy each of all the specifications and plans signed by him conveying his sanction which may be subject to such conditions as he may specify.

**47. No Objection Certificate**

(1) An applicant for a new licence other than the licence for storage of nontoxic, non-flammable compressed gases in pressure vessels and licence in Form LS-2, shall apply to the District Authority with two copies of site plan showing the location of the premises proposed to be licensed under these rules for a certificate to the effect that there is no objection to the applicant's receiving a licence for storage of compressed gas in pressure

vessel at the site proposed, and the District Authority shall, if he sees no objection, grant such certificate to the applicant in the format specified in sub-rule (6) of this rule who shall forward it to the Chief Controller with his application.

(2) Every certificate issued by the District Authority under sub-rule (1) above shall be accompanied by a copy of the plan of the proposed site duly endorsed by him under official seal.

(3) The Chief Controller, may refer an application not accompanied by a certificate granted under sub-rule (1) to the District Authority for his observation.

(4) If the District Authority, either on a reference being made to him or otherwise, intimates to the Chief Controller that any licence which has been applied for should not, in his opinion, be granted, such licence shall not be issued without the sanction of the Central Government.

(5) Notwithstanding anything contained in sub-rules (1) to (4) above, all licences granted or renewed under the said rules prior to the date on which the above provisions come in force, shall be deemed to have been granted or renewed under these rules.

(6) Format of no objection certificate shall be as under,

**Subject: No objection certificate under the Static and Mobile Pressure Vessels (Unfired) Rules, 2016**

No. ..... Date

With reference to your letter no……dated..... and in pursuance of said rule 47 of the Static and Mobile Pressure Vessels (Unfired) Rules, 2016 there is no objection for granting licence under the said rules to Shri/M/s……of address..... for storage of flammable/toxic/corrosive compressed gases in the premises at Survey No./Gat No./Khasra No.....,Village.....Taluka.....District .....State..... as shown in the site plan duly endorsed and enclosed herewith.

Signature of the no objection certificate issuing authority with his office seal

(District Authority)

(7) The District authority shall grant no objection certificate or convey his refusal for granting no objection certificate with reasons thereof in writing to the applicant as expeditiously as possible but not later than four months from the date of receipt of application from the applicant.

**48. Licence for transport of compressed gas**

(1) No compressed gas filled in a vessel shall be transported by a vehicle except under and in accordance with the conditions of a licence granted under these rules.

(2) Nothing in this rule shall apply to the transport of compressed gas filled in a vessel by a railway administration.

**49. Grant of licence**

(1) A licence prescribed under these rules shall be granted by the Chief Controller or Controller on payment of the fees as specified in clause (A) of the Schedule I.

(2) Every licence granted under these rules shall be subject to the conditions specified therein and shall contain all the particulars which are contained in the Form specified under these rules.

(3) The licensing authority shall issue an authenticated copy of the licence when so applied for by the licensee with a fee as specified in clause (B) of the Schedule I.

(4) When the licensing authority grants a licence in Form LS-1A, LS-1B & LS-2, after conducting inspection of the premises to ensure conformity of the premises to the provisions of the Act and these rules, such authority shall endorse the licence and from the date of such endorsement, the licence shall come into force.

(5) If the licensing authority observes on inspection, that the premises do not conform to the provision of the Act and rules and not fit for endorsement, he shall communicate to the licensee,

(i) his direction for rectification of deficiency; or

(ii) reasons for not endorsement of the licence; or

(iii) reasons for revocation of the licence, as the case may be.

**50. Application for licence**

A person intending to obtain a licence under these rules shall submit to the Chief Controller or Controller authorised by him,

(i) an application,

(a) in Form AS-1, if the application is in respect of a licence in Form-LS-1A to store compressed gas in pressure vessels and in Form LS-1B to store and dispense Auto LPG as automotive fuel;

(b) in Form AS-2, if the application is in respect of a licence in Form-LS-2 to transport compressed gas in pressure vessel by a vehicle;

(c) in Form AS-3, if the application is in respect of permission to import pressure vessel;

(ii) a certificate of safety under rule 33 or rule 43 as the case may be;

(iii) a test and inspection certificate as required under sub-rule (2) of rule 13;

(iv) four copies of the drawings for the site, layout, installation details (for static vessel) or vehicle mounting (for mobile vessel) and as-built vessel design drawing duly endorsed by the inspector;

(v) licence fee as specified in the clause (A) of the schedule I;

(vi) no objection certificate from the District Authority in respect of storage of compressed gas in pressure vessels along with the site-plan duly endorsed as per rule 47;

(vii) copy of the registration certificate of the vehicle issued under the Motor Vehicles Act, 1988 (59 of 1988) and weighment slip in respect of mobile pressure vessels for transport of compressed gas.

**51. Period for which licences may be granted or renewed**

(1) A licence in Form LS-1A or LS-1B for the storage of a compressed gas in a pressure vessel shall be granted or renewed subject to a maximum five years and shall remain in force until the 30$^{th}$ day of September of the year up to which the same is granted or renewed.

(2) A licence in Form-LS-2 for the transport of the compressed gas in a pressure vessel by a vehicle shall be granted or renewed subject to a maximum five years taken from the date of grant of licence.

(3) Notwithstanding anything contained in sub-rules (1) and (2), the Chief Controller or Controller authorised by him may, if he is satisfied that a licence is required for a specific work, may grant such licence for specific period.

**52. Power of licensing authority to alter conditions**

Notwithstanding anything contained in rule 49, the Chief Controller may omit, alter or add to any of the conditions specified in the Form of a licence.

**53. Prior approval necessary for alteration in the licensed premises**

(1) No alteration shall be carried out in the licensed premises until the plan showing such alteration has been approved in writing by the Chief Controller or Controller authorised by him.

(2) The licensee wishing to carry out any alteration in the licensed premises shall submit to the Chief Controller or Controller authorised by him,

(i) three copies of a properly drawn plan of the licensed premises showing in distinct colour or colours the proposed alteration and the reasons thereof;

(ii) piping and instrumentation diagram for the vessels, equipments and system proposed to be installed;

(iii) any other documents specified by the Chief Controller or Controller; and

(iv) a scrutiny fee as specified in clause (B) of the Schedule I.

(3) If the Chief Controller or Controller authorised by him, after scrutiny of the plan showing the proposed alteration and after making such enquiries as he deems fit, is satisfied that the proposed alteration may be carried out, he shall return to the licensee one copy of the plan signed by him and conveying his sanction subject to such condition or conditions as he may specify.

(4) The holder of a licence shall apply to the Chief Controller or Controller authorized by him for the amendment of the licence as soon as the sanctioned alteration has been carried out.

(5) Additions or alterations as approved under sub-rule 3 of this rule shall not be taken into use unless the licence is duly amended.

**54. Amendment and Transfer of licence**

(1) Amendment of licence: Any licence granted under these rules may be amended by the Chief Controller or Controller authorised by him, provided the licensee submits the following documents to him,

(i) an application duly filled in and signed in Form AS-1 or AS-2 as the case may be;

(ii) where any alteration in the licensed premises has been carried out, four copies of the properly drawn plan showing the alterations sanctioned under rule 53;

(iii) fee for amendment of a licence as specified in clause (B) of the Schedule I;

(iv) a certificate of safety, if required under rule 33 or rule 43, as the case may be;

(v) test and inspection certificate of new or modified vessel, if applicable, along with four copies of fabrication or modification drawing of such vessels duly endorsed by Inspector.

(vi) the fabricator's certificate in case of change in prime mover or running gear, as the case may be, in respect of a vehicle for transport of compressed gases.

(vii) the original valid licence sought to be amended along with the approved plan attached to it.

(2) Transfer of licence: A licence granted under these rules may be transferred by the licensing authority before expiry of licence on receipt of,

(a) an application duly filled in Form AS-1 or AS-2 as the case may be and signed by the person to whom the licence is sought to be transferred;

(b) letter from the previous licensee giving consent for the transfer of licence;

(c) the original valid licence sought to be transferred together with the approved plan attached to it;

(d) fee as specified in clause (B) of the Schedule I;

(e) no objection certificate of District Authority under rule 47, if applicable and not obtained earlier for the installation;

(f) four copies of replica of all previously approved site, layout, installation, fabrication, Piping and Instrumentation (P and I) or mounting drawings, as applicable in the name of the transferee;

(g) copy of the Registration Certificate under the Motor Vehicles Act, 1988 (59 of 1988) indicating change of ownership, in respect of mobile pressure vessel;

(h) a certificate of safety under rule 33 or rule 43 as the case may be;

**55. Renewal of licence**

(1) A licence granted under these rules may be renewed by the Chief controller or Controller authorised by him.

(2) Every licence granted in Form LS-1A, LS-1B and LS-2 under these rules, may be renewed for a maximum period of five years where there has been no contravention of the Act or the rules framed there under or of any conditions of the licence so renewed.

(3) Where a licence which has been renewed for more than one year is surrendered before its expiry, the renewal fee paid for the unexpired portion of the licence shall be refunded to the licensee, provided that no refund of renewal fee shall be made for any financial year during which the Chief Controller receives the renewed licence for surrender.

(4) Every application for renewal of the licence shall be made in Form AS-1 or AS-2, as the case may be, and shall be accompanied by the original licence, which is to be renewed and renewal fee.

(5) Every application for the renewal of a licence shall be made so as to reach the licensing authority on or before the date on which it expires, and if the application is so made, the licence shall be deemed to be in force until such date as the licensing or renewing authority renews the licence or until an intimation that the renewal of the licence is refused has been communicated to the licensee.

(6) Where the renewal of a licence is refused, the fee paid for the renewal shall be refunded to the licensee after deducting there from the proportionate fee for the period beginning from the date from which the licence was to be renewed up to the date on which renewal thereof is refused.

(7) The same fee shall be charged for the renewal of a licence for every twelve months as for the grant of such licence, if the application is received within the validity of the licence:

Provided that,

(i) if the application with accompaniments required under sub- rule (4) is not received within the time specified in sub-rule (5) but received not later than three months, the licence shall be renewed only on payment of a fee amounting to twice the fee ordinarily payable;

(ii) if such an application with accompaniments is received by the Licensing or renewing authority after three months from the date of expiry of the licence but not later than one year from the date of expiry of the licence, the licence may, without prejudice to any other action that may be taken in this behalf, be renewed on payment of late fee at the rate of one-year licence fee for every delay of three months or part thereof:

Provided further that in case of an application for the renewal of a licence for a period of more than one year at a time, the fee prescribed under the first provision, if payable shall be paid only for the first year of renewal.

(8) No licence shall be renewed if the application for renewal is received by the licensing or renewing authority after one year of the date of its expiry and in such case, the applicant has to seek fresh licence by submitting all documents again including fresh no objection certificate from District Authority, if not obtained earlier and late fee for the entire period along with prescribed licence fee.

**56. Refusal of licence**

The Chief Controller or Controller of Explosives refusing to grant, amend, renew or transfer a licence, shall communicate the reasons thereof to the applicant:

Provided that before refusing the grant, amend, transfer or renewal of licence, the holder of the licence shall be given an opportunity of being heard.

**57. Suspension and cancellation of licence**

(1) Every licence granted under these rules shall be liable to be suspended or cancelled, by an order of the licensing authority for any contravention of the provisions of the Act or these rules or of any condition contained in such licence, or by an order of the Central Government, if at any time the continuance of the licence in the hands of the licensee is deemed objectionable:

Provided that;

(i) before suspending or cancelling a licence under this rule, the holder of the licence shall be given an opportunity of being heard;

(ii) the maximum period of suspension shall not exceed three months; and

(iii) the suspension of a licence shall not debar the holder of the licence from applying for its renewal in accordance with the provisions of rule 55.

(2) Notwithstanding anything in sub-rule (1) an opportunity of being heard may not be given to the holder of a licence before his licence is suspended or cancelled in case,

(i) where the licence is suspended as an interim measure for the violation of the provisions of the Act or these rules, or of any condition contained in such licence or in his opinion such violation is likely to cause imminent danger to the public:

Provided that where a licence is so suspended, the licensing authority shall give the holder of the licence an opportunity of being heard before the order of suspension is confirmed; or

(ii) where the licence is suspended or cancelled by the Central Government, if that Government considers that in the public interest or in the interest of the security of the State, such opportunity should not be given.

(3) The Chief Controller or Controller or the Central Government suspending or cancelling a licence under sub-rule (1), shall communicate the reasons thereof to the licensee except when the licence is suspended under sub-rule (2).

**58. Procedure on expiration, suspension or cancellation of licence**

The licensee, on the expiration, suspension or cancellation of his licence shall forthwith give notice to the licensing authority and District Authority of the nature and quantity of compressed gas in his possession and shall comply with any directions which the District Authority, in consultation with the licensing authority, may give in regard to its disposal. In case of closure of a unit due to any reasons, the licensee shall notify the District Authority and the licensing authority regarding the kinds and quantities of hazardous gases stored in the premises and shall dispose off the said gas within the period and in the manner as may be specified by the District Authority, in consultation with the licensing authority, if deemed necessary by him.

**59. Appeals**

(1)

(a) An appeal against an order passed by the Controller shall lie with the Chief Controller;

(b) An appeal against an order passed by the Chief Controller shall lie with the Central Government;

(c) An appeal against an order passed by the District Authority shall lie with the authority superior to him.

(2) Every appeal shall be in writing and shall be accompanied by a copy of the order appealed against and shall be presented within sixty days from the date of the order passed.

(3) The action taken by the appellate authority shall conform to the provision of section 6F of the Act.

**60. Procedure on death or disability of licensee**

(1) If a licensee dies or becomes insolvent or is mentally incapable or is otherwise disabled, the person carrying on the business of such licensee shall not be liable to any penalty or confiscation under the Act or these rules for exercising the powers granted to the licensee during such time as may reasonably be required to allow him to make an application for a new licence in his own name for the un-expired portion of the original licence in respect of the year in which the licensee dies or becomes insolvent or mentally incapable or is otherwise disabled:

Provided that nothing in this sub-rule shall be deemed to authorise the exercise of any power under this sub-rule by any person after the expiry of the period of the licence.

(2) A fee as specified in clause (B) of Schedule I shall be charged for a new licence for the un-expired portion of the original licence granted to any person applying for it under this rule.

**61. Loss of licence**

When a licence granted under these rules is lost or accidentally destroyed, a duplicate may be granted on the submission of written request explaining the circumstances under which the

licence was lost or destroyed, along with copy of police complaint, two sets of drawings identical with those attached to the licence and on payment of a fee as specified in clause (B) of Schedule I.

**62. Display of information in licensed premises and production of licence on demand**

(1) In the licensed premises, the particulars of licence, operating instructions and emergency telephone numbers of local fire service, police and supplier of compressed gas shall be conspicuously displayed.

(2) The licensee shall produce the licence or its authenticated copy when called upon to do so by any of the officers specified in rule 70.

**63. Compliance of instruction of licensing authority**

If the licensing authority calls upon the holder of the licence by a notice in writing to execute any repairs in the licensed premises which are, in the opinion of such authority, necessary for the safety of the premises, the holder of the licence shall execute the repairs within such periods as may be specified in the notice.

**64. Procedure on reports of infringement**

Whenever any report is made to the District Authority by the Chief Controller or Controller of an infringement of the Act or of these rules, the District Authority shall take immediate action and shall inform the Chief Controller or the Controller, as the case may be, of the action taken by him on such report.

**65. Executive control over authorities**

Every authority, other than the Central Government, acting under this Chapter shall perform its duties subject to the control of the Central Government:

Provided that nothing in this rule shall be deemed to affect the powers of executive control of the Chief Controller over the officers subordinate to him.

## CHAPTER VI

## EXEMPTIONS

**66. Powers to exempt**

The Central Government may, on the recommendation of the Chief Controller, in exceptional cases, by order and for reasons to be recorded in writing, exempt storage and transportation of any compressed gas in any vessel from all or any of the provisions of these rules on such conditions, if any, as may be specified in the order.

## CHAPTER VII

## ACCIDENTS AND INQUIRIES

**67. Recording of incidents and notice of accident**

(1) The licensee shall maintain records of all incidents connected with storage, transportation or handling of compressed gases and shall produce the same to the inspecting officer on demand.

(2) The notice of an accident required to be given under sub-section (1) of section 8 of the Act shall be given forthwith,

(i) to the Chief Controller or Controller under whose jurisdiction the premises is located by fax or e-mail followed by a letter giving particulars of the occurrence within twenty-four hours;

(ii) to the District Authority; and

(iii) to the officer-in-charge of the nearest police station by the quickest means. Pending the visit of the Chief Controller or Controller or until instruction is received from the Chief Controller or Controller that he does not wish any further investigation or inquiry to be made, all wreckage and debris shall be left untouched except in so far as its removal may be necessary for the rescue of persons injured, and recovery of the bodies of any persons killed by the accident or in the case of railways, for the restoration of through communication.

**68. Inquiry into accidents**

(1) Whenever a District Magistrate, a Commissioner of Police or a Magistrate subordinate to a District Magistrate holds an inquiry under sub-section (1) of section 9 of the Act, he shall adjourn such an inquiry unless the Chief Controller or a Controller authorised by him is present to watch the proceedings or the Magistrate has received written information from the Chief Controller that he does not wish to send a representative.

(2) The Magistrate shall, at least fourteen days before holding the adjourned inquiry, send to the Chief Controller notice in writing of the time and place of holding the adjourned inquiry.

(3) Where an accident has been attended with loss of human life, the Magistrate, before the adjournment, may take evidence to identify any body and may order the internment thereof.

(4) The Chief Controller or his representative shall be at liberty at any such inquiry to examine any witness.

(5) Where evidence is given at an inquiry at which the Chief Controller or an officer nominated by him is not present, of any neglect as having caused or contributed to the explosion or accident or of any defect in or about or in connection with any installation or any vehicle appearing to the Magistrate or Jury to require a remedy, the Magistrate shall send to the Chief Controller notice in writing of the neglect or defect.

**69. Inquiry into more serious accidents**

(1) Whenever an inquiry is held under section 9A of the Act, the persons holding such inquiry shall hold the same in open court in such manner and under such conditions as they may think most effectual for ascertaining the causes and circumstances of the accident, and enabling them to make the report under this rule:

Provided that where the Central Government so directs the inquiry may be held in camera.

(2) Persons attending as witnesses before the court under sub-rule (1) shall be allowed such expenses as are paid to witnesses attending before a civil court subordinate to the High Court having jurisdiction in the place where the inquiry is held and in case of any dispute as to the amount to be allowed, the question shall be referred to the local Magistrate who, on a request being made to the court, shall ascertain and certify the proper amount of such expenses.

(3) All expenses incurred in or about in inquiry or investigation under this rule shall be deemed to be part of the expenses of the Petroleum and Explosives Safety Organisation in carrying the Act into execution.

## CHAPTER VIII

## POWERS

**70. Powers of inspection, search, seizure, detention and removal**

(1) Any of the officer specified in the first column of the Table below may exercise the powers mentioned in sub-section (1) Section 7 of the Act in the areas specified in the corresponding entry in the second column of that Table:

| Officers | Areas |
|---|---|
| 1 | 2 |
| The Chief Controller or Controller authorised by Chief Controller | The whole of India. |
| All District Magistrates | Their respective districts. |
| All Magistrates subordinate to the District Magistrate. | Their respective jurisdictions. |
| The Commissioners of Police. | Their respective jurisdictions. |
| Deputy Commissioners of Police subordinate to the Commissioners of Police. | The respective areas over which their authority extends. |
| All police officers not below the rank of a Sub Inspector. | The respective areas over which their authority extends. |

Provided that the powers of removal and destruction under clause (d) of sub-section (1) of Section 7 of the Act shall not be exercised by any Magistrate or police officer except under and in accordance with the instructions of the Chief Controller or Controller authorised by him.

(2) Every facility shall be afforded to the officers specified in sub-rule (1) to ascertain that these rules are being duly observed.

**71. Protection of action taken in good faith**

(1) No suit, prosecution or other legal proceedings shall lie against the Central Government or Chief Controller or Controller for anything which is done in good faith or intended to be done in pursuance of these rules.

(2) No suit or other legal proceeding shall lie against the Central Government or Chief Controller or Controller for any damage caused or likely to be caused by anything which is done in good faith or intended to be done in pursuance of these rules.

**72. Repeal and Savings**

(1) The Static and Mobile Pressure Vessels (Unfired) Rules, 1981 are hereby repealed.

(2) Notwithstanding such repeal,

(i) all licences granted or renewed under the said rules and all fees imposed or levied thereof shall be deemed to have been granted, renewed or imposed or levied, as the case may be, under the corresponding provision of these rules; and

(ii) all approvals given, and all powers conferred by or under any notification or rule shall, so far as they are consistent with the Act and these rules, be deemed to have been given or conferred by or under these rules.

**APPENDIX–I**

**[See rule 4(3)]**

Application seeking approval of fabrication shop for pressure vessels, vapourisers or fittings

1. Applicants name and full address with telephone no. and E-mail.

2. Whether the applicant has manufactured any unfired pressure vessel, vapouriser or fittings thereof. Yes/No

   If yes,

   (i) date from which such vessels/vapouriser/fittings were manufacture;

   (ii) for whom the vessels/vapouriser/fittings were fabricated and there approximate numbers;

   (iii) details of the vessels/vapouriser/fittings manufactured.

3. Specifications of Code proposed to be adopted for the manufacture of the vessels/vapouriser/fittings.

4. Organisational set-up with specific reference to qualifications and experience of the personnel engaged in the manufacture of vessels/vapouriser/fittings.

5. Organisational set-up of the inspecting personnel engaged by the applicant.

6. Process of manufacture of vessels/vapourizer/fittings, beginning with raw material and ending with the finished vessels/vapouriser/fittings.

7. Quality control checks or tests carried out at each stage of manufacture of vessels/vapouriser/fittings.

8.

(i) Details of the equipment installed for chemical analysis and mechanical tests.

(ii) Details of templates or gauges provided to check or test.

(iii) Steps taken to check the accuracy of testing and checking equipment and frequency of such checking.

9. Equipments available for carrying out non-destructive examination such as radiography, gamma ray, ultrasonic tests, other quality and performance tests.

10. List of machinery provided for manufacturing vessels/vapouriser/fittings.

11. Name and address of the independent inspecting authority.

12. Records and certificate of tests:

(i) Proforma of records for various tests carried out by the inspecting and certifying organisation; and

(ii) Proforma of tests and inspection certificate issued by the independent inspecting authority.

13. Whether the fabrication shop is certified under ISO or equivalent certification, (if so, documentary evidence thereof to be attached).

14. List of relevant codes, specifications and technical literature available.

Signature-----

Date: Name and designation

**APPENDIX–II A**

**[See rules 2(viii) and 2 (xxviii)]**

**QUALIFICATION AND EXPERIENCE OF INSPECTOR OR COMPETENT PERSON**

| Sl. No. | Rule under which competency is recognised | Qualification and other requirements | Experience for the purpose | Minimum facilities |
|---|---|---|---|---|
| 1. | Rules 6(1) and 13(2) | (1) Degree in chemical or Mechanical or Metallurgical or Marine Engineering from a recognised university or equivalent professional qualifications.<br>(2) Physically fit and mentally sound for | (1) A minimum experience of 10 years in design, fabrication and stage-wise inspection during fabrication of pressure vessels and equipments perating under pressure.<br>He shall be,<br>(2)<br>(a) Conversant with the relevant codes of | Standard gauges and instruments conforming to national/international standards for test and examination at every stage of fabrication. Either the Inspector shall have these or these shall be available to him. The Inspector shall be responsible for ensuring the quality and accuracy of these gauges and instrument used by him. A documented system |

| | | | | |
|---|---|---|---|---|
| | | carrying out tests and examination. | fabrication and test procedures relating to pressure vessels and their fittings.<br>(b) Conversant with the statutory requirements concerning design and safety of unfired pressure vessels. | to ensure this shall be maintained by the Inspector. |
| 2. | Rule 18, 19, 33 and 43. | (1) Degree in Chemical or Mechanical Engineering or Marine Engineering or Metallurgical Engineering or equivalent professional qualifications.<br>(2) Physically fit and mentally sound for carrying out tests and examinations | (1) A minimum experience of 10 years in:<br>(a) Design and fabrication erection, operation, maintenance and;<br>(b) testing examination and inspection of pressure vessels or equipment operating under pressure<br>(2) He shall be:<br>(a) conversant with the relevant code of practice and test procedures relating to pressure vessels;<br>(b) conversant with statutory requirements concerning safety of unfired pressure vessels installations and transport vehicles.<br>(c) conversant with non-destructive testing techniques as are applicable to pressure vessels.<br>(d) able to identify defects and arrive at a reliable conclusion with regard to the safety of pressure vessels. | Standard gauges, pumps and gadgets for hydraulic and pneumatic pressure tests, non-destructive tests, equipments for ultrasonic thickness test, ultrasonic flaw detection magnetic particle inspection and any other test that may be required by Chief Controller in specific cases. Either the Competent Person shall have these facilities, or these shall be available to him.<br>The Competent Person shall be responsible for ensuring the quality and accuracy of the gauges and equipments and the competence of any person that may be employed for performing a non-destructive test.<br>Competent person intending to carry out the inspection and testing of mobile pressure vessels meant for transportation of flammable or toxic or corrosive gases under Rule 18 and or 19 may have required facilities for carrying out degassing, inspection and testing as stipulated in Appendix IIB at his command. In case, if he does not have his own |

| | | | | |
|---|---|---|---|---|
| | | | | approved degassing station, he may enter into agreement with owner of approved degassing station to undertake degassing, periodic inspection and testing of mobile pressure vessels meant for transportation of flammable/ toxic/corrosive gases |

Note: The constituent members of an organisation shall fulfil the requirements under Column-3 individually and those under Column-4 collectively.

**APPENDIX–II B**

**[See rule 2 (xxvii)]**

**Minimum required Facilities at Gas Tanker Degassing Station**

(I) LPG, Propane and other Flammable Gases:

(1) Minimum 7,500 litre water capacity static pressure vessel to hold compressed gas temporarily covered under licence in Form LS-1A.

(2) Minimum safety distance of 30 metres around the vent stack to release the excess gas. The vent shall be at least 11 metres high and adequately supported and shall be provided with device to prevent reverse flow of the vent gas. The venting of the gases shall be kept to the bare minimum.

(3) Minimum 100 KL Water Storage Tank, connected pumps, piping and fittings, compressor etc with safety inter locks for carrying out the de-pressurising, de-gassing, purging, hydraulic test.

(4) Necessary facilities to carry out the Internal Visual Inspection, NDT and Hydraulic test as per the design code and re-commission/purge the vessel for safe re-filling of the gas for which it is licensed.

(5) Facilities to service/repair, calibrate, test and check the proper functioning of safety valves, excess flow valves, internal type excess flow valve, level gauges, pressure gauges, connected piping, valves and other fittings.

(6) Facilities for cold repair of dents and non-pressure parts like baffle plates, replacement of corroded bolts/studs, nuts, gaskets, fitments of internal excess flow valves.

(7) Levelled hard ground, lifting jacks, ramps, proper illumination for the Tanker Parking Area, flammable gas detectors, oxygen content meter, and other safety equipments.

(8) Fire-fighting facilities consisting of water monitors and sufficient numbers of DCP type fire extinguishers.

(II) Toxic and or corrosive gases:

(1) Minimum 7,500 litre water capacity static pressure vessel to hold compressed gas temporarily, if required, covered under licence in Form LS-1A.

(2) Direct venting of the gas in to the atmosphere is prohibited.

(3) Facility shall have the arrangement of dedicated water storage tanks for each type of gas, and shall be of adequate capacity to fill water in the mobile pressure vessels for dissolving the water-soluble gases and neutralisation of the water used in this process.

(4) Efficient scrubbing and neutralisation system and connected facilities for safe disposal of the contaminated water.

(5) Facilities to service/repair, calibrate, test and check the proper functioning of safety valves, excess flow valves, internal type excess flow valve, level gauges, pressure gauges, connected piping, valves and other fittings.

(6) Facilities for cold repair of dents and non-pressure parts like baffle plates, replacement of corroded bolts/studs, nuts, gaskets and fitment of internal excess flow valves.

(7) Levelled hard ground, lifting jacks, ramps, proper illumination for the Tanker Parking Area, flammable and toxic gas detectors, oxygen content meter and other safety equipments.

(8) Firefighting facilities consisting of water monitors and sufficient numbers of DCP type fire extinguishers.

The approved mobile pressure vessel degassing station shall maintain record pertaining to degassing and purging of pressure vessels and shall issue degassing and or purging certificate in the proforma prescribed by the Chief Controller and shall be generated online as and when notified by the Chief Controller.

(III) Procedure for obtaining prior approval for degassing station

(a) Mobile tankers for any flammable, toxic or corrosive gas, before being tested or examined under rules 18 or 19, shall be degassed to remove hazardous contents so as to ensure safety. Such degassing shall be carried out only at location approved by the Chief Controller either in plants or stations where such tankers are loaded or unloaded or in dedicated degassing station erected with facilities specified in this Appendix and approved by the Chief Controller;

(b) Any person intending to set up a dedicated Mobile tanker degassing station referred in clause (a), shall submit his application to the Chief Controller for obtaining prior approval along with a project report comprising of following information,

(i) introduction about his organisation's status and capability to undertake the degassing job;

(ii) particulars of the site location, its accessibility, means of protection to prevent entry of unauthorized persons and its suitability for the specific purpose;

(iii) list of all facilities proposed to be provided including civil, mechanical electrical, degassing, firefighting, pumps, compressors, communication etc;

(iv) step by step procedure to be followed for degassing and purging for the test and inspection;

(v) nature of deployment of technical manpower for supervision and execution of the job in safe manner;

(vi) four copies each of site, layout, Piping and Instrumentation (P and I), and other required drawing(s);

(vii) HAZOP study and Risk analysis report;

(viii) Three copies of layout drawing for obtaining prior approval under Form LS-1A;

(ix) NOC or consent letter of State Pollution Control Board if already obtained or same can be submitted along with the documents for grant of licence in Form LS-1A; and

(x) A scrutiny fee as specified in clause (B) of the Schedule I for prior approval under Rule 46.

**APPENDIX-III**

**[See rule 12]**

A. Application for recognition as competent person under the Static and Mobile Pressure Vessels (Unfired) Rules, 2016.

[See rules 18, 19, 33 and 43]

1. Name and full address of the organisation with telephone no. and E-mail;

2. Organisation status (proprietary firm, partnership firm, Government organisation, Public Sector Undertaking, Autonomous body, Company registered under Company Act,);

3. Purpose for which competency is sought (Specify the rules);

4. Whether the organisation has been declared as a competent person under any other status, if so, give details;

5.

(i) Set up of the organisation:

(ii) Name and qualification (of constituent members of organisation):

(iii) Experience (of constituent members of organisation with regard to fabrication, installation, maintenance in case of transport vehicles and examination and testing of pressure vessels and various fittings and in other related fields. Please refer to requirements mentioned in column 4 of Appendix IIA. (Please attach documentary evidence of the experience):

6. Particulars of equipments, gauges etc. available with the Organisation for carrying out the inspection/testing:

7. Details of the procedures followed in carrying out stage by stage inspection/test for certification under different rules:

8. Any other information:

9. Declaration:

I……hereby, on behalf of……certify the details furnished above are correct to the best of my knowledge. I undertake to,

(i) maintain the facilities is good working order and calibrated periodically;

(ii) to fulfil and abide by all the conditions stipulated in the certificate of competency and instructions issued by the Chief Controller from time to time.

Place: Signature of the Head of the organisation

Date: Name and Designation

Seal of the Institution

B. Application for recognition as an inspector coming under the purview of Static and Mobile Pressure Vessels (Unfired) Rules, 2016.

[See rules 6(1) and 13(2)]

1. Name and Full address of the organisation with telephone no. and E-mail:

2. Organisation status (proprietary firm, partnership firm, Government organisation, Public Sector Undertaking, Autonomous body, Company registered under Company Act.):

3. Whether the organisation has been declared as a competent person under any other status, if so, give details:

4.

(i) Set up of the organisation:

(ii) Name and qualification of its constituent members:

(iii) Experience of the organisation and constituent members with regard to stage-wise inspection during fabrication of pressure vessels and various fittings and in other related fields. Please refer to requirements mentioned

in column 4 in Appendix IIA. (Please attached documentary evidence of the experience):

5. Particulars of equipments, gauges etc. available with the Organisation for carrying out the inspection/Testing:

6. Details of the procedures followed in carrying out stage by stage inspection/test for certification:

7. Any other information:

8. Declaration:

I……hereby, on behalf of……certify the details furnished above are correct to the best of my knowledge. I undertake to fulfil and abide by all the conditions stipulated in the certificate of competency and instructions issued by the Chief Controller from time to time.

Place: Signature of the Head of the organisation

Date: Name and Designation

Seal of the Institution

C. Application for Grant of certificate of competency to a person for certifying storage installations or transport vehicles owned and operated by the organisation in which he is employed.

1. Name:

2. Date of birth:

3. Name of the organisation:

4. Designation:

5. Educational qualification (Copies of testimonials to be attached):

6. Particulars of professional experience (in chronological order):

| Name of the organisation | Period of service | Designation | Area of responsibilities |
|---|---|---|---|
| | | | |

7. Membership, if any, of professional bodies:

8. Details of facilities (examination, testing etc.) at his disposal:

9. Purpose for which competency certificate is sought (specify the rules):

10. Whether the applicant has been declared as a competent person under any statute (if so, give details):

11. Any other relevant information:

12. Declaration by the applicant:

I hereby declare that the information furnished above is true. I undertake,

(a) that in the event of my leaving the aforesaid organisation, I will promptly inform the Chief Controller;

(b) to fulfill and abide by all the conditions stipulated in the certificate of competency and instruction issued by the Chief Controller from time to time.

Place:

Date:

Signature of applicant

I……certify that Shri……whose particulars are furnished above, is in our employment and nominate him on behalf of the organisation for the purpose of being declared as a competent person under the rules. I also undertake that I will

(a) notify the Chief Controller in case the competent person leaves our employment;

(b) provide and maintain in good order all facilities at his disposal as mentioned above;

(c) Notify the Chief Controller any change in the facilities.

Place: Signature

Date: Name and Designation……..

Telephone No……

Telex No……

Official Seal

**SCHEDULE-I**

**(See rules 4,6,11,12,35,46,49,50,53,54,60,61)**

A. Licence Forms, Purposes, Licensing Authority and Licence Fees

| Sl. No | Form of licence | Purpose for which granted | Authority empowered to grant licence | Licence Fees |
|---|---|---|---|---|
| 1. | LS-1A | To store compressed gas in pressure vessels. | Chief Controller or Controller authorised by him. | (a) Where the total water capacity of vessels in an installation does not exceed 5,000 litres. Rs.5000. |
| | | | | (b) Where the total water capacity of vessels in an |

| | | | | |
|---|---|---|---|---|
| | | | | installation exceeds 5,000 litres. Rs.5000 litres for the first 5,000 litres and for every additional 1,000 litres or part thereof Rs.2500 subject to a maximum of Rs. 50,000. |
| 2. | LS-1B | To store and dispense auto-LPG in auto-LPG dispensing station as automotive fuel to motor vehicles. | Chief Controller or Controller authorised by him. | Same as the licence in Form LS-1A. |
| 3. | LS-2 | To transport in a pressure vessel by vehicle. | Chief Controller or Controller authorised by him. | Rs. 5000/- |

B. Fee other than licence fee

| Sl. No. | Purpose | Fees |
|---|---|---|
| 1. | Approval or renewal of shop approval to manufacture pressure vessel, vapouriser and fittings under Rule 4 (3) (i) and (ii). | 5000/- |
| 2. | Approval of design drawing of pressure vessel, vapouriser and fittings under Rule 4(3) (iii). | 2500/- |
| 3. | Import of pressure vessel under Rule 4(5). | 5000/- |
| 4. | Repairing of pressure vessel under Rule 6. | 2500/- |
| 5. | Recognition of competent person/inspector under Rule 12. | 5000/- for both |
| 6. | Approval of vehicle mounting drawing for transport of compressed gas under Rule 35(2). | 2000/- |
| 7. | Prior approval of specification and plans of vessels and premises under Rule 46. | 2000/- |

| | | |
|---|---|---|
| 8. | Issue of authenticated copy of licence under Rule 49(3). | 1000/- |
| 9. | Prior approval of alternation in the licensed premises under Rule 53(2). | 2000/- |
| 10. | Amendment of licence under Rules 54(1). | 1000/- |
| 11. | Transfer of licence under Rule 54(2). | 1000/- |
| 12. | Issue of new licence in case of death or disability of licensee under Rule 60(2). | 1000/- |
| 13. | Issue of duplicate copy of licence under Rule 61. | 1000/- |

**SCHEDULE–II**

**(See rule 29)**

Design, construction, testing and maintenance of dispenser, its pipe connections and installation of auto-LPG dispensing station

(A) Storage capacities: Maximum water capacity of individual vessel shall be limited to 20 M, number of Vessels shall not exceed two in an installation and shall be designed for a pressure of not less than 14.5 Kg/sq. cm.. Not more than two unloading of road tanker shall be undertaken at the dispensing station per day.

(B) The ALDS may be installed in the existing MS/HSD dispensing stations or in separate installations. The installation, operating procedures, inspections, maintenance, training, emergency plan and procedure for Auto LPG dispensing stations shall be prepared and enforced by the operator. The preventive maintenance schedule and periodic inspection of various equipments shall be carried out by the operator and the records shall be maintained. The safety distances between various facilities shall be as per the Table 5 of Rule 22.

(C) The Mobile Tanker unloading for ALDS shall be done using hose with automatic closing arrangement on both ends of the hose (smart hose), so that no release of liquid LPG takes place at the end of unloading. Alternatively, loading arms can be provided. The hose shall not be more than 5.5 m in length and shall conform to recognized Indian or International standard. The unloading shall be undertaken during the lean hours of morning and afternoon with each unloading process not exceeding 60 minutes. Mobile LPG Tanker shall be parked on a hard stand and shall be in drive out position while unloading the product.

(D) Venting of LPG shall not be permitted at the ALDS during unloading operation. During the periodic test under rule 19, the LPG shall be evacuated into a mobile evacuation vessel. Venting during maintenance and commissioning shall be only under supervision of an officer of the auto LPG operator. These operations shall be conducted only in the normal working hours. Venting for priming a pump shall not be permitted.

(E) Suitable provision shall be available for emergency evacuation of the LPG from the underground vessel into Mobile Evacuation Facility and for periodic inspections.

(F) Cathodic protection: The tank shall be provided with cathodic protection. The competent person engaged for certification under Rule 33 shall verify the design, oversee the installation of cathodic protection, witness the pre-commissioning and post commissioning results and based on his observations shall certify the adequacy of such cathodic protection in his certificate.

(G) Nozzles on the vessel: Each vessel shall be provided with 2 circular manholes located on top of the vessel having internal diameter 600 mm and 350 mm respectively. The nozzles should be provided for following functions,

(i) Two nozzles for installation of safety relief valves.

(ii) One nozzle for installation of mechanical level gauge of Rochester type.

(iii) One nozzle for electronic level gauge.

(iv) One nozzle for installation of level gauge for maximum level alarm or for installation of high level switch.

(v) One nozzle for installation of submersible pump or pump suction in case of above ground pump.

(vi) One nozzle for installation of arrangement for isolating well of submersible pumps.

(vii) One nozzle for liquid inlet from road tanker.

(viii) One nozzle for liquid return line from dispenser and vapour outlet line.

(ix) One nozzle for drainage of water.

(x) Arrangement for installation of pressure gauge may be provided in the vapour return line.

(H) Liquid level measurement: Auto LPG tanks should be provided with one mechanical type of level gauge i.e. Rochester gauge and another of a failsafe electronic type. The failsafe electronic gauge should be of a magneto restrictive type. The display as well as power source for the gauge should be installed in a safe area in the sales room, the interconnection between the two being through a suitable zener barrier/galvanic isolation. The maximum level indicator however should be an independent gauge or a level switch and the same should be integrated with a alarm in addition to an automatic tripping arrangement which shuts all ROV's and pumps.

(I) Fire safe valves: All valves installed in ALDS including block valves shall be of 'fire safe' type designed to meet the requirements of API 607 or equivalent in this respect. Such valve by its construction or special protection should remain tightly shut off when exposed to fire.

(J) Remote operated valves: The remote operated valves should be equipped with an open and closed position indicator and should be of fail-safe design, set to close within a maximum of 30 seconds. No manual operation should be possible other than with special tools which shall not be available with the operating personnel.

(K) Auto LPG Storage Installation: The underground Auto LPG storage area and above ground piping above it shall be surrounded by a kerb brick wall of minimum 20 cms. thickness and of 30 cms. height. This wall should extend along the entire periphery of the storage area without any break, maintaining a minimum of 3 m. distance from the edge of vertical projection of the underground vessel. Wire fencing shall be laid over this kerb wall so that the combined height of the wall and fencing is not less than 2 m. This fence should be of a sturdy metal meshwork of 50 mm max. mesh, made of wire of at least 2 mm thickness welded in a framework of 50 mm pipes. Two doors should be provided along the fence, each being located on the opposite side of the fencing. The area inside the fence shall be paved with either tiles or concrete. The end of filling pipe leading to the underground vessel should be located at a suitable point just inside the fenced area but accessible from outside in a manner that it is safe from inadvertent damage from vehicles moving outside the fenced area.

(L) Auto LPG dispenser and piping:

(i) The type of the dispenser used for dispensing liquefied petroleum gas shall conform to specification and be of a type approved by the Chief Controller.

(ii) The dispenser shall be provided with an excess flow valve, a remote operated shut-off valve and a pipe shear or other suitable provision in that order in the liquid inlet pipe.

(iii) The dispenser shall be installed on a firm foundation with provision of bollards to protect against physical damage.

(iv) A breakaway device with excess flow valves or quick action cut-off valves on both sides of the breakaway device conforming to Underwriters Laboratory, USA, specification number 567 or equivalent shall be provided on the delivery hose so as to prevent spillage of liquefied petroleum gas from both sides of the breakaway point in the event of its breakage.

(v) The dispensing nozzle at the end of the hose shall be of self-sealing type and suitable for matching with filler connection of cylinders fitted to vehicles as fuel tanks, as specified in standard or code accepted by the Chief Controller.

(vi) The hose for delivery of auto LPG by the dispenser to motor vehicles shall be suitable for auto LPG. The design pressure of the hose shall be minimum twenty-five kilograms per square centimeters with a safety factor of five and shall be tested at one and half times of the design pressure at an interval not exceeding one year. The hose shall be electrically and mechanically continuous.

(vii) The length of the hose connected to the dispenser shall not exceed five meters and fifty centimeters.

(viii) Clearly identified switches and circuit breakers shall be provided at easily accessible location not less than six meters away from the dispenser to cut-off power supply in the event of fire, accident or another emergency. The switches or

circuit breakers shall be visible from point of dispensing auto LPG to motor vehicles.

(ix) Every dispensing unit from which auto LPG introduced into the containers fitted to the motor vehicles, shall be equipped with self-sealing type fuelling nozzle from which the liquid released on disconnection shall not exceed five millimetres.

(x) All metallic auto LPG piping shall be rated for auto LPG and designed to American Standard ASME-B-31.3 with minimum design pressure of twenty-five kilograms per square centimetres with a factor of safety of four. The materials of pipe shall be low carbon or alloy-steel conforming to American Standard SA-333 grade 6, or SA-106 grade B Schedule 40 (for above ground) or Schedule 80 (for underground), or equivalent. The pipeline shall be tested at one and half times of design pressure if hydraulically tested or ten percent in excess of design pressure, if pneumatically tested. Joints of pipeline above forty millimetres diameter shall be welded or flanged. Threaded or screwed connection shall not be provided except for special fittings like excess flow valve, pump connections up to fifty millimetres diameter. Wherever threaded joints are used, a seal weld shall be provided. All threaded joints and socket weld pipe fittings shall be rated at least 3000 lb to BS 3799 or at pressure class 3000 to ASME B16.5 or equivalent. All flanged joints shall be rated at least class 300 to BS 1560: Part 2 or ASME: B:16.5 or equivalent.

(xi) Piping shall be protected against physical damage, collision or corrosion.

(xii) Entire piping system including the appurtenances shall wherever possible be constructed with welded joints and wherever necessary with flanged joints. The number of flanged joints shall be kept down to a minimum.

(xiii) Piping shall run directly as far as practicable between points with as few restrictions with elbows or bends as possible.

(xiv) Provision shall be made in piping to compensate for expansion, contraction, jarring and vibration. Flexible piping connections shall be introduced into fixed piping systems wherever necessary to compensate for vibration etc. or where a rigid connection is not practical. Flexible connection shall be short not exceeding 500 mm in length and shall be of approved metallic construction suitable for auto LPG and braided on outside with stainless steel wire. The design parameters for flexible piping connections shall be identical to other piping. Non-metallic pipe, tubing or hose shall not be used for permanent connection to storage vessels.

(xv) All gaskets shall be of flexi-metallic type.

(M) Management and Operation of Auto LPG Dispensing Stations: The company intends to operate Auto LPG dispensing station shall meet the following criteria for considering recognition by the Chief Controller, it shall;

(i) Be a registered company.

(ii) Possess requisite rating under Auto LPG Control Order.

(iii) Possess a background of operating and managing a business activity.

(iv) Have sufficient in-house specialists well conversant with,

(a) Knowledge and experience in installation of auto LPG equipments, their operations, maintenance and in training of personnel.

(b) Auto LPG regulations and the hazards associated.

(c) Codes of practice relating to setting up auto LPG stations.

(d) Number of such personnel engaged by the company shall be related to the stations proposed to be put up by the company.

(v) Have professional administration and organization with clear levels of responsibility.

(vi) Take responsibility for the professional skills of its personnel.

(vii) Have a firm arrangement with auto LPG supplier for un-interrupted supply of LPG of Auto LPG specification to the company stations.

(viii) Have a firm arrangement with installer for installation and maintenance of its stations. The period of such arrangement should be specified.

(ix) Have a well laid out policy with regard to selection and management of its dealers or franchisees.

(x) Take responsibility of operations, periodic maintenance and breakdown maintenance in the stations and enters into a legal agreement with its dealers in this respect.

(xi) Take responsibility in selection and training of Managers and operators of Auto LPG dispensing station of its franchisees/dealers and enter into a legal agreement with its dealers in this respect.

(N) Emergency Plan: Every Auto LPG dispensing station shall have a written emergency plan in place to control the hazards from serious auto LPG leakage or fire. The plan must be drawn in consultation with local authorities i.e. fire services. This plan should contain instructions for emergency shutdown of the station, warning to customers and other people in the surrounding, calls for assistance, usage of fire-fighting equipments among others. The plan shall be tested from time to time for evaluation of its adequacy and shall be updated and modified as required.

## SCHEDULE III

**[See rules 19(4), 21(9), 21(14) and 23(7)]**

## UNDERGROUND AND MOUNDED VESSELS

(Design, fabrication, installation, operation, maintenance and periodic inspections)

A. MOUNDED VESSELS INSTALLATION

The Mounded vessel installations are categorised in the following categories:

(a) Category 1: Upto 100 KL water capacity of each vessel

(b) Category 2: Above 100 KL and upto 500 KL water capacity of each vessel

(c) Category 3: Above 500 KL water capacity of each vessel

1. Design code for design and fabrication of the Vessel shall be as per BIS 2825, ASME Section VIII Div. 1 or Div. 2 or PD 5500 or any other standard accepted by the Chief Controller. A single code shall be applied for design, fabrication, inspection and testing. Specific considerations shall be given for internal pressure, internal vacuum and external loading. Design pressure shall be adequate for vapour pressure at 55 deg C plus static head. The design shall also include a minimum corrosion allowance of 1.5mm and stress relieving of complete vessel irrespective of its thickness.

2. In case of LPG, design pressure shall be 14.5 Kg/sq. cm at top of the vessel and temperature of $-27^0$C to + $55^0$C and the material selection in case of refinery installation shall be suitable for the traces of hydrogen sulphide.

3. The installation shall conform to a recognized Indian or International standard accepted by the Chief Controller. The vessels shall be placed horizontally, and the central axis of the vessels shall be parallel to one another and inter distance between the vessels, distance of boundary line of the installation shall be as per the Table 3. A road/clear area of width (See Table A of this schedule) on three sides shall be provided around the mound for moving and firefighting equipment. The facilities like pump house, compressors and firefighting equipments shall be located at a distance from the edge of the vessels as per the Table A of this schedule.

4. The mounded pressure vessels installation shall be done on concrete or compacted sand base foundation. The selection of the type of foundation shall have considerations for sufficient load bearing capacity, depending on the site conditions and the soil mechanics. In case bottom nozzle has been provided for the vessel, an access to the connection, like a tunnel opening of minimum 0.9 m X 1.2 m shall be provided. The bottom level of the vessel shall be above the top of the inspection tunnel. The bottom connection shall be an integral part of the vessel, and shall extend beyond the mound, and shall be at least 3 m from the edge of the Vessel. The bottom outlet pipe connection shall have a slope of 1.5 deg at the end of which a remote operated valve shall be provided.

5. The mound shall be of earth, sand or other non-combustible material of a thickness (as per Table A of this schedule) of the cover for the vessel. The cover material shall be free from any abrasive particles that may damage the anti-corrosive coating provided on the vessel. The mound shall provide adequate protection from the thermal radiation, and shall be sufficiently robust to remain in place in the event of jet flame impingement. The mound shall be protected from erosion, caving in from water seepage and provided with a protective hard cover or lining. The mound and the top surface of the mound shall have proper facility to drain the rain water. Reference points for

the settlement of the vessel and the foundation shall be provided and monitoring of the settlement if any shall be done on yearly basis.

6. The external surface of the vessels shall be suitably protected from corrosion by providing suitable external coatings and cathodic protection. The design shall conform to NACE RP 169 or any other standard accepted by the Chief Controller. The protected vessel shall be isolated from the unprotected structures and piping. The calculated life of the cathodic protection shall not be less than 15 years, considering coating defect of minimum 30% on vessel surface. The monitoring of the cathodic protection shall be on a yearly basis and records maintained.

7. Vessels shall be provided with fire safe remote operated valves (ROVs) at the first flange on the liquid lines and the closing time shall not exceed 30 seconds. Each vessel shall be provided with minimum two types of level indicators of which one shall be electronic with High level switch and shall indicate a remote display of the level at the fill point, one additional independent high-level switch shall be provided for the Category 3 type of the vessel, two safety relief valves (SRVs), pressure and temperature measuring instruments. All the safety fittings and instrumentation shall be provided on a dome or the manhole cover provided on the shell of the vessel. There shall be adequate size of the manhole not less than 600 mm. Category 2 and 3 types of vessel shall have at least two manholes each of size 600 mm provided on the vessel. The outlet of the SRVs may be connected to a flare system where available or vented vertically up into the atmosphere with vent pipe not less than 3 M from the top of the mound.

8. Provision shall be made for Gas leak detection system. Fire-fighting facility shall be provided with fire hydrant or monitor (See Table A of this schedule) in addition to the Water sprinklers to provide a water cover to the exposed surfaces of the vessel and pipelines. Such hydrants and monitors shall not be located within the distances specified in Table A from the exposed surface of vessel, fittings and pipelines. In addition, minimum 2 Nos. of fire extinguishers of capacity 75 Kgs. and shall be placed in an accessible position to operate.

9. The mounded Vessels installation shall be inspected and certified by an inspector at every important stage of construction, including the design and fabrication of the vessel, foundation, mound covering, cathodic protection, NDT and hydraulic testing of vessels and piping and final certification of safety under Rule 33.

10. The vessel shall be subjected to internal inspection once in 5 years under Rule 19 and shall include the Non-Destructive Tests comprising of ultrasonic thickness measurement check evenly spread over the entire inner surface including both dish ends and the openings, 100% wet fluorescent magnetic particle test of all weld joints, ultrasonic flaw detection of welds not less than

25% of weld seams including all the T–joints of middle circumferential seams and both dish ends weld seams & nozzle joints, liquid penetrant inspection of all the fillet welds, nozzle joints, hardness test randomly on circumferential and longitudinal welds including parent metal and nozzle welds from inside, heat affected zone and the weld beads on all the plates and joints. Alternatively, other established NDT techniques such as acoustic emission testing may be used with prior approval of Chief Controller. The vessel shall be tested pneumatically at a pressure of not more than the design pressure held for 30 minutes.

11. The vessels shall be subject to hydraulic test pressure as per the design code in addition to the above non-destructive tests once in 10 years, or when subjected to any repairs involving hot work. Settlement of the vessel, if any, shall be measured during the first water fill.

12. The safety relief valves shall be inspected and tested under Rule 18 once in a year and the excess flow valves and the remote operated valves shall be inspected and tested once in 5 years during the periodic test under Rule

**TABLE A**

**Categories for Above Ground Covered with Earth (Mounded) Vessel**

| Category No | Water Capacity of each vessel (KL) | Clear Width around Mound (M) | Distance of facilities such as pump room, vapouriser etc. from the edge of the vessel (M) | Minimum thickness of the earth cover (M) | Independent high-level gauges requirement | Minimum numbers and location of Fire Hydrant/Monitor | Manhole Of minimum sizes 600 mm |
|---|---|---|---|---|---|---|---|
| 1. | Upto 100 KL | 3 | 4.5 | 0.5 | No | 1 No. 15 M | 1 no. |
| 2. | Above 100 KL-Upto 500KL | 3.5 | 9 | 0.7 | Yes | 2 Nos. 15 M | 2 nos. |
| 3. | Above 500 KL | 3.5 | 15 | 0.7 | Yes | As per OISD I50 | 2 nos. |

B. UNDERGROUND PRESSURE VESSEL INSTALLATION FOR INDUSTRIAL USE AND AUTO LPG DISPENSING STATIONS (ALDS)

1. Design code for design and fabrication of the vessel shall be as per BIS-2825, ASME Section VIII Div.1 or Div. 2 or PD 5500 or any other standard accepted by the Chief Controller. A single code shall be applied for design, fabrication, and inspection and testing. Specific considerations shall be given for internal pressure and external

loading. Design pressure shall be adequate for vapour pressure at 55 deg C plus static head.

2. The design shall also include a corrosion allowance of 1.5mm and stress relieving of complete vessel irrespective of its thickness.

3. The underground vessels shall be placed within a concrete or brick masonry pit with a distance of 1 mtr between the walls of the pit and the vessel and inter distance between the vessels. Soil cover of at least 500 mm shall be provided over the top surface of the vessel. The vessels shall be installed on a firm RCC foundation and anchored adequately to prevent the floatation of the vessel due to up-lift force of buoyancy in case of a worst scenario of no load of the product and overburden. The designer/fabricator of the vessel shall furnish for prior approval in addition to mechanical design documents and drawings, the civil design drawings and documents and calculations duly vetted by an inspection agency to substantiate that the foundation, securing and anchoring arrangements of the vessel is designed to maximum loading as well as to prevent floatation of the tank considering worst scenario of no load of product and overburden.

4. The external surface of the Vessels shall be suitably protected from corrosion by providing external coatings and cathodic protection. The design shall conform to NACE RP 169 or any other standard acceptable to Chief Controller and shall consider negative cathodic potential of not more than (-) 850 mV and not less than (-) 1200 mV between the vessel surface and the electrolyte, the potential being measured with reference standard copper/copper sulphate reference cell. A minimum polarized shift of (-) 100 milli volts shall be maintained between the native state of the vessel and cathodically protected vessel. The protected vessel shall be isolated from the unprotected structures and piping. The calculated life of the cathodic protection shall not be less than 15 years, considering coating defect of minimum 30% on vessel surface. The monitoring of the cathodic protection shall be done on a yearly basis and records maintained

5. The underground vessels installation shall be undertaken by the recognized installers and inspected and certified by an inspector at every important stage of construction, including the design and fabrication of the vessel, foundation, mound covering, cathodic protection, NDT and hydraulic testing of vessels and piping and final certification of safety under Rule 33.

6. Each storage vessel shall have at least two safety relief valves, two independent level indicating devices of which one shall be electronic with High level switch and shall indicate a remote display of the level at the fill point, suitable arrangement for water draining etc. remote operated valves (ROVs) shall be provided on all liquid and vapour lines connected to the storage vessel that is, filling, discharge, pump by pass and vapour return lines except those of safety relief valves and drain lines and instruments with trappings and those not exceeding 3 mm for liquid and 8 mm for vapour. ROVs shall be operable from LPG unloading area/sales room/control panel and the dispenser operating area. Additional isolation valves

shall be provided at shortest distance from ROVs. The ROVs shall have closing time of not more than 30 seconds.

7. Excess flow check valve (EFCV) shall be provided on all the liquid lines (above 3 mm) and vapour lines (above 8 mm) except those of safety relief valves, drain lines and instruments. Closing flow rate of EFCV shall not be more than 20% of the rated flow of the line.

8. Fill point shall be provided with non-return valve and quick shut off isolation valve.

9. Proper arrangement shall be made for earthing and bonding of the road tanker.

10. Vent pipes shall have 3 M height and 6 M away from source of ignition.

11. ALDS with underground and mounded LPG storage vessels shall have two 75 Kg and two 9 Kg DCP fire extinguishers. At ALDS with above ground LPG Vessels, hydrants with minimum water pressure of 7 Kg/sq. cm. shall be provided at convenient location for all round coverage of the storage vessels and handling area, and water sprinklers with spray density of 10 lpm. The fire water shall be preferably diesel driven with capacity to deliver water at rate and pressure specified above. The minimum fire water storage at the premises shall be that needed for fighting fire at least for one hour.

12. The vessel shall be subjected to internal inspection once in 5 years, and shall include the Non-Destructive Tests comprising of ultrasonic thickness measurement check evenly spread over the entire inner surface and the openings, 100% wet fluorescent magnetic particle test of all weld joints, ultrasonic flaw detection of all the T–joints, Liquid Penetrant Inspection of all the fillet welds, nozzle joints. The vessel shall be tested pneumatically at a pressure of 1.1 times the design pressure. The pressure shall be held for 30 minutes.

13. The vessels shall be subjected to hydraulic test pressure as per the design code in addition to the above non-destructive tests once in 10 years, or when subject to any repairs involving hot work.

14. The safety relief valves shall be inspected and tested under Rule 18 once in a year and the excess flow valves and the remote operated valves shall be inspected and tested once in 5 years during the period test under Rule 19.

15. The periodic testing under Rule 19 to be conducted for a multi-vessel installation shall be so conducted that both the vessels are tested simultaneously.

16. The underground vessels or aboveground vessels covered by earth mound shall,

    (i) have the discharge level of the safety relief valves at least 2 meters above the top surface of the vessel, but in any case, not less than 3 meters from the ground level;

    (ii) be fitted with the necessary piping, fittings, valves and other mounting on top of vessel in such a manner that they can be operated and maintained without disturbing the earth cover. In case of above ground vessel with earth

cover (mound), liquid outlet pipe at the bottom may be allowed provided the control valve and emergency valve of this line is just outside the earth cover for the purpose of operation and maintenance from outside.

## SCHEDULE IV

**[See Rule 21 (15)]**

**LNG storage, Transportation and Handling**

These provisions shall apply to the following -

(A) The requirements of the design, fabrication and installation and commissioning of LNG storage facility using cryogenic vacuum insulated containers of double wall constructed in accordance with approved pressure vessel codes.

(B) The requirements of the road transportation of LNG in a cryogenic double walled vacuum insulated pressure vessel for the safe transportation and handling.

(C) The requirements for safe vaporization, transfer and handling.

(D) Training of personnel handling the above equipments and facilities.

### SECTION 1

### STORAGE INSTALLATIONS

A. INSTALLATION DESIGN

1.

(a) For LNG cryogenic pressure vessels storage installation, the minimum safety distances between the vessel and to the nearest building or line of adjoining property shall be in accordance with the distances specified in Table 3 under rule 22 of these rules. The maximum aggregate capacity of each such LNG installation shall not exceed 1060 $m^3$.

(b) For non-pressurized LNG storage installation, the minimum safety distances specified in NFPA 59A, as amended from time to time, may be followed.

2. The LNG installation shall be designed to withstand the following without loss of structural or functional integrity,

(a) The direct effect of wind forces;

(b) Loading due to seismic effect;

(c) Erosive action from a spill;

(d) Effect of the temperature, any thermal gradient, and any other anticipated degradation resulting from sudden or localised contact with LNG.

3. The structural members of the impoundment system must be designed and constructed to prevent impairment of the impoundments reliability and structural integrity as a result of the following,

i) Imposed loading from full hydrostatic head of impounded LNG;

ii) Hydro dynamic action from injected material.

4. Impoundment or dyke areas must be designed so that all areas drain completely to prevent water collection. Drainage pumps and piping must be provided to remove water from collecting in the impoundment area. Where automatically controlled drainage pumps are used they shall be provided with cut off devices that prevent their operation when exposed to LNG temperature.

5. The impounding system for LNG storage vessel must have a minimum volumetric liquid capacity of,

   (a) Maximum liquid capacity of vessel for an impoundment serving a single vessel;

   (b) 100% of the largest vessel's maximum liquid capacity.

6. The height of the impoundment wall shall be adequate to contain spillage of any LNG. A minimum height of 1 m. is recommended for the impoundment/dyke wall.

7. No other flammable liquid or storage vessel shall be located within an LNG impounding area.

8. A clear space of at least 0.9 mtrs. shall be provided for access to all isolation valves serving multiple vessels. The isolation valve of LNG tank piping should be as close to outer vessel as possible.

9. LNG vessels, cold boxes, piping and pipe supports, and other cryogenic apparatus installed within dyke shall be designed and constructed in a manner to prevent damage to these structures and equipments due to freezing or frost heaving in the soil.

10. Proper lighting arrangement shall be done for facilities transferring LNG during night.

11. Electrical grounding and bonding shall be provided.

12. Lightning protection shall not be required on LNG storage containers except that lightning protection ground rods shall be provided for tanks supported on nonconductive foundations.

B. LNG STORAGE VESSEL: General design requirements

(a) Foundation

1. LNG vessels foundations shall be designed by a qualified engineer and constructed in accordance with recognized structural engineering practices. Prior to the start of design and construction of the foundation, a subsurface investigation shall be conducted by a qualified soil engineer to determine the stratigraphy and physical properties of the soil underlying the site.

2. The design of saddles and legs for the LNG vessel shall include erection load, wind loads and thermal loads.

3. Foundation and support shall have a fire resistance rating of not less than two hrs.

4. LNG vessels installed in areas subject to flooding shall be secured to prevent release of LNG or floatation of the vessel in the event of a flood.

(b) Vessel Design

1. The vessel meant for storage of LNG including piping between inner and outer vessel shall be designed in accordance with ASME Section VIII Div. 1 or Div. 2/EN13458/ASME: B.31.3, process piping or equivalent code acceptable to Chief Controller.

2. The inner vessel shall be designed for the most critical combination of loading resulting from internal pressure and liquid heads. The inner vessel supports system shall be designed for shipping, seismic, and operating loads.

3. The outer vessel shall be equipped with a relief or other device to release internal pressure and shall have discharge area of at least 0.0034 $cm^2$/kg of the water capacity of the inner vessel but not exceeding 2000 cm and have pressure setting not exceeding 25psi.

4. Thermal barriers shall be provided to prevent outer tank from falling below its design temperature.

5. Those parts of LNG vessels which come in contact with LNG and all materials used in contact with LNG or cold LNG vapour shall be physically and chemically compatible with LNG and intended for service at –162C.

6. All piping that is a part of LNG vessel including all piping internal to the container, within void space, and external piping connected to the vessel up to the first circumferential external joint of the piping shall be in accordance with ASME Boiler and Pressure Vessel Code, Section VIII or ASME B 31.3 or equivalent.

7. LNG vessels shall be designed to accommodate both top and bottom filling unless other positive means are provided to prevent stratification.

8. Any portion of the outer surface area of an LNG vessel that could accidentally be exposed to low temperatures resulting from the leakage of LNG or cold vapour from flanges, valves etc. shall be intended for such temperatures or protected from the effects of such exposure.

9. Seismic loads shall be considered in the design of the LNG vessel support systems.

C. FITMENTS

1. Each LNG double walled vessel shall have at least 2 Nos. of safety relief valves capable of achieving the required relief capacity on standalone basis and shall be sized to relieve the flow capacity determined for the largest single contingency or any reasonable and probable combination of contingencies and shall include

conditions resulting from operational upset, vapour displacement and flash vaporization.

2. Relief devices shall be vented directly to the atmosphere. Each safety relief valve for LNG vessel shall be able to be isolated from the vessel for maintenance or other purposes by means of a manual full opening stop valve.

3. Safety relief valve shall be designed and installed to prevent any accumulation of water, or other foreign matter at its end.

4. The minimum pressure relieving capacity in kg/hr shall not be less than 3% of the full tank contents in 24 hrs.

5. All liquid connections to the LNG vessel except relief valve and instrumentation connection shall be equipped with automatic fail-safe product retention valves.

6. The automatic shut off valves shall be designed to close on occurrence of any of the following conditions:

   (i) Fire detection;

   (ii) Uncontrolled flow of LNG from vessel;

   (iii) Manual operation from a local and remote location.

7. Such of the automatic shutoff valves that require excessive time to operate during emergency i.e. sizes exceeding 200 mm shall be pneumatically operated and also have means of manual operation.

8. All LNG vessels shall have a device that prevents the vessel from becoming liquid full or from covering the inlet of the relief valve with liquid when the pressure in the vessel reaches the set pressure of relieving device under all conditions.

9. Every LNG vessel may be provided with one independent high liquid level alarm which may be part of the liquid level gauging devices. However, the high liquid level flow cut-off device shall not be considered as a substitute for the alarm.

10. Every LNG vessel shall be equipped with at least one liquid level gauging device. The devices shall be designed and installed so that they can be replaced without taking the tank out of operation.

11. Each LNG vessel shall be equipped with a high liquid level flow cut-off device.

12. Each LNG vessel shall be equipped with pressure gauge connected to the vessel at a point above the maximum intended liquid level.

13. Instrumentation for storage and vaporization facilities shall be so designed so that if a power or instrument air failure occurs, the system will proceed to a failsafe condition and maintain that condition until the operator takes appropriate action to reactivate or secure the system.

D. EQUIPMENT

1. Pumps and compressors employed in LNG source shall be provided with a pressure relieving device on the discharge to limit the pressure to the maximum safe working pressure of the casing and downstream piping and equipment.

2. Each pump shall be provided with adequate vent, relief valve, or both that will prevent over-pressuring the pump case during the maximum possible rate of cool down.

3. The discharge valve of each vaporizer and the piping components and relief valves installed upstream of each vaporizer discharge valve shall be designed for operation at LNG temperatures.

4. Two inlet valves shall be provided to isolate an idle manifolded vaporizer to prevent leakage of LNG into the vaporizer. A safe means of disposing of the LNG or gas that can accumulate between the valves shall be provided in case the vaporisers are of size having inlets more than 50 mm diameter.

5.

   (i) The ambient air vaporizers should be installed inside the containment area.

   (ii) Where the heated vaporizer is located 50 ft (15 m) or more from the heat source, the remote shutoff location shall be at least 50 ft (15 m) from the vaporizer.

   (iii) Where the heated vaporizer is located less than 50 ft (15 m) from the heat source, it shall have an automatic shut off valve in the LNG liquid line located at least 10 ft (3 m) from the vaporizer and shall close when either of the following occurs,

      (1) Loss of line pressure (excess flow);

      (2) The occurrence of a fire is detected by an instrument designed for the purpose and located to detect a fire in the covered area;

      (3) Low temperature in the vaporizer.

   (iv) Any ambient vaporizer or a heated vaporizer installed within 50 ft (15 m) of an LNG container shall be equipped with an automatic shutoff valve in the LNG liquid line,

      (a) The automatic shutoff valve shall be located at least 10 ft (3 m) from the ambient or heated vaporizer and shall close in either of the following situations,

         (1) Loss of line pressure (excess flow);

         (2) Abnormal temperature sensed in the immediate vicinity of the vaporiser (fire);

         (3) Low temperature in the vaporizer discharge line.

(b) If the facility is attended, manual operation of the automatic shutoff valve shall be from a point atleast 50 ft (15 m) from the vaporizer, in addition to the requirement as specified above in (a).

6. A distance of minimum 1 meter shall be maintained between vaporizers.

7. Vaporisers shall be designed, fabricated and inspected as per the requirements of ASME Boiler and Pressure Vessel Code, Section VIII Division 1. or any other equivalent acceptable code to Chief Controller.

8. Manifolded vaporisers shall be provided with both inlet and discharge block valves for each set of vaporizers.

9. Any ambient vaporiser installed within 15 mtrs. of the LNG vessel shall be equipped with an automatic shutoff valve in the liquid line. This valve shall be located minimum at least 3 mtrs. from the vaporisers and shall close when loss of line pressure occurs, or abnormal temperature is sensed in the immediate vicinity of the vaporizer or when low temperature in the vaporizer discharge line occurs.

10. Each set of vaporisers shall be provided with a safety relief valve(s) sized in accordance with the following requirements:

(a) Ambient vaporizers–relief valve capacity shall allow discharge equal or greater than 150% of the rated vaporizer natural gas flow capacity without allowing the pressure to rise 10% above the vaporizer maximum allowable working pressure.

(b) Relief valves on heated vaporizers–as above, however it shall be located such that they are not subjected to temperatures exceeding $60^0$C during normal operation.

11. Automation shall be provided to prevent the discharge of either LNG or vaporizer gas into a distribution system at the temperature either above or below the design temperature of the send out system.

12. Vaporizers shall be provided with outlet temperature monitors.

E. PIPING SYSTEM

1. All piping system and components shall be designed,

(a) To accommodate the effects of thermal cycling fatigue to which the systems will be subjected.

(b) Provide for expansion and contraction of piping and piping joints due to temperature changes.

2. Piping material including gaskets and thread compounds shall be compatible throughout the range of temperature to which they are subjected.

3. The valves provided in the installation shall be of extended bonnet type with packing seals in a position that prevents leakage or malfunction due to freezing.

4. Shutoff valves shall be provided for all tank connections except connections for liquid level alarms and connections that are blind flanged or plugged.

5. All the piping section between the two valves where the liquid may be trapped shall have the thermal relief valve.

6. Aluminum shall be used only downstream of a product retention valve in vaporizer service.

F. TRANSFER OF LNG

1. Isolation valves shall be installed so that each transfer system can be isolated at its extremities. Where power-operated isolation valves are installed, an analysis shall be made to determine the closure time so that it does not produce a hydraulic shock capable of causing line or equipment failure.

2. Adequate check valves shall be provided to prevent backflow and shall be located as close as practical to the point of connection to any system from which backflow might occur.

G. PUMP AND COMPRESSOR CONTROL

In addition to a locally mounted device for shutdown of the pump or compressor drive, a readily accessible, remotely located device shall be provided at least 7.5 mtrs away from the equipment to shut down the pump in an emergency.

H. TANK VEHICLE UNLOADING FACILITIES

1. The tank vehicle unloading area shall be of sufficient size to accommodate the vehicles without excessive movement or turning.

2. Transfer piping, pumps, and compressors shall be located or protected by barriers so that they are safe from damage by vehicle movements.

3. Isolation valves and bleed connections shall be provided at the unloading manifold for both liquid and vapour return lines so that hoses and arms can be blocked off, drained of liquid, and depressurized before disconnecting. Bleeds or vents shall discharge in a safe area.

4. The hose connecting point and center of tanker hard stand shall maintain a minimum of 9 mtr from the protected boundary.

I. EMERGENCY SHUT DOWN SYSTEM (ESD System)

1. Each LNG facility shall incorporate an ESD system that when operated isolates or shuts off sources of LNG and shuts down equipment that add or sustain an emergency if continued to operate.

2. The ESD system shall be of a failsafe design and shall be installed, located, or protected from becoming inoperative during an emergency or failure at the normal control system.

3. Initiation of the ESD system shall be manual, automatic, or both manual and automatic. Manual actuators shall be located in an area accessible in an emergency

and at least 15 mtrs. away from the equipment they serve, and shall be distinctly marked with their designated function.

J. FIRE PROTECTION FACILITIES

1. Each LNG storage facility shall be provided with continuously monitored low-temperature sensors or flammable gas detectors, which must activate visual and audible alarms at the plant site and at an constantly attended location if the facility is not attended continuously.

2. Flammable gas detection system shall activate an audible and a visual alarm at level not no higher than 25% of the LEL of the gas being monitored.

3. Fire detectors shall activate an alarm at the plant site and at a constantly attended location if the plant site is not attended continuously. If determined by an evaluation that it is necessary, then fire detectors shall be permitted to activate the ESD system.

4. A fire water supply and delivery system must be provided, unless the fire protection evaluation indicates that the fire water is unnecessary or impractical.

5. Portable or wheeled fire extinguishers, shall be made available at strategic locations. At least 4 such extinguishers of 10 kg. capacity each shall be provided.

K. PERSONAL PROTECTION

Fire extinguishers provided in the LNG installations shall be based on high expansion foam and dry chemical powder. Every person operating the equipment in the LNG installation should be equipped with under mentioned personal protective equipments,

(i) Suitable goggles for protection of eyes from LNG spray.

(ii) Hand gloves.

(iii) Protective apron.

## SECTION 2

## ROAD TRANSPORTATION

A. Design-General Requirements

The safety relief valves provided on the inner vessel of the LNG transport tank shall be sized to meet most stringent condition of simultaneous occurrence of loss of vacuum and external fire. The combined capacity of the safety valves shall be sufficient to limit the pressure in the vessel to the test pressure,

(1) The transport vessel must be designed and constructed as per the ASME Boiler & pressure vessel code, EN13530 or equivalent code approved by Chief Controller and also to meet the requirements of ISO 20421. The design temperature of the vessel, piping and valves shall be such that it is suitable for requirement sustaining cold shock caused by a loading of liquid Nitrogen into the vessel during its testing and commissioning.

(2) Each vessel must have adequate insulation that will prevent the vessel pressure from exciting the relief valve set pressure within the specified holding time when the vessel is loaded with LNG at the design condition of,

a) specified temperature and pressure of the LNG;

b) the exposure of the vessel to the average ambient temperature of $40^0$C.

(3) The outer vessel/jacket of the cryogenic vessel for transportation of LNG must be made of no other material other than steel.

(4) No aluminum valve or fitting external to the wetted outer vessel must be installed on LNG transportation vessels. Each transportation vessel must consist of a suitably supported welded inner vessel enclosed within an outer shell with vacuum insulation between the two.

B. Structural Integrity

(1) The static design and construction of each vessel used for transportation of LNG must be made in accordance with section VIII, Div. 1 or Div. 2 of ASME Boiler and Pressure Vessel Code, EN 13530 or any other code approved by Chief Controller. The vessel design must include calculation of stress due to design pressure, the weight of lading, the weight of structure supported by the vessel wall, and the effect of the temperature gradients resulting from lading and ambient temperature extremes.

(2) In order to account for stresses due to impact in an accident, the design calculations of the vessel shell and heads must include the load resulting from the design pressure in combination with the dynamic pressure resulting from a longitudinal deceleration of 2g. For this loading condition the stress value used may not exceed the lesser of the yield strength or 75% of the Y.S. of the material of construction.

(3) The fittings and accessories mounted on the vessel shall be protected in such a way that damage caused by overturning cannot impair operational integrity. This protection may take the form of cylindrical profile of the vessel, of strengthening rings, protective canopies or transverse or longitudinal members so shaped that effective protection is given.

(4) The welding of the appurtenances to the vessel wall must be made of attachment of the mounting pad so that there will be no adverse effect upon the loading retention integrity of the vessel.

C. Pressure Relief Devices, Piping, Valves and Fittings

(1) The burst pressure of all piping, pipe fittings, hoses and other pressure parts, except for pump seals and pressure relief devices must be at least 4 times the design pressure of the vessels.

(2) If a threaded pipe is used, the pipe and fitting must be Schedule 80 or heavier.

(3) Each hose coupling must be designed for a pressure of at least 120% of the hose design pressure and there shall be no leakage when connected.

(4) Piping must be protected from damage due to thermal expansion and contraction, jarring and vibration. Slip joints shall not be used.

(5) Each valve must be suitable for the vessel design pressure at the vessel design service temperature.

(6) All fittings must be rated for the maximum vessel pressure and suitable for the coldest temperature to which they will be subjected in actual service.

(7) When a pressure building coil is used on the vessel, the vapour connection to that coil must be provided with a valve or check valve as close to the vessel shell as practicable from the vessel in case of damage to the coil. The liquid connection to the coil must also be provided with a valve.

(8) Each vessel shall be rated for its holding time, the holding time being the time as determined by testing that will elapse from loading until the pressure of the contents, under equilibrium conditions reaches the level of the lowest pressure relief valve setting.

(9) All the discharge lines of relief valves, vent valve, bleed valves etc should be connected to a vent stack which should vent at a safe height.

(10) Bursting discs should not be used on the LNG transport vessels.

(11) The outer vessel shall be protected by any accidental accumulation of pressure in the annular space by using a relief plate/plug or a bursting disc. The relief device shall function at a pressure not exceeding the internal design pressure of the outer tank, the external design pressure of the inner tank or 25 psi whichever is less.

D. Accident damage protection

(1) All valves, fittings, pressure relief devices and other accessories to the vessels, which are not isolated from the vessel by closed intervening shut off valves or check valves must be installed within the motor vehicle framework or within a suitable collision resistant guard or housing and appropriate ventilation must be provided. Each pressure relief device must be protected so that in the event of the upset of the vehicle onto a hard surface, the device's opening will not be prevented, and its discharge will not be restricted. The threaded end connection safety valves are preferred in stainless steel body construction.

(2) Each protective device or housing and its attachment to the vehicle structure must be designed to withstand static loading in any direction that it may be loaded as a result of front, rear, side or sideswipe collision or the overturn of the vehicle All the valves of tank shall be at rear inside on operation box (cabinet) of suitable size and does not project out of tank diameter. The thickness of cabinet shall be 3 mm minimum.

E. Rear End Protection

Rear end vessel protections devices must:

(1) Consist of at least one rear bumper designed to protect the transport vessel and piping in the event of a rear end collision. The rear end vessel protection device design must transmit the force of the collision directly to the chassis of the vehicle. The rear end vessel protection device and its attachments to the chassis must be designed to withstand a load equal to twice the weight of the loaded cargo vessel and attachments, using a safety factor of four based on the tensile strength of the materials used with such load being applied horizontally and parallel to the major axis of the transport vessel.

(2) Every part of the loaded transport vessel and any associated valve, pipe, enclosure or protected fitting or structure must be at least 35.5 cm. above ground level.

F. Discharge control devices

(1) Each liquid filling and liquid discharge line must be provided with a shut off valve located as close to the vessel as practicable. Unless this valve is manually operable at the valve, the line must also have a manual shut off valve.

(2) Each liquid filling and liquid discharge line must be provided with an on vehicle remotely controlled self-closing shutoff valve.

(3) Each control valve must be of fail-safe design and spring-based.

(4) Each remotely controlled shut off valve must be provided with on vehicle remote means of automatic closure, both mechanical and thermal.

(5) Each remotely controlled shut off valve must be provided with on-vehicle remote means automatic closure, both mechanical and thermal. One means may be used to close more than one remotely controlled valve. Remote means of automatic closure must be installed at the ends of the tanker farthest away from the loading/unloading connection area.

G. Shear Section

Unless the valve is located in a rear cabinet forward of and protected by the bumper, the design and installation of each valve, damage to which could result in loss of liquid or vapour must incorporate a shear section or breakage groove adjacent to and outboard of the valve. The shear section or breakage groove must yield or break under strain without damage to the valve that would allow the loss of liquid or vapour.

H. Supports and Anchoring

In case, the transport tanker vehicle is such designed and constructed that the tank is not wholly supported by the vehicle frame, the transport vessel shall be supported by external cradles or load rings. The design calculations for the supports and load bearing vessel and the support attachments must include beam stress, shear stress, torsion stress, bending moment and acceleration stress for the loaded vehicle as a unit, using a safety factor of four based on the tensile strength of the material and static loading that uses the weight of the transport vessel and its attachments when filled to the design

weight of the loading. Minimum static loadings must be maximum of the following individually,

(i) Vertically downward of two (2).

(ii) Vertically upward of one and half (1½).

(iii) Longitudinally of one and half (1½). And

(iv) Laterally of one and half (1½).

I. Gauging devices

(a) Liquid level gauging devices: The vessel shall have one liquid level device that provides a continuous level indication ranging from full to empty and that is maintainable or replaceable without taking the vessel out of service

(b) Pressure gauges: Each vessel shall be equipped with a pressure gauge connected to the vessel at a point above the maximum liquid level that has a permanent mark indicating the maximum allowable working pressure of the tanker. The pressure gauge shall be housed in a canopy of the tanker.

**SECTION 3**

A. Operation, Maintenance and Training

LNG installation shall provide for written operating, maintenance and training procedures. Such procedures shall be drawn based on experience, knowledge of similar facilities.

B. Basic requirements: Every installation shall meet the following requirements

(1) Have written procedures covering operation, maintenance and training.

(2) Keep up-to-date drawings of plant equipments.

(3) Have written emergency plan as part of the operations manual.

(4) Shall be in liaison with local authorities like Police, Fire Department, Health Authorities and keep them informed about emergency plans and their role in emergency situations.

(5) Have documents wherein safety related malfunctions are identified and analysed for the purpose of determining their causes and preventing the possibility of reoccurrence.

C. Operating Procedures Manual: Every installation shall have a written manual of emergency procedures that shall include a type of emergencies that are anticipated and shall include the following procedures,

(1) Start up and shut down procedure including initial start-up of the LNG facility.

(2) Purging and inerting components.

(3) Cooling down components.

(4) Identify the possibility of abnormal conditions.

(5) Safety precautions requirement to be taken while repairs/maintenance in the installation is being carried out.

(6) Procedures for responding to controllable emergencies including notifying personnel and use of equipments i.e. appropriate to handling of emergency.

(7) Procedure for recognizing an uncontrollable emergency and for taking action to ensure that harm to the personnel in the premises and to the public outside is limited.

(8) Procedure for immediate notification of the emergency to the local authorities.

(9) Procedure for co-ordinating with local authorities in the preparation of any evacuation plan which may be required to protect the public in the event of emergency.

D. Maintenance

(i) Every installation shall have a written procedure based on experience and knowledge of similar facilities and conditions under which the installation shall be maintained.

(ii) The procedure shall incorporate the need to carry out periodic inspection, tests on every equipment and system in service to verify that the equipment is maintained in accordance with the equipment manufacturer's recommendations.

(iii) The written manual shall set out inspection and maintenance programme for each component forming part of the installation. In addition to fixing a schedule for inspection and tests, the procedure to be followed during repairs so as to ensure safety of persons and property should also be laid down.

E. Training

Every installation shall be provided with a training plan and the manner in which it will be implemented and maintained. The training manual shall comprise of under mentioned components,

(1) Procedure of basic operation to be carried out in the installation in the normal course.

(2) Carrying out of emergency procedures that relate to duties at the installation for each concerned personnel.

(3) The characteristics and potential hazards of LNG during operation and maintenance of the facility, including dangers from frostbite that can result from contact with LNG.

(4) The methods of carrying out duties of maintaining and operating the facility as set out in the manual of operating and maintenance procedures.

(5) The LNG transfer procedure.

(6) Fire prevention, including familiarization with the fire control plan of the installation, firefighting, the potential causes of fire in a facility, and the types, sizes and likely consequences of a fire in the installation.

(7) Recognizing situations in which it is necessary to obtain assistance in order to maintain the security of the facility.