Statutory Rules/Regulations for CNG Stations

by

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The Petroleum and Explosives Safety Organization (PESO), formerly known as Department of Explosives, since its inception on 05/09/1898, has been serving the nation as a nodal agency for regulating safety of hazardous substances such as explosives, compressed gases and petroleum. PESO's major work is to administer the responsibilities delegated under the Explosives Act 1884 and Petroleum Act 1934 and the Rules made there under with the motto **"Safety First"**.

PESO has its Headquarters at Nagpur in Maharashtra and serves through nine Circle Offices viz Agra, Bhopal, Chennai, Faridabad, Guwahati, Hyderabad, Kolkata, Mumbai, Vadodara and their subordinate Sub-Circle offices across the country.

Administration of the Explosives Act 1884 and Petroleum Act 1934 and the rules made there-under related to manufacture, import, export, transport, possession, sale and use of Explosives, Petroleum products and Compressed gases.

Licences for CNG stations are covered in Form G of the Gas Cylinders Rules 2016 under the Explosives Act 1884.

"compressed gas" means any permanent gas, liquefiable gas or gas dissolved in liquid under pressure or gas mixture which in a closed gas cylinder exercises a pressure either exceeding 2.5 kgf/cm2 abs (1.5 kgf/ cm2 gauge) at +15° C or a pressure exceeding 3kgf/ cm2 abs (2 kgf/ cm2 gauge) at + 50° C or both including cryogenic liquids; Explanation.– For the purposes of this clause Hydrogen Fluoride falls within the scope of compressed gas although its vapour pressure at 50° C is 1.7 to 1.8 atmosphere gauge;

“flammable gas" means any gas which, if either a mixture of 13 percent or less (by volume) with air forms a flammable mixture or the flammability range with air is greater than 12 percent regardless of the lower limit and these limits shall be determined at atmospheric temperature and pressure; Explanation.- For the purpose of this clause: "flammability range" means the difference between the minimum and maximum percentages by volume of the gas in mixture with air that forms a flammable mixture;

"gas cylinder" or "cylinder" means any closed metal container having a volume exceeding 500 ml but not exceeding 1000 liters 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 under carriage and includes a composite cylinder and cryogenic container, however, the water capacity of cylinder used for storage of CNG, nitrogen, compressed air, etc., may exceed 1000 liters up to 3000 liters provided the diameter of such cylinder does not exceed 60 cm;

"composite cylinder" means a cylinder made of resin impregnated continuous filament wound over a metallic or a non-metallic liner. Composite cylinders using non-metallic liners are referred to as all composite cylinders;

"gas cylinders cascade " means a battery of cylinders connected with each other, a tube trailer, multiple element gas containers and bundle of cylinders, conforming to the specifications BS EN-13769, BS EN-13807, ISO-10961 or any other specification accepted by the Chief Controller;

"manufacture of gas" means filling of a cylinder with any compressed gas and also includes transfer of compressed gas from one cylinder to any other cylinder;

"water capacity" means the volume of water in litres, a cylinder will hold at 15° C;

“test pressure" means the internal pressure required for the hydrostatic test or hydrostatic stretch test or pneumatic test of the cylinder as specified in the cylinder manufacturing codes;

Safety First

Compressed gases, liquefied gases and dissolved gases are hazardous because of the high pressure inside the cylinder or container. The cylinder may explode, if handled without care.

Physical hazards are in response to high pressures inside gas cylinders. - Damage from falling, heat, electrical circuits, motion, vibration or anything that can cause a weakness or crack in the cylinder wall or shell can cause a cylinder to rupture, explode, or act as an uncontrolled rocket.

Background

- CNG is emerging as the fastest growing alternative fuel in the Auto sector in the country.
- CNG Produces significantly less Pollutants than petrol/diesel.
- CNG is cheaper & safer than Petrol/diesel, Green fuel.
- More than 5,50,000 units of CNG vehicles were sold during the first nine months of the calendar year 2024.
- More than 7750 CNG dispensing station are operating in the country for refueling of CNG Vehicles.
- Majority of the CNG activity as on today is concentrated in UP, Maharashtra, Gujrat and NCR Delhi.

India has launched the National Green Hydrogen Mission with an outlay of Rs. 19,744 crores with a target of 5MMT production capacity of Green Hydrogen per annum.

Green Hydrogen has enormous potential to decarbonize several sectors, achieve net-zero carbon emissions

Definitions

"Compressed Bio Gas (CBG)" means the mixture of hydrocarbon gases and vapours consisting mainly of Methane in gaseous form, which has been produced by the decomposition of animal and plant waste, purified and compressed for use as an automotive fuel and industrial application;

"Compressed Natural Gas (CNG)" means mixtures of hydrocarbon gases and vapours, consisting mainly of Methane or suitable mixture of Hydrogen and Methane in gaseous form, which has been compressed for use as automotive fuel and industrial application and includes Compressed Bio Gas;

" Composite CNG dispensing unit" means an integrated unit comprising of CNG storage cascade, CNG compressor and CNG dispensing unit integrally attached with each other and installed inside an enclosure box;

Type of the CNG Stations

"CNG mother station" means CNG facilities connected with natural gas pipeline and having a compressor meant primarily to fill mobile cascade of daughter station and includes stationery cascade for CNG dispensing to vehicles;
"CNG online station" means CNG facilities connected with natural gas pipeline and having a compressor primarily to fill stationary cascades for dispensing CNG to vehicles;
"CNG daughter station" means CNG facilities not connected to natural gas pipeline and receives CNG through mobile cascade;
"CNG daughter booster station" means CNG facilities not connected to natural gas pipeline and such CNG dispensing stations where mobile or stationary cascades are connected to the booster compressor for increase in discharge pressure for refueling of the vehicles;

CNG Storage System

- The cascade having horizontal cylinders and sited parallel to other cascade - CNG fittings should not face cylinder fitting of any other cascade.
- Cylinders installed horizontally shall be separated from other cylinders by a distance not less than 30 cm.
- The storage of the cascade should be made in a well-ventilated shed having light roof canopy.
- An area of at least 1meter around the cascade shall be provided within the shed.

Cascade/Other Equipments for CNG

- Cylinders shall be designed as per IS:7285 for use in CNG Cascade.
- CNG On-board cylinders shall be designed as per IS 15490.
- CNG pipeline and tube work in CNG installation shall be as per ANSI B31.3.
- Components of CNG compressor, CNG dispenser and other electrical equipment shall be of the type approved by the CCE.

Cascade/Other Equipments for CNG

- Cylinders shall be re-examined every three years as per Rule 35 Gas cylinder Rules, 2016.
- Gaskets/packing use shall be compatible with Natural Gas.
- CNG hoses shall be internally braided and electrically continuous and shall be suitable for CNG service. The CNG hoses shall be tested pneumatically at 400 bar pressure.

Safety of the Vehicles for Refueling

- The vehicles shall have approved type of CNG kit.
- Drivers shall carry test record for CNG cylinders and other vital part.
- Cylinders & Valves fitted in the vehicle shall be in accordance with Gas Cylinder Rules, 2016.
- Every vehicle using CNG fuel system shall display CNG “Level Prominently”.

CNG Refueling into Vehicles

- The vehicles shall be refueled by trained operator.
- The operator shall check the history card of the cylinder available with the driver.
- The hose connection shall be in good condition and match the dispenser filling nozzle.
- The engine shall be in switch off mode while refueling.
- There shall not be any passenger while refueling.
- The vehicle shall not be left unattended while refueling.
- The cylinders on the vehicle shall not filled in excess of the maximum allowable working pressure of the cylinder.
- Sufficient fire fighting equipments shall be provided near the vehicle refueling point.
- Proper training shall be imparted to the personnel working in the CNG station.

Licencing Of CNG Stations

- The licenses for filling of CNG in cylinders and dispensing of the CNG as automotive fuel are granted in the Form ‘G’ of the Gas Cylinder Rules, 2016.
- Necessary guidelines/provisions for safe storage, Handling & Refueling of the Natural Gas as automotive are given in the Gas Cylinder Rules, 2016.

Licence for filling and possession

(1)No person shall fill any cylinder with compressed gas and no cylinder filled with compressed gas shall be possessed by anyone except under and in accordance with the conditions of a licence granted under the Gas Cylinder Rules, 2016.

(2) The licensee shall be responsible, for all operations connected with the filling and possession of cylinders in the licensed premises.

Prior approval of specification and plan of premises proposed to be licensed

(1) Every person desiring to obtain a licence to fill and store any compressed gas in any cylinder shall submit to the Chief Controller or Controller authorised by Chief Controller-

(a) specification and plan drawn to scale clearly indicating —

(i) the manner in which the provisions prescribed in these rules shall be complied with; the premises proposed to be licensed, the area of which shall be distinctly coloured or otherwise marked;

(ii) the surrounding area lying within 100 meters of the edge of all facilities which are proposed to be licensed;

(b) a scrutiny fee of as specified in Schedule V.

(2) If the Chief Controller or Controller after scrutiny of the specification and plan and after making such inquiries as considered necessary, satisfied that compressed gas will be filled and stored in the premises proposed to be licensed, according to the provisions of these rules, he shall return to the applicant one copy of each of the specification and plan signed by him conveying his sanction subject to such conditions as may be specified.

No Objection Certificate

(1) An applicant for licence in Form “G”, for CNG dispensing station, 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. The District Authority, if satisfied, shall grant no objection certificate to the applicant receiving a licence for the above purpose at the site proposed, and shall forward it to the Chief Controller or Controller with his application.

(2) Every certificate issued by the district authority shall be accompanied by a copy of the plan of the proposed site duly endorsed by him under official seal.

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

(4) The requirement of No Objection Certificate from District Authority under rule 45 sub rule (2) shall not be applicable for licence in Form G forming part of a service station licenced in Form XIV under the Petroleum Rules 2002.

Grant of licence

(1) A licence or approval, as the case may be, under these rules may be granted by the Chief Controller or Controller on payment of the fee specified in Schedule V.

(2) A licence or approval under sub-rule (1) shall be granted if the provisions of Gas Cylinder Rules, 2016 are complied with by the applicant.

(3) Every licence or approval granted under these rules shall be subject to the conditions specified therein.

(4) When the licensing authority grants a licence in Form 'E', 'F' or 'G', after conducting inspection of the premises to ensure conformity of the premises to the provisions of the Act and these rules, the 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, his direction for rectification of deficiency; or reasons for not endorsement of the licence or reasons for suspension and revocation of the licence, as the case may be.

Electrical installations

In premises for filling and storing flammable gases in cylinder all electric meters, distribution boards, switches, fuses, plugs and sockets, all electric fittings, fixed lamps, portable hand lamps and motors, shall be of flame proof construction conforming to IS or IEC-60079-1, IS or IEC-60079-11 or any other standard as approved by the Chief Controller and shall be effectively earthed.

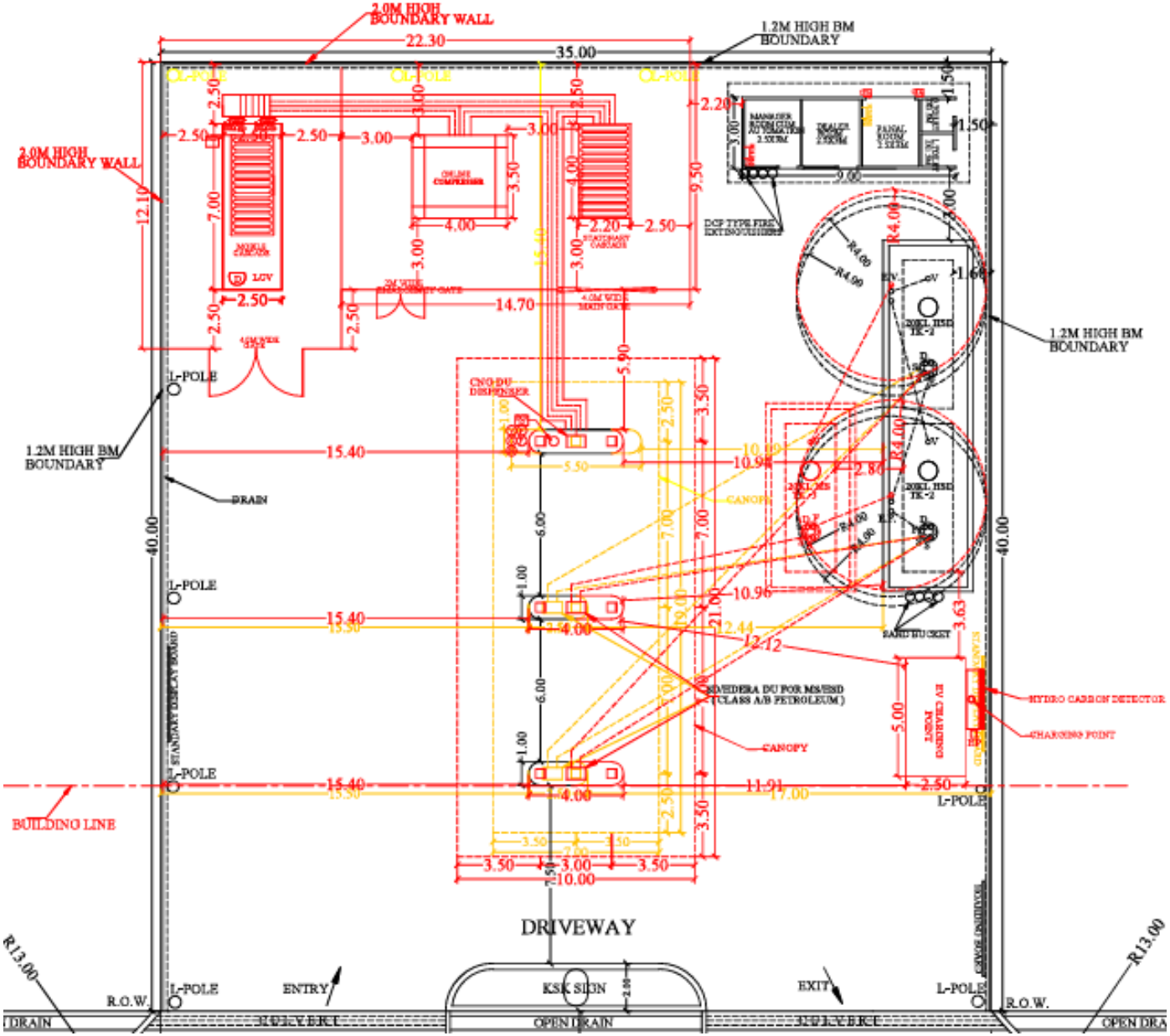
Requirement of Safety Distances Around CNG Cascade

Total Capacity of gas storage units (in litres)	**Minimum distances from Building & boundaries (in Meters)**
Upto 4500	2.5
4501 to 10000	4.0
10001 to 100000	10.0

Inter distances between various facilities in the CNG fueling station

Sl. No.	Distance from (in meters)	CNG /CBG Compressor	CNG /CBG dispensing Unit	Storage Cascade	Outer Boundary wall/ CLF*	MS/ HSD Dispenser	Vent of MS /HSD u/g storage tanks	Filling Point of MS/ HSD
1	CNG /CBG compressor	-	3	2	3	6	6	T-1 (Min-3)
2	CNG /CBG dispensing Unit	3	-	2	4	6	4	-do-
3	Storage cascade	2	2	-	T-1	T-1 (Min-6)	T-1 (Min-4)	-do-
4	Outer boundary wall/CLF*	3	4	T-1	-	6	4	-do-
5	MS/HSD Dispenser	6	6	T-1 (Min-6)	6	-	6	-do-

Typical Layout CNG/RO Station




DANGER
FLAMMABLE
GAS
ASSAM
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USE PPE KIT
AT SITE

1(a). If CNG or CBG cascade and compressor is installed on suitable RCC or Steel structure and open to sky then following additional conditions shall also be complied along with all other requirements of the rule-

(i) Dedicated flooding type fire fighting system for CNG or CBG cascade storage and compressor kept on RCC structure operatable from ground level or automatic shall be provided.

(ii) An analysis report showing 4 hours fire resistant rating as per IS-1642-1989 shall be conducted by reputed agency and its report shall be enclosed along with other documents.

(iii) Risk analysis report prepared by a reputed engineering agency and its report shall be enclosed along with other documents.

(iv) The structural adequacy with respect to the superstructure with reference to static and dynamic load/vibrations on full operation of all the equipment shall be carried out by a reputed structural engineer and its report shall be enclosed along with other documents.

(v) A HAZOP study shall be carried out by a reputed engineering firm and its report shall be enclosed along with other documents.

(vi) Minimum two stair cases opposite to each other for proper access to the CNG equipment area shall be provided.

(vii) CCTV camera shall be provided for close monitoring of the station min retention of minimum 24 Hrs recording.

(viii) Emergency stop buttons shall be provided on ground level and roof level.

No alterations or additions shall be carried out to the premises without prior approval of the licensing authority.
Smoking, naked lights, lamps, source of fire, mobile phones or any other implements capable of igniting flammable vapour or gas shall not be allowed inside the premises.

The licensee shall provide at the licensed premises the fire fighting facilities at least as per the following scale at different locations:-

Location	**Type of extinguishers**
Dispensing Unit	lx10 Kg DCP
Compressor (On-line)	lx10 Kg DCP
(mother station	1x70 Kg DCP
CNG storage	lx10 Kg DCP
Cascade refueling area	lx10 Kg DCP
MCC/Electrical installation	1x4.5 Kg CO_2 per 25 Sq. M. floor area

CNG DISPENSING STAION OPERATING IN INDIA

SR. NO.	STATE	NO. OF STATIONS
1	Andhra Pradesh	213
2	Bihar	199
3	Chhattisgarh	28
4	Goa	16
5	Gujarat	1068
6	Haryana	536
7	Chandigarh	11
8	Uttar Pradesh	1193
9	Himachal Pradesh	24
10	Jharkhand	128
11	Karnataka	468
12	Kerla	194
13	Maharashtra	1090
14	Madhya Pradesh	355
15	Odisha	136
16	Punjab	298
17	Rajasthan	410
19	Tamilnadu	409
20	Telangana	216
21	Uttrakhand	28
22	West Bengal	149
24	Dadra and Nagar Haveli	7
25	Daman and Diu	6
26	Delhi	483
27	Jammu and Kashmir	2
29	Puducherry	11
	TOTAL	**7678**

CNG DISPENSING STATION OPERATING IN THE NORTH EASTERN REGION

Sr. No.	STATE	NO. OF STATIONS	After 01/01/2024
1	Assam	32	22(approval 42)
2	Tripura	25	1
3	Nagaland	Nil	
4	Manipur	Nil	
5	Mizoram	Nil	
6	Meghalaya	Nil	
7	Arunachal Pradesh	Nil	
	TOTAL	**57**	

OISD Standard For CNG

- OISD has also framed guidelines and safety requirement on compression, storage, handling and refueling of Natural Gas for use in Automotive sector as OISD Standard NO 179 in the year 1998.

Critical Safety Issues In CNG Operation

- There are number of issues which have not been successfully overcome and which have potential for causing unsafe situations in CNG dispensing stations.
- **Issues of concern**
- A. Spurious cylinders/filling of test due cylinders.
- B. Improper retro fitment.
- C. Non standardization of equipment.
- D. Poor Maintenance practices.
- E. Poor operational practices.
- Quality of Natural Gas
- Identification for Genuineness of the cylinders fitted in automobile.

Observations in the field.

- No scrutiny is done to verify the antecedents of the cylinder.
- Only R.C.Book is checked to confirm that vehicle is authorized to take CNG and no physical verification is done.
- Presence of Metal plate fitted near the fill point is noted to decide that vehicle is fit for filling.


Cylinder No
6301

- The use of CNG as automotive fuel has been increased in manifolds but the application of safety standards, lack of availability of trained manpower, maintenance of compressor, dispenser, natural gas pipelines and spurious cylinder (fitted in automotive vehicles) identification procedure has caused so many accident. Therefore a Task force committee on CNG handling was constituted under the chairmanship of Chief Controller of Explosives with other stake holders as the member of this committee.

Recommendations of Task Force Committee on Safety Requirements in CNG station

- **The installation of cascades above the compressors:** it was deliberated that there is a major risk involved in such installation; hence such installation should not be encouraged only in the name of space limitation. The cascades should be either placed at ground on suitable foundation or should be placed at the roof of the station building.
- **Draining at Dispenser:** It was deliberated that the regular draining of oil and condensate from the dispenser should be done so that condensate and oil should not be carried over up the intake cylinder to affect its intake volume and the health condition. It was opined by Chief Controller of Explosives that all the CGD entities should follow this system
- **The quality of natural gas supplied:** It was deliberated that the quality of natural gas for CNG purpose shall conform to the requirements of IS:15490 and monitored regularly. The gas should be free from the sulphur content and moisture as these are the main causes for the corrosion of the cylinder which ultimately leads to the bursting of it. Accordingly, the natural gas supplying companies should maintain the quality of natural gas.
- **Checking of validity of Cylinders and verification of cylinder plates:** it was deliberated that checking of cylinders and there validity genuineness and health condition is very much essential in order to avoid the accident. It was also informed by CCE that use of spurious cylinder is a major cause of concern to all stakeholders. All the entities should devise a methodology to check the genuineness and validity of the CNG cylinder before refilling it.

- **Flexible piping in high pressure line from the Compressor:** It was observed during the visit to CNG stations that compressor's discharge line was of flexible pipes. It was deliberated that because of the againg factor and in case of fire incident, the flexible pipes may fail and aggregate fire hazards. Hence, SS pipings/ tube shall be used to prevent such incidents.
- **Safety distances of cascades from the wall:** It was deliberated that as per Gas Cylinder Rules, 2016 and OISD:179, safety distances are required to be maintained in case of multiple cascades installed. Entities are maintaining the distances as per water capacity of single cascade which is not proper as the distance is based on the water capacity of total number of cascades installed therein. The safety distance in such a scenario will be more as per the Gas Cylinders Rules, 2016.
- **Partition wall between compressor and cascades:** It was deliberated that there should be partition wall between the compressor and the cascades to avoid any impact to cascades in case any fire incidents takes place in compressor and vice versa. It was also deliberated that wall near the cascades or portion wall should be fire resistant.

- **Emergency shutdown system:** It was deliberated that in most of the cases, the compressor system remains in operation even if a fire has occurred. To avoid any major incident, there shoul be an emergency shutdown system at conspicuous locations, so that in case of emergency, operator can shut down the entire compressor and dispensing operation completely.
- **Scrapping of cylinders:** It was informed that spurious cylinders are also being used for filling CNG, it was deliberated that the cylinders taken out of the services due to any reasons should be scrapped and destroyed by cutting into two/three pieces.
- **Cylinder filling permission by manufacturer:** It was deliberated that there should be a system by the manufacturer to endorse the Sl Nos. of the cylinders supplied to any person on the filling permission issued by CCE to keep the track record of the cylinders supplied. Such cylinders shall be supplied along with manufacturer's test and inspection certificate.

Thank you