Institute for ***Plasma Research***

Welcomes you all on

GAS CYLINDER SAFETY

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COMPILED BY: ***SAFETY COMMITTEE, IPR***

INTRODUCTION

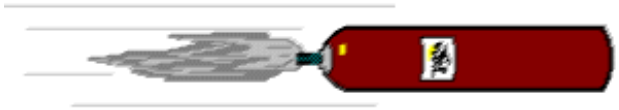
Compressed Gas Cylinders are potential to cause property damages and personal injuries if proper care is not being taken while handling.

Accidents involving gas cylinders can cause serious injury or even death.

INTRODUCTION

Gases are commonly compressed in cylinders at pressure that range from few bar to 200 bar or even more.

Since the gases are contained in highly pressurized metal containers, the large amount of potential energy resulting from compression of the gas makes the cylinder a potential rocket or fragmentation bomb,



DEFINITION

- Gas cylinder or “cylinder’ means any close metal container having a volume exceeding 500 ml but not exceeding 1000 litres intended for the storage and transport of compressed gas.

- LPG container/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. However, the water capacity of cylinders used for storage of CNG, nitrogen, compressed air, etc. may exceed 1000 litres upto 2500 litres provided the diameter of such cylinder does not exceed 60 cm.

TYPES OF GAS CYLINDERS

- **Flammable:**

  LPG, Hydrogen, DA etc.

- **Non-Flammable & Non Toxic:**

  Oxygen, Nitrogen, Argon, CO_2 etc.

- **Toxic & Poisonous:**

  Chlorine, Ammonia, Phosgene etc.

MAIN USES OF GAS CYLINDERS

- Chemical Processes,
- Soldering, Welding and Flame Cutting,
- Breathing (Emergency Rescue),
- Medical and laboratory uses,
- Fuel for vehicles,
- Extinguishing Fires,
- Heating and cooking,
- Water Treatment,

MAIN HAZARDS OF GAS CYLINDERS

- Impact from blast of gas cylinder or rapid release of compressed gas,
- Impact from parts of gas cylinders that fail, or any flying debris,
- Contact with release gas or fluid,
- Fire resulting from the escape of flammable gas or fluid,
- Impact from falling cylinders,
- Manual Handling Injuries,

MAIN CAUSES OF ACCIDENTS

- Inadequate training and supervision,
- Poor installation,
- Poor examination and maintenance,
- Faulty equipment and/or design, (e.g. badly fitted valves and regulators)
- Poor handling,
- Poor storage,
- Inadequately ventilated working conditions,
- Incorrect filling procedures,
- Hidden damages,

IDENTIFICATION COLOURS

- The cylinder is painted with appropriate identification colours specified in **IS:4379** for industrial cylinders and **IS:3933** for medical cylinders.

- No person shall in any way interfere with or change the colour painted on a gas cylinder.

IDENTIFICATION COLOURS

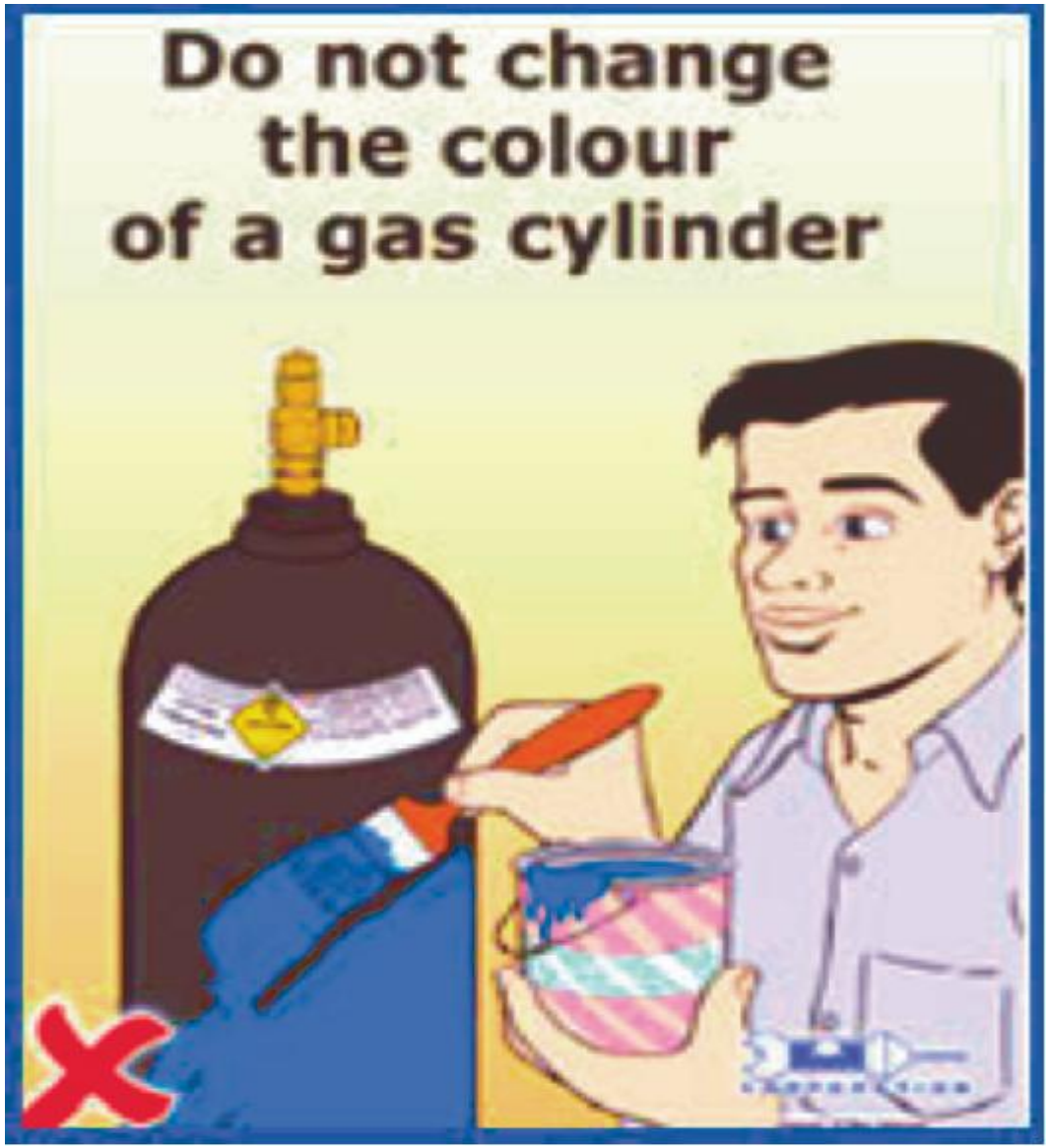
Fig.1.

COLOUR SPECIFICATIONS FOR SELECTED INDUSTRIAL GAS CYLINDERS (NON-MEDICAL)

Name of the Gas	Oxygen (O_2)	Nitrogen (N_2)	Carbon Dioxide (CO_2)	Ammonia (NH_3)	Freon 12 (CCL_2F_2)
Visual Identification					
Distinctive Colour: Body	Black	Grey	Black	Black	Bottom Grey, Neck end Violet
Band	None	Black	White	Red & Yellow	None
Pressure when fully charged at 30 deg C (approx.) Kg/sq.cm	139	139	18	11	8
Lbs/sq.cm	1980	1980	260	155	115

Name of the Gas	Argon (A)	Chlorine (CL_2)	Hydrogen (H_2)	Acetylene (C_2H_2)	LPG. Commercial Butane (C_4H_{10}) (80%)	Air
Visual Identificationt						
Distinctive Colour: Body	Blue	Yellow	Red	Maroon	Red	Grey
Band	None	None	None	None	None	None
Pressure when fully charged at 30 deg C (approx.) Kg/sq.cm	139	8	139	18	3	139
Lbs/sq.cm	1980	114	1980	250	45	1980

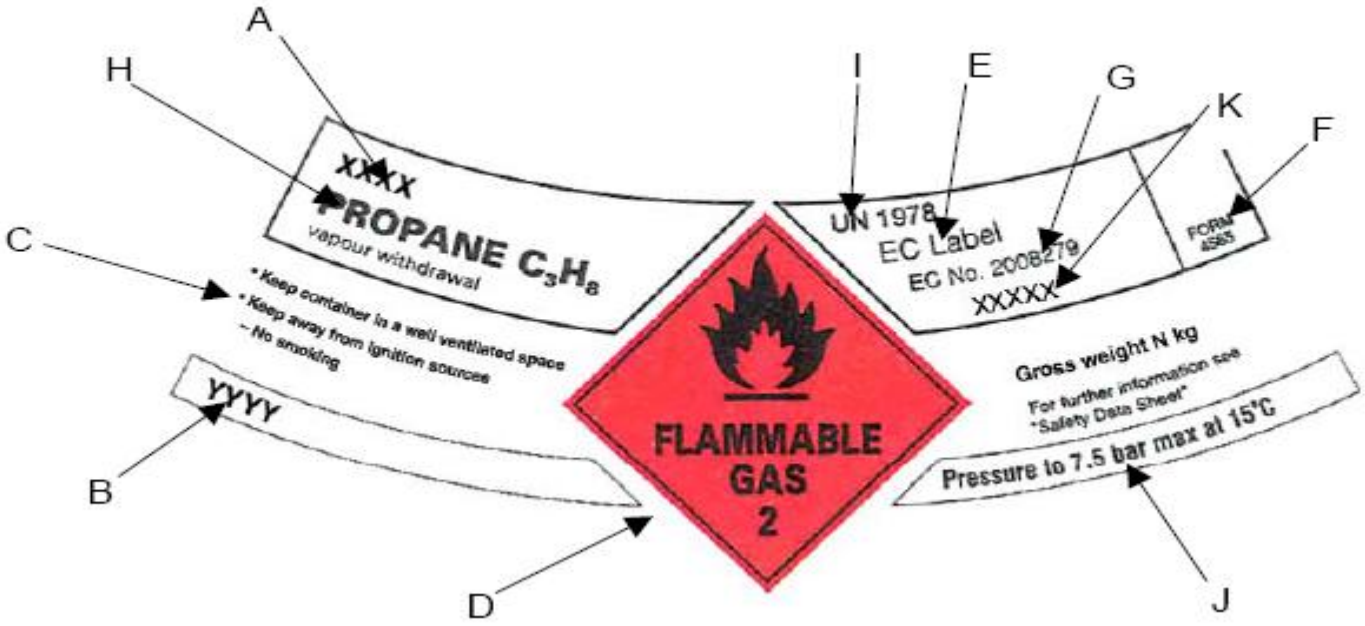
IDENTIFICATION COLOURS



MARKING ON CYLINDERS

- Manufacturer’s Name
- Serial No.
- Name of the Gas
- Manufacturing Specifications
- Heat treat. symbol
- Date of Hyd. Test
- Working Pressure
- Test Pressure
- Tare weight
- Water Capacity

LABELLING ON CYLINDERS



A = company name

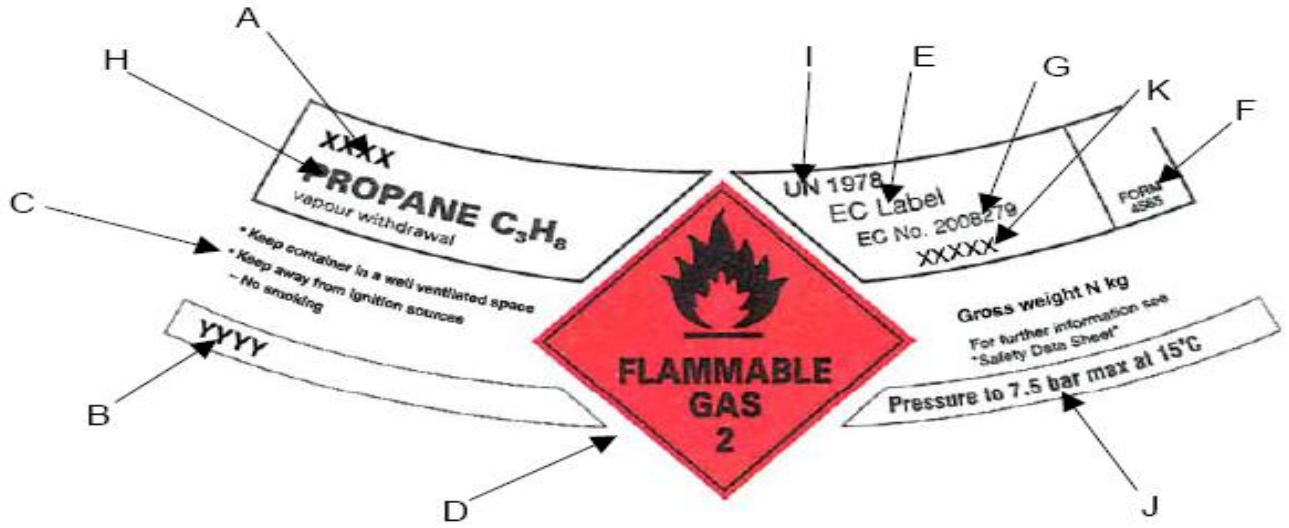
B = address of company

C = risk & safety phrases relating to the product

D = hazard symbol

E = EC label

LABELLING ON CYLINDERS



F = revision number

G = EC number, if applicable

H = product name

I = UN identification number

J = any additional company information

K = Emergency contact telephone number

TESTING, SERVICE LIFE & CONDEMNATION OF GAS CYLINDERS

- No person shall fill any cylinder with any compressed gas unless the cylinder has been examined and subjected to hydrostatic test or as the case may be, and other tests set forth in Schedule IV within such period as is specified in IS:8868 or as approved in writing by the Chief Controller.

TESTING, SERVICE LIFE & CONDEMNATION OF GAS CYLINDERS

- Service life of LPG Cylinders not prescribed in Rules but for **CNG** Cylinders on board it is 20 yrs and **Auto LPG** containers is 15 yrs.

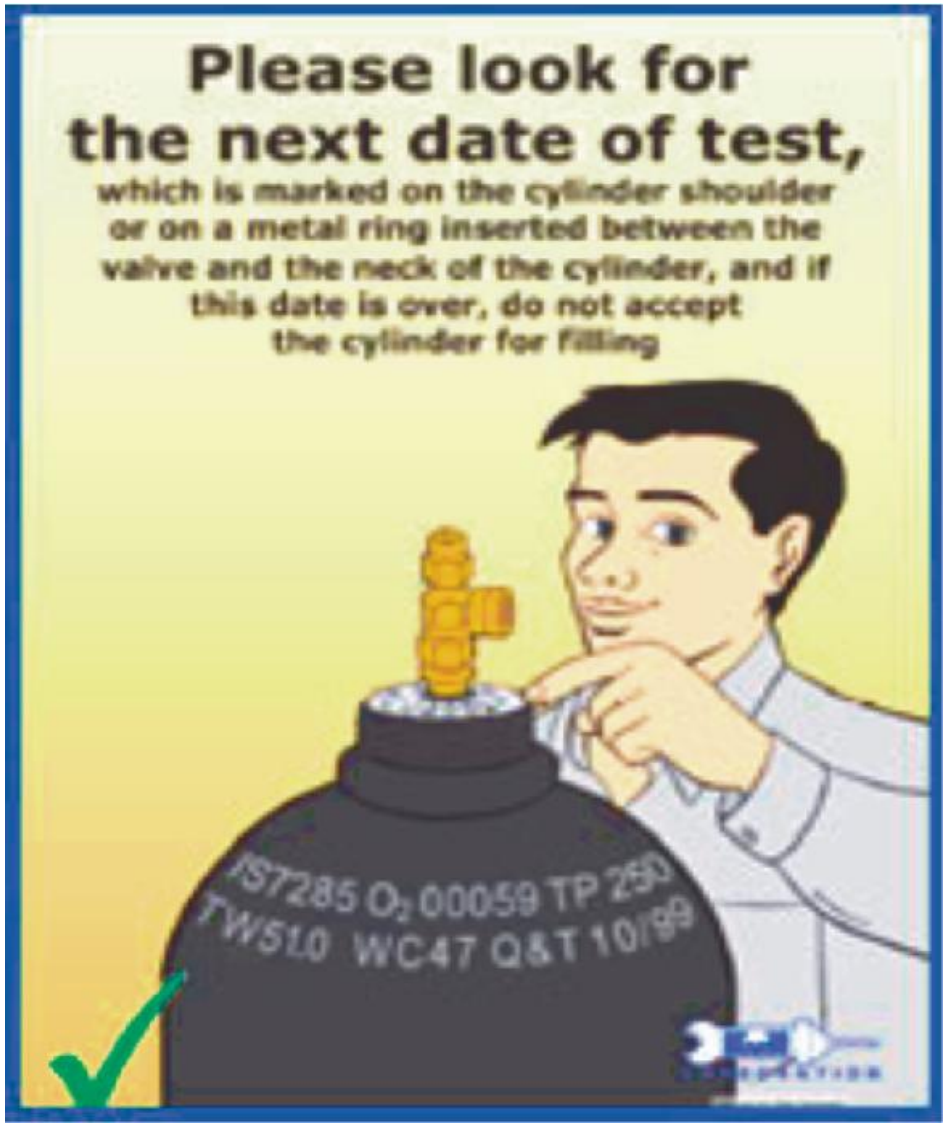
- Any cylinder which fails to pass in periodic examination or loses tare weight by over 5% has to be condemned.

TESTING, SERVICE LIFE & CONDEMNATION OF GAS CYLINDERS

CYLINDER EXPOSED TO **FIRE**

- Cylinder exposed to fire shall not be used unless it has undergone proper examination and hydrostatic test or hydrostatic stretch test,
- Dissolved acetylene cylinders, which have been damaged by fire shall be condemned and destroyed by an experienced and competent person.

TESTING, SERVICE LIFE & CONDEMNATION OF GAS CYLINDERS



STORAGE OF GAS CYLINDERS

- Cylinders shall be stored in a cool ,dry well ventilated place under cover away from open flames or any potential sources of heat and such place of storage shall be easily accessible.
- Cylinders shall not be stored under conditions, which will cause them to corrode.
- LPG cylinders and dissolved gas cylinders like acetylene shall not be stacked in a horizontal position.

STORAGE OF GAS CYLINDERS

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- Avoid storing gas cylinders so that they stand or lie in water.
- Gas cylinders containing flammable gas should not be stored in part of a building used for other purposes.
- Empty cylinders shall be segregated from the filled ones and care shall be taken that all the valves are tightly shut.

STORAGE OF GAS CYLINDERS

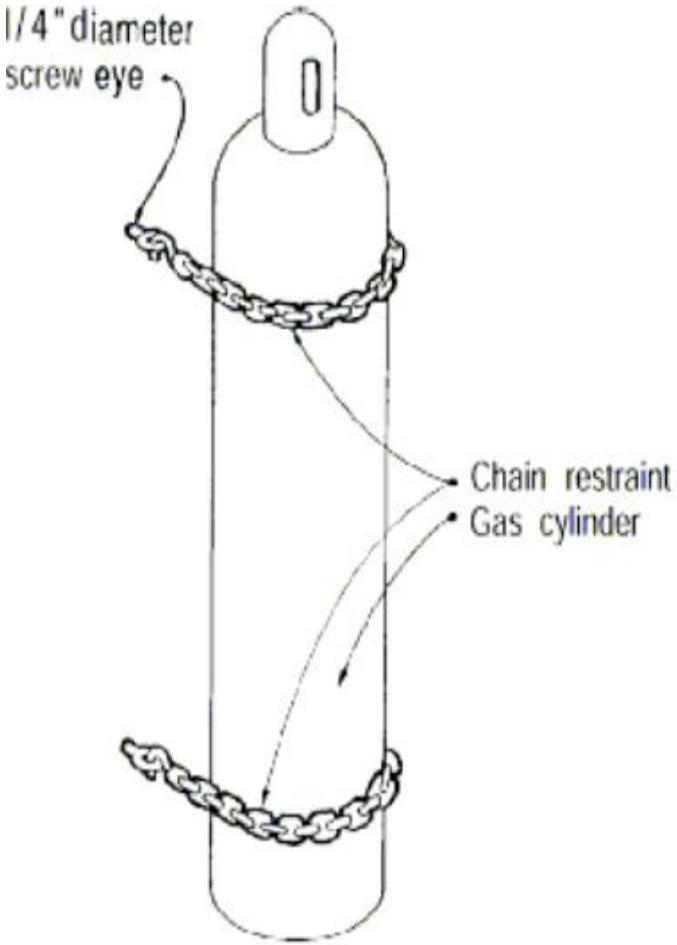
- Cylinders containing flammable gases and toxic gases shall be kept separated from each other and from cylinders containing other types of gases by an adequate distance or by a suitable partition wall.

- All gas cylinders shall be securely fastened by straps in individual racks and support to rigid structures so that they will not fall or be knocked over.

STORAGE OF GAS CYLINDERS

Arrange Cylinders BASED UPON,

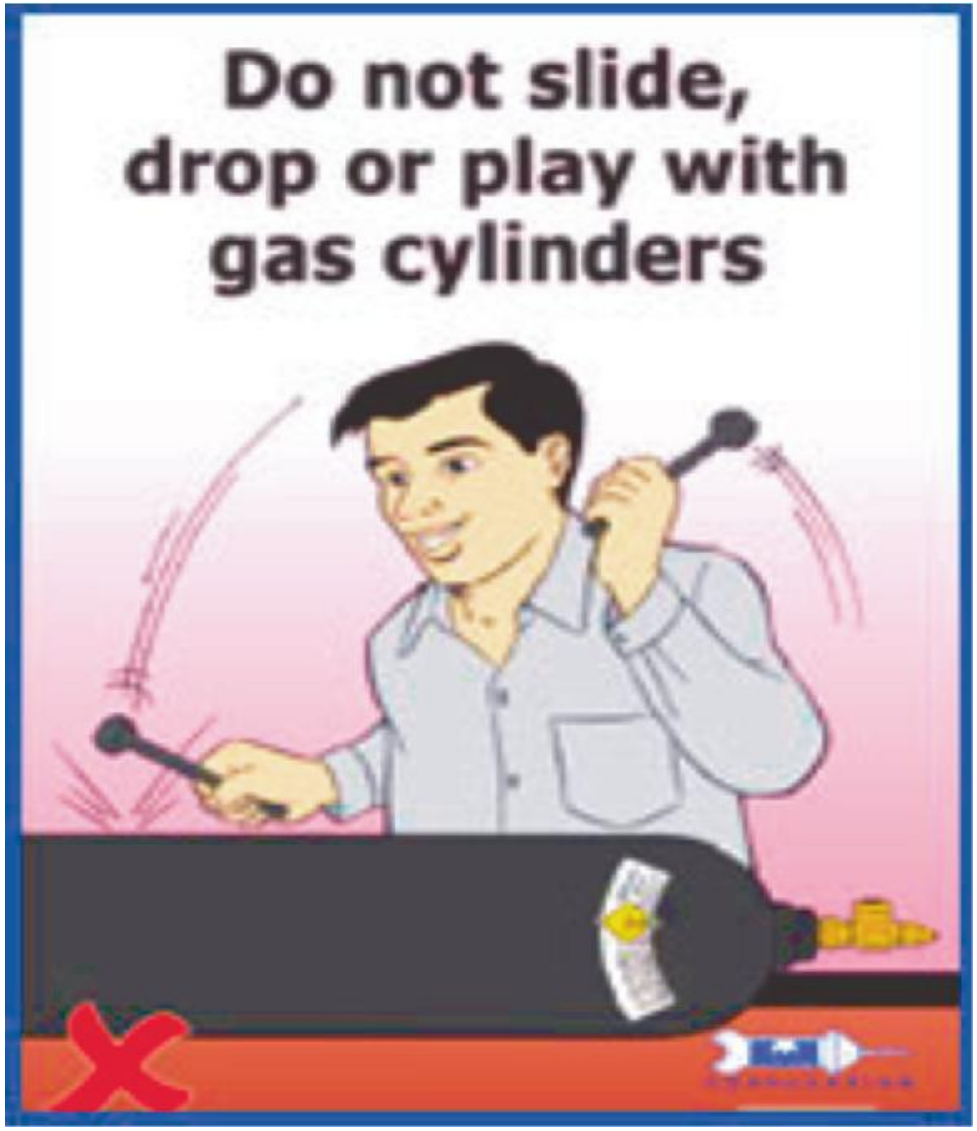
- Types of gases
- Full & empty cylinders
- Secure the Cylinder with Cap & tied with Chain,



HANDLING & USE OF GAS CYLINDERS

- Use gas cylinders in a vertical position, unless specifically designed to be used otherwise,
- Cylinders shall be adequately supported during handling,
- The cylinders shall be handled carefully and not be allowed to fall upon one another,
- Sliding, dropping or playing with cylinders is prohibited,

HANDLING & USE OF GAS CYLINDERS



HANDLING & USE OF GAS CYLINDERS

- LPG Cylinders shall always be kept in an upright position and shall be properly placed,
- Open flames, lights, mobile phones, lighting of fires, welding and smoking shall be prohibited in close proximity to any cylinder containing flammable gases,
- When required, wear appropriate personal protective equipment when handling gas cylinders,
- Use hand truck to move the cylinders,

HANDLING & USE OF GAS CYLINDERS

- Fit suitable protective valve caps and covers to cylinders, when necessary, before transporting. ***Caps and covers help prevent moisture and dirt from gathering in the valve of the cylinder***, in addition to providing protection during transport,

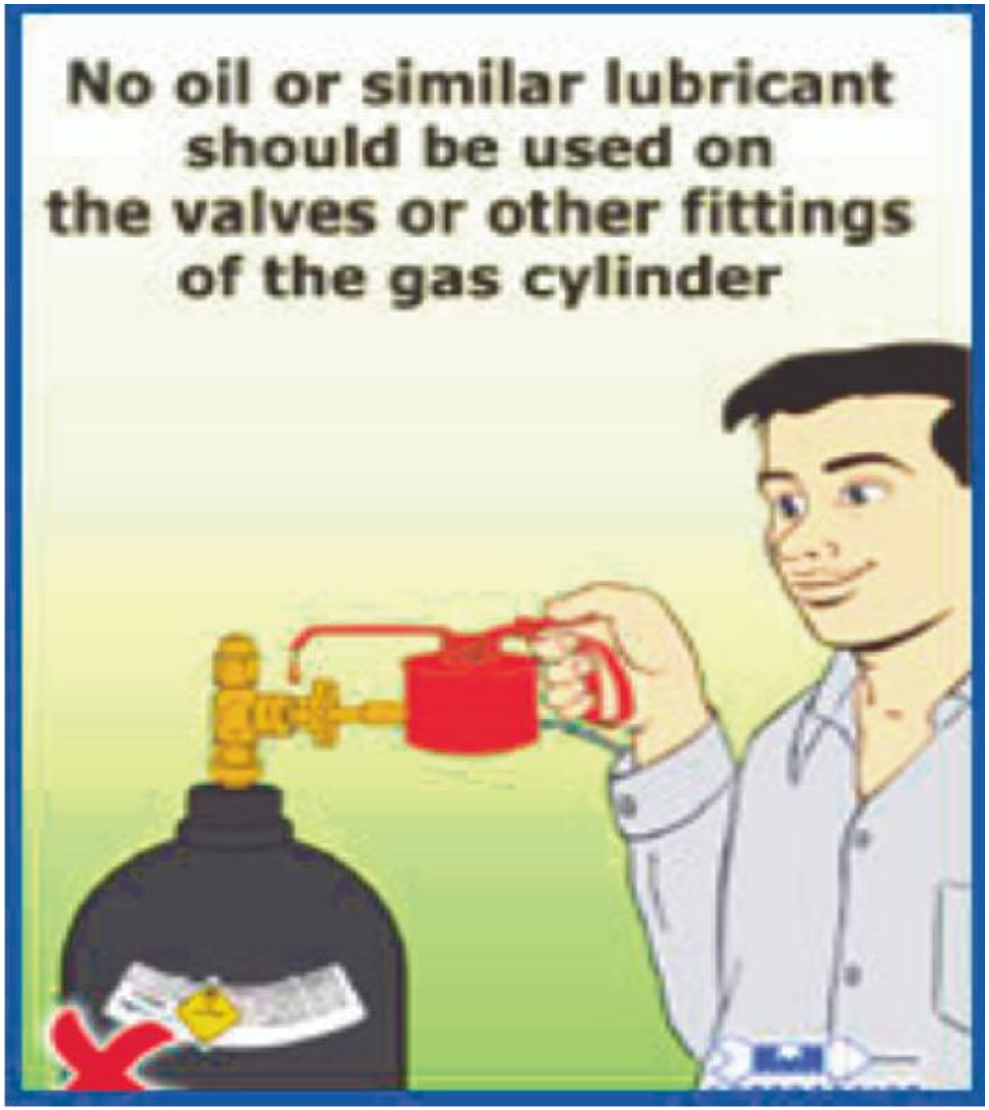
- Never attempt to lift a cylinder by the valve protection cap!!

HANDLING & USE OF GAS CYLINDERS

IMPORTANT TIPS

- Never change the colour of the cylinder,
- Tampering of cylinder valve, pallet manifold valve and other safety devices associated with cylinder/ pallet is strictly forbidden in respect of safety,
- Oil & grease are the enemy of gas specially for oxygen & oxidant gas. Do not use oily hand & tools on cylinder valve and other component,
- DON'T lubricate cylinder valves, regulator, other assemble with greasy hands or oily rags,

IMPORTANT TIPS



IMPORTANT TIPS

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- Do not drag the cylinder,
- Do not drop or allow to drop cylinders from height or on hard surface,
- Do not use magnet to lift the cylinder,
- Do not over tighten the valve spindle,

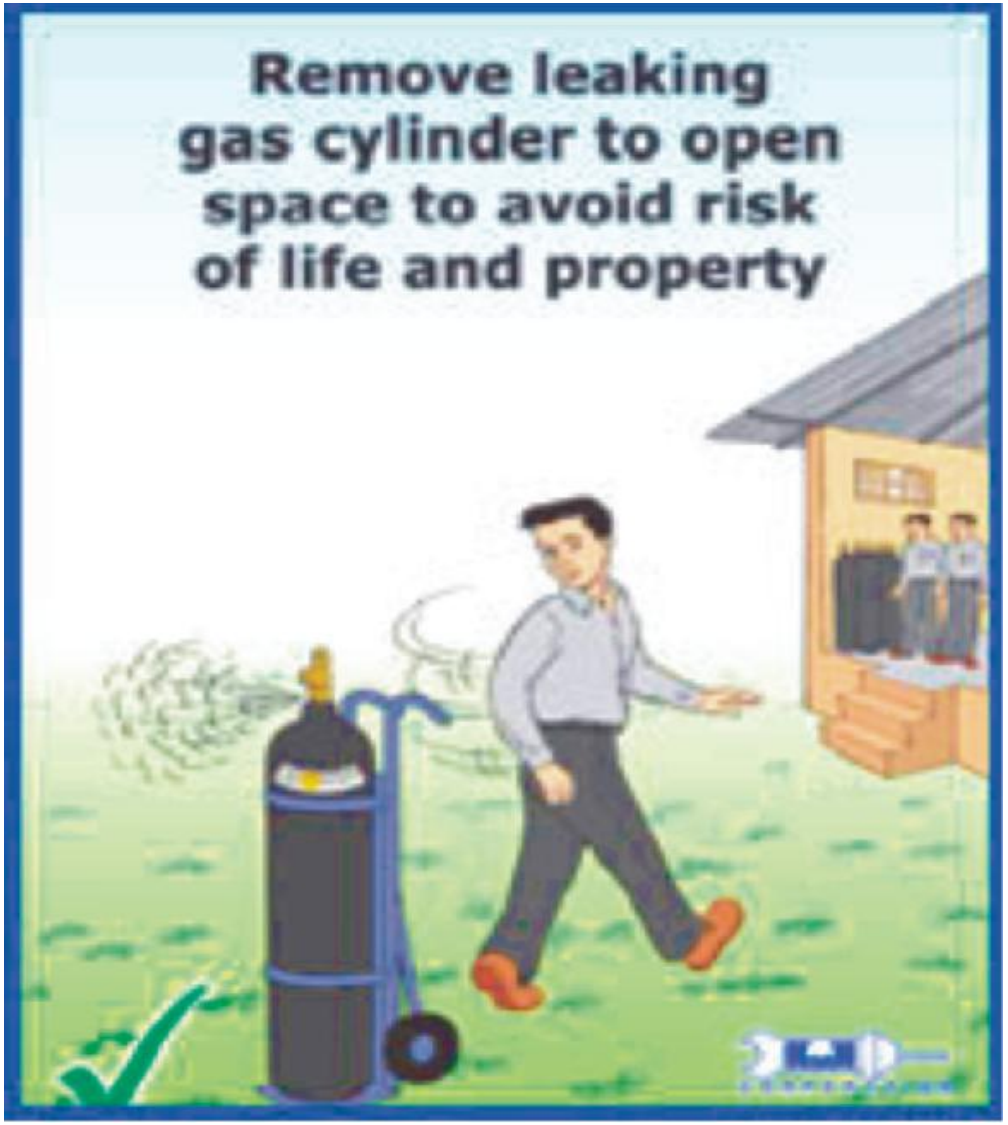
IMPORTANT TIPS

- Do not remove valve guard from a cylinder,
- Never strike an arc on cylinder, this is a very unsafe activity,
- Never transport cylinder in two wheeler or in passenger car,
- Do not transfer gas from one cylinder to other cylinder,
- Never smell the gas to confirm the flow of gas,

IMPORTANT TIPS

- Do not keep cylinder valve open when it is not in use,
- Do not use mobile phone, matches, sparking tools in the vicinity of flammable gas store area,
- Do not remove product sticker, card from the cylinder,
- Never use cylinder as a roller,

IMPORTANT TIPS



THANK YOU