GAS INDUSTRIES ASSOCIATION

www.gasassociation.in

We cordially Invite you for the Webinar - 2021

TOPIC

Avoiding accidents in Gas Cylinder by following prefilling inspection steps

December 20th, 2021
16.00 pm to 17.00 pm

About GIA Webinar:

Context: According to the statistics around 700 accidents happened in India related to gas cylinders and resulted in hundreds of deaths. Several of these accidents were horrific in terms of damage they caused to life and property. Majority of these accidents happen due to unsafe and irregular handling procedures and most of the times these practices originate due to ignorance and untrained staff.

GIA member companies are a group of leading companies which practice the safe procedures and continuously keep developing them according to the local environment and factors. In a bid to impart this knowledge to the industry at large we have designed this webinar to propagate the knowledge and best practices of cylinder prefilling inspection which is the most important step in avoiding accidents.

Speakers:
Senior experts in cylinder gas business from Linde, INOXAP, Air Liquide, Taiyo Nippon Sanso and Air Water have prepared the contents of this webinar.

Who shall attend:

- All personal involved in operations and maintenance of Industrial gas cylinders. This shall include senior management which is involved in design and supervision as well as shop floor operators.
- Medical Oxygen business has expanded due to Covid scenarios and has seen churning of personal with the entry of new players. We invite all such companies staff to attend this as a training.
- We also invite the end users like hospitals and industrial unit operators to make them selves aware of the procedures so that proper safety can be ensured through vendors.

Click here
for Registration:

Note: The Webinar will be held via **Microsoft Office 365 Team** applications.

Contact us: **Secretary General** ✉ anoop.tandon@gasassociation.in 📱 **+91 93424 35266**

Gas Industries Association

Webinar on Cylinder Pre – Fill Inspection

Making our world more productive

Gas Industries Association: Introduction

- **GIA Formed in 2007, registered in the city of Mumbai under the aegis of Asia Industrial Gases Association.**
- **Non-profit association of Industrial Gases Majors engaged in production and distribution of industrial gases.**
- **GIA adopts a strict antitrust guidelines - not allowed to use the forum for any commercial or such activities.**

Mission

GIA seeks to achieve these objectives:

- **To promote safety, health, and environmental awareness in the production, use and handling of industrial & medical gases by members of this society, their customers and the public**
- **To provide standards and information based on international codes to national associations and work with governmental agencies (PESO/BIS)**
- **To promote harmonisation of standards and practices in India in line with global harmonisation for the gas industry.**
- **To review accidents and incidents and recommend preventive measures**
- **To promote effective response to emergencies involving industrial gases in transport and at customers' sites**

AIGA and Key Members

AIGA was formed in Dec 2003 as an non profit association to represent the majority of Industrial Gas companies in the countries in Asia. Its' broad purpose is to promote better safety, health, environmental awareness and security in production, distribution and use of these products.

Active Members

Air Liquide creative oxygen

AIR PRODUCTS

MESSER

THE LINDE GROUP

PRAXAIR

TAIYO NIPPON SANSO The Gas Professionals

Iwatani International Corporation

宝钢气体 BAOSTEEL GASES

Yingde Gases

8 National Association Members

India, Indonesia, Korea, Malaysia, Philippines, Singapore,Taiwan, and Thailand

Representative Office

China

Pro Tem Group

Vietnam

Asia Industrial Gases Association
52 Jurong Gateway Road,JEM, #15-02, Singapore 608550 Email: milan.sarkar@asiaiga.org

GIA Gas Industries Association

AIGA

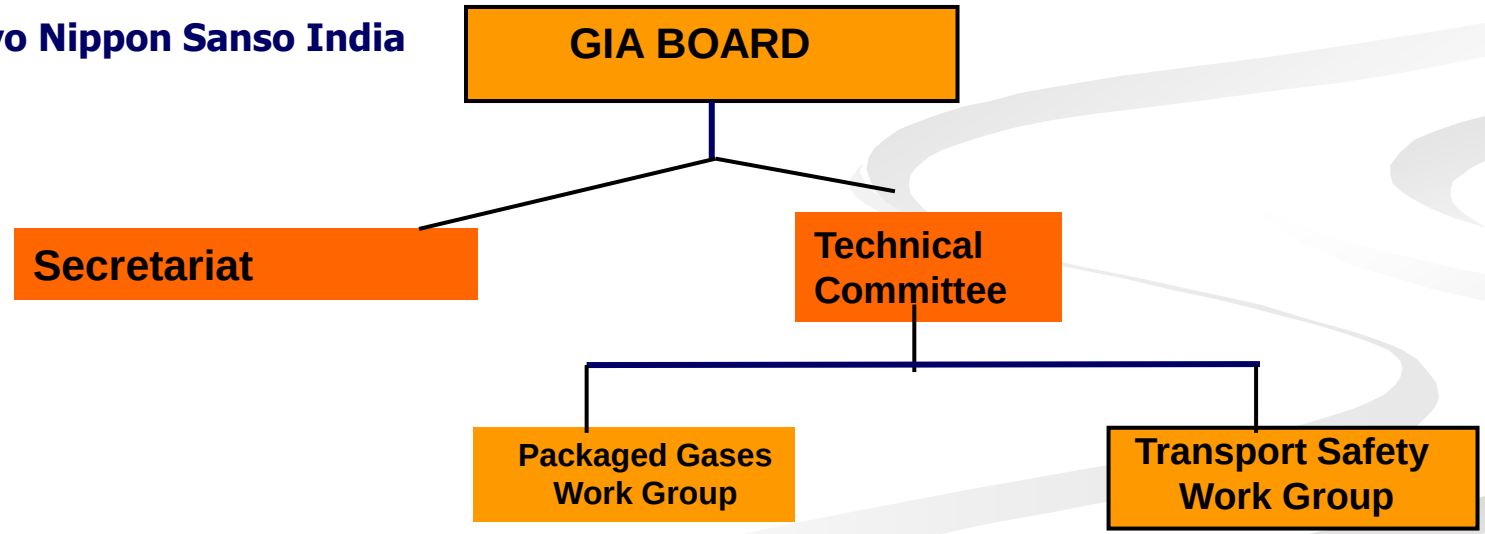
Membership and Management Board

The following are the members:

- Air liquide India
- Linde India
- INOXAP
- Praxair India
- Air Water India Pvt Ltd
- Taiyo Nippon Sanso India

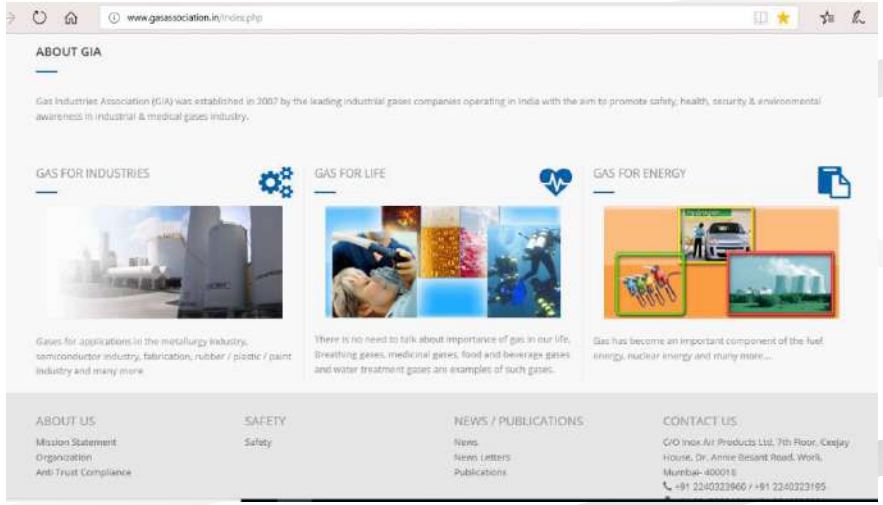
GIA Management Board:

- The Senior Executives of member companies
- The Chairman of the Technical Committee
- The Secretary General (GIA)



GIA Web Site: Open to All

- GIA Web Site:
  - Technical Publications
  - Training Material
  - Standards and Harmonised documents
  - News Letters
  - Blog



Web site : www.gasassociation.in

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GIA's publications are subject to periodic review and users are cautioned to obtain the latest edition.

Introduction

- During routine use, cylinders, Accessories and bundles may be subjected to irregular treatment, mechanical damage, fire damage or contamination. A pre-fill inspection of cylinder is necessary to ensure that the cylinder is safe to fill.

- Pre-fill inspection guidelines as established and are contained in various cylinder codes and regulations are in practice for the benefit of fillers and users.

- Several incidents have occurred due to inadequate pre-fill inspection which could have been avoided.

Why to perform Pre-Fill Check

Every Gas Cylinder needs to be inspected at the time of Filling

- To ensure that it has no visible defects which may be Unsafe for Filling / Unsafe for Use.
- To ensure Cylinder complies with Regulatory requirements with regard to Colour coding , Marking, Labelling and accessories (Valve & Valve protection etc.).
- To ensure that the Valve is functional and it is approved for Gas service.

"The primary responsibility for carrying out the pre-fill inspection process correctly, fully rests with the operators. Facility Manager to ensure the Competency of Operator and required Infrastructure"

Pre - fill Inspection - Agenda

Pre-fill Inspection can be divided in five main Categories

- PPE Requirement
- Cylinder Document Check & physical Verification.
- Cylinder External/Physical Condition Check.
- Cylinder accessories check.
- Residual pressure/contamination check.
- Colour code,Tag,Label ,sticker, check.

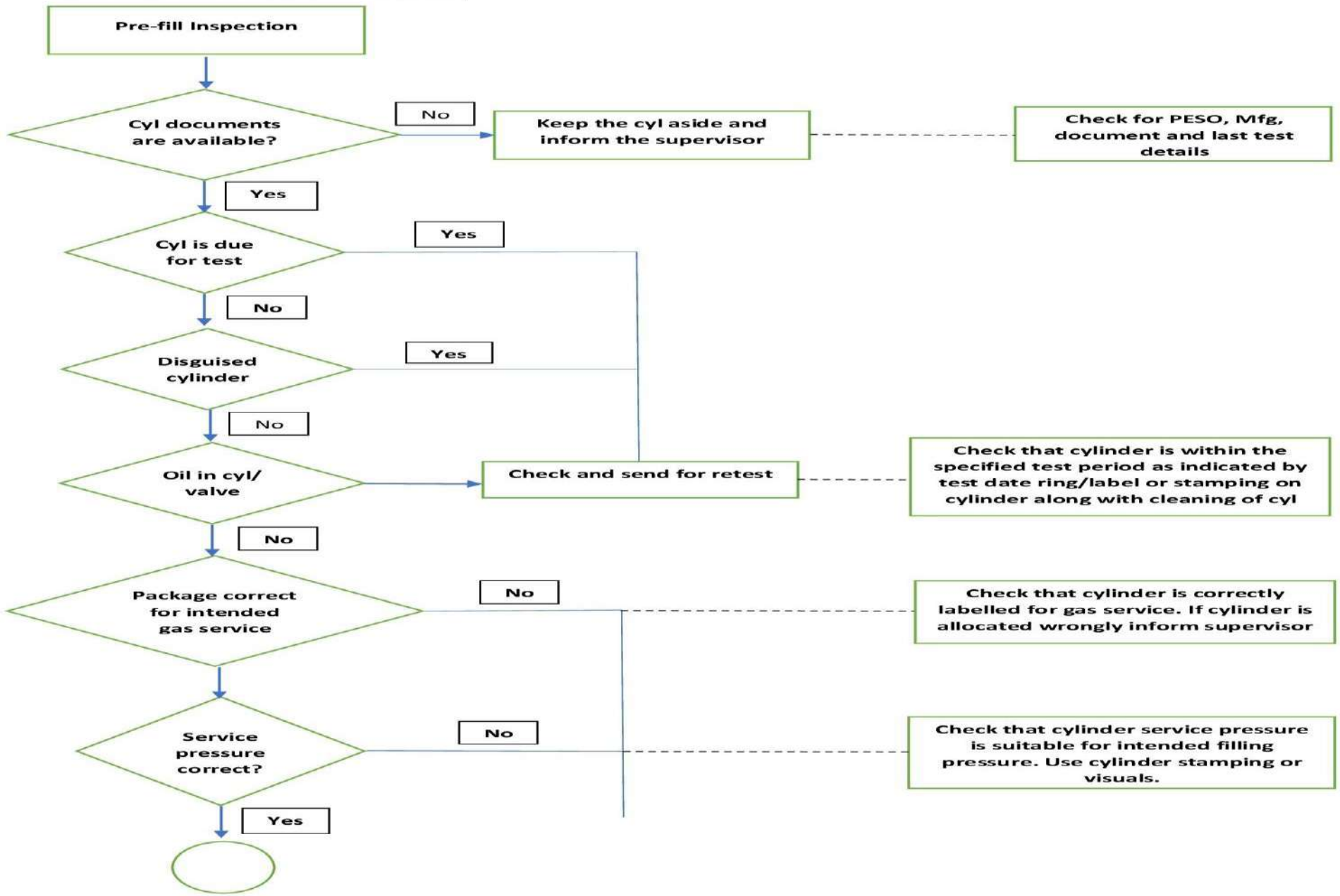
PPE for Pre-Fill

PPE requirements for the pre fill inspection process & the current work area

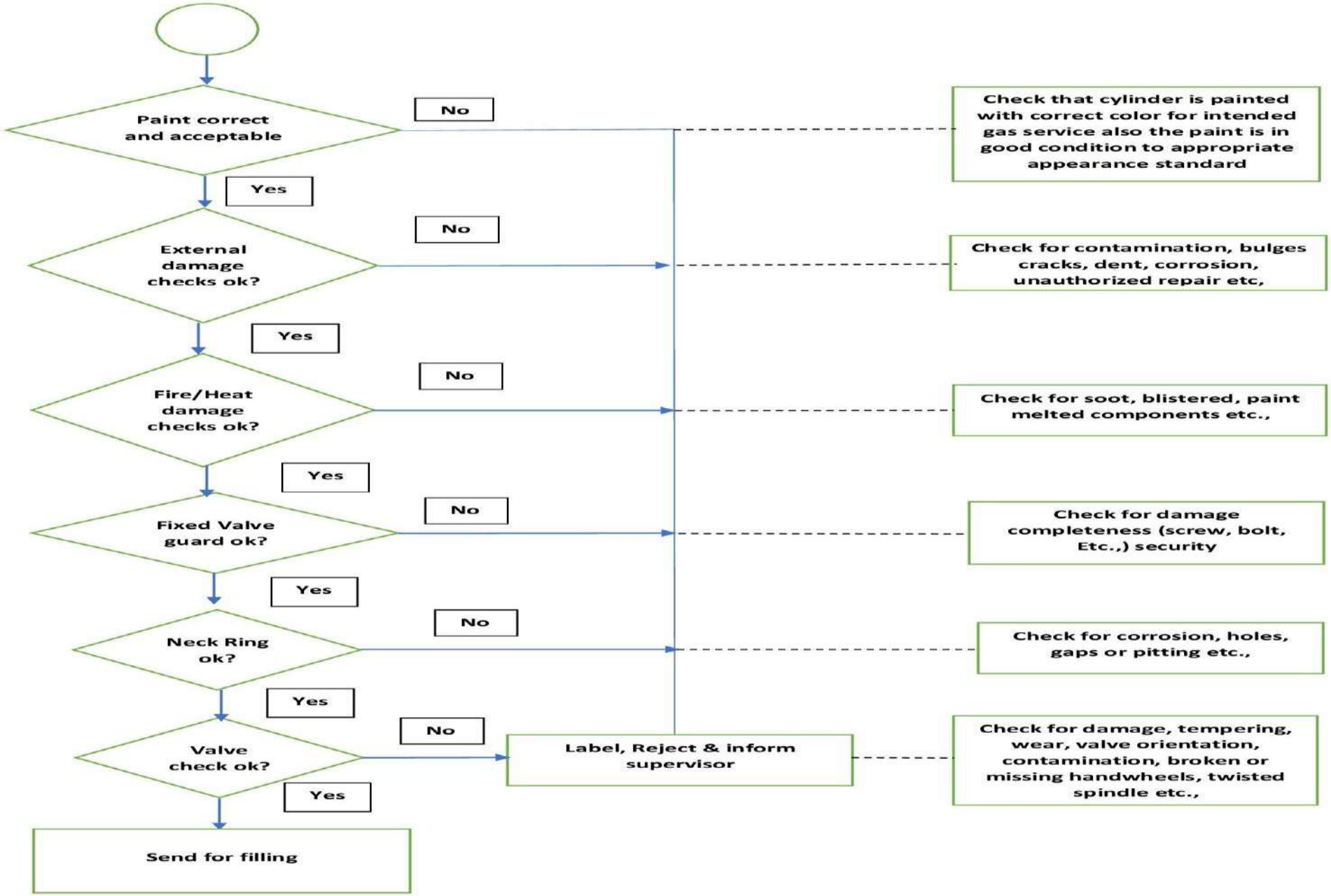
- ❑ Long trousers & sleeves
- ❑ Safety boots
- ❑ Safety glasses
- ❑ Gloves
- ❑ Ear protection

Note : Conduct the Risk Assessment and select the right PPE for the area of operation.

PROCESS FLOW CHART



PROCESS FLOW CHART



Past Incident

Several cases of modified markings or other misuse of cylinders have been reported. The inspection of cylinders before filling operations or in gas cylinder retesting are to detect cylinders with unauthorised markings or those that may have been damaged or misused.

Disguised Transportable Gas Cylinders

Past Incident

Conversion of a 13.4 liter CO2 cylinder into a 20 LT Argon Cylinder

Criminal manipulation on gas cylinders shell by combining two different cylinder parts together by nails.

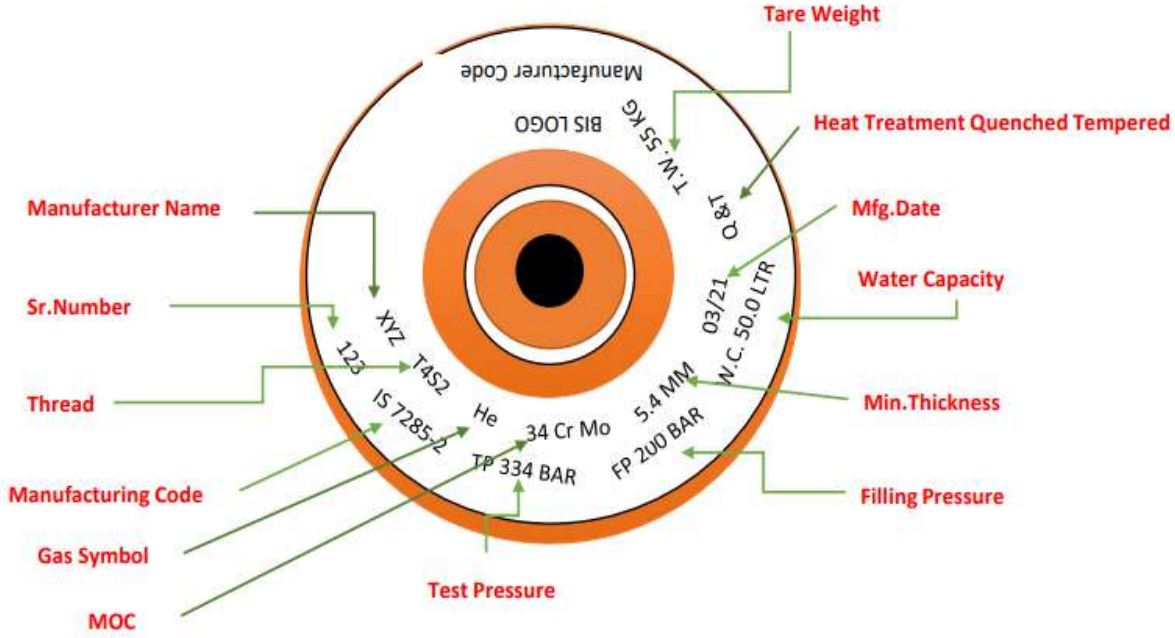
Past Incident

Two persons have been killed and six others injured in a blast at an oxygen refilling station.

Prefill Inspection – Document Check on First Fill

Cylinder Document check and Physical Verification Following Documents are must to fill the cylinders

1. Manufacturers Certificate.
2. Filling Permission for the gas to be filled.
3. Periodic Hydro test Certificate if applicable



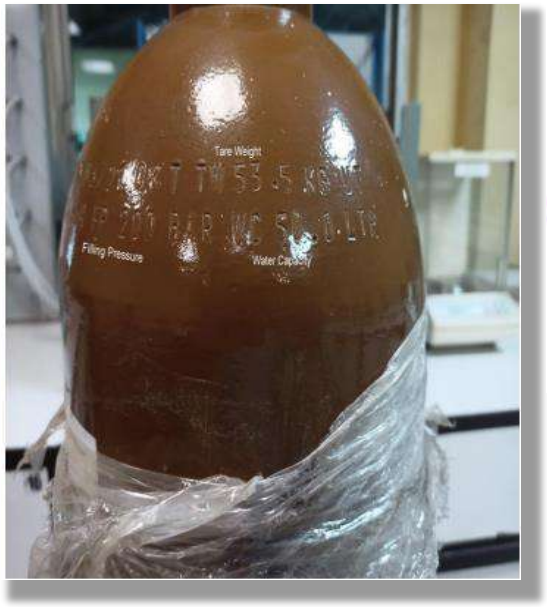
Every cylinder is marked with

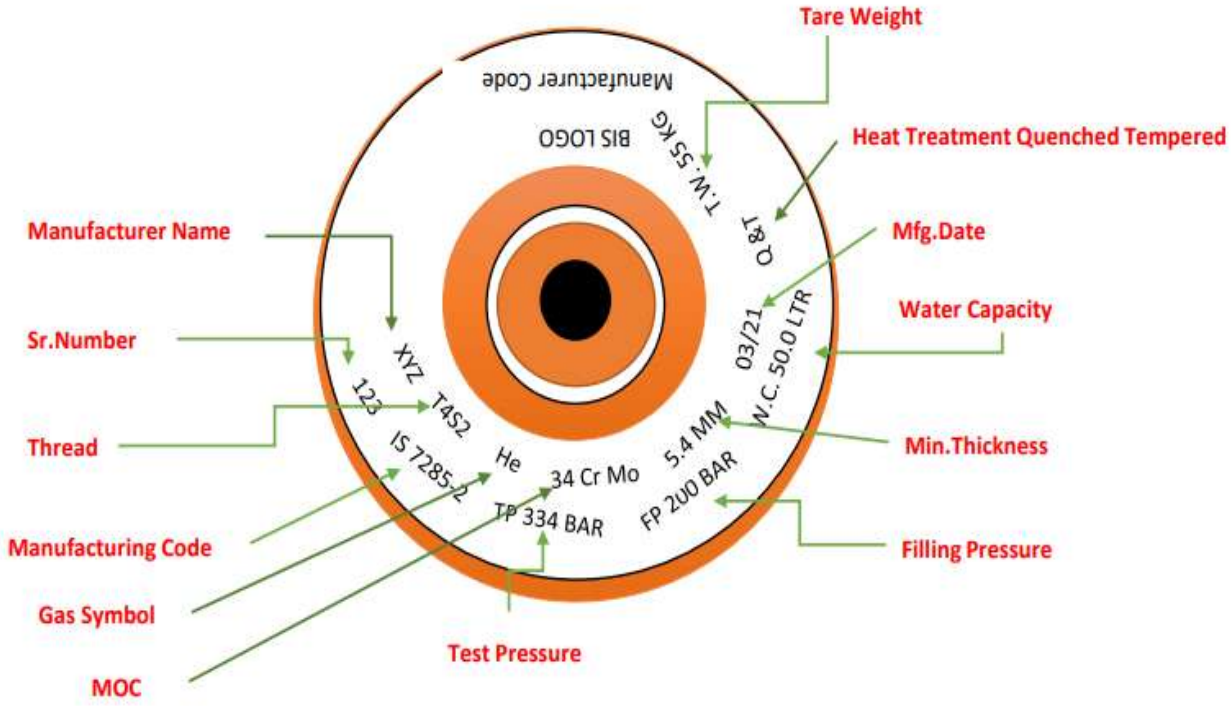
1. Manufacturer name
2. Specification to which Cylinder is manufactured.
3. Gas Service

Prefill Inspection – Document Check on First Fill

Every cylinder is marked with :-

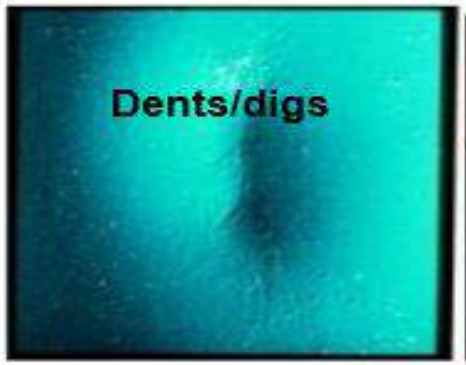
4. Date of Original test
5. Periodic test date if applicable
6. Working pressure
7. Test Pressure
8. Water capacity
9. Tare weight

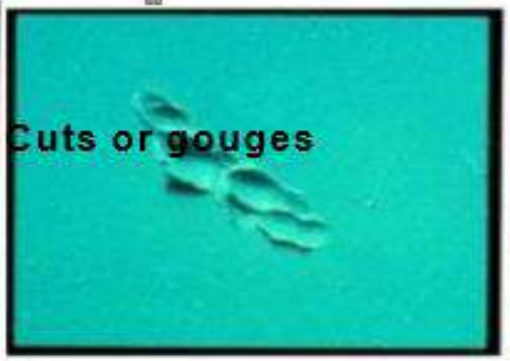




This data should be verified with Cylinder manufacturer Documents.

Cylinder - External Check (Body damage)





General corrosion

Chain/line/pitting corrosion

Base corrosion

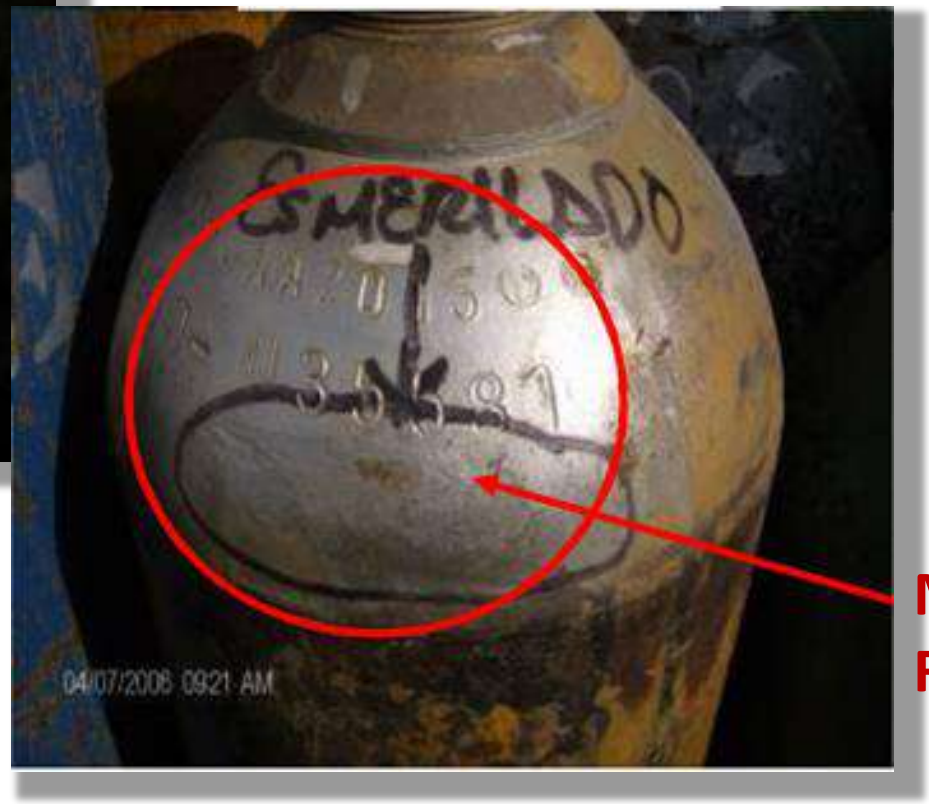
Cylinder External Check - Damage

Cylinder shell corrosion

- Foot ring corrosion or damage & stability
- Valve protection/shroud damage
- Unauthorised repairs
- Weld damage on welded cylinders

Cylinders having any of the above signs of external damage must be sent to the Maintenance area.

Cylinder External Check - Damage



Markings Removed

- Unauthorised repairs

Cylinder External Check – Contamination & Damage

- Grease
- Oil
- Dirt
- Bitumen
- Concrete
- Paint

Cylinder External Check –Fire or Heat Damage

Heat or fire damage can seriously affect the integrity of cylinders.

Heat or fire damage evidence

- Blistered paint
- Arc or torch burns
- Burnt, cracked, or discoloured label
- Burn marks on the metal
- Soot over normal paint
- Deformed hand wheels
- Melted cylinder valve bodies
- Deformed test rings

Cylinders displaying evidence of heat exposure as above needs to be identified and sent to test shop for further assessment.

Determining Cylinder Test Status

- Regular testing ensures cylinders remain safe to fill for the extensive life periods for which they are designed.
- Testing processes allow us to identify faulty and/or tampered cylinders
- Test date is Punched on cylinder neck and due date ring is inserted between Cylinder valve and neck.
- In case Test due identification ring is missing check for last test date details on Cylinder shoulder.


Cylinder without test ring


Cylinder with Test Ring


Test date punch

Cylinder External Check - Disguised Cylinders

Special attention should be given to cylinders that are a different shade or tone than usual, as they may have been deliberately modified to look like a cylinder from another gas service.

Disguised

Cylinder External Check - Hammer Test

Some Regulations Require Hammer Test

- Hammer test should be done before filling to test cylinder integrity.
- Strike the side of the cylinder at approximately mid height with a light tab using a ½ lb ball peen hammer or similar tool.
- A clear bell-like tone that gradually fades indicates that the cylinder is free of contaminants and corrosion.
- A dull thud indicates that the cylinder may contain corrosion products or liquid or solid contaminants.
- If you hear a dull thud tag the cylinder and send to test shop.

Note : The Hammer Test is effective for detecting significant quantities of contaminants and severe corrosion. The test will not detect small quantities of these impurities

Cylinder Accessories - Valve as per IS 3224

Sample of deferent type valve.

Residual Pressure Valve

CO2 Valve

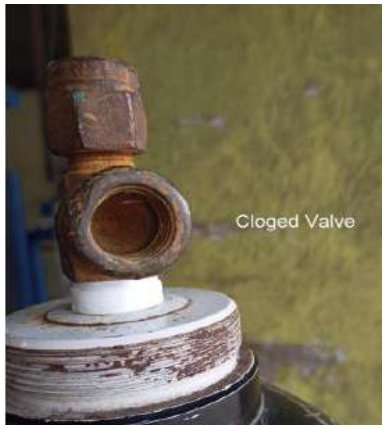
Inert Gas Cylinder Valve

Medical Oxygen Valve

Cylinder Accessories Check - Valve Checks

All cylinder valves must be inspected for signs of damage and/or contamination:

- Correct type for gas service
- Bend Valve
- Contaminated with oil, grease & dust
- Valve tampering
- Thread damage
- Clogged Valve



Check valves with GO-NO-GO (plug/Ring/Threaded gauge)

Potential Hazardous condition or unsafe practices

If the small end **(GO)** does not enter, clean the threads with a tap. If the larger end **(NO GO)** enters, the socket is badly worn out. Mark and send the cylinder to Test Shop for valve replacement.

Cylinder Accessories Check - Valve Guard Types

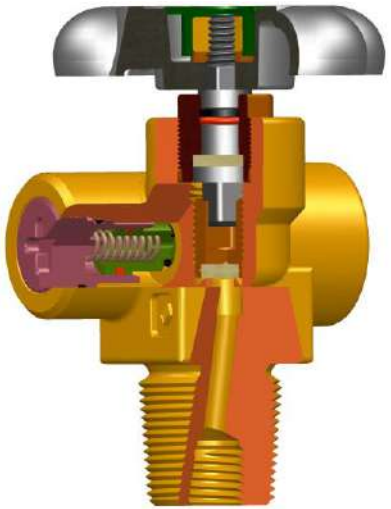
Returned & Residual Pressure and RPV Valves

•Returned pressure is the pressure of unused product in cylinders returned from customers. Returned pressure is indicated by briefly opening the cylinder valve.

•Residual pressure is the positive pressure that is retained by the RPV device. Residual pressure is indicated by the use of a special ‘prod’ tool to unseat the non return valve .

•Residual Pressure Valves (RPV Valve) must be checked for the functional test by using the Prod tool.

Tool used to check the functioning of RPV valves



Inspection for Contamination

- There is a possibility that the empty Cylinder received for refilling is contaminated during use or transport of empty or it is not having any residual pressure.
- Precaution to be observed to identify such cylinders.
- If the Cylinder is received without positive pressure, it should be evacuated/Flushed before filling.
- If the cylinder is received with pressure, the residual gas should be vented out and cylinder should be flushed.
- Conduct Ring Test to identify Cylinder containing free water, segregate and send to Test Shop for further action.

Note: While dealing Toxic & Flammable Gas special care to be taken for venting and purging.

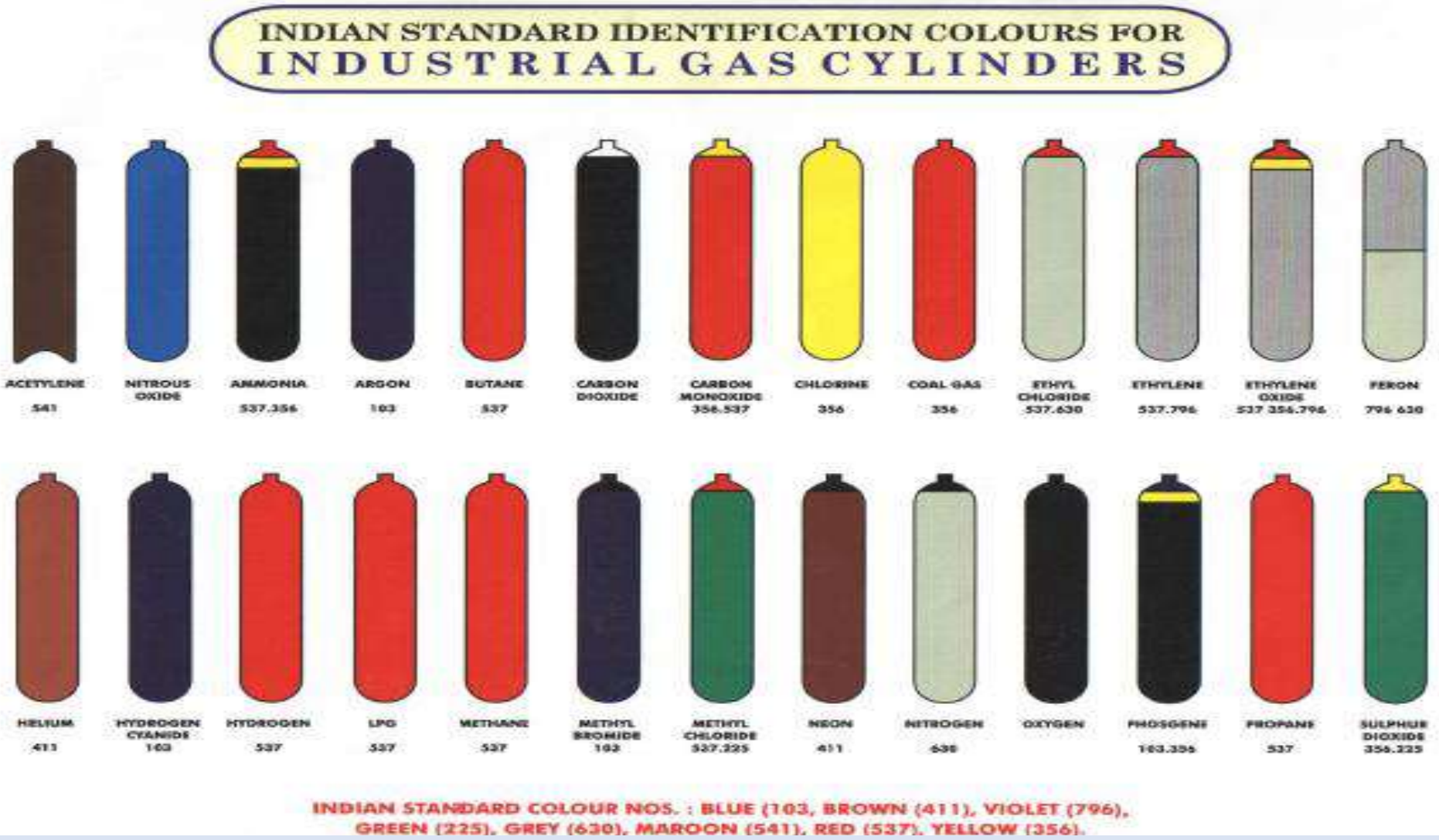
Cylinder Internal Check - Test cylinders for odor (only for Oxygen cylinders) - Best Practice.

- If there is no pressure within the cylinder insert N2 and do the odor test.
- If any odor is detected, keep cylinder aside, mark and segregate and notify Supervisor for further action.

Cylinder Internal Check - Odor Test Regulations

- If Specifically required, this test is done only on Oxygen , Medical Oxygen and breathing / diving Grade of Air Gases.
- At facilities where a local regulation prohibits this test for health reasons, a properly calibrated On-line or Portable Hydrocarbon analyser may be substituted.
- Odour test must not be done on any Special Gases, Flammable Gases and any Gas that may present a Health Hazard.
- Never place your nose directly on the Gas stream.
- Crack Open the valve for a very brief time and reclose it.
- If there is no sufficient gas in the cylinder, introduce a small amount of oil free Nitrogen and carry out test.
- Refer to CGA P – 15 for further details.

Cylinder Appearance Standard



Check the Cylinder is painted with correct colour for the Gas traffic / service and the paint is in good condition and to the appropriate appearance standard.

Gas Cylinder Labels

- Labels are the primary means of identification of gas contents in containers

- Check that the cylinder is correctly labelled for the gas traffic/service

- Cylinders may be mistakenly identified as a gas traffic & filled with the wrong gas causing a catastrophic incident, leading to possible injury or damage to property etc

- Check basic safety information and statutory data from label.

"WARNING" Gas Cylinders, Rules, 2016

(i) Do not change the colour of this cylinder.

(ii) This cylinder shall not be filled with any gas other than the one it now contains.

(iii) No flammable material should be stored in the close vicinity of this cylinder or in the same room in which it is kept.

(iv) No oil or similar lubricant shall be used on the valves or other fittings of this cylinder.

(v) Please look for the next date of test, which is marked on a metal ring inserted between the valve and the neck of the cylinder, and if this date is over, do not accept the cylinder for filling.

Pre-Fill Checks for Bundles/MCP's

- Check for Bundle frame / Manifold & Pigtail nut condition.
- Check for Cylinder Test Status
- Check for Gas Service
- Check for Valve condition and contamination.
- Check the condition of the top hook provided to lift the Bundle.
- Check the condition of side supporting angles.
- Check the painting condition of the Bundles also.

Best Practice : Cylinders are Safe to Fill Tagging

•On completion of the Pre-Fill Inspection, to confirm to the filler.

• Pre-Fill Inspection Passed tag is placed on ALL single cylinders/Bundles or pallet of cylinders

Reference

- Gas Cylinder Rule 2016.
- AIGA 109/20 – Pre-Fill Inspection Customer Owned Cylinders.
- IS 4379-1981 Cylinders Colour Code.
- ISO 9809, Gas cylinders – Refillable seamless steel gas cylinders – Design, construction and testing.
- ISO 24431, Gas Cylinders – Seamless, Welded and Composite Cylinders for Compressed and Liquified Gas (excl Acetylene).
- ISO 11755. Transportable Gas Cylinders – Cylinder Bundles for Permanent and Liquified Gases (Excl Acetylene).
- ISO 11114, Gas Cylinders – Compatibility of Cylinders & Valve Materials with Gas Contents (Part 1 – Metallic Materials & Part 2 – Non Metallic Materials)
- ISO 11117:2008 Gas Cylinders -Valve protection caps & Valve Guards – Design, Construction & Tests.
- ISO 10961:2010 Gas Cylinders – Cylinder Bundles Design , Manufacture, Testing & Inspection.

Thank You