
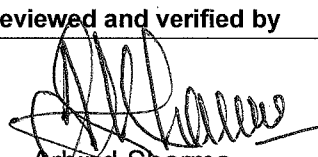
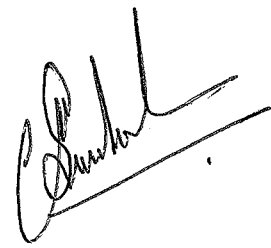
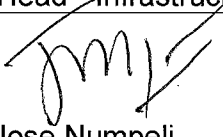

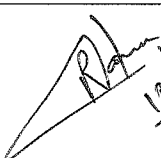


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## STANDARD OPERATING PROCEDURE (SOP)

# HANDLING, STORAGE AND USE OF COMPRESSED GAS CYLINDERS

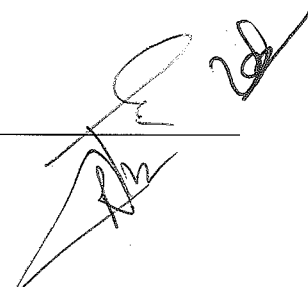
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13/02/2023

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Document Change Note

Rev. No	Rev. Date	Comments / Changes
00	2-12-2022	New Issue



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## 1. PURPOSE

To prevent accidents while handling, storage and use of compressed gas cylinders for industrial purpose during construction activities

## 2. SCOPE

This procedure shall apply to all AMNS project sites and related work areas including contractors to meet –

- Legal and regulatory requirements
- Project specific HSE requirements
- ISO 45001 and ISO 14001 standard requirements
- AMNS HSE Policy

## 3. DEFINITIONS

**Compressed gas:** 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 1.5 kgf/ cm<sup>2</sup> gauge at + 15° C or a pressure exceeding 2 kgf/ cm<sup>2</sup> gauge at + 50° C or both including cryogenic liquids.

**Gas Cylinder or Cylinder:** Any closed metal container having a volume exceeding 500 ml but not exceeding 1000 litres intended for the storage and transport of compressed gas.

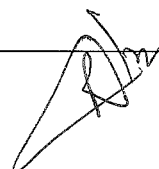
**Zone 1:** A hazardous area classified as an atmosphere where a mixture of air and flammable substances in the form of gas, vapour or mist is likely to occur in normal operation, but if it does occur, will pose serious fire/ explosion hazard.

**Zone 2:** A hazardous area classified as an atmosphere where a mixture of air and flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation, but if it does occur, will persist for a short period only.

## 4. RESPONSIBILITY

The Project Head and the HSE Manager are responsible for ensuring that the project is in compliance with the general requirements and those given in this procedure.





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## 5. PROCEDURE

### 5.1. HAZARDS

The hazards associated with use of electrical equipment are:

- Gas leak – Toxic/ Flammable gas in to work atmosphere
- Falling cylinders, rolling over personnel
- Fire/ explosion/ Hot surfaces
- Manual handling
- Pinch points

### 5.2. GENERAL

Commonly used industrial gas cylinders are -

Gas	Characteristics	Cylinder Color
Oxygen	No smell, non-toxic, will burn but supports combustion. In oxygen rich area small spark can catch fire to the normal combustibles especially in confined space.	Black
Nitrogen	No smell, does not burn, inert except at high temperatures. Asphyxiant at high concentrations especially in confined spaces.	Grey, with Black at the neck
Argon	No smell, heavier than air, does not burn, will cause Asphyxiation in absence of oxygen	Blue
Acetylene	Distinct garlic type smell, Fire and explosion hazard	Maroon
Propane	Distinctive fish like smell. Highly flammable	Bright red - "Propane highly flammable"

All the industrial gas cylinders must be procured from the approved supplier and all the cylinders shall meet the Indian Regulations:

- (i) The Gas Cylinder Rules, 2016
- (ii) The Static and Mobile Pressure Vessels (Unfired) Rules, 2016

Any suspected cylinders shall be kept separately and brought to the notice of the supplier for clarification or for returning. All the cylinders received from supplier shall be fitted with valve guard / cap

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### 5.3 SAFE STORAGE OF GAS CYLINDERS

- Cylinder storage area shall be clearly demarked appropriately away (30 meter from the hot work area) from the work site.
- The cylinders are stored in a covered shed which is well ventilated, protected against direct sun light and heat.
- The shed area shall properly graded to protect from any rainwater or mud. The approach is also properly graded for easy movement of cylinder trolley. Access to the area shall be restricted to authorised persons only.
- The storage shed is strengthened by at least 1 meter high rigid structure (temporary using metal scaffold pipes) and provision for chaining cylinders.
- All cylinder shall be stored in an upright position.
- Different types of cylinders are stored separately with proper permanent barrier with proper identification labelling.
- Empty cylinders and full cylinders shall be stored separately and are properly labeled.
- All the cylinders shall be fitted with correct type of valve cap / guard all the time and all the cylinders shall be kept vertical and secured by chaining.
- All the flammable gas cylinders shall be kept away from the oxygen cylinders
- All the electrical fittings shall meet for zone II classification in the cylinder storage area
- Appropriate Cautionary boards such as NO SMOKING, NO NAKED FLAME AND NO HOT WORK, and CYLINDER TYPE & COLOUR CODE should be displayed.
- Appropriate type and sufficient numbers of Fire Extinguishers shall be provided and maintained all the time.

### 5.4 SAFE USE OF INDUSTRIAL GAS CYLINDERS

- The industrial gas cylinders shall be handled and used by the trained persons.
- Before receiving for the use the cylinder contents shall be checked by the marking on the cylinder. In case of any doubt the same should not be used and returned to the supplier.
- The cylinders shall be kept in the cylinder trolley/ cage and properly secured by chain

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- Ensure that the cylinders are protected from any knockout and not obstructing the passage
- Always the cylinders are kept vertical/ uptight position while in use.
- No one should attempt to repair or replace the any part of cylinders. Any defects noticed on cylinder shall be returned to supplier
- Correct & suitable regulators with pressure gauge to be fixed on the valve before use. Flash back arresters shall be in place at least at cylinder side.
- The valve to be opened or closed only by proper valve key
- Under no circumstances the oxygen be brought in contact with oil / grease which can catch fire instantaneously. Keep cylinder valves free from oil and grease.
- Venting of partially empty cylinders should be prohibited.
- Always maintain a minimum of 20 feet or 6 meter distance between flammable gas cylinder and oxygen cylinder.

## 5.5 TRANSPORTATION OF GAS CYLINDERS

- All cylinders must be properly capped and valve part shall be protected from any external damage while transporting
- Always cylinders shall be transported upright position and all the cylinders are properly secured by chaining and shall be placed in sectional boxes.
- Cylinders shall never be dropped on tyre or other material from the trailer or truck. They shall be lowered safely.
- Never use chain or metal slings for lifting or lowering Gas cylinders. Use flat band/web slings.
- Cylinders shall never be rolled or dragged. They have to be moved / shifted only in trolley.
- Do not transport cylinders while regulators & pressure gauges mounted on them unless they are mounted on trolley.

## 5.6 MINIMUM PPE REQUIREMENTS

<b>Head Protection</b>	Helmet	<b>Eye protection</b>	Safety glasses
<b>Foot Protection</b>	Steel toe safety shoes	<b>Hand protection</b>	Cotton gloves (rubber coated)
Additional PPE shall be used as per JSA			

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## 6. CHECKING, CORRECTIVE AND PREVENTIVE ACTION

Periodic inspections shall be carried out to assess compliance to this procedure. Any deviations shall be reported to Project Head & Corrective and preventive action shall be taken.

## 7. RECORDS

Sl. No.	Title	Location	Retention period
01	Inspection reports of gas cylinders, hoses and associated accessories	HSE Department	Until completion of project

## 8. REFERENCE DOCUMENTS

S. No.	Format No.	Standard Name
1	AMNS/Project/SOP/HSEM/04	Hot Work Safety
2	AMNS/Project/TS/HSEM/22	Manual Material Handling

## 9. ANNEXURES

AMNS/Project/SOP/HSEM/03/F01 - Gas Cylinder Checklist

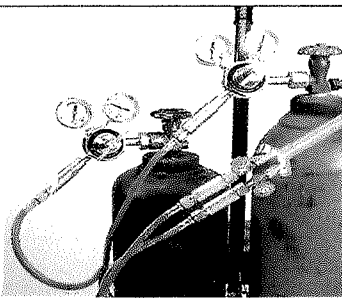
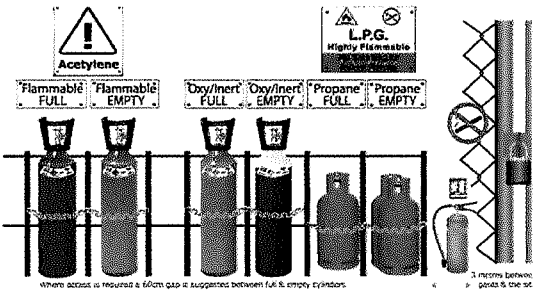


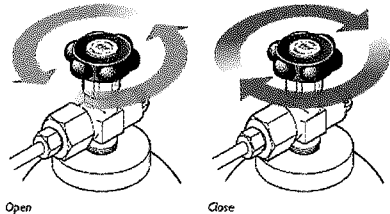
Annexure-1 - Dos and Don'ts while handling, storing and using compressed gas cylinders



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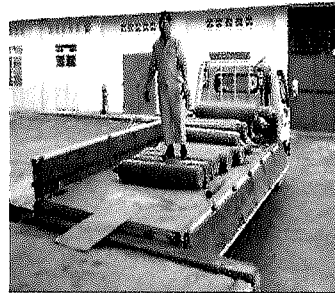
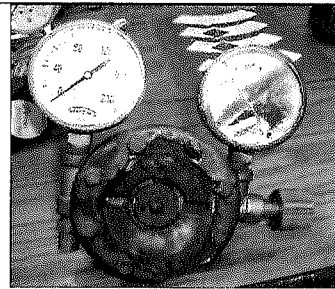
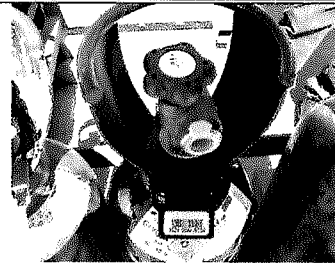

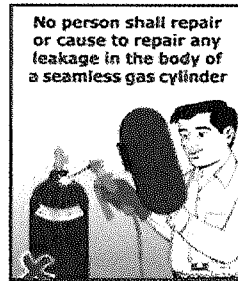
### Annexure-1

#### DO's AND DONT's WHILE HANDLING/STORAGE AND USE OF GAS CYLINDERS

Do's	Pic's
<ul style="list-style-type: none"> <li>➤ Ensure a regulator is fitted before use</li> <li>➤ Ensure cylinder is firmly secured</li> <li>➤ Ensure connections are tight and suitable</li> <li>➤ Ensure flash back arresters are fitted</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Ensure cylinders are stored and used away from ignition sources</li> <li>➤ Store full and empty cylinders separately</li> <li>➤ Ensure adequate ventilation is available for the gas in question</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Ensure valve guards or caps are fitted when cylinders are not in use</li> <li>➤ Cylinders shall be secured by cylinder wall brackets/ chains</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Use mechanical assistance when handling cylinders</li> <li>➤ Cylinder trolleys to be used for shifting of gas cylinders.</li> </ul>	
<ul style="list-style-type: none"> <li>➤ Close valves and tighten caps when not in use.</li> </ul>	

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Don'ts	Pic's
➤ Repaint cylinder	
➤ Transport Gas cylinders in the passenger compartment vehicle ➤ Rolling cylinders by foot	
➤ Lubricant on valve or other fittings of cylinder	
➤ Tamper with the gas cylinder test tag ➤ Tamper with or remove the barcode from a gas cylinder	
➤ Attempt to fight a fire involving a gas cylinder ➤ Use a cylinder that shows evidence of damage or corrosion ➤ Fill cylinders with any material at all	 

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<b>AM/NS INDIA</b>	<b>Handling, Storage &amp; Use of compressed gas cylinder</b>  <b>GAS CYLINDER STORAGE CHECKLIST</b>	AMNS/Project/SOP/HSEM/04/F01
		Rev : 00
		Date: 02 Dec 2022
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<b>Project Name:</b>		<b>Date:</b>	
<b>Location:</b>			
<b>Name of Contractor</b>			

SN	Check Points	OK/ Not OK / NA	Remarks
1	Is the cylinder storage area shall be clearly demarked appropriately away (30 meter from the hot work area) from the work site.		
2	Are the cylinders are stored in a covered shed which is well ventilated, protected against direct sun light and heat?		
3	Is the shed area and its approach is properly graded?		
4	Is the access to the area restricted to authorized persons only?		
5	Are the cylinders stored in an upright position and secured (chained)?		
6	Are different types of cylinders stored separately with proper permanent barrier and with proper identification labelling?		
7	Are the empty cylinders and full cylinders stored separately and are properly labelled?		
8	Are all the cylinders fitted with correct type of valve cap / guard all the time?		
9	Are all flammable gas cylinders kept away from the oxygen cylinders (minimum of 20 feet or 6 meter)?		
10	Is the electrical fittings meet zone II classification in the cylinder storage area?		
11	Are cautionary boards displayed near the storage area?		
12	Are appropriate type and sufficient numbers of Fire Extinguishers provided and maintained all the time?		
13	Are the cylinders shifted with cylinder trolley?		
14	Do all cylinder have cylinder caps / valve guard?		

**Inspected By:**

Name:

Signature

