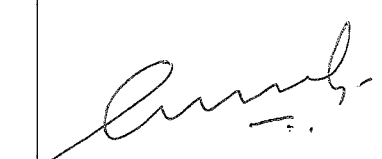
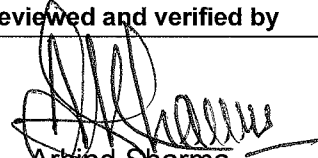
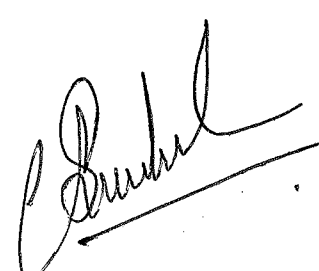
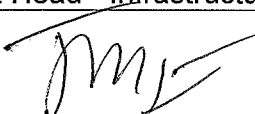

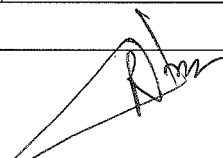


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## STANDARD OPERATING PROCEDURE (SOP)

# HOT WORKS (WELDING/CUTTING/GRINDING/ FLAME HEATING)

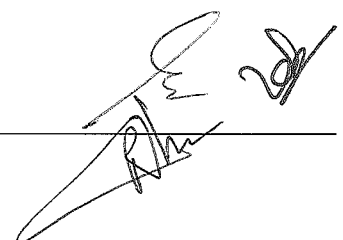
Prepared by	Reviewed and verified by	Authorized by
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20/02/2023  
13/02/2023

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Document Change Note

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



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## 1.0 PURPOSE

The purpose of this procedure is to prevent accidents while carrying out activities involving heat/ spark generation.

The activities include –

- Arc welding
- Gas cutting
- Cutting / Grinding using powered hand tools
- Heating of surfaces/ metal body using gas flames

## 2.0 SCOPE

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

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

## 3.0 DEFINITIONS

**Hot Work:** Hot work means any activity which can introduce a source of ignition such as sparks or naked flames. It is a general term which normally refers to grinding, welding, thermal or oxygen cutting or heating, and other related heat-producing or spark-producing operations.

**Welding:** Welding has been defined as the fusion of two pieces of metal, rendered plastic or liquid by heat or by pressure, or by both. There are many different welding processes, but the two most commonly used are gas welding and electric arc welding.

**Hazardous Area:** Hazardous Area (classified area) has been defined as an area in which flammable liquids, vapours or gases, combustible liquids, dusts or fibres, or other flammable or explosive substances may be present in ignitable concentrations.

**Hot Work Area:** The area exposed to sparks, hot slag, radiant or convective heat as a result of the hot work.

**Gas Cutting:** Oxy-fuel cutting is a thermal cutting process that uses oxygen and fuel gas (such as acetylene, propane, propylene and natural gas) to cut through materials.

## 4.0 RESPONSIBILITIES

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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## 5.0 PROCEDURE

### 5.1. HAZARDS

The hazards associated with welding and gas cutting are:

- Hot surfaces/ molten metal/ splash of hot material
- Electrocution
- Toxic fumes & gases
- Arc flash/ bright spark
- Improper access/ egress leading to slip/trip/ fall
- Fire and explosion

### 5.2. GENERAL REQUIREMENTS

- Permit to Work procedure shall be used for all gas cutting, welding, grinding & cutting using power tools, heating using naked flames operations in flammable area.
- Only trained and authorized employees are permitted to perform gas cutting, welding, grinding & cutting using power tools, heating using naked flames operations.
- Arrange good ventilation in the hot work area.
- In confined space, continuous mechanical/forced air ventilation equipment (forced air and/or exhaust) must be provided to remove the fumes.
- Never carry out hot work in enclosed vessels, drums or tanks which have contained flammable materials unless they have been purged, tested and certified safe to work on.
- Provide Suitable fire extinguisher like Dry Chemical Powder and/or Carbon di Oxide type near each welding job and supported by fire blanket and dry sand bucket
- Ensure fire watcher is provided while carrying out hot works in flammable atmosphere
- Use only approved personal protective clothing when welding or cutting.

### 5.3. WELDING

- All the equipment shall be subjected to periodic maintenance, inspection and test by the competent person.
- Keep trailing welding cables clear of roads & walk-ways. Secure to overhead fixtures where possible.
- When welding at height, provide proper scaffold (approved by scaffold inspector) and lay the cables safely.
- Ensure the cables and connections are in good condition. Make certain that the welding equipment, work piece is properly earthed.
- Electric arc welding sets shall be positioned safely as close as possible with proper care to avoid long trailing cable.
- When portable welding transformers are used proper earthing must be ensured.

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- In the case of portable motor generator welding sets, all the parts such as frames & bed plates are properly earthed.
- Use crocodile clamp in the neutral cable.
- Power supply to the welding machine shall be routed through appropriate RCCB/ ELCB to prevent electrocution.
- All the electrode holders shall be of local / international standards & shall have positive clamping mechanism for the electrode. They shall be inspected periodically and maintained.
- Electrode holders shall not be kept on ground when not in use, provide suitable wooden stands.
- When necessary, use screens to protect neighboring workers from the arc.
- Stand on an insulated mat when the ground is damp.
- Wear adequate protective clothing including long sleeve leather gloves, leather apron and clear goggles for chipping.
- Use appropriate respiratory protection if required.
- Helmets or hand shields with proper shielding must be used during arc welding or cutting operations.
- Make sure that your shield/ goggles contain the correct filter glasses.

#### 5.4. GAS CUTTING

- All accessories of gas cutting (Hoses, regulators, cutting torch, connectors) shall meet local/international standards.
- Inspect all accessories prior to use for any damages/ leaks. If found defective, stop using and report to supervisor for rectification.
- Soap water testing shall be done on hose, to determine leaks prior to use.
- Make sure the gas hoses are free from kinks. Never drag long hoses which will reduce the strength
- Never exceed hose length more than 15 meters. If needed, take the cylinders close to the work place. If taking cylinders close to work place is not safe or not feasible, the long hoses shall be secured from damages from other work activities in that area.
- Use approved hose connectors only
- Ensure that the hose and torch are depressurized when work is completed and close the valve on the cylinder.
- All hoses shall be fitted with flashback arresters (fuel specific) on both sides of the hose. The hose have to be crimped to the connector, which is then secured or tightened to the flashback arrestor.
- Safety cutting goggles must be worn during cutting operations.
- Long sleeve leather apron shall be worn while carrying out gas cutting
- All oxy-Acetylene sets which are portable shall be moved on wheeled trolley.
- When not in use, blow-pipes and hoses shall not be left in vessels or enclosed spaces
- No domestic or commercial LPG gas cylinder shall be used along with industrial cylinder for oxy-fuel cutting.

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In the event that a gas cylinder becomes over heated it shall be dealt promptly with following actions:

- Shut the valve
- Detach regulator or other fitting.
- Take cylinder out of doors and immerse or drench in cold water until cylinder is cool.
- If cylinder is too hot to touch continuously, do not move it but drench with cold water spray.
- HSE department shall be informed immediately together.

➤ **Leaking but not on fire**

- If possible stop leak by shutting off valve.
- If not possible to stop leak, the cylinder should be removed to a safe outdoor location, keeping the leak uppermost.

➤ **Leaking cylinder on fire**

- Apply cooling water to the top of cylinders
- If it is suspected that the valve is damaged, no attempt to extinguish the fire should be made and specialized assistance must be sought.
- If the valve is undamaged – Extinguish fire using a fire extinguisher if possible and close the valve.
- If a cylinder is exposed to a heat source, such as a general fire, the cylinder should be kept cool with water spray and if possible remove from the heat source. Direct flame impingement on pressurized gas cylinders is prohibited.

➤ **Flashbacked OR Suddenly extinguishing welding torch**

- Shut both blowpipe valves shutting oxygen first.
- Check that regulator settings were correct.
- Check cylinder pressures.
- If blowpipe is overheated plunge it in water, afterwards making sure that the nozzle is tight.
- Purge both hoses individually
- Relight after making certain that the fuel gas flow has become properly established.

## 5.5. GRINDING/CUTTING USING POWER TOOLS

- All the equipment shall be subjected to periodic maintenance, inspection and test by the competent person.
- Keep trailing machine cables clear of roads & walk-ways. Secure to overhead fixtures where possible.

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- When power tool operation is done at height, provide proper scaffold (approved by scaffold inspector) and lay the cables safely.
- Ensure the cables and connections are in good condition.
- Power supply to the tools shall be routed through appropriate RCCB/ ELCB to prevent electrocution
- Barricade the operation area, to protect neighboring workers from the flying sparks and debris.
- Wear adequate protective clothing including long sleeve leather gloves, leather apron and face shield.
- Use appropriate respiratory protection if required

## 5.6. HEATING USING NAKED FLAMES

- All accessories of gas heating (Hoses, regulators, cutting torch, connectors) shall meet local/international standards.
- Inspect all accessories prior to use for any damages/ leaks. If found defective, stop using and report to supervisor for rectification.
- Make sure the gas hoses are free from kinks. Never drag long hoses which will reduce the strength
- Never exceed hose length more than 15 meters. If needed, take the cylinders close to the work place. If taking cylinders close to work place is not safe or not feasible, the long hoses shall be secured from damages from other work activities in that area.
- Use approved hose connectors only
- Ensure that the hose and torch are depressurized when work is completed and close the valve on the cylinder.
- All hoses shall be fitted with flashback arresters (fuel specific) on both sides of the hose. The hose have to be crimped to the connector, which is then secured or tightened to the flashback arrestor.
- Safety goggles must be worn during cutting operations.
- Long sleeve leather apron shall be worn while carrying out gas cutting
- Fuel cylinders shall be moved on wheeled trolley.
- When not in use, blow-pipes and hoses shall not be left in vessels or enclosed spaces

## 5.7. MINIMUM PPE REQUIREMENTS

Head Protection	Helmet	Hand Protection	Long sleeve leather gloves
Respiratory Protection	Fumes mask	Foot Protection	Steel toe safety shoes
Body Protection	Leather Apron	Eye protection	Gas cutting goggles Welding face shield
Additional PPE shall be used as per Job Safety Analysis			



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## 6.0 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.

## 7.0 RECORDS

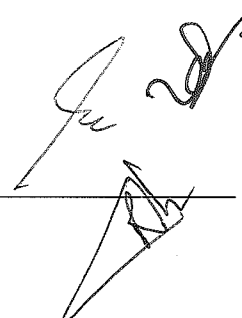
S. No.	Title	Location	Retention period
01	Periodic inspection reports	Department/ Project site	6 Months

## 8.0 REFERENCE DOCUMENTS

S. No.	Format No.	Standard Name
1	AMNS/Project/SOP/HSEM/03	Handling, Storage and Use of compressed gas cylinders
2	AMNS/Project/TS/HSEM/14	Working in Confined Space
3	AMNS/Project/TS/HSEM/13	Personal Protective Equipment
4	AMNS/Project/SS/HSEM/10	Permit to Work (PTW)

## 9.0 ANNEXURES

- |                                 |  |
|---------------------------------|--|
| 1. AMNS/Project/SOP/HSEM/18/F01 | - Gas cutting set/ flame heating checklist |
| 2. AMNS/Project/SOP/HSEM/18/F02 | - Welding checklist                        |
| 3. AMNS-Project-TS-HSEM-06-F13  | - Portable grinding machine checklist      |
| 4. AMNS-Project-TS-HSEM-06-F17  | - Wheel type cutting machine               |



<b>AM/NS INDIA</b>	<b>HOT WORK SAFETY GAS CUTTING / HEATING CHECKLIST</b>	AMNS/Project/SOP/HSEM/03/F01
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<b>Project Name:</b>		<b>Name of Site Area &amp; Location</b>	
<b>Date</b>		<b>Identification No.</b>	
<b>Name of Contractor</b>			

SN	Check Points	OK/ Not OK / NA	Remarks
1	Is the complete installation from cylinder, hose, torch, regulator free from oil and grease?		
2	Are the cylinders secured to a trolley or structure?		
3	Are the regulators and gauges in good condition?		
4	Are the hoses in good condition? No cracks or Joints		
5	Is the torch assembly in good condition?		
6	Are flashback arrestors in use (on both sides of the hose)?		
7	Are the flashback arrestor crimped to the hose?		
8	Is cylinder having cap for protection of valves?		
9	Is the wrench/handle kept on the cylinder valve?		
10	Are the valves closed and lines bled after use?		
11	Are cylinders stored away from heat sources?		
12	Is a fire extinguisher available when using the torch?		
13	Is the torch leak test done in last 6 months?		
14	Is a fire watcher in place		
15	Is a spark lighter available? (no match box or lighter to be used).		

**Inspected By:**

Name:

Signature

<b>AM/NS INDIA</b>	<b>HOT WORK SAFETY WELDING SET CHECKLIST</b>	AMNS/Project/SOP/HSEM/03/F02
		Rev : 00
		Date: 02 Dec 2022
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<b>Project Name:</b>		<b>Name of Site Area &amp; Location</b>	
<b>Date</b>		<b>Identification No.</b>	
<b>Name of Contractor</b>			

SN	Check Points	OK/ Not OK / NA	Remarks
1	Is the machine having a valid inspection tag?		
2	Is grounding of the machine frame and safety ground connections of portable machines checked periodically?		
3	Are Electrode free from defect, no metal portion exposed? Are electrodes removed from the holders when not in use?		
4	Is ON/OFF switch, meters and other control working?		
5	Is the output leads protected?		
6	Is the machine cable free from joints and cable rated for maximum current?		
7	Is wet machine thoroughly dried and tested before being used?		
8	Is the welding machine rectifier type? (Transformers are not allowed as per standard)		
9	Does the connecting cables lengths have adequate insulation?		
10	Body of the welding machine is fully intact, the cover fully closed.		

**Inspected By:**

Name:

Signature

