

Procedure Title:	<b>Compressed Air &amp; Compressed Gas Cylinders</b>	SOP Number:	<b>SOP-100-03-PR-010</b>
Procedure Owner:	<b>Corporate HSE</b>	Issuing Authority:	<b>Chief Safety Officer</b>

# COMPRESSED AIR & COMPRESSED GAS CYLINDERS

2	8/9/17	Added New 4.1 Compressed Air Safety & Changed the Title	DWS	9/7/17
1	11/8/16	4.1.10 Changed 1-hour to 1/2 -hour fire rating to comply with OSHA.	DWS	11/28/16
0	7/11/13	Complete Rewrite	DWS	1/20/14
<b>Rev. #</b>	<b>Rev. Date:</b>	<b>Changes</b>	<b>Approved</b>	<b>Issue Date</b>

# Compressed Air & Compressed Gas Cylinders

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## 1.0 PURPOSE

The purpose of this procedure is to establish the minimum requirements for Compressed Air & Compressed Gas Cylinders for STIS DBA Southeast Texas Industrial Services.

## 2.0 SCOPE

This procedure applies to all HenSu Holdings employees, contractors, subcontractors and visitors associated with an HenSu Holdings site.

## 3.0 RESPONSIBILITIES

The following personnel have responsibilities defined in this procedure:

- HenSu Holdings Managers
- HenSu Holdings Supervisors
- HenSu Holdings Employees
- HenSu Holdings Contractors
- HenSu Holdings Subcontractors
- HenSu Holdings Visitors

## 4.0 PROCEDURE

Each site shall make every attempt to prevent the possibility of incidents and accidents to employees while performing work activities involving compressed air and compressed gas cylinders through compliance with safety regulations, training of employees to properly perform their job activities and through employee involvement in safe work activities.

### 4.1 COMPRESSED AIR SAFETY

#### 4.1.1 General safety requirements for compressed air.

- 4.1.1.1 All pipes, hoses, and fittings shall have a rating of the maximum pressure of the compressor.
- 4.1.1.2 All safety valves shall be tested.
- 4.1.1.3 Air supply shutoff valves should be located (as near as possible) at the point-of-operation.
- 4.1.1.4 Air hoses should be kept free of grease and oil to reduce the possibility of deterioration.
- 4.1.1.5 Hoses should not be strung across floors or aisles where they are liable to cause personnel to trip and fall. When possible, air supply hoses should be suspended overhead, or otherwise located to afford efficient access and protection against damage.
- 4.1.1.6 Hose ends shall be secured to prevent whipping if an accidental cut or break occurs.
- 4.1.1.7 Pneumatic impact tools should never be pointed at a person.
- 4.1.1.8 Before a pneumatic tool is disconnected (unless it has a quick disconnect plugs), the air supply shall be turned off at the control valve and the tool bled.
- 4.1.1.9 Compressed air shall not be used under any circumstances to clean dirt and dust from clothing or off a person's skin. Compressed air used for cleaning shall be regulated to 15 psi unless equipped with diffuser nozzles to provide lessor pressure.

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- 4.1.1.10 Double eye protection shall be worn by personnel using compressed air for cleaning equipment.
- 4.1.1.11 Static electricity can be generated through the use of pneumatic tools. This type of equipment shall be grounded or bonded if it is used where fuel, flammable vapors or explosive atmospheres are present.
- 4.1.2 Safety Requirements for Operating and Maintaining Compressed Air Machinery
  - 4.1.2.1 All components of compressed air systems shall be inspected regularly by qualified and trained employees. Operators need to be aware of the following:
  - 4.1.3 Air Receivers:
    - 4.1.3.1 The maximum allowable working pressures of air receivers should never be exceeded except when being tested. Only hydrostatically tested and approved tanks shall be used as air receivers.
    - 4.1.3.2 Air tanks and receivers should be equipped with inspection openings, and tanks over 36 inches in diameter should have a manhole. Pipe-lug openings should be provided on tanks with valves of less than five (5) cubic feet.
    - 4.1.3.3 The intake and exhaust pipes of small tanks should be made removable for interior inspections.
    - 4.1.3.4 No tank or receiver should be altered or modified by unauthorized persons.
    - 4.1.3.5 Air receivers should be fitted with a drain cock that is located at the bottom of the receiver.
    - 4.1.3.6 Receivers should be drained frequently to prevent accumulation of liquid inside the unit unless provided with an automatic drain system.
    - 4.1.3.7 Air tanks should be located so that the entire outside surfaces can be easily inspected. Air tanks should not be buried or placed where they cannot be seen for frequent inspection.
    - 4.1.3.8 Each air receiver shall be equipped with at least one (1) pressure gage and an ASME safety valve of the proper design.
    - 4.1.3.9 A safety (spring loaded) release valve shall be installed to prevent the receiver from exceeding the maximum allowable working pressure.
    - 4.1.3.10 Only qualified personnel should be permitted to repair air tanks, and all work shall be done according to established safety standards.
  - 4.1.4 Air Distribution Lines
    - 4.1.4.1 Air lines shall be made of high quality materials, fitted with secure connections.
    - 4.1.4.2 Only standard fittings shall be used on air lines.
    - 4.1.4.3 Operators shall avoid bending or kinking air hoses.
    - 4.1.4.4 Air hoses shall not be placed where they will create tripping hazards.
    - 4.1.4.5 Hoses shall be checked to ensure they are properly connected to pipe outlets before use.
    - 4.1.4.6 Air lines shall be inspected frequently for defects, and any defective equipment shall be repaired or replaced immediately.
    - 4.1.4.7 Compressed air lines shall be identified as to the maximum working pressure (psi), by tagging or marking pipeline outlets.

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### 4.1.5 Pressure Regulation Device

- 4.1.5.1 Only qualified personnel shall be allowed to repair or adjust pressure regulating equipment.
- 4.1.5.2 Valves, gages and other regulating devices shall be installed on compressor equipment in such a way that cannot be made inoperative.
- 4.1.5.3 Air tanks safety valves shall be set no less than fifteen (15) psi or ten (10) present (whichever is greater) above the operating pressure of the compressor, but never higher than the maximum allowable working pressure of the air receiver.
- 4.1.5.4 Air lines between the compressor and receiver should usually not be equipped with stop valves. Where stop valves are necessary and authorized, ASME safety valves should be installed between the stop valves and the compressor.
- 4.1.5.5 The safety valves should be set to blow at pressures slightly above those necessary to pop the receiver safety valves.
- 4.1.5.6 Blow-off valves should be located on the equipment and shielded so sudden blow-off will not cause personnel injuries or equipment damage.
- 4.1.5.7 Case iron seat or disk safety valves should be ASME approved and stamped for intended service application.
- 4.1.5.8 If the design of a safety or a relief valve is such that liquid can collect on the discharge side of the disk, the valve should be equipped with a drain at the lowest point where liquid can collect.
- 4.1.5.9 Safety valves exposed to freezing temperatures should be located so water cannot collect in the disk, the valve should be equipped with a drain at the lowest point where liquid can collect.

### 4.1.6 Air Compressor Operation

- 4.1.6.1 Air compressor equipment should only be operated only by authorized and trained personnel.
- 4.1.6.2 The air intake should be from a clean, outside, fresh air source. Screens or filters can be used to clean the air.
- 4.1.6.3 Air compressors should never be operated at speeds faster than the manufacturers recommendations.
- 4.1.6.4 Equipment should not become overheated.
- 4.1.6.5 Moving parts, such as compressor flywheels, pulleys, and belts that could be hazardous should be effectively guarded.

### 4.1.7 Compressed Air Equipment Maintenance

- 4.1.7.1 Only authorized and trained personnel should service and maintain air compressor equipment.
- 4.1.7.2 Exposed, noncurrent-carrying, metal parts of compressors should be effectively grounded.
- 4.1.7.3 Low flash point lubricants should not be used on compressors because of its high operating temperatures that could cause a fire or explosion.
- 4.1.7.4 Equipment should not be over lubricated.
- 4.1.7.5 Gasoline or diesel fuel powered compressors shall not be used indoors.

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- 4.1.7.6 Equipment placed outside but near buildings should have the exhausts directed away from doors, windows and fresh air intakes.
- 4.1.7.7 Soapy water or lye solutions can be used to clean compressors parts of carbon deposits, but kerosene or other flammable substances should not be used. Frequent cleaning is necessary to keep compressors in good working condition.
- 4.1.7.8 The air system should be completely purged after each cleaning.
- 4.1.7.9 During maintenance work, the switches of electrically operated compressors should be locked open and tagged to prevent accidental starting.
- 4.1.7.10 Portable electric compressors should be disconnected from the power supply before performing maintenance.

### 4.2 COMPRESSED GAS CYLINDERS

#### 4.2.1 Receiving and Storage

- 4.2.1.1 Cylinders shall be properly identified with labels.
- 4.2.1.2 The color or shape of the cylinder shall not be used to determine its contents.
- 4.2.1.3 Any cylinder without legible written identification of contents shall not be received or used.
- 4.2.1.4 Precautions contained on the Safety Data Sheets (SDS) shall be followed for the use and storage of compressed gases.
- 4.2.1.5 All cylinders shall be secured in an upright position with a chain, cable or other non-combustible material.
- 4.2.1.6 Cylinders shall not be received or stored without the protective cap in place and screwed down.
- 4.2.1.7 Cylinders that are leaking, severely corroded, have dents, holes, cracks, fire burns, or other signs of container deterioration shall not be received, stored or used.
- 4.2.1.8 Cylinders shall be stored in a well-ventilated location that is clean and free of combustible material.
- 4.2.1.9 Compressed gas cylinders shall never be placed or stored inside of tanks or other confined spaces.
- 4.2.1.10 Cylinders shall be stored by the types of gas they contained.
- 4.2.1.11 Hydrogen is extremely flammable and explosive. It requires good ventilation, particularly in storage.
- 4.2.1.12 Oxygen cylinders shall be stored at least twenty (20) feet from flammable gas containers unless they are separated by a five (5) feet high fire resistant barrier with at least a one half (1/2) hour fire rating.
- 4.2.1.13 Storage areas shall have dry chemical type fire extinguishers available with signage posted stating *No Smoking or Open Flame*.
- 4.2.1.14 Full and empty cylinders shall be stored separately.
- 4.2.1.15 Cylinders shall be stored away from stairs and elevators.
- 4.2.1.16 Empty cylinders shall have their valves closed and visibly marked as *EMPTY* or *MT*.
- 4.2.1.17 Cylinders shall always be kept away from sources of heat and electrical wiring.

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- 4.2.1.18 Upon the completion of the task or the equipment will be left unattended, bottles shall be turned off and the gages removed from the cylinders.
- 4.2.1.19 Acetylene cylinders shall always be stored, transported and used vertically with the valve end up.
- If acetylene cylinder is allowed to be laid horizontally, the cylinder shall be placed vertical for a minimum of thirty (30) minutes before use.
- 4.2.2 Using Cylinders
- 4.2.2.1 Cylinders in use shall be secured in an upright position.
- 4.2.2.2 Hoses and connections shall be checked daily to ensure they are in good condition.
- Connections shall be leak tested using a soapy water solution or other approved testing material.
- 4.2.2.3 Flashback arresters shall be installed at the gauges on both the fuel and oxygen lines.
- 4.2.2.4 All cylinder outlets shall be kept free of oil or grease
- Never lubricated
  - Never handled with oily hands
- 4.2.2.5 Cylinders shall not be used without the appropriate pressure regulators and adjusted to the required working pressure.
- 4.2.2.6 Valves shall be opened by hand using the valve wheel or tool designed for the purpose.
- 4.2.2.7 Never substitute one gas for another. Oxygen shall never be used as a substitute for compressed air.
- 4.2.2.8 Unused gas cylinders shall be removed from the welding and cutting area.
- 4.2.2.9 Cylinders shall not be used as rollers, supports, and braces or handled roughly.
- 4.2.2.10 Empty cylinders shall be handled as if they were full. First close the cylinder valve, and then open the regulator to relieve pressure before disconnecting. Do not stand in front of exhausting gas.
- 4.2.2.11 If cylinders are found to have leaking valves or fittings that cannot be stopped from leaking by closing the valves, they shall be removed from all sources of ignition and either emptied slowly or removed from the facility.
- 4.2.3 Transporting or Transferring Cylinders
- 4.2.3.1 Cylinders shall never be moved, transported or transferred without the valve protective cap in place.
- 4.2.3.2 Cylinders shall be moved in as near an upright position as possible. Special hand trucks are recommended for handling of a single cylinder.
- 4.2.3.3 When compressed gas cylinders are being transported, the regulator shall be removed, the valve shall be closed and the cap shall be put in place. The cylinder shall be secured in an upright position.
- 4.2.4 When cylinders must be hoisted, they shall be secured in an approved device designed for the purpose.
- They shall not be transported or hoisted by means of magnets or slings.

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## 4.2.5 Manufacturers Requirements

- 4.2.5.1 Compressed gas cylinders shall be hydrostatically tested every five (5) years unless the cylinder is less than thirty-five (35) years old and has a star by the pressure test date. It shall then be tested every ten (10) years.

## 5.0 REFERENCES

OSHA 1910.253	Oxygen-fuel Gas Welding and Cutting
OSHA 1910.101	Compressed Gases
OSHA 1910.102	Acetylene
OSHA 1910.103	Hydrogen
OSHA 1910.104	Oxygen

## 6.0 TERMINOLOGY

### Site

Any location where HenSu Holdings personnel are involved in work activities.

## 7.0 EXHIBITS

None