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**EHS-322 COMPRESSED AIR AND COMPRESSED AIR EQUIPMENT GUIDELINES**

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## 1.0 Introduction

### 1.1 Purpose

This purpose of these guidelines is to provide instruction for the safe use and maintenance of compressed air and compressed air equipment at Emory University, as prescribed in the Occupational Safety and Health Administration (OSHA) Standard – 29 CFR 1910.169 Compressed Air and Compressed air Equipment.

### 1.2 Scope

These guidelines are inclusive of Emory employees, including Emory Healthcare (EHC), faculty, staff, students, contractors, and other people who work with or in close proximity to air and compressed air equipment.

### 1.3 Definitions

**Air Dryer.** A device associated with air compressor systems that helps remove water from the air tank and air lines.

**ASME.** American Society of Mechanical Engineers

**Desiccant.** A material having a large proportion of surface pores, capable of attracting and removing water vapor from the air.

**Dew Point.** The temperature at which moisture in the air will begin to condense if the air is cooled at constant pressure. At this point the relative humidity is 100%.

**Drain Valve.** A type of valve positioned at a low pint on an air tank to remove the accumulation of water. It can be manual, float or an electric valve.

**Filters.** Devices for separating and removing particulate matter, moisture or entrained lubricant from the air.

**Gauge Pressure.** The pressure determined by most instruments and gauges, usually expressed in psig.

**I.D.** The inside diameter of a pipe or tube.

**PSI.** Pound per Square Inch. A unit of measurement that refers the pressure applied on one square inch of an object's surface.

**PSID.** Pound per Square Inch Differential. A unit of measurement that refers to the difference in pressure between two pressure sources.

**Rated Capacity.** Volume rate of air flow at rated pressure at a specific point.

**Rated Pressure.** The operating pressure at which compressor performance is measured.

**Receiver.** A vessel or tank used for storage of gas under pressure. In a large

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compressed air system there may be primary and secondary receivers.

**Valves.** Devices with passages for directing flow into alternate paths or to prevent flow.

#### 1.4 Training Requirements

Only trained and authorized personnel are allowed to operate, maintain and service compressed air machinery. Training includes a review of information contained in this guideline, as well as any manufacturer instruction and required training related to the equipment being used.

#### 1.5 Personal Protective Equipment (PPE) Requirements

Ensure that personnel operating compressed air equipment wear PPE appropriate for the specific hazards, including:

- Eye protection – safety glasses with side shields or goggles
- Foot protection – close-toe shoes (steel-toe shoes or boots are required if crushing hazards are present)
- Hand protection – gloves (i.e. heat/cold-resistance, chemical-resistant, etc.)

### 2.0 General Safety Requirements

- Have all components of the compressed air system inspected regularly by authorized and trained personnel.
- Ensure all pipes, hoses, and fittings meet the maximum pressure rating of the compressor.
- Prevent sharp objects from rubbing against the hose and maintain the air hose in good condition:
  - Keep the air hose off the floor.
  - Always coil the hose (without kinks) and hang it over a broad support when not in use.
  - **Note: Narrow supports can create weak points in the hose.**
- Always use the lowest pressure necessary to perform a job task.
- When using an air nozzle to direct air pressure for specific tasks, (i.e. cleaning equipment, removing dust from hard to reach areas on equipment, clearing lines, etc.) ensure that the air pressure exiting the nozzle is 30 psi or less:
  - Adjust the air regulator to reduce the air pressure, or
  - Use a safety tip on the air nozzle to maintain air pressure below 30 psi should the tip of the air nozzle become blocked or dead-headed, and
  - Ensure that effective chip guarding, such as barriers, baffles or screens, are utilized to protect workers; and
  - Ensure that personal protective equipment are provided and worn by the operator, as indicated by a hazard assessment.
- Never point the nozzle of an air hose at anyone and never use compressed air to clean debris from a person's skin or clothing, while they are being worn.
- Keep exposed skin away from hot compressor components.
- Do not use air compressors to supply breathing quality air, unless the requirements in OSHA 29 CFR 1910.134 are achieved.
- Only use safety valves that are constructed, installed, and maintained in accordance with the A.S.M.E. Boiler and Pressure Vessel Code, Section VIII Edition 1968.

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- Ensure engine-driven portable air compressors consist of an air compressor and a gasoline or diesel engine rigidly connected together in permanent alignment and mounted on a common frame.

### **3.0 Specific Requirements of Compressed Air Machinery**

#### **3.1 Compressors**

- Ensure the air intake is from a clean, outside, fresh air source, or that the air is effectively cleaned using screens or filters.
- Never operate air compressors at speeds faster than the manufacturers' recommendation.
- Ensure all moving parts are properly guarded and ensure that all exposed, non-current-carrying, metal parts of the compressor are effectively grounded.
- Confirm all pipes, hoses and fittings have a rating not less than the maximum pressure of the compressor.
- Inspect compressors and air tanks before use for any signs of wear or damage.
- When placing compressors outside near buildings, direct exhausts away from doors, windows and fresh air intakes.

#### **3.2 Air Distribution Lines and Filtration**

- Only use standard fittings on air lines.
- Ensure hoses are properly connected to pipe outlets before use.
- Avoid bending or kinking air hoses and inspect air lines frequently for defects.
- Do not place air hoses where they will create tripping hazards.
- Keep air hoses free of grease and oil to reduce the possibility of deterioration.
- Tag or mark the air distribution outlets with the maximum working pressures (psi) of the compressed air lines.
- Ensure installed airline filters are mounted vertically.
- Do not use dry type particulate filters where intake air contains moisture or vapors in amounts that could cause a breakdown in the filter element.
- Direct automatic drain flow away from the immediate area using a drain line of at least 1/8" I.D.

#### **3.3 Pressure Regulation Devices**

- When adjusting a regulator to the desired pressure, ensure that it doesn't exceed the rated capacity of hoses and equipment.
- Set safety valves approximately 10% higher than the maximum operating pressure of the compressor, but never higher than the maximum allowable working pressure of the air receiver.
  - Ensure that safety valves are set to blow at pressures slightly above those necessary to pop the receiver safety valves.
  - Ensure blowoff valves are directed away from locations where a sudden blowoff could cause injury to personnel or damage equipment.
- Where air lines between the compressor and receiver are equipped with stop valves, ensure that ASME safety valves are installed between the stop valves and the compressor.
- Do not allow safety valves to be exposed to freezing temperatures.

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- If a valve does become frozen, ensure it is thawed and drained before operating the compressor.
- Do not use a flame to thaw valves.

**3.4 Air Receivers**

- Ensure new air receivers are constructed in accordance with the 1968 edition of the A.S.M.E. Boiler and Pressure Vessel Code Section VIII.
- Only hydrostatically tested and approved tanks are allowed to be used as air receivers.
- Maintain the pressure drop between the receiver and the point of use at a minimum.
- Locate air tanks or receivers such that the entire outside surface can be easily inspected.
- Ensure air tanks and receivers greater than thirty-six (36) inches in diameter are equipped with manhole access.
- Ensure air tanks with volumes less than five (5) cubic feet are provided with pipe lug openings.
- Ensure all air receivers are equipped with the following:
  - A drain valve located at the bottom of the receiver to drain and prevent accumulation of liquid inside the tank;
  - Note: Air receivers with automatic drain systems are exempt from this requirement.
  - At least one pressure gauge; and
  - One or more spring-loaded, safety release valves installed to prevent the receiver from exceeding the maximum allowable working pressure.
  - Never exceed the maximum allowable working pressures of air receivers.
  - Note: When the tank is being tested, it is acceptable to exceed the operating pressure.

**3.5 Air Dryers**

- When selecting an appropriate air dryer, ensure that dew point, operating pressure and inlet temperatures are considered to ensure the required performance is met.
- Ensure replacement refrigerants, such as HFC-134a, are utilized in refrigerated air dryer systems instead of hydrochlorofluorocarbon (HCFC) refrigerants.
- Refrigerant type dryers should only be serviced by a licensed and trained technician to assure that the refrigerant material is properly handled.
- Consider installation of desiccant dryers where extremely low dew point temperatures are required.
- Ensure desiccants are replaced every three to five years or as indicated by the manufacturer of the desiccant air dryer.

**3.6 Portable Compressed Air Machinery**

- Follow the manufacturer's guidelines for operation of portable air compressors.
- Ensure state, local, and federal regulations are followed when portable air compressors are towed on highways.

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### 3.7 Inspection and Maintenance

- Follow the manufacturer's recommendations for care and maintenance when servicing compressed air equipment.
- Ensure only qualified personnel are permitted to repair air compressors, air tanks, and associated equipment.
- Before conducting any repairs to the pressure system of air compressors, receivers or compressed air equipment, ensure all hazardous energy sources are locked and tagged out, and all pressure has been released.
- Drain moisture, oil or carbon buildup from compressed air receivers daily.
- Inspect air line particulate filters daily and clean or replace the filter element whenever the pressure drop across a filter at rated flow is approximately 10 psid. **Note: Pressure drop across a filter can be monitored by the use of two pressure gauges, one mounted on either side of the filter, or by installing a differential pressure indicator.**
- Perform daily inspections of the safety devices on compressed air systems. The safety valve can be checked by pulling the valve ring.
  - If the ring goes back in by itself, the safety valve is working properly.
  - If any of the following occurs, the safety valve is NOT working properly:
    - The valve sticks and the ring does not re-set;
    - Air leaks out after ring is pulled, then released; or
    - If air is not released when the ring is pulled.
- Inspect inlet air filters, at least weekly. Clean or replace air filters according to operating conditions and manufacturer specifications.
- Clean the condenser coils with a blow gun (fitted with a safety nozzle) or with a soft bristled brush, as needed.
- Clean compressor parts with soapy water. Never use flammable substances.
- Never use high flash point lubricants on compressors. The high operating temperatures could cause a fire or an explosion.

### 4.0 References

Occupational Health and Safety Administration [OSHA], 1910 Subpart M, Compressed Gas and Compressed Air Equipment – *Air Receivers*, 29 CFR 1910.169.  
Compressed Gas Association [CGA] (2008). P-1 OSHA – *Safe Handling of Compressed Gases in Container*.