

Compressed Air Safety

Headlines



How can an air receiver tank explode?

During operation, deposits of lubricating oil tend to build up in the line supplying compressed air from the compressor cylinder to the air receiver. As the diameter of the supply line decreases, the already high temperature of the compressed air rises further to a point where it is possible for the contaminant to ignite.

Sparks are then carried into the air receiver where oil from the compressor, which is often present as a mixture with air in the air receiver, burns explosively. As the pressure relief valve is not designed for such an event, rupture of the air receiver vessel is likely to occur. In other air compressor accidents, static electricity sparks have also been identified as a source of fires and explosions.

Prevention Measures

To avoid such incidents and damage, all air compressor equipment should be maintained in a safe operational condition and be regularly inspected. To prevent excessive fouling of compressed air supply lines, only the grade of oil recommended by the manufacturer/supplier should be used in the compressor.

Compressor General Safe Operation

Compressors can be portable and stationary; powered with electricity or gas. Portable compressors on wheels must be prevented from rolling. Warning signs are required for electric air compressors equipped with an automatic-start function. A piston inside the compressor squeezes air inside the tank to run shop tools and equipment. Get training on safe compressor use and work practices.

Before each use, inspect the compressor hoses, wires, and pipes for wear and damage. Check the air tank for pin holes, rust, or weak spots at the welds. Never repair, weld, or drill into tanks; damaged tanks must be replaced. Drain moisture from the tank after each use to prevent rust. Protect air lines and hoses by keeping the work area clean of sharp objects, chemicals, and grit that can cause damage.

Start the compressor using manufacturer's instructions. The compressor switch should be off, the air tank drained, and the tank pressure reading zero before you power the compressor and turn it on. Adjust the regulator to the desired pressure, making sure it doesn't exceed the rated capacity of hoses and equipment.

Safety valves prevent the tank from becoming over-pressurized; check them before each use by pulling the valve ring. It should go back in by itself. Replace the valve if air leaks after the ring is pulled, if the valve sticks and the ring doesn't re-set, or if air is not released when the ring is pulled. Safety valves should be set about 10% higher than the maximum operating pressure of the compressor.

To avoid burns, keep your hands away from hot compressor parts. Wear gloves and use tools to disconnect hoses while the unit is warm. Use grounded compressors in a dry environment to avoid electric shock. Keep cooling fans and belt motor pulleys guarded to prevent caught/crush injuries. Keep loose hair, clothing, and jewelry away from moving parts. Air from the compressor is not safe for breathing through a supplied-air respirator unless it has been certified as Grade D breathing air through special filtering and purifying filters.

Never look into a compressed air nozzle, or into a tool powered by compressed air. Compressed air nozzles can cause severe damage if the air is discharged into your body. A careless air discharge can rupture an eardrum, cause brain hemorrhage, pop an eye, rupture internal organs, and cause bubbles in the blood stream. Do not use compressed air for cleaning parts unless it is less than 30 psi in pressure and proper PPE is worn. Under NO CIRCUMSTANCE should employees use compressed air to clean themselves or clothing while they are worn.

To shut the compressor down, turn the power switch off; do not unplug it. Close the regulator valve until the pressure gauge reads zero. Drain the air tank. Unplug the compressor if it will be unattended or if you are finished for the day. De-pressurize tank, pipes, hoses, and gauges before disconnecting them. Cool compressors before storing.

Safety Requirements for Operating & Maintaining Compressed Air Machinery:

All components of compressed air systems should be inspected regularly by qualified and trained employees. Operators need to be aware of the following:

Air receivers:

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.

1. 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 volumes of less than five cubic feet.
2. The intake and exhaust pipes of small tanks, similar to those used in garages, should be made removable for interior inspections.
3. No tank or receiver should be altered or modified by unauthorized persons.
4. Air receivers should be fitted with a drain cock that is located at the bottom of the receiver.
5. Receivers should be drained frequently to prevent accumulation of liquid inside the unit. Receivers having automatic drain systems are exempt from this requirement.
6. 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.
7. Each air receiver shall be equipped with at least one pressure gauge and an ASME safety valve of the proper design.
8. A safety (spring loaded) release valve shall be installed to prevent the receiver from exceeding the maximum allowable working pressure.
9. Only qualified personnel should be permitted to repair air tanks, and all work must be done according to established safety standards.

Air Distribution Lines:

1. Air lines should be made of high quality materials, fitted with secure connections.
2. Only standard fittings should be used on air lines.
3. Operators should avoid bending or kinking air hoses.
4. Air hoses should not be placed where they will create tripping hazards.
5. Hoses should be checked to make sure they are properly connected to pipe outlets before use.
6. Air lines should be inspected frequently for defects, and any defective equipment repaired or replaced immediately.
7. Compressed air lines should be identified as to maximum working pressures (psi), by tagging or marking pipeline outlets.

Pressure regulation Devices:

1. Only qualified personnel should be allowed to repair or adjust pressure regulating equipment.
2. Valves, gauges and other regulating devices should be installed on compressor equipment in such a way that cannot be made inoperative.
3. Air tank safety valves should be set no less than 15 psi or 10 percent (whichever is greater) above the operating pressure of the compressor but never higher than the maximum allowable working pressure of the air receiver.
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.
5. The safety valves should be set to blow at pressures slightly above those necessary to pop the receiver safety valves.
6. Blow off valves should be located on the equipment and shielded so sudden blow offs will not cause personnel injuries or equipment damage.
7. Case iron seat or disk safety valves should be ASME approved and stamped for intended service application.
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.
9. Safety valves exposed to freezing temperatures should be located so water cannot collect in the valves. Frozen valves must be thawed and drained before operating the compressor.

Air Compressor Operation:

1. Air compressor equipment should be operated only by authorized and trained personnel.
2. The air intake should be from a clean, outside, fresh air source. Screens or filters can be used to clean the air.
3. Air compressors should *never* be operated at speeds faster than the manufacturers' recommendation.
4. Equipment should not become overheated.
5. Moving parts, such as compressor flywheels, pulleys, and belts that could be hazardous should be effectively guarded.

Compressed Air Equipment Maintenance:

1. Only authorized and trained personnel should service and maintain air compressor equipment.
2. Exposed, noncurrent-carrying, metal parts of compressor should be effectively grounded.
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. Equipment should not be over lubricated.
5. Gasoline or diesel fuel powered compressors shall not be used indoors.
6. Equipment placed outside but near buildings should have the exhausts directed away from doors, windows and fresh air intakes.
7. Soapy water or lye solutions can be used to clean compressor 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.
8. The air systems should be completely purged after each cleaning.
9. During maintenance work, the switches of electrically operated compressors should be locked open and tagged to prevent accidental starting.
10. Portable electric compressors should be disconnected from the power supply before performing maintenance.