



## Oxygen Safety

The basic concept of fire, which was discovered as far back as 800,000 years ago, is based off the fire triangle. The 3 things a fire needs to burn are oxygen, heat, and fuel. However, if you take away one of the sides from the triangle, fire isn't possible and will immediately diminish. Oxygen systems are unique because it is normally impossible to remove any one of the three legs that are present in the fire triangle. Oxygen behaves differently from air, compressed air, nitrogen and other inert gases because it is very reactive. Any mechanism that releases heat, such as the impact of a high speed particle, adiabatic compression of the gas, or the burning of lubricants or seal materials, can be a sufficient ignition source to start a fire in an oxygen system. It is important to realize when Oxygen is pressurized and/or concentrated, most materials, including common material found in oxygen systems such as stainless steel and aluminum, are fuels that readily support burning and can result in catastrophic circumstances. Because of this, Oxygen systems hold an elevated risk and should be designed, constructed, installed and commissioned by competent people who have specialized knowledge of the subject.

When these risks are not appropriately mitigated such as through correct selection of components and materials, a fire can occur. Fires in Oxygen systems release large amounts of energy, and since the oxygen is often subsequently vented, secondary fires often occur involving surrounding structures, making these component failures especially destructive.

## The Chase Advantage

The obvious goal of a filter is to collect particulate, which would be a point of ignition. Chase Filter Company (CFC) uses components that are made up from materials that are non flammable in oxygen at pressures equal to or greater than the maxim allowable working pressure. What this does is essentially remove the fuel portion of the fire triangle and greatly reduces both the risk of a fire occurring and the consequences of an unanticipated ignition. This rigorous engineering process results in oxygen system components with an unprecedented level of fire safety.

CFC oxygen filters are designed, tested, and verified to contain the consequences of an ignition event without breaching the filter element or the filter body. Because of this, all the downstream piping and system components are protected and the possibility of a catastrophic event has been greatly reduced.



## Common Terms

**Friction:** When 2 solid materials rub together they generate heat, which can ignite other materials.

**Kindling Chain:** The kindling chain is defined as the ability of ignition to propagate within a component or system, potentially leading to burnout. A kindling chain reaction can occur if the heat of combustion and specific configuration of the ignited materials are sufficient to ignite or melt the surrounding materials.

**Particle Impact:** Small particles (contaminants) can be carried along the flowing oxygen stream, often times at high pressure. When the particles collide into a surface, the impact energy is released as heat and because of the particles small mass, they become hot enough to ignite causing larger materials to also ignite.

**Adiabatic Compression or Compression Heating:** The heat of compression ignition mechanism, also known as rapid pressurization or adiabatic compression, is heat generated when a gas is rapidly compressed from a low pressure to a high pressure. Heat of compression is the most efficient igniter of non metals but in generally not capable of igniting bulk metals. The characteristic elements for heat of compression are as follows:

- Rapid pressurization of oxygen.
- An exposed nonmetal close to the rapidly pressurized dead end, and
- A pressure ratio that causes the maximum temperature from compression to exceed the situational auto ignition temperature of the nonmetal.

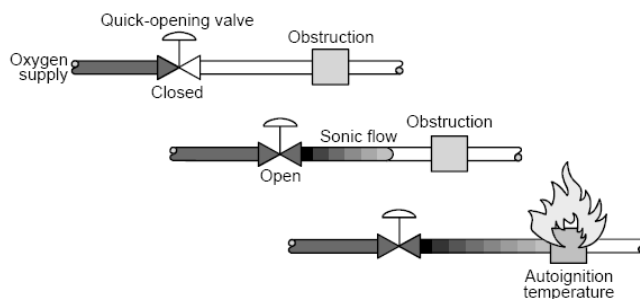


Figure 1

**Disassembly of oxygen components** – All components requiring repair, overhaul or testing shall be fully disassembled, thoroughly cleaned, reassembled and tested in accordance with the manufacturer's specifications. Proper cleaning removes particles, films, greases, oils, loose scale, corrosion, dirt and dust which will prevent interference with component function and reduce contamination which could cause ignition.

- **Always consult an expert when designing and assembling an oxygen system.**