

## HOW FOG MACHINES WORK

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Water based fog machines are the most commonly available types for both consumer use and commercial applications, and while there are many manufacturers of fog machines, and while there can be great differences in the design and quality of the components used by fog machine manufacturers, their operation is quite simple and almost always the same.

The fog fluid in the fluid tank is forced through a heat exchanger by a high pressure pump. The heat exchanger maintains a high temperature at which the fluid vaporizes in a process commonly known as "flashing". As the fluid is "flashed" it rapidly expands, and that expansion forces the vapor through the nozzle of the machine. When the vapor mixes with cooler air outside the fog machine, it instantly forms an opaque aerosol we see as fog. That's basically how most fog machines work. Below are more specific details of how the main components of a fog machine work.

**The Pump** - In a fog machine, the pump plays the critical role of delivering fog fluid from the fluid tank to the heat exchanger. The most commonly used pump is a piston pump, and is carefully matched to the design of the heat exchanger. If a pump delivers fluid too quickly, the heater will turn off relatively quickly since too much fluid is moving through the metal block. This results in the machine shutting down to re-heat in a shorter time. The piston pump is the source for most of the noise generated by a fog machine.

**The Heat Exchanger** - Heat exchangers vary widely in design, materials, wattage and quality. A well engineered fog machine has taken into account all these factors for optimum fog output and safety. Essentially, the heat exchanger is a block of metal, usually aluminum, with a heating element built into it to heat the metal block. The temperature of the block is regulated by a thermostat. A channel inside the metal block allows the fluid to travel through it to the nozzle. The wattage used to heat the exchanger is the specification most manufacturers use to describe how powerful their fog machines are.

**The Nozzle** - As the fog fluid is pumped through the heat exchanger, it is super-heated and then immediately forced through the exit nozzle at the front of the fog machine. These nozzles are usually made from solid brass and have an extremely small nozzle hole where the vaporized fog fluid is expelled under high pressure. The nozzle and its protective shroud will become very hot during operation of the fog machine. Do not touch it or place it near anything that could catch on fire.

**Remote Controls** - Most fog machines come with a basic on/off switch remote control. Operation is very basic, you hold down the button for fog, you release the button to stop the fog. The problem with this type of controller is that it shackles you to the remote control. The best option is a Timer Remote Control designed to give "hands free" operation of the fog machine. This remote allows you to control both the interval at which the fog machine comes on, and the amount of time it stays on during the interval eliminating the need for you to spend precious Halloween time manually operating a remote. For more information on Timer Remote Controls see our Fog Machine Faq section.

**Fog Machine Fluid** - Water based fog fluids are typically made from glycol and water. It is important to understand that fog machines and their fluids are designed as systems. Specific fluid formulas require a specific temperature range for optimum aerosolization during the "flashing" process. Fog machine manufacturers design their machines to be compatible with their fluids. If a machine is calibrated at too low a temperature for a given fluid, the result can be "wet" fog that can leave a residue. If the temperature is too high, the fluid can "burn" or decompose the fluid, thus changing its chemical composition. This "burning" can create harmful byproducts. Well designed fog machines have removable fluid tanks for the convenience of the user.