

PORTABLE FIRE EXTINGUISHER: A REVIEW

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Abstract:

Fire can naturally occur due to presence of three element combinedly that is oxygen, fuel, heat. To prevent fire from spreading we need to remove any one of the elements.

In this paper latest invention of fire extinguisher is been mention which helps to increase the human safety while they deal with fire. These detect the fire initial stage and give to avoid from spreading. Most of the robot which are develop to fight with the fire on the moment as it occurs.

Keywords: Centrifugal pump, fire extinguisher, positive displacement- pump

Introduction

The fire triangle or combustion triangle are simple models for understanding the necessary ingredients for most fires. The triangle illustrates the three elements a fire needs to ignite: heat, fuel, and an oxidizing agent. A fire naturally occurs when the elements are present and combined in the right mixture, meaning that fire is actually an event rather than a thing. A fire can be prevented or extinguished by removing any one of the elements in the fire triangle. For example, covering a fire with a fire blanket removes the oxygen part of the triangle and can extinguish a fire. In large fires where firefighters are called in, decreasing the amount of oxygen is not usually an option because there is no effective way to make that happen in an extended area.[1]

A fire pump is a part of a fire sprinkler system's water supply and powered by electric, diesel or steam. The pump intake is either connected to the public underground water supply piping, or a static water source (e.g., tank, reservoir, lake). The pump provides water flow at a higher pressure to the sprinkler system risers and hose standpipes. Fire pumps function either by an electric motor or a diesel engine, or, occasionally a steam turbine. If the local building code requires power independent of the local electric power

grid, a pump using an electric motor may utilize, when connected via a listed transfer switch, the installation of an emergency generator.

The fire pump starts when the pressure in the fire sprinkler system drops below a threshold. The sprinkler system pressure drops significantly when one or more fire sprinklers are exposed to heat above their design temperature, and opens, releasing water. Alternately, other fire hoses reels or other firefighting connections are opened, causing a pressure drop in the fire fighting main. Fire pumps are needed when the local municipal water system cannot provide sufficient pressure to meet the hydraulic design requirements of the fire sprinkler system. This usually occurs if the building is very tall, such as in high-rise buildings, or in systems that require a relatively high terminal pressure at the fire sprinkler in order to provide a large volume of water, such as in storage warehouses. Fire pumps are also needed if fire protection water supply is provided from a ground level water storage tank.

Working and principles

Water is the most cost-effective reagent for fire extinguishment. Breaking up water jets into finer particles improves surface area available for heat absorption but smaller particle mass reduces penetration of water into fire. Mist based extinguishers are available in the market which claim lower water consumption but they are prohibitively expensive and therefore their availability for use is restricted. [2]

What is a fire pump? A type of pump used to move water through a fire sprinkler system or to manual hose bibs in a commercial building or industrial plant. The pump's intake is usually connected to the external water supply, although in some cases it may be connected to a local water source such as a well, tank, or body of water. The fire pump system, of which the pump is the critical component, is designed to quickly deliver enough water to efficiently douse a fire before it has a

chance to spread. In many areas, they are required to be periodically tested and certified by the local fire inspection agency. They are commonly used in buildings with upper floors that are too high to be reached with the pressure of the local water supply, or where there is not enough firefighting capacity from the local water supply

Latest inventions

Fire disasters can occur anytime and result in high losses. It is often that fire fighters cannot access the source of fire due to the damage of building and very high temperature, or even due to the presence of explosive materials. Author proposed the use of robots to extinguish the fire that can be controlled from a specified distance in order to reduce the risk. The robot movement was controlled using Android smartphones via Wi-fi networks utilizing Wi-fi module contained in the robot. We used ATmega8 as main microcontroller in the robot. The robot was equipped with cameras and ultrasonic sensors. The camera played role in giving feedback to user and in finding the source of fire. Ultrasonic sensors were used to avoid collisions during movement. Feedback provided by camera on the robot displayed on a screen of smartphone. The ultrasonic sensors worked well that the robot can be stopped at a distance of less than 15 cm. In the fire test, the robot can perform the task properly to extinguish the fire.[3] Temperature sensor LM35 is capable of sensing temperature between +2°C and +150°C. The

programming of microcontroller has determined a range of parameters for normal room temperature and abnormal room temperature during fire accident. The temperature has been raised using a lighter for testing purpose and it has been noticed that the sensor was able to detect the sudden rise of the temperature. Since the output voltage is the function of the temperature, it was able to get Celsius degree unit by analysis the output voltage of the sensor. The smoke sensor has the ability of detection smoke using the method of making temperature cycle high and low. Smoke generally contains carbon and during the testing, smoke has been detected by measurement of output signal within one or two complete heating period. SnO2 is the sensitive substance of smoke sensor with characteristics of lower conductivity in clean air and sensor's conductivity was more significant along with the rising of gas concentration. Flame sensor has shown the ability to detect the source of fire flame within the range of a wavelength 760nm-1100 nm. It has been observed that the detection distance of flame has shown better performance within the range of 25cm to 90 cm whereas standard range is defined as 20 cm to 100 cm..[4]

Positive displacement vs Centrifugal pumps

Centrifugal pump has low cost and there is no need to provide safety valve to it which decreases its cost 3 to 10 times than the positive displacement pump.

	Centrifugal pump	Positive displacement
1	An impeller rotates in the housing, reducing pressure at the inlet. This brings fluid to the outside of the pump's housing, increasing the pressure enough to push it out of the discharge.	They pull fluid into a compartment at the inlet and move it to an outlet for discharge using a rotary, reciprocating, or diaphragm method to move the fluid.
2	Lower viscosity fluids of up to 550 cSt do well in centrifugal pumps.	High viscosity fluids 1,320,000 cSt run more efficiently, with lower energy costs in PD pumps.
3	Some self-priming pumps can lift liquid to 13" hg vacuum.	They create a vacuum on the inlet side and can reach vacuums of 25 to 28" hg - a great choice for lift.
4	Best for low pressure 250 PSI (580 feet) applications but can be run in series to boost pressure.	Operates from 250 PSI to 3,000 PSI and gets more efficient in higher pressure.
5	Maximum capacity is 120,000 GPM	Maximum capacity is 3,300 GPM

Conclusion

Fire can be eliminated by removing on parameter from triangle which is heat, fuel and oxygen. Centrifugal pump provides compactness in the system by eliminating the safety valve. Also the cost of the system decreases 3 to 10 times than reciprocating pumps.

Many inventions and innovations are done till the date but these are very costly systems, so there is need to develop low cost, handy and portable with the same effectiveness in performance fire extinguisher.

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