



Pumps & Pumphouses for Industrial and Commercial Installations

Over the years, sprinkler systems have proved their effectiveness and reliability in containing and extinguishing fires. From the introduction of this type of protection, a reliable water supply to the sprinkler installation has proved as critical as the sprinkler system itself.

One tried and tested way of supplying water to the system is through fire pumps and water tanks.

OPERATION

The fire pump is automatically placed on demand by a pressure drop in the sprinkler system when a sprinkler head is called into action. From a pressure switch signal, the pump set package controller initiates the pump driver to start, powering the pump to supply water to the sprinkler system. The sprinkler contractor determines the flow of water and pressure needed for the risk. The pump characteristics and associated equipment are selected to satisfy the individual sprinkler applications.

The two main ways of driving fire pumps are by electric motor or diesel engines. Many installations will utilise both in a duty and stand by configuration. When the site does not have the capability of supporting the electric motor power supply diesel engines become the preferred driver. Generators are another option for supplying the power to the electric motor.

The sprinkler pumps supply water to the installation control valves and hence to the distribution and range pipes.

The pump takes its water supply from a water storage tank, rated to supply the system at maximum demand for 30, 60 or 90 minutes depending on the Hazard Classification.

Pumps are key components of a sprinkler system and must be approved for use in such a system by an appropriate Certification Body, such as LPCB Certification. When the system is designed to American standards the pump approvals will be either FM Global or Underwriters Laboratories.

PUMP TYPES

The most common types of pumps used in sprinkler system water supplier are centrifugal end suction

and spilt case. These pumps can transfer fluids with high efficiencies over a wide range of flows and pressures. The pumps are used in ordinary hazard risks such as schools, shops, hotels, hospitals and office premises and high hazard risks such as warehouses and factories. Smaller pumps are used for residential and domestic sprinkler systems where the flow duration can be for 10 minutes.

The end suction type pump takes its water from the end of the pump and discharges at the top. The horizontal split case type takes water in on one side and discharges it on the opposite side.

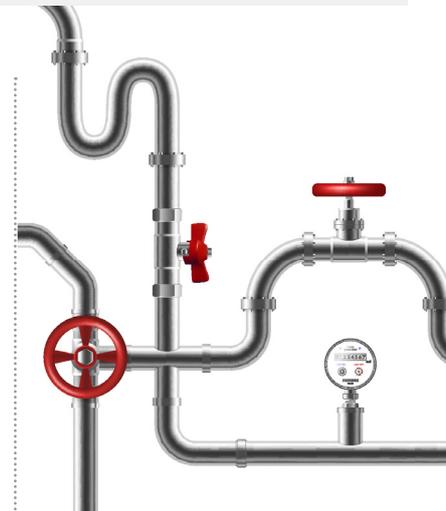
The most common arrangement is where the pumps work with a 'positive head' of water: that is where at least two thirds of the stored water is above the centerline of the pump. Pumps sometimes have a 'suction lift' arrangement where the pumps draw water from a sump at the bottom of an underground tank. Occasionally vertical turbine pumps are used for suction lift conditions.

FIRE PUMP PACKAGES DEVELOPED TO MEET INDUSTRY NEEDS

As world markets advance and fire protection systems evolve to satisfy the new needs, fire pump technology is developed to keep pace with the demands created by the changes. Revised regulations are also determining the duty demands and specification requirements of fire pump packages. These facts result in an ever-changing scope of supply with new pump types required and packages developed to satisfy the needs of current and future applications.

HIGH RISE BUILDINGS

Construction of high-rise buildings is on the increase in major cities. The heights of the buildings are rising constantly as ground space becomes even more precious. If only one riser were to be installed in a high rise building then the lower sprinkler ranges would have to find a way to overcome the high



MAINTENANCE AND TESTING SHOULD BE CARRIED OUT TO COMPLY WITH THE REQUIREMENTS OF BS EN12845 WHICH INCLUDES:

- WEEKLY TESTING OF PUMP AND PUMP ENGINES (10 MINUTES FOR THE ELECTRICALLY DRIVEN PUMP AND 30 MINUTES FOR THE DIESEL DRIVEN PUMP)
- TESTING QUARTERLY TO PROVE THAT THE PUMP DUTIES ARE STILL PERFORMING TO THEIR DUTIES.
- ANNUAL SERVICE AND CHECK OF PUMPS AND ENGINES (FOR MORE DETAILS SEE BIF 16B, MAINTENANCE OF SPRINKLER SYSTEMS).

pressure needed to satisfy the demands of the highest level at which sprinklers are installed. High pressures are required from the pump to supply the top levels of a high-rise building to overcome the high static distance to the highest sprinkler ranges. This means that the pressures to the lower ranges will be higher than the system components and sprinkler head can handle.

Conventional installation procedures cannot be applied and the contractor has the option of fitting pressure reducing valves or zoning the area to eliminate high pressures on the lower ranges. As pressure-reducing valves are not recommended for this purpose under many fire authority rules and the sprinkler rules specifically state that they should only be used for this application when absolutely necessary, zoning becomes the correct method of installation, with European BS EN 12845 rules also insisting on a maximum zone height of 45m.

The way of meeting these requirements with an approved and listed fire pump is by utilising multi-stage, multi-outlet pump. This pump has outlets with increasing pressures to match the pressure required for the various levels of the building. Each outlet will have its own dedicated riser from the pump to the floor levels it serves.

PRESSURE MAINTENANCE PUMP (JOCKEY PUMP)

In order to prevent the activation of the main fire pump due to minor fluctuations in pressure, an electrically driven 'jockey pump' may be installed and connected to the system. This pump is also occasionally referred to as the pressure maintenance pump. The pump is equipped with automatic starting equipment and ensures the Maintenance Pump (Jockey Pump) would stop and start in response to signals from a pressure switch mounted in the installation trunk main. The duty of the unit is small so that in the event of serious pressure loss the main fire pump would immediately be brought into operation.

EARLY SUPPRESSION FAST RESPONSE (ESFR) INSTALLATIONS

Developments in sprinkler head technology have increased the need for specialised fire pumps for Multi stage/Multi Outlet pumps in high-rise buildings where specialist types of sprinkler heads are installed. Early Suppression Fast Response (ESFR) sprinklers were developed in the 1990's to protect many commonly used storage arrangements. Formerly these applications would have been protected with in-rack sprinklers and ceiling protection but ESFR sprinklers generally remove the need for in-rack sprinklers and is a solution that uses ceiling protection only. Because of the nature of this head, design principles and operating characteristics differ from conventional sprinkler protection. An LPC technical bulletin (TB209) was developed that specifies the requirements and recommendations for the installation of ESFR sprinklers. TB209 lays out special requirements that are only applied when ESFR sprinklers are utilised, specifying special selection criteria for the pumps that are applied only when utilising ESFR heads.

FACTORY ASSEMBLED PACKAGED PUMP HOUSES

Pre-assembled pump house packages are commonplace with many retail chains preferring factory-built pump house packages. Major industrial users are also seeing the benefit of fabricating the package under factory conditions and insisting on this type of pump house construction.



End suction, close coupled type pump



Multi stage/Multi Outlet pump in a high-rise building



Split case electrically driven pump



Pre-packaged Pumphouse



Vertical Turbine pump

The package requires the pumps to be installed within custom built housing with all the necessary pipework, valves, test lines, louvres, heating and lighting normally supplied in a conventional site-constructed pump house. The pre-assembled units are designed in accordance with the applicable fire rules and regulations and where necessary the applied national construction standards. With all the associated advantages, the factory assembled, and tested pump house has become much more convenient to install for both the end user and contractor. The completed unit is offloaded directly on to a pre-cast plinth and the contractor simply needs to secure the unit to the plinth, provide the electric supply into the pump house and pipe in the water supply.

If you have a question or seek advice regarding automatic water-based fire suppression systems, please email the team : ian.gough@bafsa.org.uk or joe.mcafferty@bafsa.org.uk. If they do not have an answer for you, they will know someone who has! FAQs can be found at bafsa.org.uk/sprinkler-systems/faqs/