

# VERTICAL TURBINE FIRE PUMP |

## GENERAL INFORMATION

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Fire pumps are purchased and installed to protect buildings and property against fire loss. As a result, fire insurance premiums are significantly reduced and in certain cases the savings will pay for the entire fire pump system in a short period of time.

The National Fire Protection Association (NFPA) was formed to establish standards and codes for all members to use as guides in designing and manufacturing the safest and most reliable fire pump systems. Insurance companies now follow those guidelines as published in NFPA Pamphlet 20 as the standard on which to approve fire pump systems. Approval authorities include the Underwriters' Laboratories' (U.L.) and Factory Mutual (F.M.).

Fire pumps are classified in one of two ways: approved with either U.L. or F.M. label or unapproved without label. Approved pumps conform to specific laboratory standards, performance, and materials of construction and can only be used in fire protection systems. Unapproved fire pumps may be standard or special construction pumps to meet specific needs. To obtain maximum insurance benefits, however, the unapproved pumps must be approved for that specific job through the local insurer. Unapproved pumps do not necessarily have to conform to UL or FM standards, although usually they are required to conform to NFPA Pamphlet 20.

### APPROVED FIRE PUMPS

Fire insurance may be purchased from either a **stock** or **mutual** company. Both types of companies have agencies which maintain standards and supervise and inspect fire pump installations. The largest group of insurers consists of the stock companies which function through the Underwriters' Laboratories.

### SYSTEM REQUIREMENTS

To provide the system which best meets the user's needs, the fire pump sales engineer requires certain types of information including, but not necessarily limited to the type of driver required, the electrical power characteristics, site elevation, average temperatures, capacity and pressure requirements, maximum lift below grade, optional controller features, and, if present, the size of existing piping.

Armstrong manufactures a complete line of U.L. listed and F.M. approved standard construction vertical turbine fire pumps as well as special construction models as required. All Armstrong Fire pumps conform to NFPA-20 requirements.

### WATER SUPPLIES AND SUBMERGENCE

Vertical turbine fire pumps can be used to pump water from sumps, reservoirs, and wells. When the fire pump installation calls for a sump water supply, the second impeller from the bottom of the bowl assembly must be below the lowest water level. In a properly designed sump this will insure adequate submergence for both NPSHR and vortex suppression. When pumping from wells, the maximum pumping level may not exceed 200' when pumping at 150% capacity. In cases where the static water level exceeds 50' the pump must be oil lubricated. All wells must be properly certified prior to installing a listed fire pump. In well installations, the second impeller must be submerged 10' below the water level when the pump is operating at 150% capacity. In both cases submergence should be increased one foot for each 1,000' of elevation above sea level. Vertical turbine barrel pumps can be used in a booster pump configuration to increase pressure when water is drawn from the city mains.

### PERFORMANCE

Listed fire pumps are designed with very specific performance characteristics: head at shut-off may not exceed 140% of the design head and may not be less than 65% at 150% of the design capacity.

### ENGINEER FEATURES

All listed Armstrong Fire pumps are manufactured in accordance with NFPA-20 and the Underwriters' Laboratories or Factory Mutual standards. Standard ratings include:

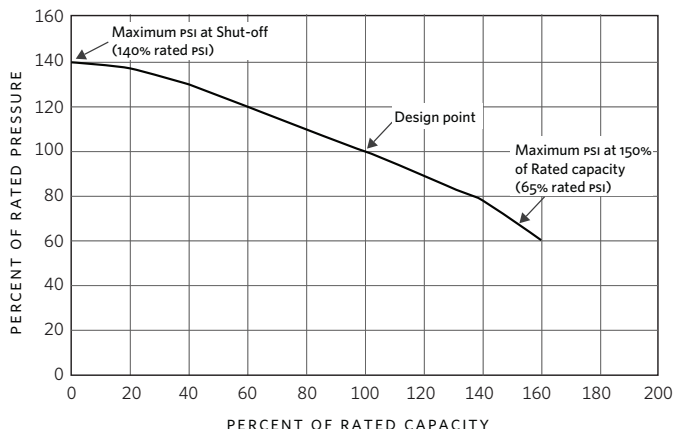
- Vertical turbine type pumps for large and small capacities. 250 to 5000 gpm, 58 to 500 psig
- Vertical turbine can type pumps for large and small capacities. 250 to 1000 gpm, 60 to 500 psig

**Special alloys:** Special alloys (stainless steel, zincless bronze and aluminum bronze) are available for use in corrosive environments such as sea water. Under corrosive conditions pumps must be constructed of acceptable corrosion resistant materials selected in accordance with chemical analysis and experience in the area. Special coatings on column pipe are also available to resist corrosion.

### Stainless steel shaft

### Flanged column pipe

### Below ground discharge head (type 'vu')



**FITTINGS AND OTHER ACCESSORIES**

Fire pump systems include valves and fittings to insure the proper delivery and control of water to the sprinkler heads or hydrants. Although each fire pump system is different, most systems include a pressure gauge on the discharge of the pump, discharge tee, relief tee, air release valve, relief valve, open or closed relief cone, hose valve manifold, hose valves with caps and chains, water level gauge, and other miscellaneous fittings.

An electric drive controller is similar to a regular combination motor starter but can tolerate locked rotor current for a short period of time. This feature is to insure that the most amount of water possible will get to the fire. Electric motor controllers also incorporate an isolating switch so that the circuits can be isolated for repair and maintenance.

Signalling devices are also included to indicate various states of system readiness.

Like the electric drive controller the diesel engine controller reacts to drops in system pressure. It must also be capable of starting the diesel engine and monitoring critical functions such as oil pressure, coolant temperature, engine failure, battery failure, and over speed.

Jockey pump controllers are not covered by NFPA-20 standards. Consequently, any device that will

**DRIVERS**

A listed fire pump is usually driven by either an electric motor or diesel engine. The electric motor option includes a vertical hollow shaft motor with NRR, with a 1.15 service factor. The diesel engine driver is the only internal combustion engine approved for fire pump service. It must be water cooled through a heat exchanger or radiator cooled with engine driven fan, have a water cooled or specially insulated exhaust manifold, and be equipped with all accessories as listed in NFPA-20. If electric starting is employed, dual battery units are required. Also required for use with a vertical turbine pump and a diesel engine driver is a right angle, vhs, gear drive. Steam turbines are also acceptable, but rarely used, drivers.

**CONTROLLERS**

All fire pumps must be equipped with a U.L. listed or F.M. approved control panel. Water pressure in the system is monitored by a pressure switch. When the pressure falls below a preset level, such as when sprinkler heads open in response to a fire, the controller automatically starts the fire pump. The controller contains a manual stop/start mechanism, local alarm, and a relay for a remote alarm.

permit automatic starting and stopping through a pressure switch is usually acceptable to the local approving agency.

**JOCKEY PUMPS**

Jockey Pumps are normally used to maintain constant line pressure in the fire protection system. Their purpose is to prevent frequent operation of the primary fire pump when system leakage allows the line pressure to drop below the minimum level. The low capacity jockey pump is normally designed to start at a pressure about 5 to 10 psi above the system operating pressure.

The specific size, type, and operating pressure of the jockey pump must conform to the requirements of the authority having jurisdiction over the fire pump installation. The jockey pump, however, does not require U.L. or F.M. approval.

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