

## VERTICAL TURBINE FIRE PUMPS

### Advantages of Armstrong Vertical Turbine Fire Pumps

#### No Priming Required

NFPA 20 requires that centrifugal pumps be installed under a flooded suction condition. Vertical turbine pumps should be applied for any underground water source where the supply water level is below the pump suction. Vertical turbine impellers remain submerged in the water supply at all times. Start-up is instantaneous and requires no supervision.

#### Steep Pump Performance Curves

Vertical turbine pump performance curves are steeper than those of horizontal pumps. This results in smaller changes in capacity during pressure changes.

#### Adaptable to Different Water Levels

Because the column length may be varied to fit the application, a vertical turbine fire pump can be tailored to meet virtually any water level. This is important when the pump support floor or foundation is above the suction lift of a horizontal fire pump. A vertical turbine fire pump can be installed in wells, offshore platforms, rivers, or wherever a fluctuating water level exists.

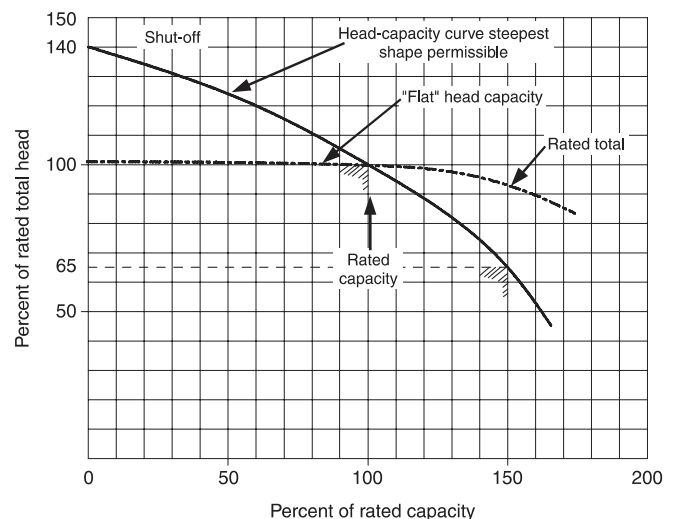
#### Adaptable to a wide Range of Water Supplies

Approved water supplies range from municipal water systems to sea water including wells, underground and above ground reservoirs, open ponds, streams, and above and below ground storage tanks.

#### Available to Meet a Wide Range of Capacity and Pressure Requirements

By varying the number of stages and sizes of bowls and impellers, a full range of system pressures and capacities can be obtained from virtually any water level. This allows the system designer maximum flexibility in designing the most effective and reliable fire protection system.

Fire pumps designed and manufactured in accordance with NFPA 20, UL/FM standards must satisfy specific pressure/capacity requirements. These guidelines insure that adequate pressure is provided over a wide capacity range and that maximum pressure at shut-off does not exceed the limits of the system.



#### Low Maintenance

Our pump designs provide for radial hydraulic balance. The hydraulic forces are equalized by multi-vane bowl diffusers. This reduces sleeve bearing radial loading and provides exceptional bearing life.

The weight of all rotating elements (including axial hydraulic thrust) is supported by a single thrust bearing at the top of the driver. Maintenance is minimal, but when required the bearing is easily accessible.



## Engineering Features

**PRESSURE RATINGS** from 40 to 500 psi.

**CAPACITY RATINGS** Labeled from 250 through 5,000 USgpm.

**INTERMEDIATE BEARINGS** 0-50 feet product lubricated column and shaft assembly. Greater than 50 feet oil lubricated column & shaft assembly.

**TESTING:** Testing includes a non-witnessed performance test and a non-witnessed hydrostatic test of the discharge head and bowl assembly.

### **DISCHARGE HEAD ASSEMBLY**

Discharge Head: ASTM A48, class 30, cast iron fitted with 125# ANSI flanged discharge for use where maximum pressure (shut-off) is 175 psi. For higher pressures, a discharge head with 250# ANSI discharge flange rating is used. Fabricated steel discharge heads are also available.

Stuffing Box: ASTM A48, class 30 with ASTM B505 alloy 932 bearing, braided acrylic packing, 316SS gland, cast in grease chamber below packing for maximum pressures to 150 psi. Above 150 psi a bypass style stuffing box is provided with two bronze, ASTM B505 alloy 932 lantern rings. Gland bolts are 304 stainless steel with stainless steel nuts.

Head Shaft: Two piece ASTM A582, 416 stainless steel with threaded coupling in the discharge head. With bronze ASTM B584 alloy 838 adjusting nut.

### **COLUMN ASSEMBLY**

Pipe: Steel ASTM A53, type S, grade "B" with threaded steel couplings. Maximum lengths are 10 feet. Flanged column is also available.

Product Lubrication: Bearing retainers - ductile iron A536 GR60 or bronze ASTM B584, neoprene lineshaft bearings - D2000-77a. Oil lubrication optional.

Lineshaft: ASTM A108, C-1045 carbon steel with ASTM A269, type 304 stainless steel; sleeves at bearing journals. Couplings are steel ASTM, A108, grade 1215.

### **BOWL ASSEMBLY**

Bowls: ASTM A48, porcelain enamelled class 30 cast iron or A536 GR60 ductile cast iron.

Bowl Wear Ring: ASTM B505-943 bronze.

Bowl Bearings: ASTM B505-932 bronze.

Bowl Shaft: ASTM A582, type 416 stainless steel.

Impellers: Enclosed type, all bronze ASTM B584-838 except 19F ASTM 148-952 bronze, dynamically balanced.

Impeller Collets: ASTM A108, grade 1215 steel.

Strainer: Non-ferrous clip-on basket type, ASTM B584 red brass. For well pumps a cone type strainer can be applied.



## Special Materials

Special alloys are available for use in corrosive environments. Contact factory for specific material recommendation for your application.

<b>Bowl Assembly</b>				
Bowls & Impellers	Alloy 937 Zincless Bronze	Alloy 958 Nickel Aluminum Bronze	Grade CF-8M 316 Stainless Steel	316 Stainless Steel
Bowl Shaft & Hardware	316 Stainless Steel	K-500 Monel	316 Stainless Steel	316 Stainless Steel
<b>Column Flanged</b>				
Column Pipe	Steel Epoxy Coated	Alloy 958	Aluminum Bronze	316 Stainless Steel
Bearing Retainers	Alloy 937 Zincless Bronze	Alloy 937 Zincless Bronze	Alloy 937 Zincless Bronze	316 Stainless Steel
Lineshaft, Couplings & Hardware	316 Stainless Steel	K-500 Monel	316 Stainless Steel	316 Stainless Steel
<b>Discharge Head</b>				
Discharge Head	Cast Iron or Steel Epoxy Coated	Alloy 958	Aluminum Bronze	316 Stainless Steel
Packing Box Assembly	Alloy 937 Zincless Bronze	Alloy 958	Alloy 937 Zincless Bronze	316 Stainless Steel
Top Shaft & Hardware	316 Stainless Steel	K-500 Monel	316 Stainless Steel	316 Stainless Steel
<b>Strainer</b>				
(Basket or Cone Type)	Red Brass	K-500 Monel	316 Stainless Steel	316 Stainless Steel

All sizes of vertical fire pumps can be furnished with the UL (Underwriters Laboratories) label for sea water service. FM (Factory Mutual) labelled pumps of these types of construction are not available without additional investigation and tests.

## Performance Data

Flow labelled vertical fire pumps are available in capacities which range from 250 through 5,000 USgpm at 60 cycle, 1770 rpm speeds. Pressure ratings are available to 500 psi.

Capacity	Model	Pressure Range	Listing	Capacity	Model	Pressure Range	Listing					
250	8JKH-FP	26-188	UL	4000	18MKM/20MKL-FP	111-121	UL					
		60-189	FM			165-188	UL					
500	10DKH-FP	67-255	UL			19FKM-FP	111-188	FM				
		65-168	FM				107-131	UL				
750	12LKM-FP	68-500	UL				19FKMH-FP	161-197	UL			
		69-224	FM					211-259	UL			
1000	14LKM-FP	66-404	UL		19FKMH-FP			107-259	FM			
		66-229	FM					124	UL			
1500	12FKH-FP	70-83	UL			4500		19FKM-FP	177-198	UL		
		93-111	UL						19FKMH-FP	105-245	FM	
		116-222	UL				118			UL		
		73-310	FM				172-187	UL				
2000	15DKH-FP	67-267	UL	19FKH-FP	119-186		60-68	FM				
		63-210	FM				120-135	UL				
2500	16MKM-FP	66-220	UL			5000	19FKH-FP	168-207	UL			
		65-222	FM					225-276	UL			
3000	18MKL-FP	97-132	UL					59-65	118-130	60-276	FM	
		145-230	UL							167-200	118-130	UL
3500	18MKM/20MKL-FP	111-121	UL	223-267	167-200						118-130	UL
		165-188	UL								59-267	167-200
		111-188	FM			59-267	167-200					UL
	19FKM-FP	115-139	UL				59-267					167-200
		173-209	UL					59-267	167-200			UL
		229-277	UL						59-267	167-200		UL
114-277	FM	59-267	167-200	UL								

# Typical Specifications

Supply and install as indicated on plans one (1) fire pump system consisting of:

## 1. PUMP

One model \_\_\_\_\_ vertical turbine fire pump listed by Underwriters Laboratories Inc. (UL) and approved by Factory Mutual (FM) having a capacity of \_\_\_\_\_ USgpm for a pressure boost of \_\_\_\_\_ psig.

## 2. DIESEL ENGINE

The pump shall be direct connected through flexible coupling to a diesel engine, manufactured by \_\_\_\_\_, model \_\_\_\_\_ UL and FM listed and approved with a net continuous rating of \_\_\_\_\_ hp at \_\_\_\_\_ rpm at \_\_\_\_\_ ft. of elevation above sea level. The diesel engine shall conform to the requirements of the National Fire Protection Association, Pamphlet #20 and shall be specifically approved for fire pump service. It shall operate at a rated speed not exceeding the above RPM and shall develop sufficient horsepower to drive the pump with 10% reserve power.

### Cooling Water System

The cooling water supply for the heat exchanger shall be from the discharge of the pump, taken off prior to the pump discharge valve. The pipe connection shall include four (4) manual shut-off valves (including by-pass line), two strainers, two pressure regulators, a listed automatic solenoid valve and a pressure gauge, piping and fittings all fitted to engine, per NFPA 20, by the pump manufacturer.

### Storage Batteries

Two heavy duty lead acid batteries shall be provided and furnished in a dry charge condition with electrolyte liquid in separate containers. Suitable battery rack and 60" of battery cables shall be included.

### Right Angle Gear Drive

FM approved right angle gear drive shall be supplied with drive shaft rated for the maximum bhp of the pump. A suitable coupling guard shall be supplied to enclose rotating assemblies.

### Fuel System

The fuel system shall be UL listed and shall consist of an above ground storage tank of \_\_\_\_\_ gallons as recommended per NFPA 20, fill pipe and cap, manual shut-off cock, flame arrestor, oil level gauge and braided flexible connectors. The tank shall be supplied with legs for floor mounting. Approved steel tubing and miscellaneous pipe and fittings shall be supplied by the mechanical contractor.

## 3. ELECTRIC MOTOR

The fire pump shall be coupled to a vertical hollow-shaft electric motor with a maximum hp of \_\_\_\_\_ at \_\_\_\_\_ rpm, \_\_\_\_\_ Volt, \_\_\_\_\_ phase, \_\_\_\_\_ cycle. Motor shall be open drip proof, standard efficiency with 1.15 service factor.

## 4. MINIMUM FITTINGS

The pump shall be supplied with the following accessories:

- One (1) discharge gauge, 3½" (89 mm) dial type
- One (1) 1½" (38 mm) air release valve

## 5. OTHER ACCESSORIES

Pump shall be supplied with one (1) outside test header 2½" (63.5 mm) hose valves with caps and chains to suit the rated pump flow. One (1) main relief valve and one(1) waste cone shall be supplied.

## 6. AUTOMATIC DIESEL ENGINE CONTROLLER

The Fire Pump Controller shall be manufactured by \_\_\_\_\_ model \_\_\_\_\_ built strictly in accordance with the latest requirements of the NFPA. Controller shall be listed and labeled by Underwriters Laboratories of Canada (ULC) and/or Underwriters Laboratories (UL) and/or approved by Factory Mutual (FM).

## 7. JOCKEY PUMP

The jockey pump shall be model \_\_\_\_\_ for a capacity of \_\_\_\_\_ USgpm and a pressure boost of \_\_\_\_\_ psig. The jockey pump shall be driven by an open drip proof electric motor of \_\_\_\_\_ hp, \_\_\_\_\_ rpm, \_\_\_\_\_ Volt, \_\_\_\_\_ phase, \_\_\_\_\_ cycle.

## 8. JOCKEY PUMP CONTROLLER

The jockey pump shall be controlled by an automatic jockey pump controller model \_\_\_\_\_ with full voltage starter.

## 9. MOUNTING AND TESTING

The pump shall be suitable for a maximum working pressure of \_\_\_\_\_. Pump shall be hydrostatically tested at twice the maximum working pressure for at least 5 minutes.

The pump shall be performance tested at rated speed. The pump shall furnish not less than 150% of rated capacity at a pressure not less than 65% of rated head. The shut-off total head of the pump should not exceed 140% of total rated head. A certified test curve, indicating the flow, head, power and efficiency shall be supplied.