Midship Mounted Two-Stage Centrifugal Fire Pumps

A. Pump

The pump shall be of two-stage construction and shall comply with all applicable requirements of the latest standards for automotive fire apparatus of the National Fire Protection Association, NFPA No. _____, and shall have a rated capacity of _____ GPM. The Pump shall be free from objectionable pulsation and vibration under all normal operating conditions.

1. Pump Body

The pump body shall be close-grained, gray iron and must be horizontally split in two sections for easy removal of the entire impeller shaft assembly, and designed for complete servicing from the bottom of the truck without disturbing setting of the pump in the chassis or apparatus piping which is connected to the pump. Pump body halves shall be bolted together on a single horizontal face to minimize leakage and facilitate reassembly.

2. Discharge Manifold

The discharge manifold shall be cast as an integral part of the pump body assembly and shall provide at least three full 3-1/2 inch openings for ultimate flexibility in providing various discharge outlets for maximum efficiency, and shall be located as follows:

- One outlet on the right side of the pump body
- One outlet on the left side of the pump body
- One outlet directly on top of the pump discharge manifold

3. Impeller

The impellers shall be bronze, accurately balanced (mechanically and hydraulically), labyrinth type, wear rings that resist water bypass and loss of efficiency due to wear.

a. Optional Flame Plating (Standard on pumps with capacities 1500 GPM or larger)

The impellers shall have flame plated hubs to assure maximum pump life and efficiency despite the presence of abrasive particles, such as fine sand, in the water being pumped.

4. Wear Rings

The wear rings shall be bronze, and shall be easily replaceable to restore original pump efficiency and eliminate the need for replacing the entire pump casing due to wear.

5. Impeller Shaft

The impeller shaft shall be stainless steel, accurately ground to size. The impeller shaft shall be of two-piece construction separable between the pump and pump transmission to allow true separation of the transmission from the pump without disassembly of either component.

6. Anti-Friction Bearings

The impeller shaft shall be supported at each end by oil or grease lubricated anti-friction ball bearings for rigid and precise support. Bearings shall be protected from water and sediment by suitable seal housings, flinger rings, and oil seals. No sleeve type bearings shall be used.

7. Seal Housings

The seal housings shall be equipped with two-piece glands to permit adjustment or replacement of packing without disturbing pump. Lantern rings shall be located at inner ends of seal housings so that all rings of packing can be removed without removal of the lantern rings. Water shall be fed into seal housing lantern rings for proper lubrication and cooling when the pump is operating.

8. Optional Seal Housings

The alternate seal housings shall be equipped with self-adjusting, maintenance-free, mechanical shaft seals. Packing is not required and shall not be used.

9. Transfer Valve

The transfer valve design shall be of latest ball type, of all bronze constructions and incorporate a hydraulically balanced seal assembly to minimize leakage around the ball and assure maximum pump efficiency. The transfer valve shall operate smoothly and without sticking even when exposed to sandy or dirty water. The transfer valve actuator shall be operated electrically, by means of a control switch mounted on the operator's panel complete with two indicator lights indicating PRESSURE and VOLUME. Operation of the transfer valve shall provide smooth changing of the transfer valve to either PRESSURE or VOLUME without shutting down, at any discharge pressure up to 250 psig.

10. Pump Transmission

The pump transmission shall be rigidly attached to the pump body assembly and be of latest design incorporating a high strength, involute tooth form Morse™ HV chain drive capable of operating at high speeds to provide smooth, quiet transfer of power. The shift engagement shall be accomplished by a free-sliding collar to maintain ROAD or PUMP position.

a. Pump Shift

The pump shift shall be pneumatically operated and shall use a standard automotive air valve to control a double-action, air-shift cylinder. The in-cab control valve shall include a detent lock to prevent accidental shifting.

11. Priming System

The priming system shall include an oil-free rotary vane priming pump rigidly attached to the pump transmission and activated by a vacuum-activated priming (VAP) valve with a single push-button switch. Valve actuation may be accomplished while the main pump is in operation, if necessary to assure a complete prime.

a. Lubrication Option

A lubrication option shall allow the use of Prime Safe lubricant. A priming tank is required when the lubrication option is selected.

12. Pressure Control System

The relief valve system shall be positive and quick acting, and shall have a control valve to provide instantaneous hydraulic lock-out which does not require the operator to cancel out or disturb the pressure rating. Relief valve control (pilot valve) shall be protected from malfunction due to sand or other sediment in the water by a strainer which can be removed, cleaned, and replaced from the operator's panel while the pump is operating. Relief valve indicator lights shall be provided and mounted on the panel adjacent to the pilot valve assembly. The indicator lights are to be ``amber'' marked OPEN to indicate the relief valve is bypassing and ``green'' marked CLOSED to indicate the relief valve is closed.

a. Discharge Relief Valve

The discharge relief valve system shall incorporate two separate units, a panel mounted pilot valve which controls the operation of the relief valve proper, and the relief valve which is normally mounted on the pump. The relief valve shall be mounted on the pump or in the piping between the intake and discharge sides of the pump. It shall modulate flow between discharge and intake by ranging between the fully open and fully closed position in response to hydraulic signals from the pilot valve. The relief valve shall be available in three sizes. A two-inch diameter relief valve shall be used on pumps with rated capacities of 750 GPM (2850 L/min.) or less. For pumps with rated capacities through 1250 GPM (4750 L/min.), a three-inch diameter relief valve shall be used. For pumps with rated capacities of 1250 GPM through 2250 GPM (4750 through 8550 L/min.), a four-inch relief valve shall be used.

b. Intake Relief Valve

The intake relief valve shall be a pilot-operated intake relief valve and shall be provided by the pump manufacturer. The pilot valve shall be mounted in a position specified by the purchaser, and allow adjustment from 50 P.S.I.G. to 250 P.S.I.G. A pilot-operated intake relief valve will allow full opening of the relief valve with a very small rise in intake pressure above set pressure.

13. Manifold Drain Valve Assembly

The manifold drain valve assembly shall consist of a stainless steel plunger in a bronze body with multiple ports. The valve shall be designed so that the pump discharge pressure prevents it from opening accidentally. The drain valve control shall be panel mounted, cable or rod operated and identified PUMP DRAIN.

14. Tank to Pump Valve

The tank to pump valve shall be a full-flow, 3-1/2 inch diameter ball valve that is attached directly to the pump. The valve shall be operated by a 90° spring detent remote control handle or by an optional 12 or 24 volt electric rotary actuator.

15. Discharge Valves

The discharge valve shall be bronze-fitted, ball-type, with a self-adjusting seal for wear. All discharge valves shall be capable of being locked or unlocked at the valve from the control panel at any position between OPEN or CLOSED, and shall operate freely up to maximum pump discharge pressure. Valve seal shall be between the pump and the valve stem mechanism to minimize air leaks and facilitate draining. One valve shall be furnished for each 250 GPM of rated capacity. Means shall be provided for attaching (1) a pressure gauge which will indicate the pressure in the line immediately outboard of the valve, and (2) a drain of at least 3/4 inch NPT for simultaneously draining the valve and line outboard the valve. They shall be available in the following sizes:

- 2-1/2”
- 3-1/2”
- 1/4 –turn remote locking
- Rack and sector push-pull
- Electric

16. Monarch Intake Valve

The Waterous Monarch Intake Valve shall inlude an extra short intake fitting, an intake butterfly valve and an intake nipple with integral relief valve mounting pad, all designed to fit behind the pump panel. The Waterous Monarch shall feature a Jamesbury Wafer Sphere high performance butterfly valve. The Monarch valve shall also feature a provision for a pre-valve relief valve and your choice of a manual worm gear, pneumatic or electric actuator.

17. Auto Tank Fill System

The Auto Tank Fill System shall maintain tank water level between 50 and 80% of capacity.The system shall be calibrated for any shape or size tank, shall allow operator interaction while Auto Tank Fill System is in operation, operator shall have the ability to open or close the electric-actuated ball valve using the Electric Valve Position Control. The Auto Tank Fill System shall be equipped with the following items unless specified otherwise:

- Pressure Transducer
- Tank Level Display
- Electric Valve Position Control
- Auto Tank Fill Selector Switch (Green LED indicates Auto Tank Fill Mode)
- Cables
- Electric-Actuated Ball Valve (sold separately)

18. Overheat Protection Manager (OPM)

The Waterous Overheat Protection Manager (OPM) shall act as a safety device by releasing hot water from the discharge area of the pump to the ground. The OPM shall consist of a valve that opens when the water in the pump reaches 140° F (60° C) and a warning light on the pump panel that is triggered by a thermal switch when the water in the pump reaches 180° F (82° C).

19. Pump Intake Strainers and Anodes

The pump intake strainers shall be removable, die cast zinc screens that are designed to provide cathodic protection for the pump, thus reducing corrosion in the pump. Anodes are normally mounted on the pump intake piping, but they may also be installed in the discharge piping if no intake mounting locations were available. Physical mounting of the anode may be via an NPT tap or bolt-on flange.