**AP FLEX Pump**

**General**

Single stage fire pumps. Main castings made in bronze.

Performance – rated to 500 U.S. gpm @ 150 psi.

**Special note:**

When preparing the specifications for your new fire apparatus, assure the use of a HALE pump by incorporating these pump specifications as written. No competitive pump can match HALE construction or performance!

**DETAILED SPECIFICATIONS**

**Pump construction**

1. The pump shall be of a size and design to mount on the chassis of a commercial and custom truck, and have the capacity of \_\_\_\_\_ (250, 300, 350 or 500) gallons per minute (U.S. GPM), NFPA 1901 rated performance.
2. The entire pump shall be manufactured and dynamometer tested at the pump manufacturer's factory. The pump manufacturer must have ISO 9001 quality control certification.
3. The pump shall be driven by the truck chassis engine through a transmission mounted or split drive line power take-off (PTO). The engine and PTO shall provide sufficient horsepower and RPM to enable the pump to meet and exceed the specified performance within the torque rating of the PTO, truck transmission gears and drive line components.
4. The entire pump, both suction and discharge passages, shall be hydrostatically tested to a pressure of 500 PSI. The pump shall be fully tested at the pump manufacturer's factory to the performance spots as outlined by the latest NFPA 1901 Standard. Pump shall be free from objectionable pulsation and vibration.
5. The pump body and related parts shall be bronze alloy, with a minimum tensile strength of 34,000 PSI. All moving parts in contact with water shall be of high quality bronze or stainless steel. Pumps utilizing castings made of lower tensile strength cast bronze not acceptable.
6. Pump body shall be vertically split, on a single plane, for easy removal of impeller, clearance rings and mechanical seal assembly, from the pump without disturbing the mounting of the pump in the chassis. As an alternative, it must be possible to remove all these items without disturbing the pump body, manifolds and associated pipe work.
7. The pump discharge shall be rotatable to achieve different positions – 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 o’clock (by rotating the volute).
8. Pump impeller shall be hard, fine grain bronze of the mixed flow design, accurately machined and individually balanced. The vanes of the impeller intake eye shall be hand-ground and polished to a sharp edge. The impeller to be of sufficient size and design to provide ample reserve capacity. The impeller shall be keyed to the pump shaft.
9. Impeller clearance rings shall be bearing bronze, easily renewable without replacing impeller or pump body.
10. The inboard rear clearance ring shall be of a single labyrinth, intermeshing type design to provide extended life and better pump performance due to reduced recirculation.
11. The pump shaft shall be precipitation hardening stainless steel with a positive impeller lock. Pump shaft must be sealed with double lip oil seal to keep road dirt and water out of gearbox.
12. Pump shaft to be rigidly supported by rolling element bearings for minimum deflection and end float. Shaft end float shall be controlled by the bearings and shall not be adjustable.
13. The pump shaft shall have only one mechanical seal. The mechanical seal shall be a self-adjusting mechanical type, incorporating a rotating spring-loaded hard carbon ring running against a stationary silicon carbide seat with a PTFE backup ring that provides best in class reliability. The seal shall be pre-loaded during pump assembly and shall require no maintenance or adjustments during its life. (No exceptions.)

Gearbox construction

1. The gearbox as well as the pump shall be constructed and tested at the pump manufacturer's factory.
2. The aluminum alloy gearbox is designed to function without lubrication change for up to three years assuming manufacturer’s specified gear oil is used.
3. The bearings and shaft shall be oil splash lubricated, by the gear rotation, to ensure that the pump can be operated at any angle up to 15˚ in any direction.
4. Gearbox shall be of sufficient size to withstand the torque of the engine in pump operating conditions. The gearbox shall be designed of ample capacity for lubrication reserve and to maintain the proper operating temperature.
5. Input shaft to be rigidly supported by rolling element bearings for minimum deflection and end float. Shaft end float shall be controlled by the bearings and shall not be adjustable.
6. The input shaft shall be of heat-treated nickel chromium molybdenum steel and shall withstand the torque of the engine in pump operating conditions. Input shaft must be sealed with oil seal to keep road dirt and water out of gearbox.
7. All gears both drive and pump, shall be of highest quality electric furnace chrome nickel steel. Bores shall be ground to size and teeth integrated and hardened, to give an extremely accurate gear for long life, smooth, quiet running, and higher load carrying capability. An accurately cut helical high contact design shall be provided. (No exceptions.)
8. The pump ratio shall be selected by the apparatus manufacturer to give maximum performance with the engine, transmission and power take-off selected.
9. The gearbox housing will be fitted with a cooling water system as standard.
10. The gearbox will be rotatable to achieve six different positions – horizontal left, horizontal left - 22.5° down, horizontal right, horizontal right – 22.5° down, inverted (input over pump) and vertical (pump over input).

**Priming Pump**

The priming pump shall be a positive displacement, oil-less rotary vane electric motor driven pump conforming to the requirements of NFPA 1901. The pump body shall be manufactured of heat treated anodized aluminum for wear and corrosion resistance. The pump shall be capable of producing a minimum 24 in-Hg vacuum at 2000 feet above sea level. The electric motor shall be a 12 VDC (or 24 VDC) totally enclosed unit. The priming pump shall not require lubrication. The priming pump shall be operated by a single push-pull control valve mounted on the pump operator panel. The control valve shall be of all bronze construction.