

Throttling UP



Article by Ed Collet who is an engineer by trade, a firefighter, and an Instructor for pump operations and re-supply with the Bowling Green State University Fire School.

Centrifugal fire pumps are the mainstay of the fire service whether in a large industrial fire engine capable of moving multiple thousands of gallons of water or a portable pump with a flow of 150gpm. While very efficient at moving water, all air must be evacuated from the pump cavity to pull water in to the eye of the impeller. This is done by priming the pump. On modern fire apparatus priming is done by a positive displacement pump connected to an electric motor or more common today by an air driven venturi. When it comes to portable pump there is not sufficient electrical power available for the draw of a primer motor and there is not an air source for an air primer, so we must rely on an exhaust primer to remove the air from the pump cavity. Exhaust primers were once prevalent on fire engines when gas engines were the norm. This is where the practice of throttling up when priming the pump started in order to get the needed exhaust gas velocity through a venturi to evacuate the air. As electrical systems improved and engines moved to diesel power priming duties moved to motorized pumps.

But exhaust primers are still in use on portable pumps, so it is important to understand how the exhaust primer works. The Bernoulli principal states as a fluid, in this case exhaust gas, goes though a venturi the gas will accelerate, and the pressure will drop. Exhaust gases pass through a section with a reduced diameter which increases the velocity of the gas. When the gas accelerates the pressure becomes lower than atmospheric pressure allowing water to be pushed up through the suction hose and into the pump body by atmospheric pressure. Since there is not the concern of burning out a primer motor, it is possible to pull a prime through more than the 20' of suction hose as long as lift

is less than 15 feet. In order to minimize carbon build up in the venturi it is important to let the engine warm up before going to high throttle for priming. Once the engine is warm with the suction hose and strainer in the body of water, go to the full throttle position. Double check the drain valve on the bottom of the pump body is closed. Crack the discharge to provide for water flow once the pump is primed. It is not required to crack the discharge to pull a prime but I have found it beneficial in getting and maintaining a prime to have water flowing as soon as possible. Close the exhaust flap to force the exhaust gas to the venturi then open the valve between the pump and venturi. Once a solid stream of water comes from the venturi discharge and flow is developed from the discharge, close the valve between the pump and venturi. Finally open the exhaust flap and set the throttle to the desired position. Opening the exhaust flap after closing the valve between the pump and venturi insures a positive pressure in the tube connecting the venturi to the exhaust system to prevent water being draw into the engine. To keep the primer working its best, it is important to maintain it at regular intervals. This includes removing the venturi section and cleaning it with carburetor cleaner. Remove the copper tube between the venturi to clean the inner diameter with carburetor cleaner as well.



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