



TURBINE TIPS

Turbine Tips provided by Pond and Lucier, LLC. ®

634 Plank Road, Suite 103 Clifton Park, NY 12065

Phone: 518.371.1971 Fax: 518.371.1756 E-mail: pal@pondlucier.com



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Subject: Thoroughly Clean Fuel System Piping after Liquid Fuel Pump Failure
Applies to: General Electric gas turbines: primarily MS5001P and 6001B
Controls: Speedtronic Mark II, IV and V

Overview:

If a liquid fuel pump should fail (either *Roper* or *IMO* brands) during turbine operation, it is important to thoroughly clean the system piping that could become contaminated. Most fuel systems are equipped with both a low-pressure (LP) and high-pressure (HP) filter. The LP filter is located upstream of the fuel oil stop valve. The HP filter is located downstream of the fuel pump and upstream of the flowdivider. Thus, debris from the pump could contaminate the bypass loop. See Figure 1 below.

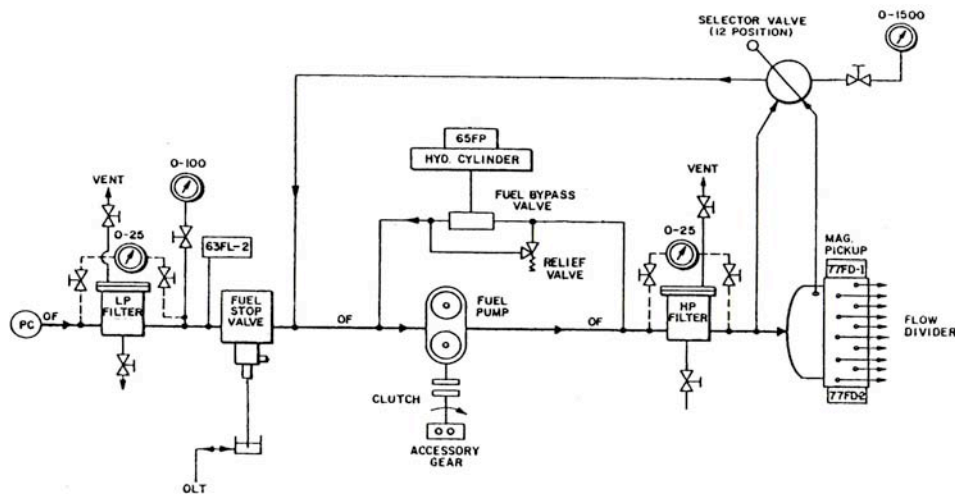


Fig. 1: Simplified Liquid Fuel System Schematic

First, the failed pump is removed and inspected. Before it is replaced, the inlet and discharge fuel piping also should be inspected. It is *imperative* that piping leading to and from the bypass valve be clean of debris resulting in the pump failure. Please refer to the photograph in Figure 2 below.

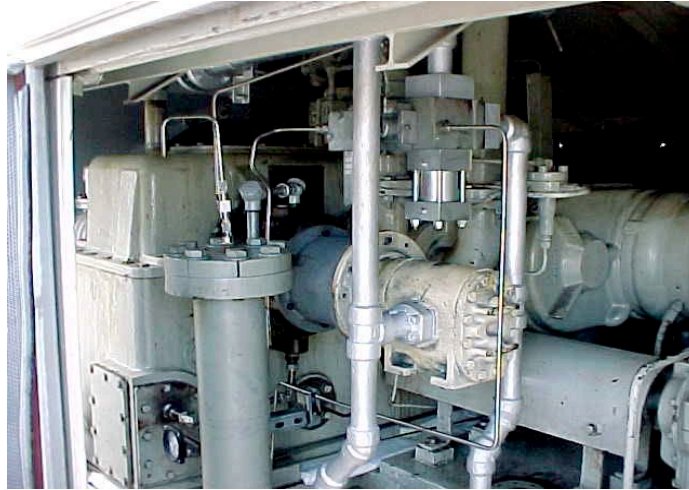


Fig. 2: Roper Fuel Pump with Bypass Valve (above) and HP Filter (left)

The piping “tee” in the pump discharge line shows how fuel can flow **either** through the HP filter or up through the bypass valve toward suction of the pump. The return line from the bypass valve is connected to another piping “tee” as shown in Figure 1 above. The flowdivider shown in Figure 3 below is protected because it is downstream of the HP filter.



Fig. 3: HP Filter (vertical) and fuel oil pipe leading to Flowdivider

Debris from a failed fuel pump (typically brass particles from the thrust bearing and pieces of rubber seals) could clog the bypass valve throat. See Figure 4 below for the return pipe loop. The foreign matter would collect in the throat opening of the valve, choking off fuel flow.



Fig.4: Fuel piping inlet leading to the Bypass Valve (blue, center)

This can be a very serious problem during the restart of the gas turbine once the new pump is installed. Assume that the pipes were **NOT** cleaned after a pump failure. During start-up, the turbine may trip on **overtemperature**, because the bypass valve (clogged) cannot divert sufficient fuel back to the suction side of the pump. That is, after the fuel stop valve trips, the flowdivider may likely continue to turn, distributing the excess fuel to the combustors. Fuel could continue to flow (evacuating the fuel lines and HP filter) for as long as 15 seconds. This “overburn” could cause serious damage to the hot gas path of the gas turbine.

Contact **David Lucier** or **Charlie Pond** if you have had a fuel pump failure and need technical assistance.

Also, **Pond And Lucier, LLC** has a full-service hydraulics lab in its new facility in Amsterdam, NY. Please contact us there on Tel: **518-843-3634** for details. Visit the **reconditioning** section of this website for the pricing chart for fuel and hydraulic systems components we service.