

## **GENERAL INFORMATION**

The Porter Consolidated Corporation has been commissioned to construct a new power generating facility. The site will house one 300 MW coal-fired power unit. Initial planning estimates that the facility will be operational in three years. Excavation and site preparation are complete.

The Porter Consolidated Corporation has purchased 30 Diesel Engine Generators to supply power for construction activities. Each single-bearing generator includes control circuitry that provides various indications, warnings, and fault protection. Each generator supplies uninterrupted power to its respective construction area on a 24 hour basis. If a generator fails, construction in the respective area is halted at a cost of \$5,000 per hour.

The current operating environment has standard low and high temperatures of -10 and 100 degrees Fahrenheit, respectively. The generators are maintained by the site equipment maintenance team.

## **SCOPE**

- Diesel Fuel System from the fuel tank assembly to the 6 fuel injectors
- Fuel Level Indicator and the Low Fuel Alarm system

Outside the Scope:

- Engine Block Heater
- Control Panel Lighting
- All Remaining Control Panel Gauges, Indicators, and Warning Lights

## **THEORY OF OPERATION**

The Diesel Generator fuel system stores, cleans, and delivers fuel to the engine for continuous combustion. The fuel system is required to deliver fuel to the engine at an uninterrupted delivery flow of 2,300-2,700 psi to the engine while operating under load.

Fuel is drawn from a welded steel fuel tank assembly into the primary fuel filter. The primary fuel filter is located downstream of the fuel tank and is rated at 30 micron. A pressure gauge is mounted on the top of the primary fuel filter and indicates the pressure drop across the filter within +/- 5%. The fuel leaves the primary fuel filter and is drawn into the engine mounted fuel pump. Pressurized fuel then leaves the pump and passes through a secondary fuel filter. The secondary fuel filter is located downstream of the fuel pump and is rated at 2 micron. Both fuel filters are equipped with a manual drain which allows accumulated moisture and debris to be removed without removing the filter. The filters' media is a treated paper element rated for 1,000 hours of operation before the paper element deteriorates.

Once leaving the secondary fuel filter, the pressurized fuel passes through a check valve, which is installed between the secondary filter and the cylinder head, to remove air from the fuel supply line. Under load, pressurized fuel then travels to the injector nozzles which spray diesel fuel into the engine's combustion chamber. Surplus fuel exits at the rear of the head, through a restricted return fitting which maintains system fuel pressure, and returns back to the fuel tank.

All associated fuel lines are ¼" rigid lines. Fuel connectors are used to connect the fuel lines to the fuel system components using a cork type gasket. A manually operated fuel shut-off valve (ball valve) is located downstream of the secondary fuel filter to isolate the fuel system and prevent fuel drain-back when the fuel filters are replaced.

An analog fuel level indicator is located on the control panel. Visual reference of fuel quantity is indicated by a needle pointer which moves along the indicated fuel scale graduations. A float assembly located at the top of the fuel tank sends a signal to the fuel level indicator via a sending unit to indicate fuel quantity within +/- 10 % of actual. When the fuel level drops below ¼ of a tank, a LOW FUEL alarm sounds.

A fuel filler screen is positioned in the filler neck assembly to prevent debris from entering the fuel tank during servicing. The fuel tank is equipped with a manual drain which allows accumulated moisture and debris to be removed.

\*For training purposes only.