



## **Technical Brief - Configuration details and critical accessories recommended for day tank installations when applied to power generation equipment.**

Day tanks are fuel containment systems designed for installation in close-proximity to an engine to provide a reliable supply of diesel fuel. They are often mandatory when the engine-mounted fuel pump is unable to draw fuel from a remote-mounted fuel tank due to distance or elevation issues. For safety and reliability, these fuel systems are configured as suction-type, meaning that the day tank draws fuel from the main tank, and the engine draws fuel from the day tank.

There are key differences in the configuration of the day tank and pump systems when used with above-ground storage tanks (AST) or under-ground storage tanks (UST). There are also important considerations that relate to day tank accessories.

Day tank integration with AST - in this type of application, attention should be given to the elevation of the day tank in relation to the main AST. Because of the possibility for syphoning between the day tank and AST, certain components should be installed in the fuel piping. Typically, a solenoid valve and strainer are installed on the day tank's pump inlet. This is an electrically-operated valve that will be normally closed. It will only open when the day tank level is sensed to be low, at which point the solenoid valve is opened and the supply pump is energized. As the day tank reaches a full level, the solenoid valve and pump are de-energized, which stops the flow of fuel and closes the fuel inlet to the tank. Additional components that are recommended on these systems are manually-operated ball valves and fusible link valves that automatically close in the event of a fire. These should be installed on the inlet and outlet of the day tank to allow isolation of the equipment for emergency or regular scheduled maintenance purposes.

A well-designed system requires that the day tank be capable of returning any excess fuel back to the AST. Failure to stop a fill pump or close a solenoid valve could result in continuous filling of the day tank. Without the means to return excess fuel, a spill will be inevitable. The overflow return pump is generally mounted on the day tank and should be sized to be able to overcome the supply pump. Its outlet should be equipped with a check valve to prevent backfeeding of fuel into the day tank when the return pump stops.

Some applications will have the AST in a remote location that is too far for the day tank pump to draw fuel reliably (example: day tank mounted on a rooftop while main tank is at grade). In these cases, the day tank is equipped with an overflow pump, and a stand-alone supply pump is mounted near the main tank to draw fuel from the AST and push it to the day tank. The remote pump would still interface with the day tank level controller to receive start/stop signals.

Day tank integration with UST - in this type of application, consideration should be given to the possibility that the day tank supply pump might lose its prime. For this reason, a foot valve is generally installed on the main tank, and a hand pump, check valve and solenoid valve are installed on the day tank. The hand pump allows for emergency filling of the day tank and also provides the means to restore fuel prime on the line that feeds the motor-operated pump. The check valve and solenoid valve act to restrict any backflow to the main UST. In UST applications, overflow (return) fuel is generally piped from the day tank to the UST and gravity is enough to prevent overflowing of the day tank. As in AST designs,

should the day tank be too far from the UST, the supply pump should be located by the UST.

General configuration recommendations – following are additional recommendations to consider for a properly configured day tank system:

1. Insist not only in UL142-compliant day tanks but also in UL508-compliant day tank controls.
2. Size the day tank to allow for a minimum 2 hours of engine run-time without need to refill.
3. The day tank supply pump should be sized to three-times the full-load fuel consumption of the engine (or engines if the day tank feeds multiple engines). In the example above (120GPH or 2GPM consumption), the pump should be sized at minimum of 6GPM.
4. The return pump (if applicable) should be sized to exceed the capacity of the supply pump.
5. Size all accessories (such as ball valves, solenoid valves, etc.) no smaller than the fuel lines that connect to the accessories.
6. Specify double wall construction with rupture basin leak detection sensor. This sensor is interconnected to the supply pump to stop its operation in the event of a leak in the main containment. The day tank controller should also indicate the condition with a visual alarm.
7. Always specify that the appropriate pressure relief vent caps be included with the day tank. These allow for emergency venting should the normal atmospheric vent become obstructed. In interior installations, the working vent must be piped to the exterior.
8. Review local authorities having jurisdiction (AHJ) to understand whether day tank controls and accessories should obtain power from engine batteries (i.e.: 24Vdc) or whether a 120Vac emergency accessory circuit would be acceptable.
9. Most diesel engines draw more fuel than is required for combustion. The excess fuel is typically returned to the day tank. Depending on rate of fuel return, you may need to consider routing it to the main tank, or you may need to design your system with a larger day tank or a fuel cooler to avoid heating of the fresh fuel supply. Heated fuel will diminish the engine's horsepower rating, and may lead to engine shutdown if the building loads exceed the power capability of the engine.
10. On a prime-duty application, increase system reliability by specifying a duplex fuel supply pump set with cast iron pump housings and steel rotors. Duplex pumps allow for lead/lag or simultaneous operation at the operator's discretion. The heavier duty cast-iron pump will last longer and produce less operating noise.
11. Insist on the following local and remote alarms from your day tank vendor:
  - a) low level alarm and remote annunciation output contact.
  - b) high level alarm and remote annunciation output contact.
  - c) critical high level alarm, pump shutdown and remote annunciation output contact.
  - d) critical low level alarm, engine shutdown (prevents loss of fuel prime) and remote annunciation output contact.
  - e) tank leak detection alarm and remote annunciation output contact.

The guidelines above may help in the selection of the appropriate product for your application. However, we recommend that you contact your day tank vendor to review any options or accessories that might be needed to insure reliable and safe operation of a specific fuel system application. For additional resources related to day tanks and related fuel systems, you may visit [www.hurtado.cc/resources.htm](http://www.hurtado.cc/resources.htm).