

## Technical Brief – Guidelines for selection of a remote tank fill station.

Many of today's generator set installations utilize some form of above-ground fuel storage tank. Typical applications involve freestanding tank(s), or a "sub-base" tank installed within the generator set skid.

Due to space, security or other architectural limitations, the design engineer may be forced to locate fuel storage tanks away from locations that would be ideal for fuel filling operations. However, the remote location of these tanks may now lead to unsafe conditions, especially when fuel delivery personnel deploy long runs of fuel hose in order to reach them. Today's requirements for on-site fuel storage combined with demands for safe and visually- aesthetic facilities have led to the popularity of a remote tank filling station as a safe and proven solution.

A tank fill station is designed to allow for safe and convenient remote filling of fuel tanks. It is available in various configurations, generally dependent on the type of fuel, the type of fuel delivery vehicle, the size of the fuel tank and its relative location to the fuel delivery point. Also to be considered is the amount of time that would be desirable (or allowable) for completion of the fill operation. Following are guidelines for selection of an adequate tank fill station for a diesel fuel tank.

### Fuel Delivery Vehicle Type:

Fuel delivery vehicles are generally referred to as either *gravity trucks* or *pumper trucks*. A gravity delivery truck has no means to positively discharge fuel when the destination tank is at grade, or above grade, as in the case of a multi-level parking garage. More common, the pumper truck, is equipped for positive fuel delivery via a truck-mounted pump. The flow rate may vary by vehicle, but, given a short distance to the tank, it is generally sufficient to allow the operator to complete the task in a relatively short amount of time.

### Location of the Fuel Tank:

The location of the fuel tank might be the most critical aspect for selection of a tank fill station. The tank fill station should be selected so that it can allow reliable delivery of fuel to the tank. Considerations to fuel pressure, fuel line size, head restrictions, etc. are critical. If it is determined that a pumper truck might not be able to provide adequate pressure to deliver fuel to the tank, the engineer should consider a fuel fill station that incorporates a pump.

### Fuel Capacity of Tank:

The size (capacity) of the fuel tank is important when selecting a fill station that incorporates a pump. The flow rate of the pump should be selected to provide reasonable fuel filling times, without overwhelming the fuel tank.

Once the above factors are determined, one can select the appropriate tank fill station:

For delivery of fuel from pumper-type truck:

Simplex FuelPort or Automatic FuelPort – this product provides a wall or floor-mounted Nema 3R cabinet, which houses a quick-disconnect coupling for the delivery truck hose. This fitting is generally available in 2", 3" or 4". The enclosure also provides the needed valves, spill containment and manually operated hand pump to ensure safe operation. The automatic version of the FuelPort includes a control panel and fuel level sensor that alerts the operator once the tank is reaching a full level. It is also capable of closing an electrically-operated valve to prevent overfilling of the tank. A "compact" version of this product is available to allow for a smaller footprint for locations where aesthetics are important (condominiums, retail centers, etc.).

For delivery of fuel from a gravity-type truck, or from a pumper truck with inadequate pumping pressure for the specific application:

Simplex SmartPump or Mini SmartPump – this product provides automated fuel filling operation in a similar package as the FuelPort. Its key difference is the integration of a motor-operated pump responsible for drawing fuel from the delivery truck and pushing it to the fuel tank. Whether to use a full-size SmartPump, or a Mini SmartPump, depends on the flow rate desired. The full-size SmartPump is capable of flow rates in excess of 100GPM, which make it suitable for large-tank applications. The Mini SmartPump, on the other hand, provides a choice of flow-rates from 7GPM to 25GPM. These may be appropriate for generator sub-base tanks. In a typical installation, a fuel delivery period of 20-25 minutes is not uncommon but the availability of various flow rates allows the engineer to size a system that suits his/her particular client's needs.

One important consideration... since emergency power is normally tied to emergency situations, the design engineer should consider allowing for the most flexibility in the fuel fill operation. While pumper trucks may be available in the area where the proposed building is to be constructed, these trucks might be prioritized to government or other critical infrastructure in times of emergency. The self-sufficiency of a SmartPump design may prove invaluable when the only vehicles available for delivery of fuel are small gravity trucks.

<b>Tank Filling Systems</b>			
<b>Delivery Truck Type</b>	<b>Shutoff</b>	<b>Number of Tanks</b>	<b>Simplex Model</b>
Pumper	Manual	1	FuelPort
	Automatic	1 or more	Automatic FuelPort
Gravity	Automatic	1	SmartPump
		1 or more	
<p>To calculate flow rate (in gallons per minute) required for a 25 minute filling operation on a tank that is 25% full, you may use the following formula:</p> $\text{Flow Rate (GPM)} = \frac{\text{tank capacity} \times 0.75}{25}$			

For specifications, pictures and additional resources related to tank filling stations and generator set fuel systems, you may visit [www.hurtado.cc/resources.htm](http://www.hurtado.cc/resources.htm).