Fueling Arrangements for Diesel Powered Appliances

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Rules for Diesel Appliance Tanks

Regulations

- California fire Code Section 604
- UL 2200 “Stationary Engine Generator Assemblies”
- NFPA 110 “Standard for Emergency and Standby Power Systems”
  - References NFPA 37 “Standard for the Installation and use of Stationary Combustion Engines and Gas Turbines

Recommended Practices

- PEI 1400 “Recommended Practices for the Design and Installation of Fueling Systems for Emergency Generators, Stationary Diesel Engines and Oil Burner Systems”
- NFPA 37 Standard for the Installation and use of Stationary Combustion Engines and Gas Turbines

Diesel Powered Appliance

- Generators
- Pumps
  - Stormwater management
  - Sewage lift
  - Fire water
- Air compressors
- Others

Diesel Powered Appliance Tank Arrangement Options

- Aboveground Tank by unit
- Belly tank type (tank under the engine)
  - Single wall tank
  - Basin Tank
  - Double wall tank
- Remote Tank/Auxiliary (Day) Tank Configuration

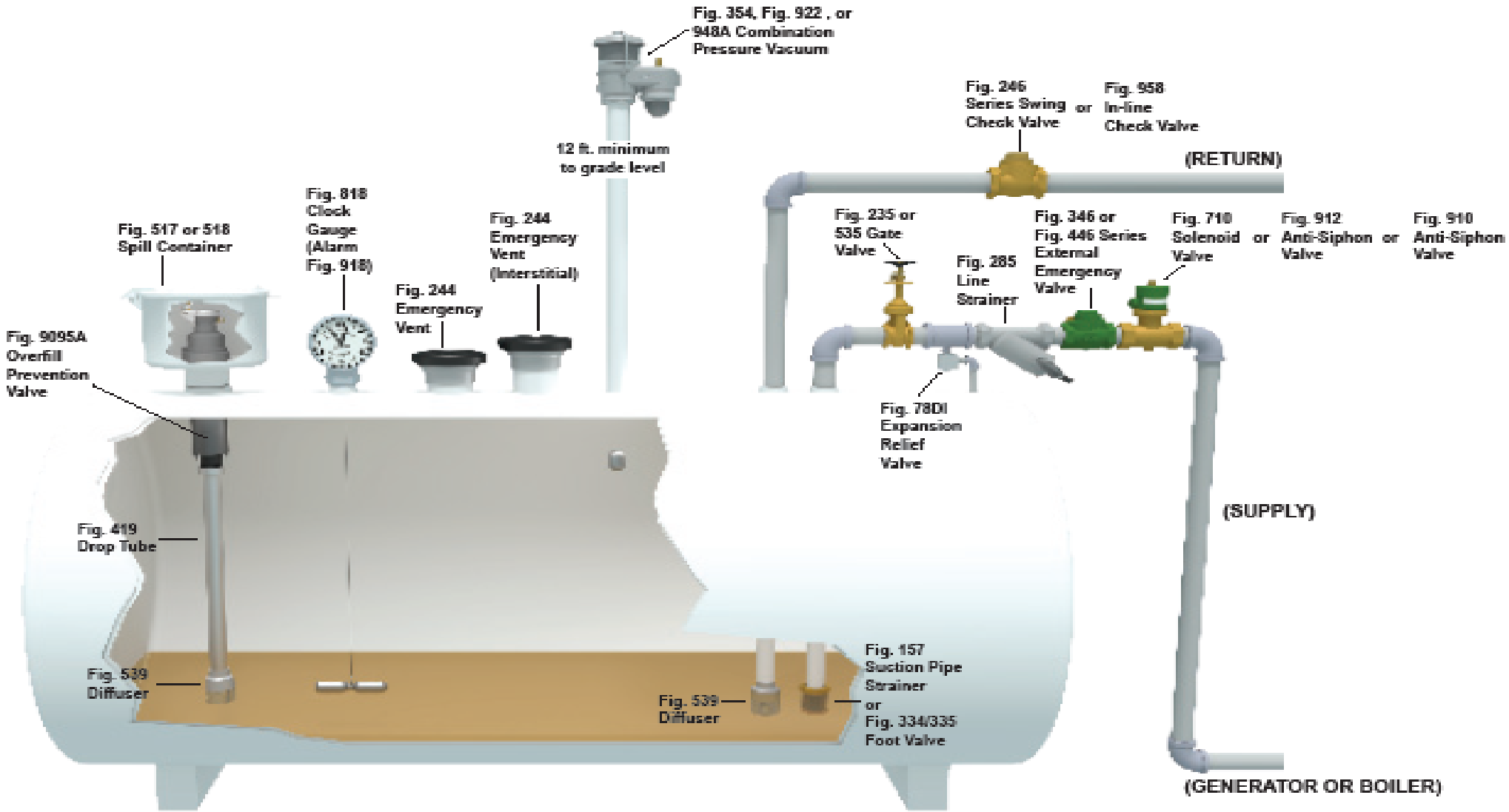
Diesel Engine Operation

- The power unit controls output by controlling the flow of fuel to the individual engine cylinders
- Because of this the fuel system must transfer sufficient fuel for full load operation at all time, i.e. more then is needed
- When the engine is not at full power excess fuel is pumped and needs to be returned to a tank
- Long fuel return distances can cause operational issues
- The fuel injection process pressurizes the fuel, and that heats the product
- The returned product can start to agitate and heat the product in the storage tank

Tank Located by Appliance

- Simplest system, one tank near unit supplies fuel
- Common on smaller units with smaller tanks, fire pumps
- Piping runs should not be too long
  - Some cases tank can be indoors
- Tank Location can make filling a challenge
  - Overfill protection
  - Antisiphon system

Emergency Generator or Fuel Oil Suction System



Belly Tank System

- Tank located under generator base, generator on top of tank
- Puts fuel right next to tank, makes fuel return simple
- Minimizes the generator system foot print
- A support system must be part of the system.
  - Can be part of tank, or separate
- They can be single wall, tanks in basins, double wall, protected


CAT
CAT
CRANE
RENTAL
GEN-TANK

Differences

- Single wall tank will depend on a separate containment structure around the tank
  - Count the emergency vents
- Basin tank is a tank set in a basin that is open to atmosphere
  - Identified on listing label, and count the E vents
  - More common on systems from 1990’s or before
- Double wall tank is a tank built inside a tank
  - Again, count the E-vents, there should be two on a double wall tank
  - There will be a monitor point for interstitial space
  - Many have a single wall top plate

Basin Tanks

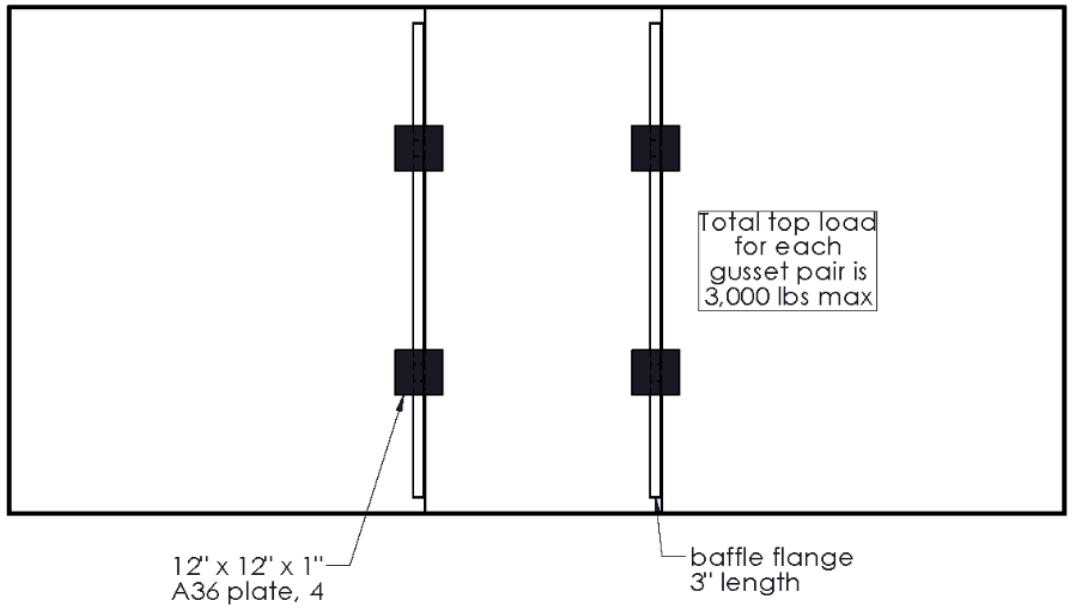
- Basin is open to atmosphere and can collect stuff, water, organics, garbage etc.
- Can be difficult to access to inspect, and clean
- The interior is usually painted, and repairing paint can be difficult
- More common on systems from before advent of double wall tanks (1990’s)

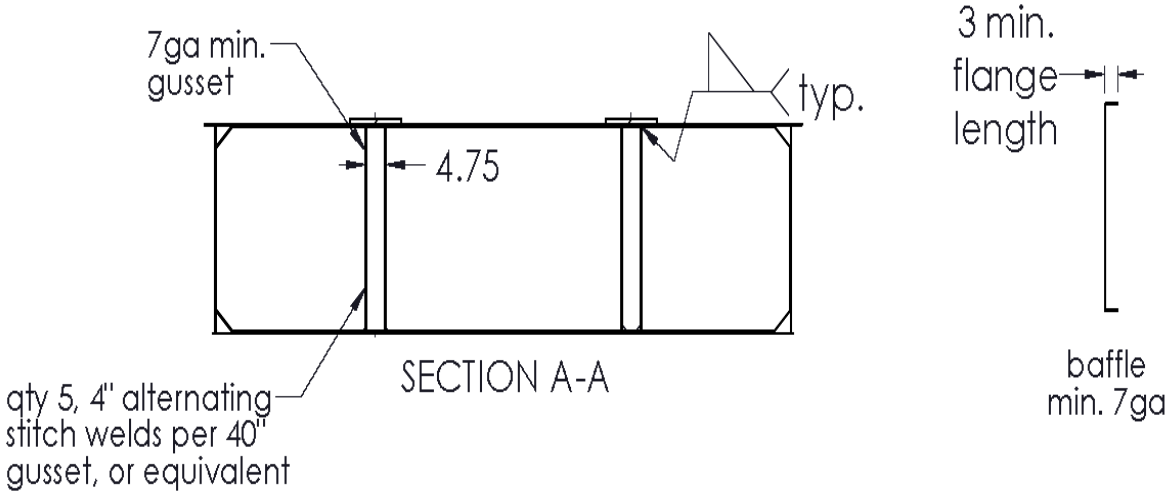
Double wall tanks

- Distinct primary and secondary tank
- Secondary is protected from weather, and other stuff
- Minimal access to primary tank
- Because openings are on the top they are prone to being exposed to any material drops on the tank top
- Because the fittings are usually located in one spot it can make access to those openings a challenge
- Some emergency vent units are not as weatherproof as others


DIESEL
FLAMMABL
NO SMOKIN
1
2
0

Baffle Style Generator Base Tank






GEN-TANK

How to identify the type of Belly Tank

- Look for listing tag, tag will be specific
- Tag is usually located near fittings
- Count the emergency vents
  - A double wall tank will need 2 emergency vents
- Look for tag on containment monitoring fitting
  - “Basin Tank Alarm” often means basin tank
  - Interstitial Monitor for double wall tank
  - Look at top of tank

UL Label Statement options

UL Serial No._____

- Will have one of these statements:

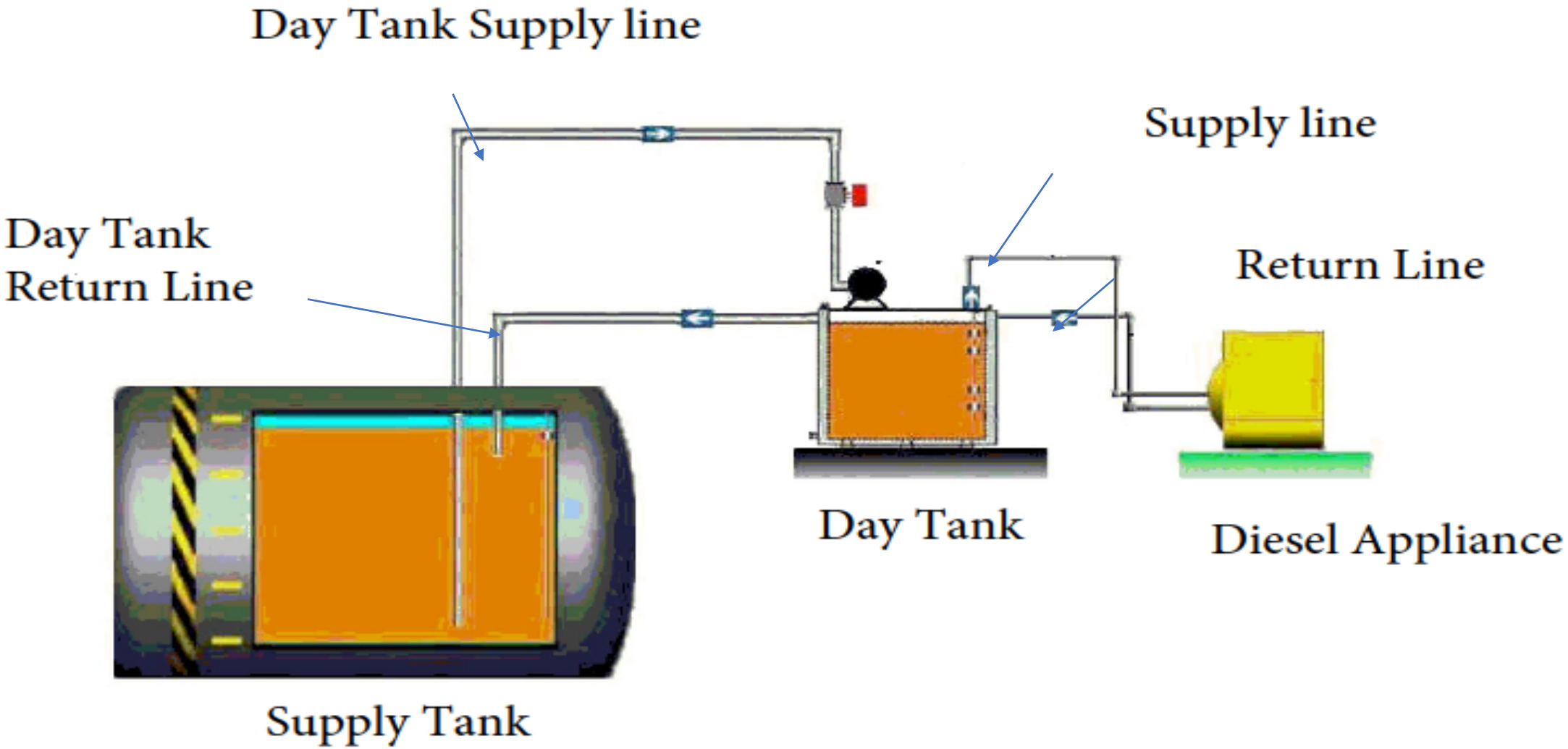
  Single wall Tank (containment by others)
  - *Aboveground Tank for Flammable Liquids*

  Tank in a basin (or dike)
  - Open Top Diked Aboveground Tank for Flammable Liquids
  - Open Top Diked Secondary Containment Aboveground Tank for Flammable Liquids
  - Closed Top Diked Aboveground Tank for Flammable Liquids

  Double wall tanks
  - Closed Top Diked Secondary Containment Aboveground Tank for Flammable Liquids
  - Secondary Containment Aboveground Tank for Flammable Liquids

Remote Tank Auxiliary (Day) Tank System

- This uses a primary source tank to hold product and locates a remote tank near the diesel engine to accommodate the engine operation
- This allows for larger supply of fuel and better location
- Tank near power unit is called a “Day Tank” or “Auxiliary Tank”
- Return to Source tank can be pumped or be via gravity if equipped
- Return lines should be equal in size, or larger than feed lines
- The Auxiliary tank should have a high level shut off, and it should have a redundant feature


Day Tank Supply line
Supply line
Day Tank
Return Line
Return Line
Day Tank
Diesel Appliance
Supply Tank

“Day Tank” Definitions

- NFPA: A day tank (or auxiliary tank) is an integral component of the piping system between an oil-burning or motor fuel burning (generator) device and the AST or UST that supplies it. (from NFPA 31)

- UL 142A Definition : Day tanks are designed for a small temporary or backup supply of fuel for engine driven equipment (20 to 1,320 gallons)


TRAMONT
TRAMONT
SYSTEM
FUEL LEVEL
ALARM
FUNCTION
MODE
Underwriters Laboratories Inc.
TRAMONT

Installation Details

- Tanks are generally vented to building exterior (service and emergency) but exceptions exist
  - Vents can discharge to a vented appliance enclosure
- Protected tanks can have indoor emergency vents under some fire code allowances
- Long venting runs may need to be upsized to account for flow resistance
- Tanks should be equipped with overfill mechanism, but short belly style tanks can create a challenge for overfill valves.
- Many piping options exist but metallic piping is most common, some flexible materials may be needed to isolate engine vibration

Summary

- Diesel powered appliances are a unique installation
- The fact that they support something means their installation arrangement is based on the supported item
- Special tanks are designed specifically to support the powered item
- Multiple tanks may be involved in supporting the equipment
- Note larger generators may also contain more then 55 gallons of lubricating making them “oil filled operating equipment” per SPCC

Questions?

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