



Diesel Powered Appliance Tank Challenges

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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

Unique Factors for Diesel Powered Appliances

- Location, the powered appliance is usually located near the utility it supports, so it can be in an odd spot (indoors, remote, near traffic)
- Only runs when something is not right, otherwise it just sits
- Duty cycle: goes from nothing to full operation in short time
- The unit needs to recirculate fuel for proper operation so tank is near unit.
- Unique installation standards (Building Codes)
- Seismic issues
- Can be built by organizations who focus on the generation unit.
- Y2K

Location Issues

- To be near supported utility It also gets put into the available space, so there can be interference
 - Site drainage
 - Roof drainage from nearby structures can affect system
 - Proximity to traffic
 - Snow removal
- Can also be located below grade, or below transfer point
- Can supply unit at height

Proximity to
traffic and
pedestrian
traffic





Local Drainage issues





Pathway for Water to Enter





Location issues

- Tanks located remotely from fill point (indoor tanks)
- Tanks located below grade or below fill point (.37 psi per foot)
 - Problematic with non cylindrical tanks
- Tanks with extensive piping to appliance (including grade change)
- Vent system from tanks inside buildings may need to consider head loss due to distance and geometry
 - May need to upsize the emergency vent pipe to limit tank pressures



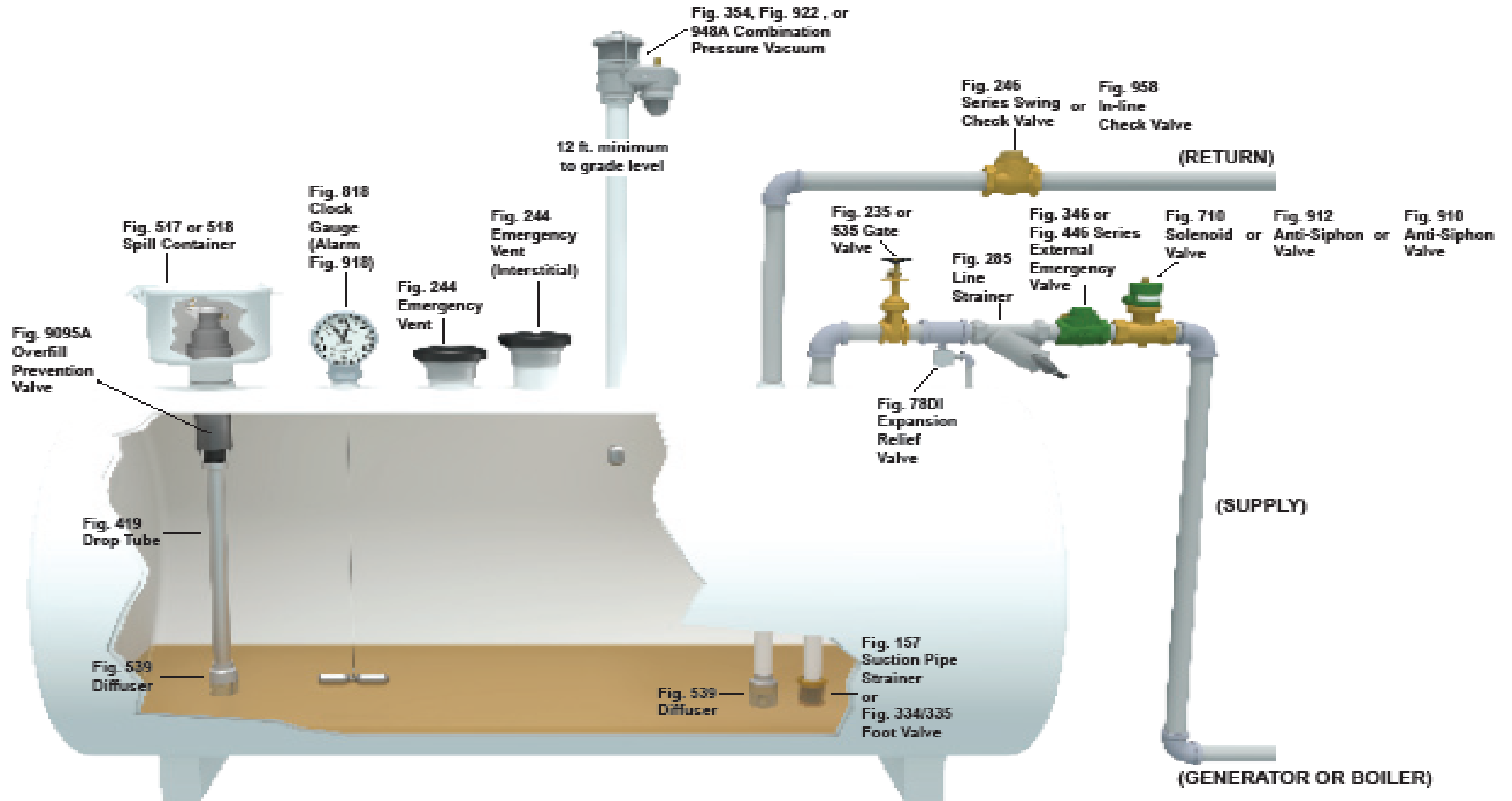
Unique Aspects of Diesel Appliance Construction

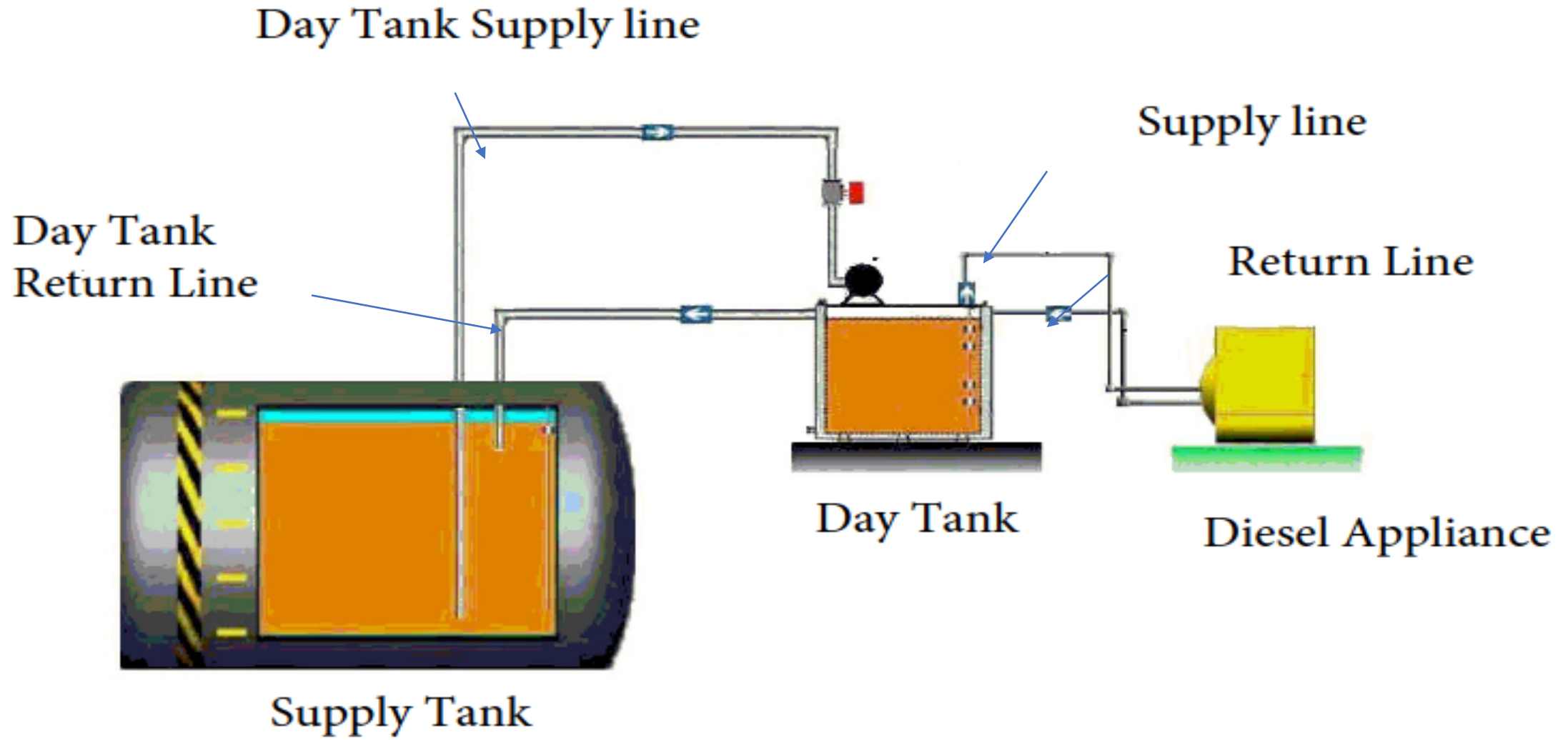
- Can be built by organizations who focus on the generation unit (or pump or compressor) and not the tank.
- Often use rectangular tank, and tank can be unit base
- Unique installation standards
 - UL2200
 - NFPA 36
 - PEI 1300

Tank construction types

- Remote tank system
- Remote tank/day tank system
 - AST to AST
 - UST to AST
- Sub base tank
 - Single wall
 - Basin tank
 - Double wall tank

Emergency Generator or Fuel Oil Suction System





“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)



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Auxiliary, or Day Tank Controls

- There is always the potential for issues when a large tank supplies a small tank
- Proper system design provides a fail safe should the auxiliary tank be overfilled.
 - Redundant float switches
 - Gravity return to tank
- Means to test safety system

Generator Tank inspection obligations

- NFPA 110 chapter 110 has inspection and testing requirements for the generator unit
 - NFPA 110 requires the generator system to be tested to confirm availability
 - The Chapter 8 inspections do not address the tank
- NFPA 110 references NFPA 30 and NFPA 37 for maintenance of liquid fuel systems (Section 7.9)
- NFPA 30 references SP001 and API 653 (NFPA 30 21.81)
- Tanks for generators are also regulated under fire code, and (possibly) 40CFR112
- Inspections can be more difficult due to location and access issues
- May have more than one tank in the system

Tank Inspection

- Tank inspection should be done in accordance with an appropriate and accepted standard. (Good engineering practice)
- Inspection generally includes monthly inspection, annual inspection and possibly a formal inspection based on tank design
- Note that tank appendages also need to be maintained per manufacturer recommendations
- Component access can be difficult but component removal may be required to properly maintain the equipment
- “Equivalent” procedures can be used but there must be a justification and the equivalent must prove operability of element inspected.

Fuel Considerations

- The unit can sit unused for long periods of time
- The fuel in the tank has a recognized shelf life, generally 1 year.
 - Some services can filter and treat fuel
 - Other times a fuel swap is an option
 - Different blends for different seasons
- Any water that gets into the fuel will find a low spot and collect
 - Low spots are a function of many things
- Fuel additives are an option but not a cure all.
- Access to the tank bottom can be challenging, so finding water can be hard (emergency vent may be the best way in)
- Maintain integrity of access points

Grounding and Bonding

- Grounding: provides a conductive path to earth so that the grounded object has no electrical potential
- Bonding: Provides an electrical connection between two or more conductive objects so they have the same electrical potential
- Bonding and grounding to be done in accordance with electrical code
- Because these systems can involve several electrical components that can be separated bonding and grounding is important.
- When appliance generates electricity then stray current can cause issues

Grounding and bonding challenges

- Components can be located some distance apart
- Piping may not be a good conductor
- The engine can be equipped with vibration isolators which require jumper wires to bond
- The presence of stray currents can cause corrosion issues, and the build up of static charge
- The recirculation of fuel to tank from engine operation can also cause static charge to build up and heating of the fuel

Questions?

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