Release Detection Problems for Emergency Generator Tanks

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September, 2025

Introduction

- Who regulates Emergency Generator USTs?
- What parts of the system are regulated as USTs?
- Compliance Complexities
- Compliance Resolutions

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Who Regulates Emergency Generator Systems?

- EPA
- States
- International Fire Code (IFC) Chapter 57
- Building Codes

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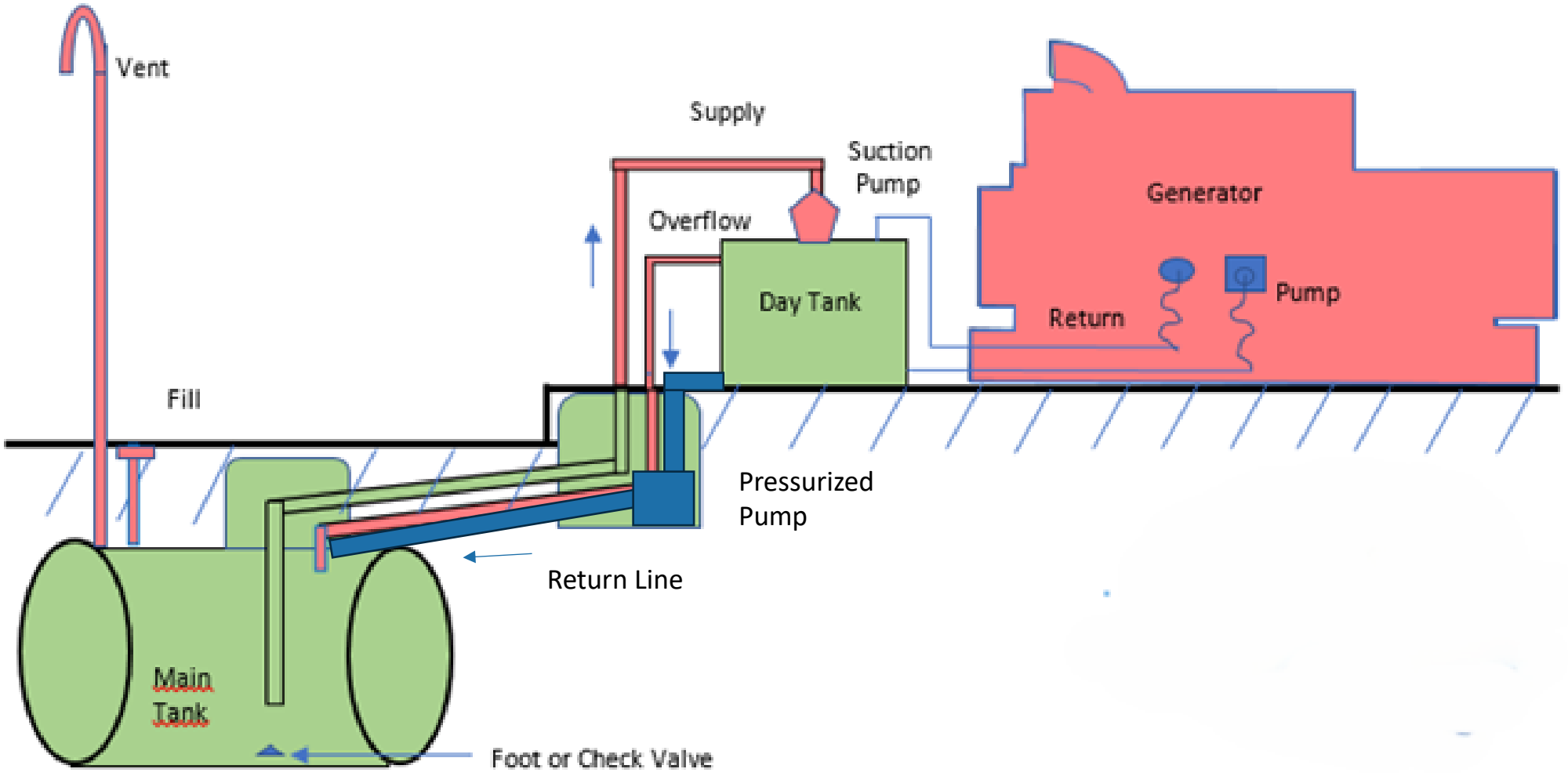
Industry Standards

NFPA 30 “Flammable and Combustible Liquids” Chapters 21, 22,27, new chapter proposed
NFPA 31 “Standard for the Installation of Oil Burning Equipment”
NFPA 110 “Standard for Emergency and Standby Power Systems”
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”

Emergency Generator System Design



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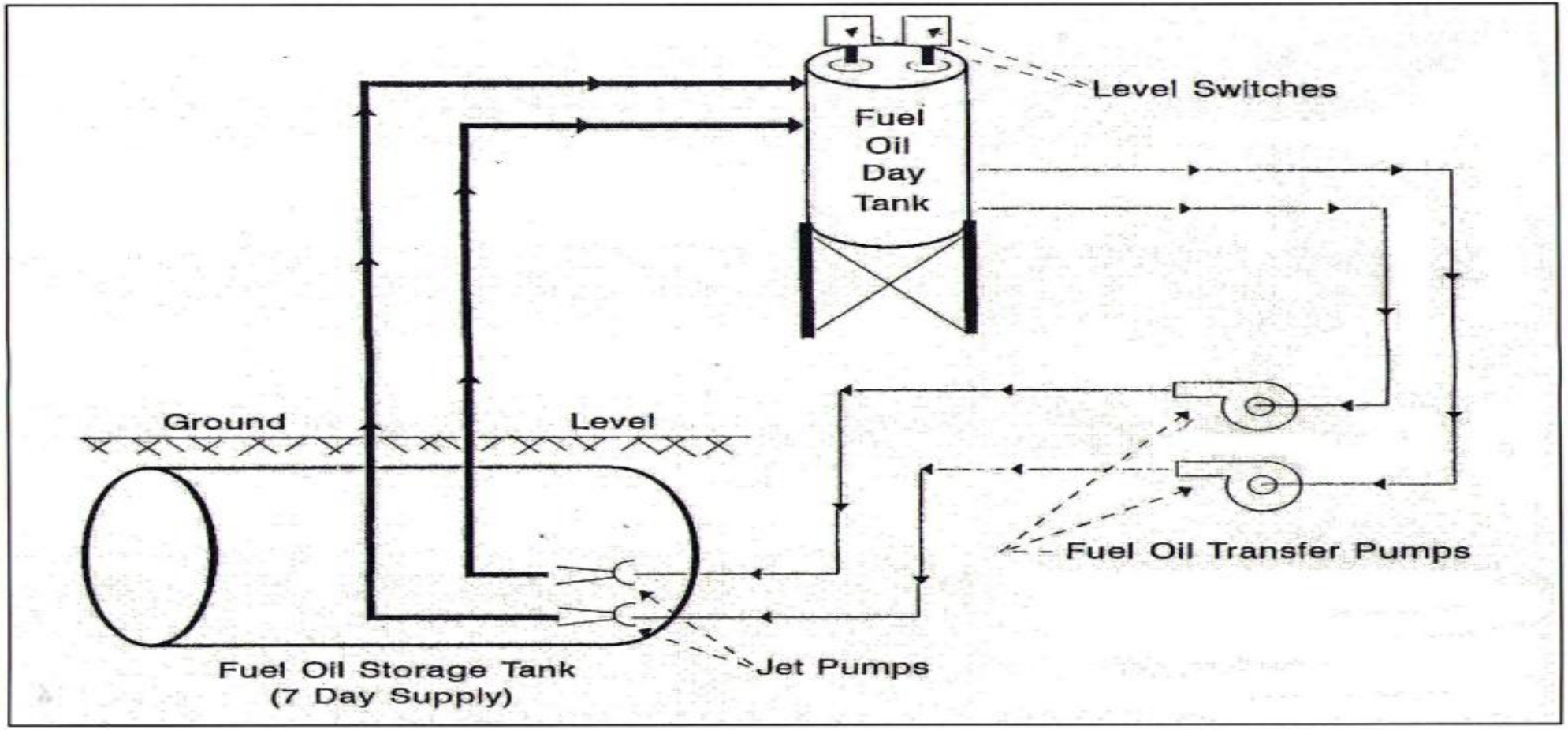
Emergency Generator System Design



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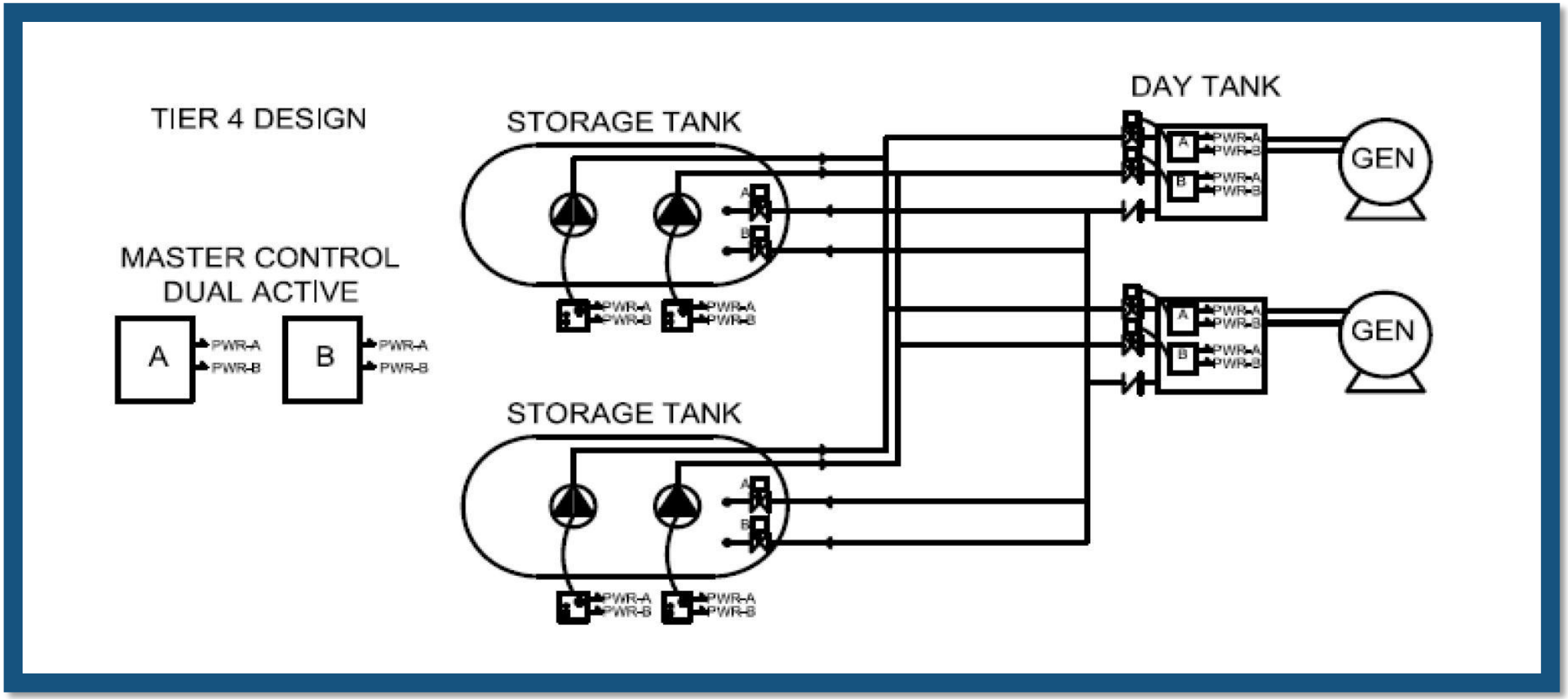
Emergency Generator System Design



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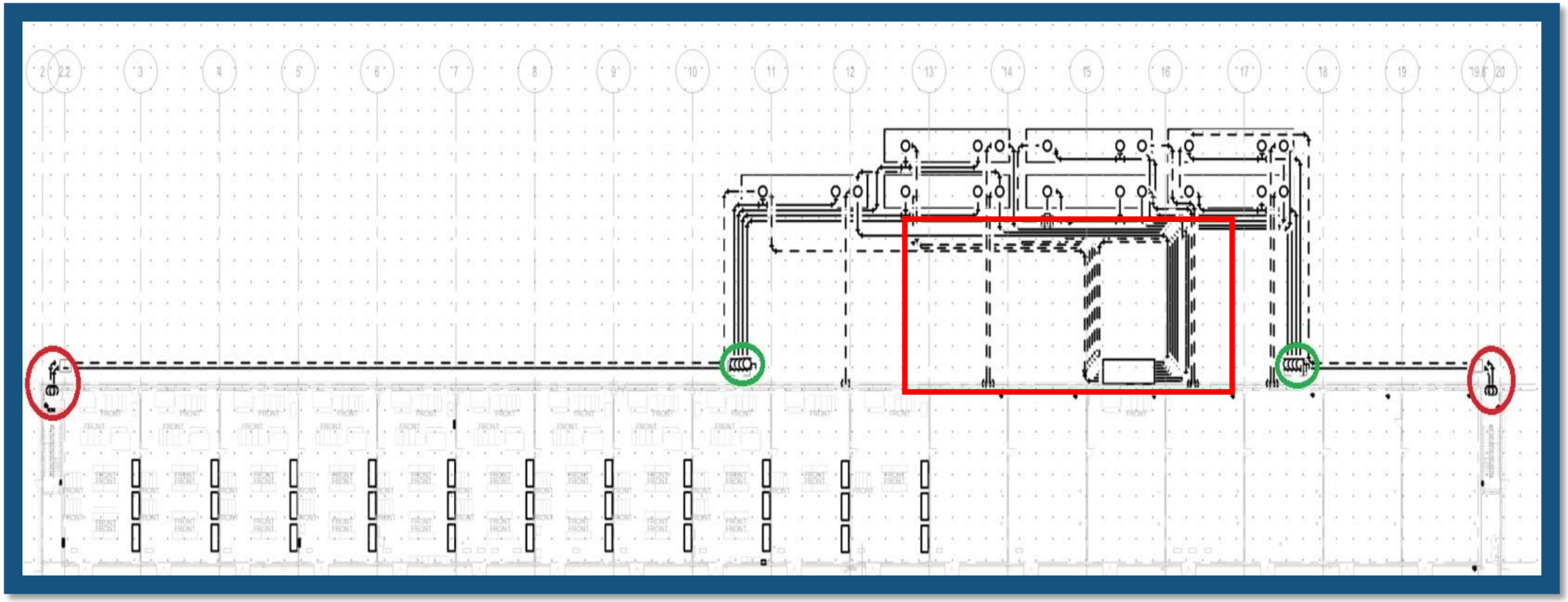
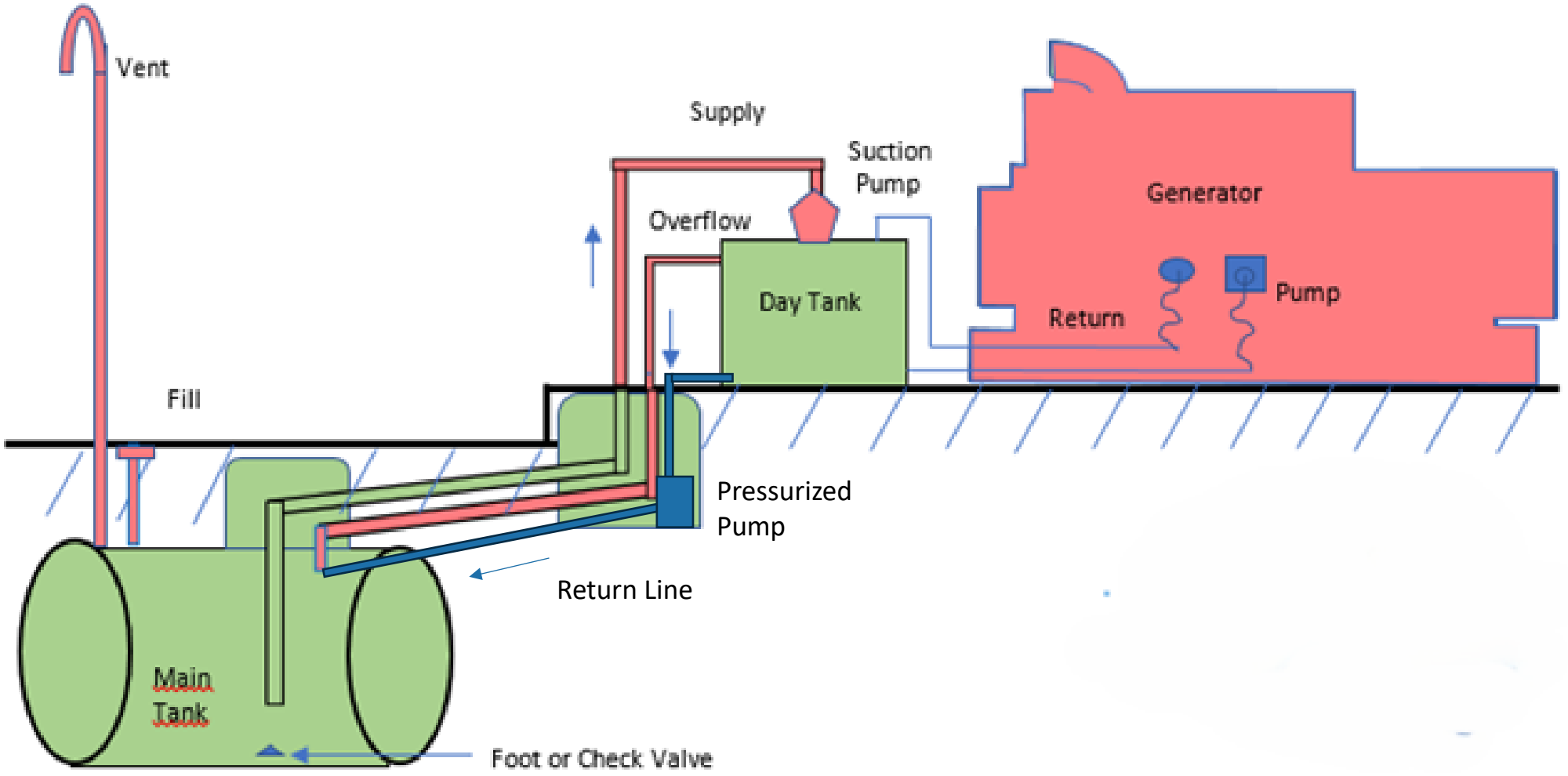
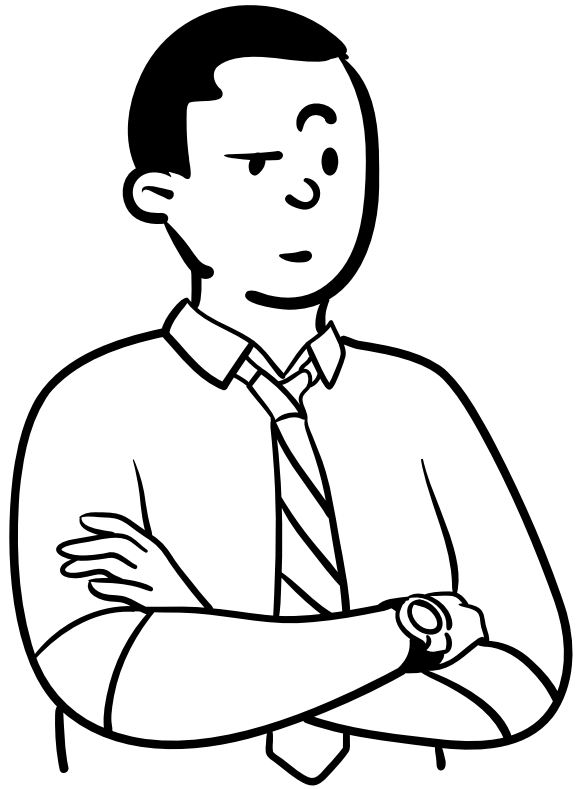


Return Line versus Overflow Line



Release Detection Complexities

- SIR can not be used
- Large tanks (>50k gal.)
- Line tightness testing
- ALLDs – many issues
- Long piping runs and large diameter piping– sump sensors may not meet the ALLD requirements



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Emergency Generator Tanks – Automatic Line Leak Detectors

3.0 gph at 10 psi within 1 hour requirement

- Mechanical
- Electronic
- Sump sensors
- AIM System

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Emergency Generator Tanks – Mechanical Line Leak Detectors

- Do not function well with typical designs
- Restricts product flow to generator
- Not good in an emergency!

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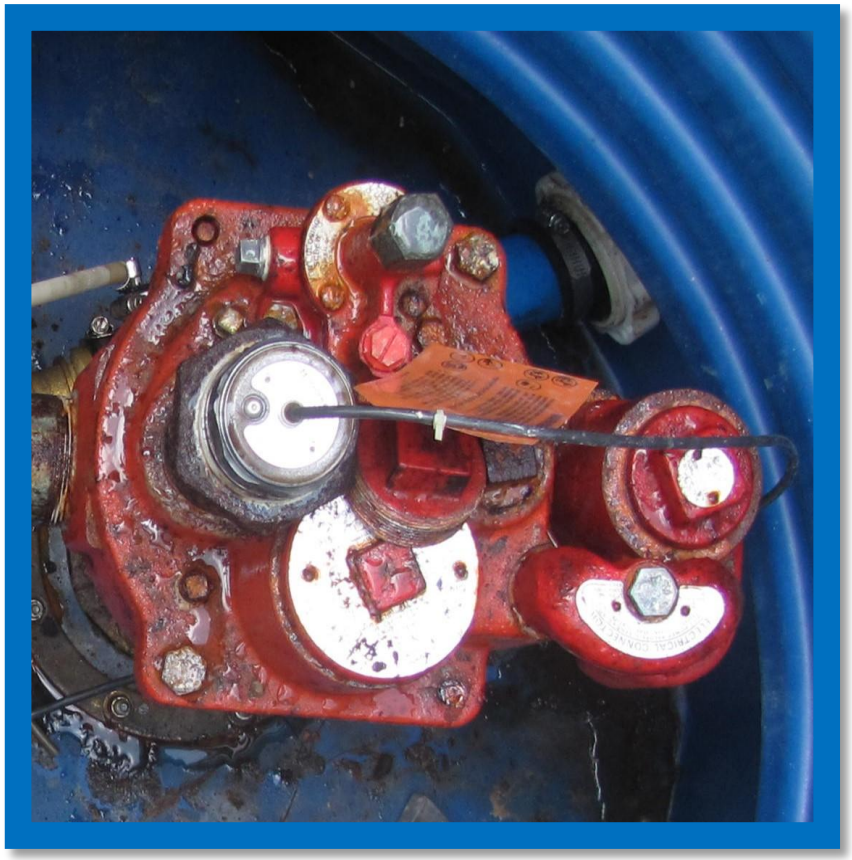
Emergency Generator Tanks – Electronic Line Leak Detectors

- Stays in alarm mode
- Piping modifications may be needed
- Ensure that positive shutdown is not installed



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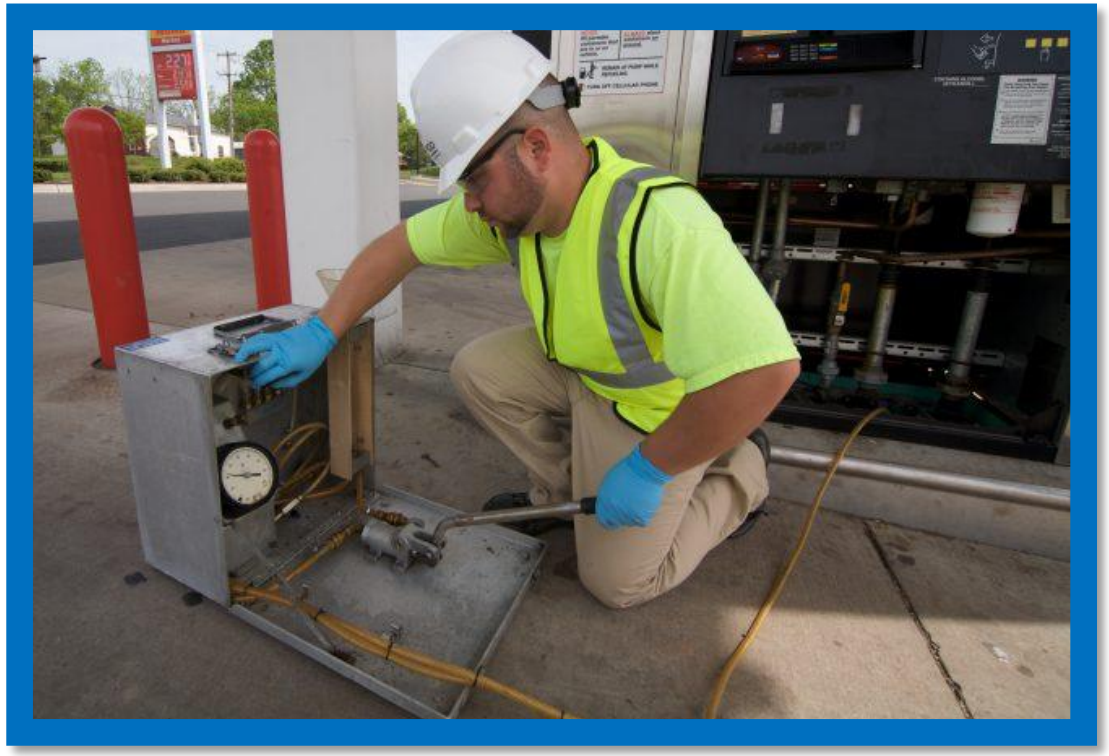
Emergency Generator Tanks – Line Tightness Testing

- Safe Suction – no test
- Unsafe Suction – every 3 years
- Supply and Return Lines – Pressurized



Emergency Generator Tanks – Sump Sensors

- Double walled pipe
- Containment sumps
- Sump sensors
- AIM system for lengthy piping runs

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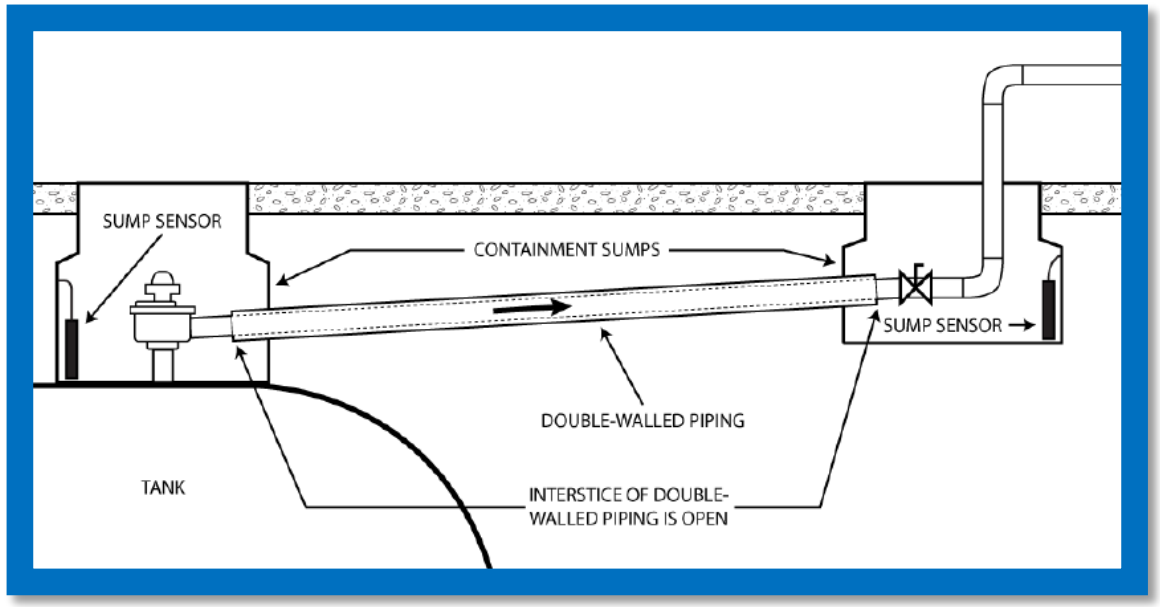
Automated Interstitial Monitoring (AIM) System

- One solution for pressurized piping release detection
- Requires double-walled piping
- Meets both ALLD and one other method requirement
- Specific to emergency generator tanks



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AIM System – Key Components

- Double-walled piping with full interstitial communication
- Monitoring points (pressure, vacuum, liquid reservoirs, or containment sumps)
- Sensors
- Automatic tank gauging system or console

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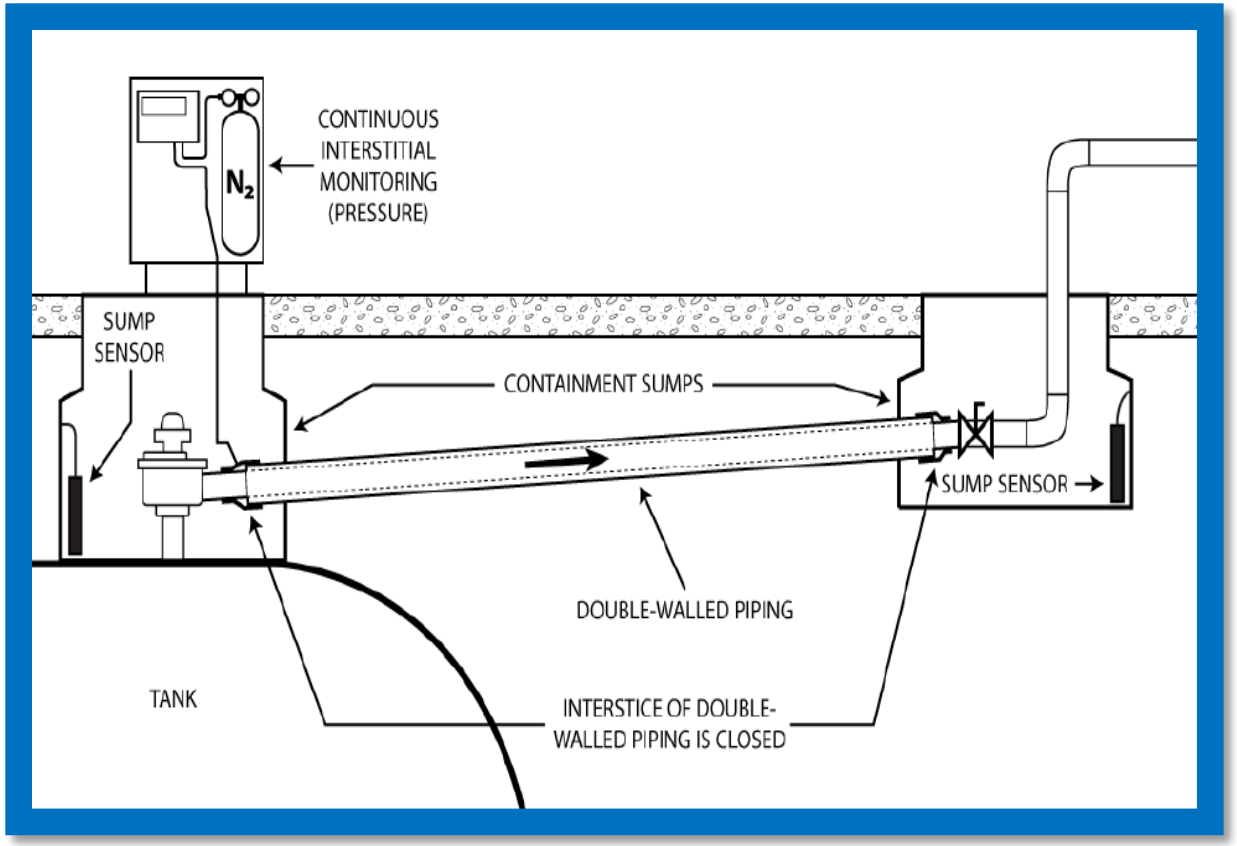
Category 1 Systems

- Pressure or vacuum
- Continuous monitoring of inner and outer wall
- Meets 3/10/1 requirement



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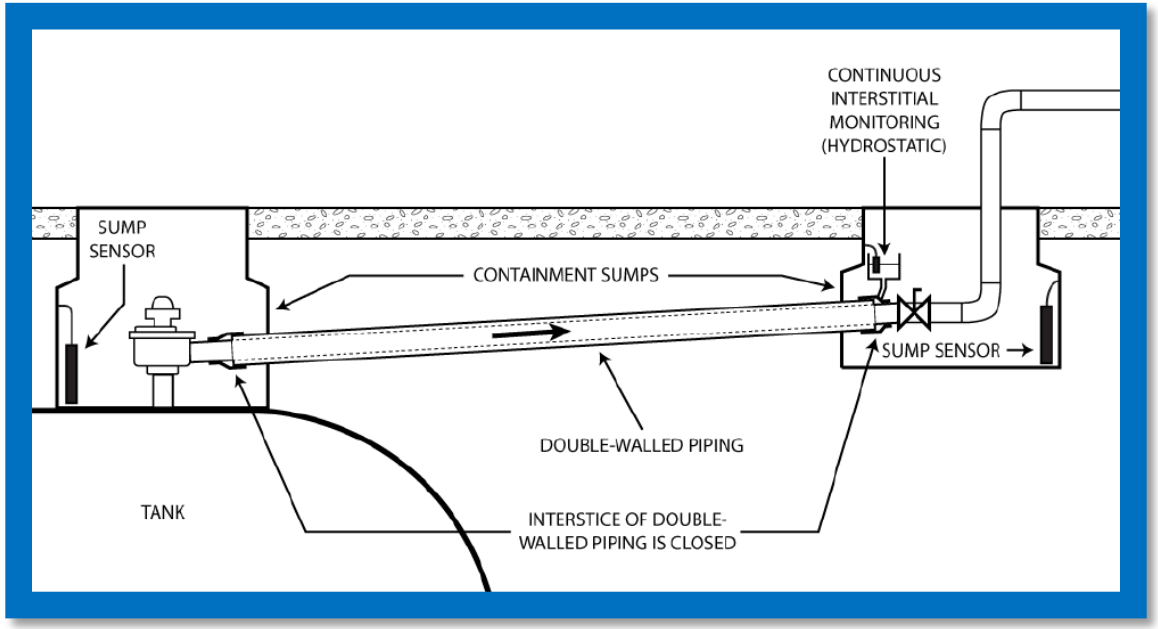
Category 2 Systems

- Liquid-filled System
- Changes in liquid indicate release
- Continuous Monitoring
- Meets 3/10/1 requirement



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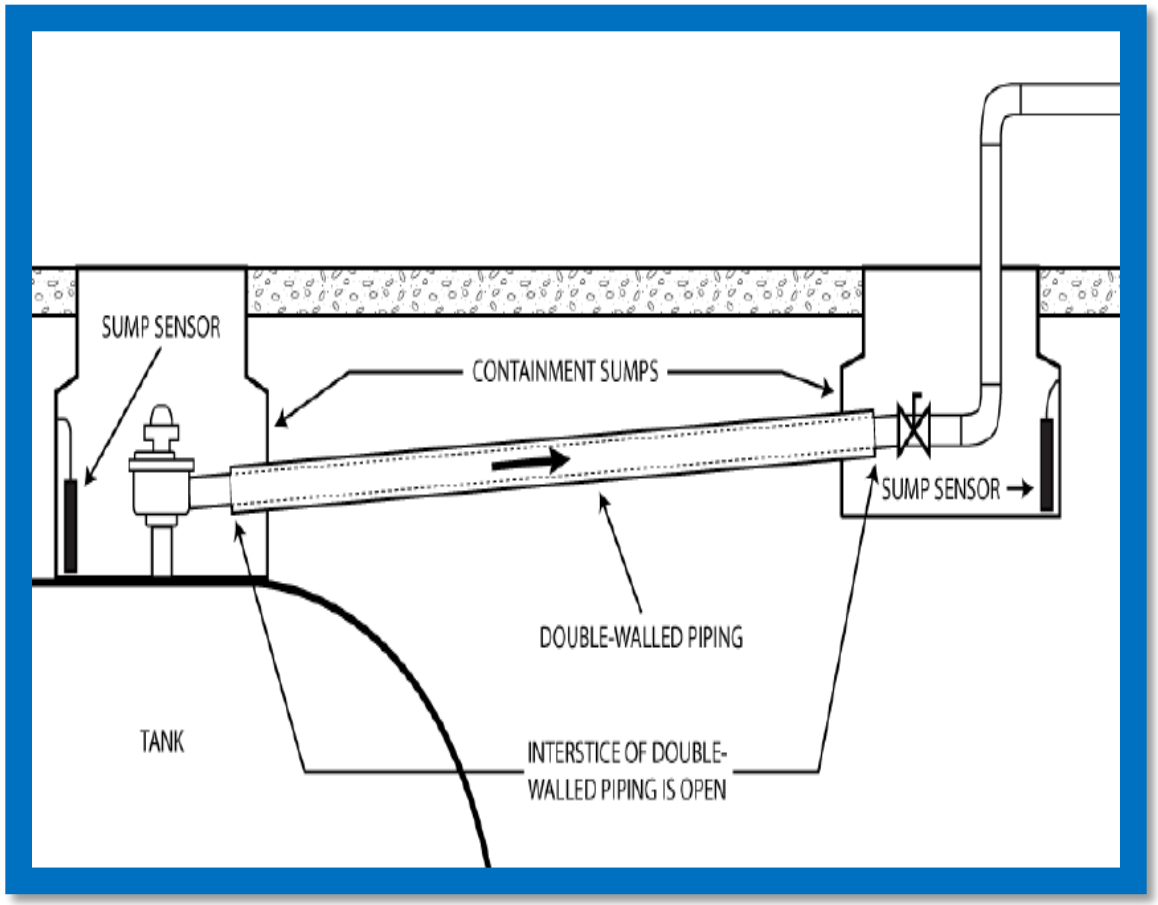
Category 3 Systems

- Dry interstice system
- Float based sensors in containment sumps
- MUST consider equipment limitations with this design
- Must have the piping interstice tested annually



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Category 3 System Calculations

Table 3 (Part 1) – Maximum Lengths of Double-Walled Piping for Category 3 AIM Systems (Examples of Commercially Available Pipe)

Leak Rate Equivalency to 3.0 gph at 10 psi			Example Commercially Available Pipe: Manufacturer and Product												
			Ameron						APT						
			Dualoy 3000/L 3 in. Over 2 in.	Dualoy 3000/L 4 in. Over 3 in.	Dualoy 3000/L 6 in. Over 4 in.	Dualoy 3000/L 2 in.	Dualoy 3000/L 3 in.	Dualoy 3000/L 4 in.	0.5 in. Double Wall	0.75 in. Double Wall	1.00 in. Double Wall	1.5 in. Double Wall	1.75 in. Double Wall	2 in. Double Wall	2.5 in. Double Wall
			Interstitial Volume (gal/ft)												
Line Pressure (psi)	3.0 gal/hr Equivalent Vol (mL/min)	Equivalent Leak Rate Vol (gph)	0.2186	0.2652	0.8398	0.0133	0.0196	0.0252	0.0031	0.0042	0.0119	0.0052	0.0182	0.0218	0.0104
			Maximum Piping Length (ft) Between Sensors												
10	189	3.0	13.7	11.3	3.6	225.3	152.9	118.9	966.5	713.3	251.8	576.2	164.6	137.4	288.1
15	232	3.7	16.8	13.9	4.4	276.5	187.6	145.9	1186.3	875.6	309.0	707.2	202.1	168.7	353.6
18	254	4.0	18.4	15.2	4.8	302.7	205.4	159.8	1298.8	958.7	338.4	774.3	221.2	184.7	387.2
19	261	4.1	18.9	15.6	4.9	311.1	211.1	164.2	1334.6	985.1	347.7	795.7	227.3	189.8	397.8
20	268	4.2	19.4	16.0	5.1	319.4	216.8	168.6	1370.4	1011.5	357.0	817.0	233.4	194.9	408.5
21	274	4.3	19.9	16.4	5.2	326.6	221.6	172.4	1401.1	1034.2	365.0	835.3	238.7	199.2	417.6
22	281	4.5	20.4	16.8	5.3	334.9	227.3	176.8	1436.9	1060.6	374.3	856.6	244.7	204.3	428.3
23	287	4.5	20.8	17.2	5.4	342.1	232.1	180.5	1467.6	1083.2	382.3	874.9	250.0	208.7	437.5
24	293	4.6	21.2	17.5	5.5	349.2	237.0	184.3	1498.3	1105.9	390.3	893.2	255.2	213.1	446.6
25	299	4.7	21.7	17.9	5.6	356.4	241.8	188.1	1529.0	1128.5	398.3	911.5	260.4	217.4	455.7
26	305	4.8	22.1	18.2	5.8	363.5	246.7	191.9	1559.6	1151.2	406.3	929.8	265.7	221.8	464.9
27	311	4.9	22.6	18.6	5.9	370.7	251.5	195.6	1590.3	1173.8	414.3	948.1	270.9	226.1	474.0
28	317	5.0	23.0	18.9	6.0	377.8	256.4	199.4	1621.0	1196.5	422.3	966.4	276.1	230.5	483.2
29	322	5.1	23.4	19.2	6.1	383.8	260.4	202.6	1646.6	1215.3	428.9	981.6	280.5	234.1	490.8
30	328	5.2	23.8	19.6	6.2	390.9	265.3	206.3	1677.2	1238.0	436.9	999.9	285.7	238.5	499.9

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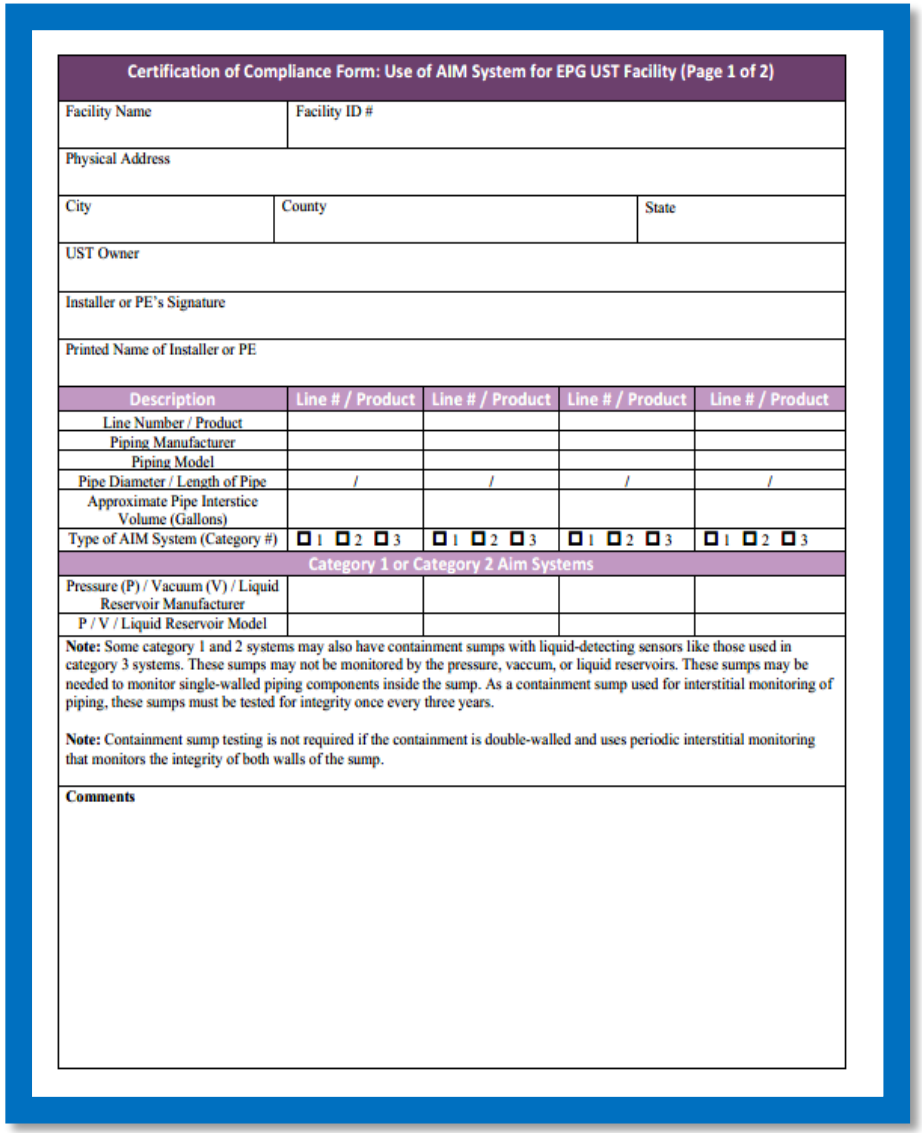
Certification of Compliance Form



Certification of Compliance Form: Use of AIM System for EPG UST Facility (Page 1 of 2)

Facility Name	Facility ID #	
Physical Address		
City	County	State
UST Owner		
Installer or PE's Signature		
Printed Name of Installer or PE		

Description	Line # / Product	Line # / Product	Line # / Product	Line # / Product
Line Number / Product				
Piping Manufacturer				
Piping Model				
Pipe Diameter / Length of Pipe	/	/	/	/
Approximate Pipe Interstice Volume (Gallons)				
Type of AIM System (Category #)	☐ 1 ☐ 2 ☐ 3	☐ 1 ☐ 2 ☐ 3	☐ 1 ☐ 2 ☐ 3	☐ 1 ☐ 2 ☐ 3
Category 1 or Category 2 Aim Systems				
Pressure (P) / Vacuum (V) / Liquid Reservoir Manufacturer				
P / V / Liquid Reservoir Model				

Note: Some category 1 and 2 systems may also have containment sumps with liquid-detecting sensors like those used in category 3 systems. These sumps may not be monitored by the pressure, vaccum, or liquid reservoirs. These sumps may be needed to monitor single-walled piping components inside the sump. As a containment sump used for interstitial monitoring of piping, these sumps must be tested for integrity once every three years.

Note: Containment sump testing is not required if the containment is double-walled and uses periodic interstitial monitoring that monitors the integrity of both walls of the sump.

Comments

Necessary Information for Compliance Determinations

- System Diagram
- Return line and/or Overflow lines
- Valve placement
- Photos
- Blueprints
- Information Request

Recap

- Who regulates Emergency Generator USTs?
- What parts of the system are regulated as USTs?
- Compliance Complexities
- Compliance Resolutions
- Necessary Information

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Questions