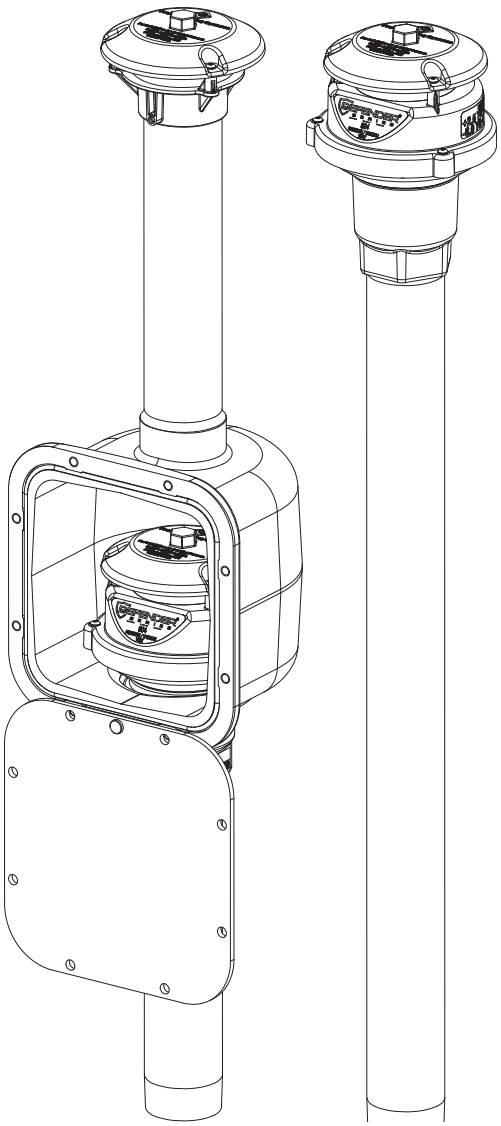
Franklin Electric
FUELING SYSTEMS

DEFENDER SERIES™ PRESSURE / VACUUM VENT WITH IN-LINE VAULT



INSTALL GUIDE

804031001 r3

DEFENDER SERIES™
P/V VENT

SCAN / CLICK

The information in this publication is provided for reference only. While every effort has been made to ensure the reliability and accuracy of the information contained in this document at the time of printing, we recommend that you refer to "franklinfueling.com" for the most current version of this document. All product specifications, as well as the information contained in this publication, are subject to change without notice. Franklin Electric does not assume responsibility and expressly disclaims liability for loss, damage, or expense arising out of, or in any way connected with, installation, operation, use, or maintenance by using this document. Franklin Electric assumes no responsibility for any infringement of patents or other rights of third parties that may result from use of this document or the products. We make no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Copyright © 2025 Franklin Electric Co., Inc., Madison, WI 53718. All world rights reserved. No part of this publication may be stored in a retrieval system, transmitted, or reproduced in any way, including, but not limited to, photocopy, photograph, magnetic, or other record, without the prior written permission of Franklin Electric.

For technical support, please contact:
Franklin Electric Technical Support
Web: franklinfueling.com/support-center
Tel: +1 800 984 6266

For additional questions and concerns, please contact:
Franklin Electric
3760 Marsh Rd
Madison, WI 53718 USA
Web: franklinfueling.com
Tel: USA & Canada +1 800 225 9787 • Tel: UK +44 (0) 1473 243300
Tel: Mex 001 800 738 7610 • Tel: DE +49 6571 105 380 • Tel: CN +86 10 8565 4566

DEFENDER SERIES is a registered trademark of Franklin Electric Co., Inc.
Torx is a is a registered trademark of Acument Intellectual Properties, LLC

804031001 r3

CONVENTIONS USED IN THIS DOCUMENT

This document includes safety precautions and other important information presented in the following format:

NOTE: This provides helpful supplementary information.

IMPORTANT: This provides important supplementary information and instructions to avoid damaging hardware or a potential hazard.

⚠ **CAUTION**: This indicates a potentially hazardous situation that could result in minor or moderate injury if not avoided. This may also be used to alert against unsafe practices.

⚠ **WARNING**: This indicates a potentially hazardous situation that could result in severe injury or death if not avoided.

⚠ **DANGER**: This indicates an imminently hazardous situation that will result in death if not avoided.

OPERATING PRECAUTIONS

Franklin Electric equipment is designed to be installed in areas where volatile liquids such as gasoline and diesel fuel are present. Working in such a hazardous environment presents a risk of severe injury or death if you do not follow standard industry practices and the instructions in this document. Before working with or installing the equipment covered in this document, or any related equipment, read this entire document, particularly the following precautions:

IMPORTANT: To help prevent spillage from an underground storage tank, make sure the delivery equipment is well-maintained, that there is a proper connection, and that the fill adaptor is tight. Delivery personnel should inspect delivery elbows and hoses for damage and missing parts.

⚠ **CAUTION**: Use only original Franklin Electric parts. Substituting non-Franklin Electric parts could cause the device to fail, which could create a hazardous condition and/or harm the environment.

⚠ **WARNING**: Follow all codes that govern the installation and service of this product and the entire system. Always lock out and tag electrical circuit breakers while installing or servicing this equipment and related equipment. A potentially lethal electrical shock hazard and the possibility of an explosion or fire from a spark can result if the electrical circuit breakers are accidentally turned on while installing or servicing this product. Refer to this document (and documentation for related equipment) for complete installation and safety information.

⚠ **WARNING**: Before entering a containment sump, check for the presence of hydrocarbon vapors. Inhaling these vapors may cause dizziness/unconsciousness, and if ignited, can explode causing serious injury or death. Containment sumps are designed to trap hazardous liquid spills and prevent environmental contamination, so they can accumulate dangerous amounts of hydrocarbon vapors. Check the atmosphere in the sump regularly while work is in process. If vapors reach unsafe levels, exit the sump and ventilate it with fresh air before resuming work. Always have another person standing by for assistance.

⚠ **WARNING**: Follow all federal, state, and local laws governing the installation of this product and its associated systems. When no other regulations apply, follow NFPA codes 30, 30A, and 70 from the National Fire Protection Association. Failure to follow these codes could result in severe injury, death, serious property damage, and/or environmental contamination.

⚠ **WARNING**: Always secure the work area from moving vehicles. The equipment in this document is usually mounted underground, so reduced visibility puts service personnel working on it in danger from moving vehicles that enter the work area. To help prevent this safety hazard, secure the area by using a service truck or other vehicle to block access to the work area.

⚠ **DANGER**: Inspect the installation location for potential ignition sources such as flames, sparks, radio waves, ionizing radiation, and ultrasound sonic waves. If any potential ignition sources are identified, implement proper safety measures.

Contents

1 Introduction 1
1.1 Regulatory Compliance 1
1.2 Documentation 1
1.2.1 Symbol Legend 2
2 Safety/Security 3
2.1 General Safety Information 3
2.2 Documentation Availability 3
2.3 Installation & Service Access 3
2.4 Hazard Assessment 4
2.5 Required Personal Protective Equipment (PPEs) 4
2.6 Cyber Security 4
2.7 Qualifications and Responsibilities 5
2.7.1 Qualifications for Certification 5
2.7.2 Responsibilities 5
3 Pre-Installation Overview 6
3.1 Upon Receipt of Item(s) 6
3.2 Technical Overview 6
3.2.1 Identifying Components 7
3.2.2 Identifying Components with ATEX Flame Arrestor 8
3.2.3 Model Descriptions, Specifications, Certifications & Approvals 9
3.2.3.1 CARB/EPA Model 9
3.2.3.2 International Models 9
3.2.3.2.1 US/EPA 9
3.2.3.2.2 EN/APEA “Blue Book” 10
3.2.3.2.3 China 10
3.2.3.3 Specifications 10
3.2.3.3.1 Fuel Compatibility 10
3.2.3.4 Certifications & Approvals 10
3.2.4 Dimensions 11
3.2.5 Required Tools & Materials 12
4 Installation 13
4.1 End-Of-Line Install – Top of P/V Vent Piping 13
4.2 In-Line Install – Middle of P/V Vent Piping 14
4.3 P/V Vent Flame Arrester Install 14
5 Testing 15

5.1 Annual Inspections 15
5.1.1 End-Of-Line Configuration 15
5.1.2 In-Line Configuration 15
5.1.3 Flame Arrester Configuration 16
6 Appendix 17
6.1 Related Documents 17
6.2 Installation Configuration Drawings 17
6.2.1 End-Of-Line 17
6.2.2 In-Line 18
6.2.3 3" P/V Vent Lines 19

1 Introduction

The DEFENDER SERIES® Pressure/Vacuum (P/V) vent regulates the pressure at which vapor is allowed to escape from the underground storage tank and the vacuum at which outside air is allowed to enter the tank. The P/V vent's internal rolling diaphragm delivers consistent and controlled cracking for both low leak and high-pressure conditions while the superior construction of UV-resistant materials extends the overall service life. *The in-line vault provides added protection and facilitates at-grade servicing and testing, eliminating the added expense of lift trucks as well as the potential safety concerns of conducting work at height.*

1.1 Regulatory Compliance

IMPORTANT INFORMATION - FOLLOW ALL INSTRUCTIONS

- The products contained within in this guide shall only be assembled and installed by a qualified person (see §2.7). *Use of non-qualified personnel, or any deviations from these recommended procedures, could result in damage or malfunction.*
- For Operating Parameters, see §3.2.3
- For Specific Conditions of Use, see §3.2.3
- For Certifications & Approvals, see §3.2.3
- For Field Testing, see §5
- For Maintenance & Inspection, see §5.1

1.2 Documentation

- Instructions of this document are in English. All other language versions are translations of this original document.
- Information given in this document is provided as a guide only.
    - The Illustrations depict a typical setup and are for instruction and description purposes only.
    - It is the installer's responsibility to ensure that correct and safe procedures are followed at the worksite.
- This document and related documents are available from Franklin Electric at www.franklinfueling.com.

1.2.1 Symbol Legend

Wear Protective Headwear

Wear Eye Protection

Wear Protective Clothing

Wear High-Visibility Clothing

Wear Protective Gloves

Wear Safety Footwear

Refer to instruction guide

General Warning

Warning: Flammable Material

No open flame; Fire, open ignition source and smoking prohibited

2 Safety/Security

2.1 General Safety Information

- Procedures in this document are only to be performed by people qualified and certified to perform them (see §2.3 and §2.7).
- Personnel working on or with energized equipment must be authorized by relevant regulatory bodies to carry out such work and must have the appropriate training. Check with your employer and relevant regulatory body's rules for working with energized equipment.
- Obey all local laws, rules, regulations, and instructions in this document. In case of inconsistency or contradiction between information contained in this document and any laws, rules and regulations, obey the stricter of the two.
- Keep unqualified personnel at a safe distance during installation.
- If it is necessary to remove safety/security devices, immediately reinstall the safety/security devices after completing the work.

2.2 Documentation Availability

Upon installation completion, this document shall be transferred by the qualified person or manufacturer to the owner, operator, or other responsible person of the facility where the installation is done.

- Save this guide for future use, and make sure to provide it to anyone who services this equipment (see §2.3).
- Always reference the guide(s) that came with the equipment for a complete list of installation and safety precautions. The most current Franklin Electric documentation can be found online at www.franklinfueling.com.

2.3 Installation & Service Access

Certified Installer or Service* Technician

Only Franklin Electric certified installers and service (technicians) are authorized to install, or service Franklin Electric products. *See §2.7 for information on certification training.*

2.4 Hazard Assessment

Prior to beginning work and prior to recommencing work after leaving and returning to the worksite, a worksite, *pre-job hazard assessment* must be performed to identify safety and environmental needs. At a minimum, this hazard assessment should:

- Identify possible hazards and risks.
- Identify the safety needs of the job.
- Identify the correct procedures, practices and equipment.
- Eliminate unsafe conditions and actions from the worksite.
- Identify the need for personal protective equipment.
- Inspect equipment before use.
- Confirm sheaths of all cables are secured and undamaged.
- Confirm plugs and connectors are properly connected and serviceable.
- Perform ongoing risk assessment during the project

2.5 Required Personal Protective Equipment (PPEs)

These PPEs are required during all phases of installation.

Wear Protective Clothing

Wear Eye Protection

Wear High-Visibility Clothing

Wear Protective Gloves

Wear Protective Headwear

Wear Safety Footwear

2.6 Cyber Security

This product is designed to be connected to and to communicate information and data via a network interface. It is solely the owner's responsibility to provide and continuously ensure a secure connection between the product and the Owner's network or any other network (as the case may be).

The Owner shall establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ***The Owner shall also ensure that the device and/or any connecting devices have the latest firmware version available to ensure device security features are up to date.***

The manufacturer, Franklin Electric, and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

2.7 Qualifications and Responsibilities

Completion of this course is required *before certification test access will be granted for any other course (online or live):*

- Fuel System Installation Safety

2.7.1 Qualifications for Certification

To be considered "qualified", individuals shall pass training from the following applicable certification training courses (online or live) for the process or processes to be performed:

- Forecourt Specialist
  - DEFENDER SERIES® P/V Vent
- CARB Certificatons
  - FFS EVR Phase I Systems – VR-101

FE Online or Live Certification Training

SCAN / CLICK

2.7.2 Responsibilities

The following responsibilities are for guidance only and are not limited to those listed here. It is the responsibility of:

- The owner of the install site(s) to ensure that all P/V vent installers and service technicians shall be certified (see §2.7.1), follow all local laws, rules and regulations, along with the instructions and the specifications listed in this document.
- The certified user(s) to know the P/V vent and its safe use.
- The certified user(s) to have and maintain a valid Franklin Electric training certification (see §2.7.1).

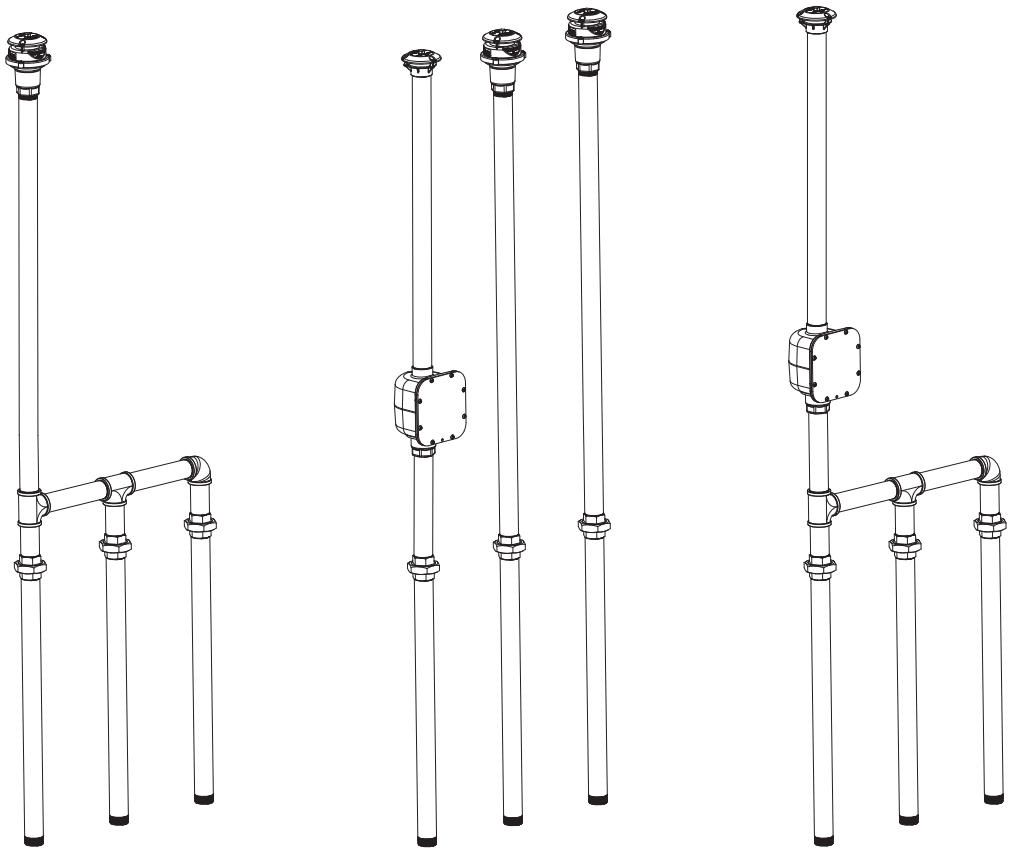
3 Pre-Installation Overview

3.1 Upon Receipt of Item(s)

- Verify all items are in accordance with the order.
- Check all items for damage.
- If any item shows damage or is not in accordance with the order, inform Franklin Electric *immediately*.
- Remove the packaging material.
    - Follow all local laws, rules and regulations regarding disposal of discarded parts, packaging material or items and any subsequent components.

3.2 Technical Overview

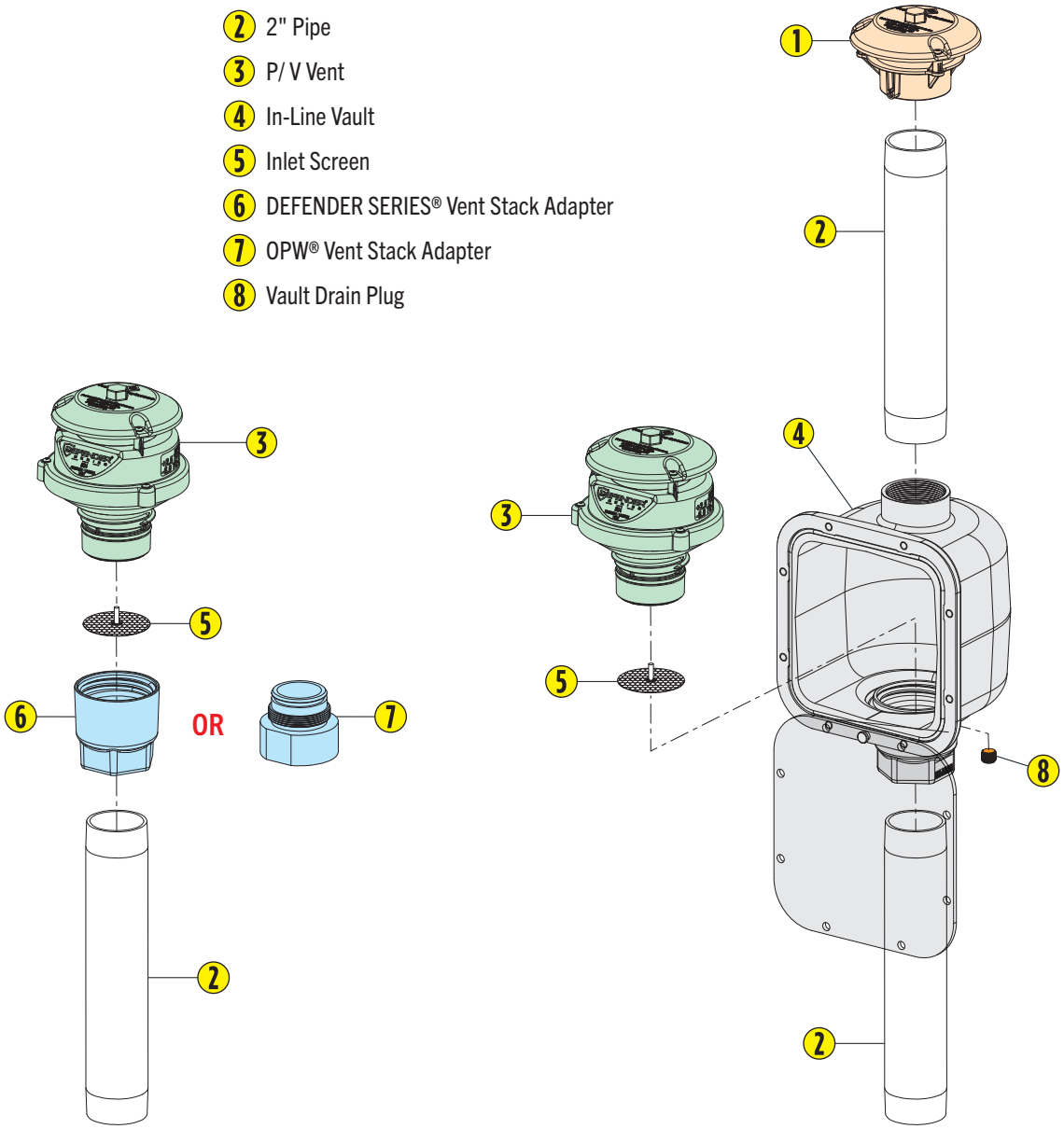
The DEFENDER SERIES® Pressure/Vacuum (P/V) Vent with In-Line Vault can be mounted either at the top of the P/V vent piping or in the P/V vent enclosure located in the middle of the P/V vent piping at working height (see §6.2 for configuration drawings). To avoid the risk of climbing a ladder, and to maximize the simplicity of inspection and service, the preferred installation is to be mounted in-line. The P/V may be mounted on a single riser pipe or many riser pipes manifolded to a single line. Use a support frame to mount and stabilize all P/V vent riser piping.

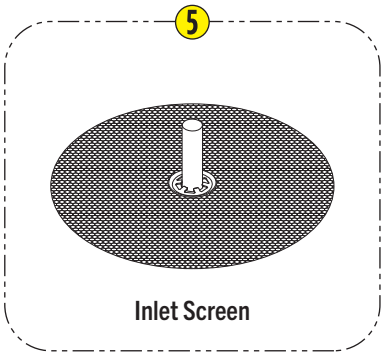


3.2.1 Identifying Components

IMPORTANT: If installing the flame arrester, see §3.2.2.

1. Rain Cap
2. 2" Pipe
3. P/ V Vent
4. In-Line Vault
5. Inlet Screen
6. DEFENDER SERIES® Vent Stack Adapter
7. OPW® Vent Stack Adapter
8. Vault Drain Plug

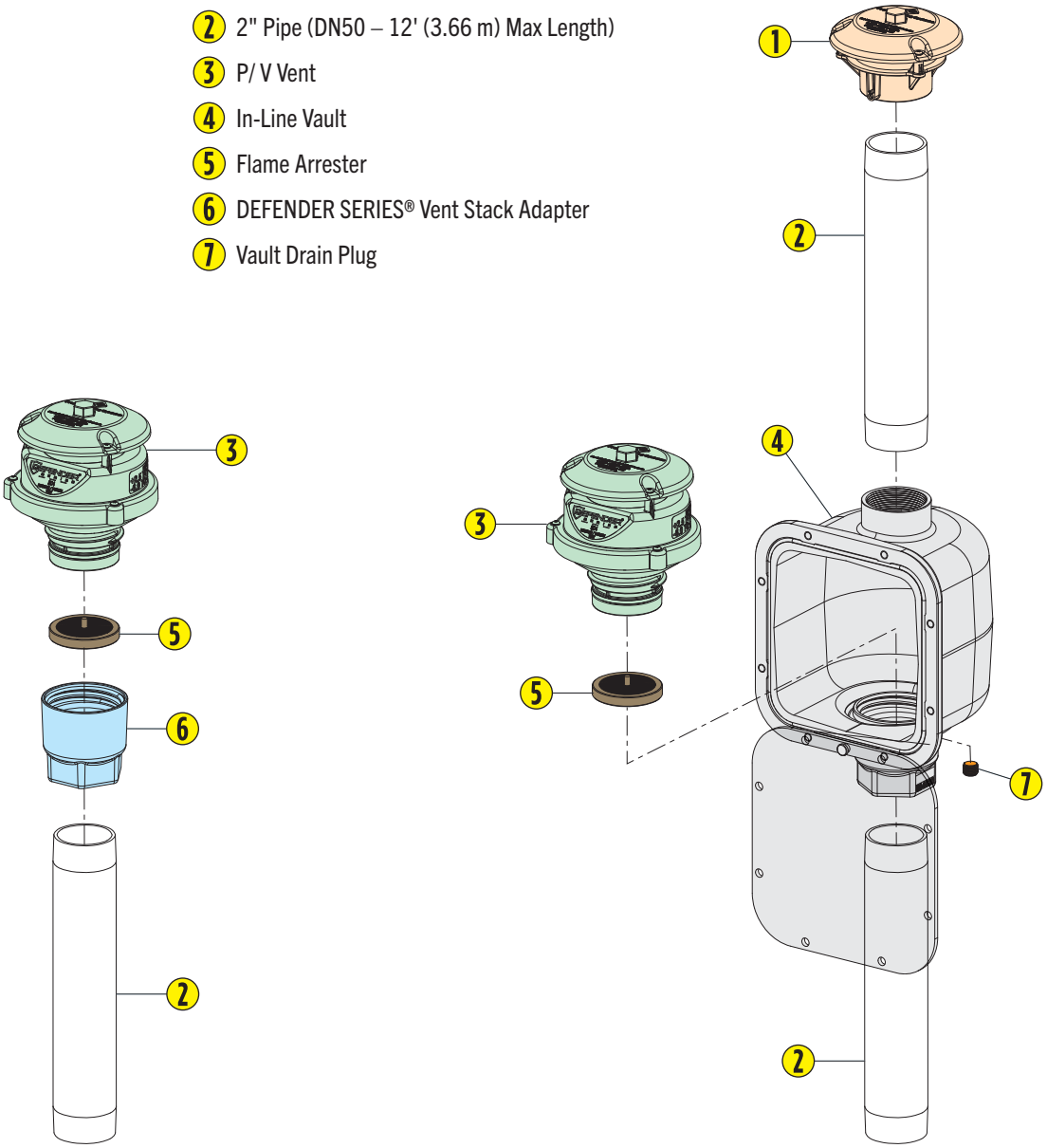


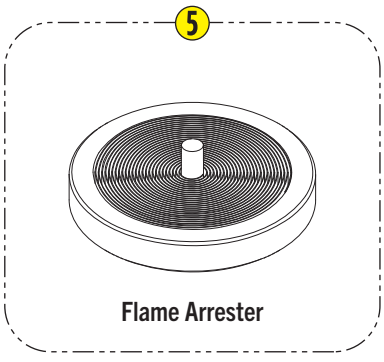


3.2.2 Identifying Components with ATEX Flame Arrestor

IMPORTANT: Do not use the mesh screen disc *if installing the flame arrester.*

1. Rain Cap
2. 2" Pipe (DN50 – 12' (3.66 m) Max Length)
3. P/ V Vent
4. In-Line Vault
5. Flame Arrester
6. DEFENDER SERIES® Vent Stack Adapter
7. Vault Drain Plug





Flame Arrester

3.2.3 Model Descriptions, Specifications, Certifications & Approvals

3.2.3.1 CARB / EPA Model

The DEFENDER SERIES® P/V vent is designed to meet the following performance requirements according to CARB CP-201 and EPA 40 CFR part 63 for gasoline dispensing facilities:

- Positive Cracking = +2.5 to +6.0" WC
- Negative Cracking = -6.0 to -10.0" WC
- Positive Leak Rate <= 0.05 CFH @ +2.0" WC
- Negative Leak Rate <= 0.21 CFH @ -4.0" WC

Performance Decal (Back of P/V Vent)

The leak rate performance of the DEFENDER SERIES® P/V vent *allows for up to three vents to be installed for each tank venting system,* in order to comply with the total vapor recovery system leak rate according to CARB CP-201.

3.2.3.2 International Models

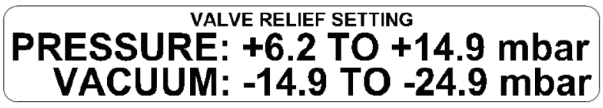
The international models of the DEFENDER SERIES® P/V vent is designed to meet the following performance requirements according to local regulatory agencies. *All international models are compatible for use with an optional EN 16852 certified flame arrester element (see §4.3, for install instructions).*

Certification Marking (Top of P/V Vent)

3.2.3.2.1 US / EPA

- Positive Cracking = +6.2 to +14.9 mbar
- Negative Cracking = -14.9 to -24.9 mbar

Performance Decal (Back of P/V Vent)



3.2.3.2.2 EN/APEA "Blue Book"

- Positive Cracking = Fully open at +35 mbar
- Negative Cracking = Fully open at -2 mbar

Performance Decal (Back of P/V Vent)

3.2.3.2.3 China

- Positive Cracking = +20 to +30 mbar
- Negative Cracking = -15 to -20 mbar

Performance Decal (Back of P/V Vent)

3.2.3.3 Specifications

Item	Specification
Maximum Flow Rate	8000 SCFH at 2 PSI
Operating Temperature	-22° F to 122° F (-30° C to 50° C)
P/V Vent Body	UV-Resistant Polymer
Seals	UL Listed Elastomers
Screens	Stainless Steel
Rain Cap	UV-Resistant Polymer
In-Line Vault – Body	Ductile Iron per ASTM A395, e-coated & powdercoated
In-Line Vault – Cover	Stainless Steel

3.2.3.3.1 Fuel Compatibility

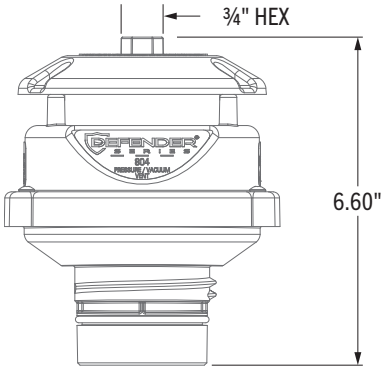
- Gasoline/Ethanol blends 0–85% (E0–E85)
- Diesel/Biodiesel blend 0–20% (B0–B20)

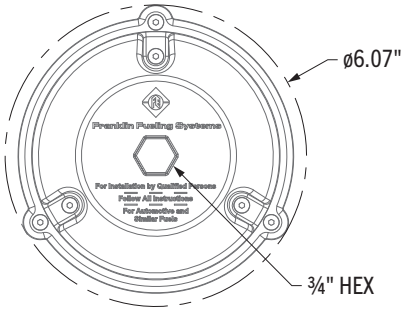
3.2.3.4 Certifications & Approvals

Agency	Certification
UL/ULC	UL2583 listed; File E235878
CARB	Enhanced Vapor Recovery (EVR) certified under Executive Orders VR-101, VR-102, VR-104, and VR-105
EPA	Meets the requirements of EPA 40 CFR part 63 for Gasoline Dispensing Facilities
ATEX	CE 0539 Ⓔx **II 1 G Ex ia IIA T4 Ga** DEMKO 03 ATEX 0313804X
IECEx	**Ex ia IIA T4 Ga** IECEx UL 11.0024X

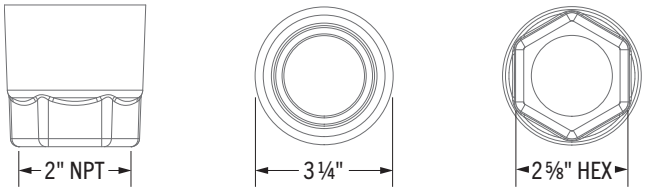
3.2.4 Dimensions

P/V Vent

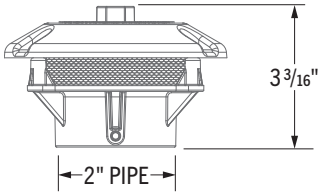


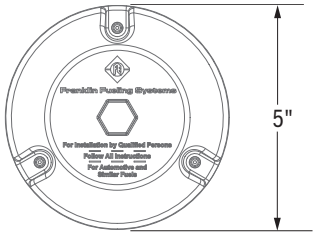


Vent Stack Adapter

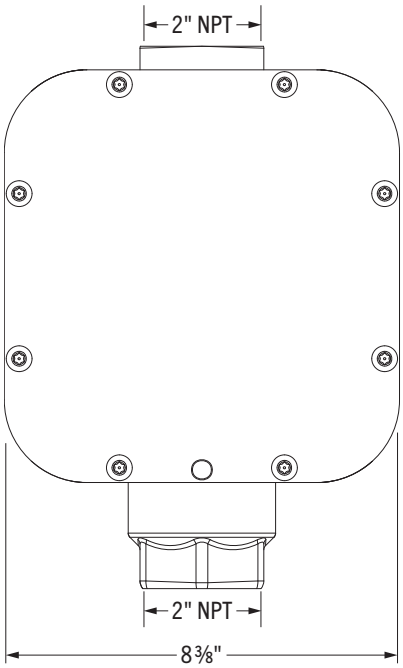


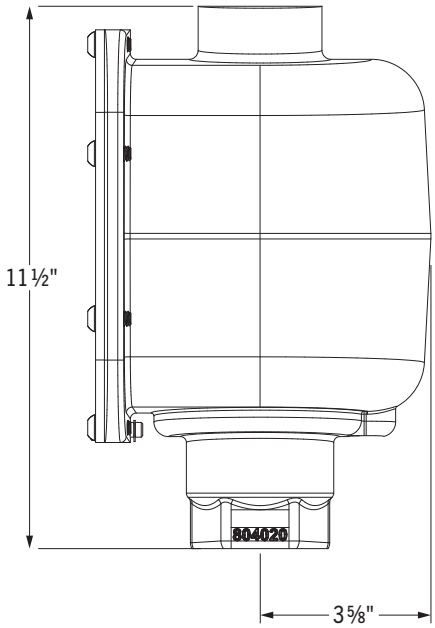
Vent Cap





In-Line Vault





3.2.5 Required Tools & Materials

- Thread Sealant (approved for gasoline and gasoline-ethanol blends)
- Torque Wrench (with operating range capable of 96 – 144 in-lbs)
- ¾" Socket or Wrench
- T-40 tamper-resistant Torx® tool

4 Installation

⚠ **WARNING**: Use a thread sealant that is approved for gasoline and gasoline-ethanol blends for all tapered (NPT or BSPT) pipe fittings and plugs.

NOTE:

- The in-line vault enclosure may be painted, *but not the cover plate.*
- When the installation is complete, make sure this guide is left with the service station owner or operator.

4.1 End-Of-Line Install – Top of P/V Vent Piping

1. Apply approved thread sealant (see §3.2.5) to the 2" P/V vent pipe thread.
2. Thread the stainless steel adapter fitting onto the 2" P/V vent pipe, and then *tighten until it is sealed properly.*
3. Insert the inlet disc screen inside the adapter fitting with the stem oriented upwards. Make sure the O-ring is properly lubricated (with synthetic O-ring grease), and then thread the P/V vent into the DEFENDER SERIES® vent stack adapter fitting until it bottoms out fully *(120 in-lbs maximum torque)*.

NOTE: If using an existing OPW® pipe adapter (2⅜" – 12 straight thread with O-ring)

a. Clean and reuse the OPW® debris screen.

b. Replace the O-ring with the *new one provided.*

c. Tighten the P/V vent onto the DEFENDER SERIES® vent stack adapter until it bottoms out fully *(100 in-lbs maximum torque).*

4.2 In-Line Install – Middle of P/V Vent Piping

1. Apply approved thread sealant* to the ***lower*** *2" P/V vent pipe,* thread on the in-line vault enclosure, and then *tighten until it is properly sealed.*
2. Apply approved thread sealant* to the ***upper*** *2" P/V vent pipe,* thread it into the in-line vault, and then *tighten until it is properly sealed.*
3. Install the P/V vent cap on the top of the upper pipe, and *tighten the screw to secure it.*

NOTE: *See §3.2.5 for approved thread sealant.

4.3 P/V Vent Flame Arrester Install

1. Insert the flame arrester into the adapter/vault.
2. Thread the P/V vent into the adapter/vault until it fully bottoms out against the flame arrester.
3. Torque the vent to 96 – 120 in-lbs (10.8 – 13.6 Nm).

NOTE:

- The flame arrester element is ATEX approved when it is installed with the ATEX marked DEFENDER SERIES® P/V vent (see §3.2.3.2).
- *Do not use the mesh screen disc* ***if installing the flame arrester.***
- See §5.1 and §5.1.3 for annual inspection instructions.
- See §3.2.3.4 for Certifications and Approvals.

5 Testing

Compliance testing of the Defender Series® P/V Vent with In-Line Vault , if required by the local air quality district, shall be conducted in accordance with California Air Resources Board (CARB) test procedure as defined by CARB CP-201.

5.1 Annual Inspections

⚠ **CAUTION**: Use only original Franklin Electric parts. Substituting non-Franklin Electric parts may cause the device to fail, which could create a hazardous condition and/or harm the environment

5.1.1 End-Of-Line Configuration

1. Apply a ¾" wrench or socket in the top of the P/V vent, and then unthread the P/V vent from the DEFENDER SERIES® vent stack adapter.
2. Inspect the outside of the P/V vent. This includes the O-ring and screen (available in the maintenance kit, p/n 804110901). *Clean or replace as necessary.*
3. Remove the inlet disc screen from the adapter and inspect for debris. *Clean or replace as necessary.*
4. Reinstall the inlet disc screen and P/V vent according to previous instructions.

5.1.2 In-Line Configuration

1. Relieve pressure/vacuum on the tank prior to accessing the in-line vault.
2. Remove the drain plug and empty any contents into an approved (petroleum and chemical-resistant) container.
3. Use a T-40 tamper-resistant Torx® tool to remove the eight 5⁄16" - 18 Torx® tamper-resistant bolts from the cover. *Allow the cover to rotate and hang from the lower pin. **Do not remove the pin**.*
4. Use a ¾" wrench or socket in the top of the P/V vent, and unthread the P/V vent from the DEFENDER SERIES® vent stack adapter.
5. Inspect the outside of the P/V vent, including the O-ring (available in the Maintenance Kit, p/n 804110901). *Clean or replace as necessary.*
6. Remove the inlet disc screen from the adapter and inspect for debris. *Clean or replace as necessary.*
7. Reinstall the inlet disc screen *with the stem oriented upwards.*
8. Ensure the O-ring is properly lubricated with synthetic O-ring grease, and thread the P/V vent into the in-line vault until it bottoms out *(120 in-lbs maximum torque).*
9. Ensure the O-ring is fully seated in the channel on the face of the in-line vault flange.
10. Close the cover, reinstall the eight tamper-resistant bolts *(torque to 120–144 in-lbs.)*
11. From ground level, visually inspect the rain cap for signs of bird nests or insect activity.

5.1.3 Flame Arrester Configuration

1. Visually inspect the flame arrester element for
    - Contamination
    - Damage
    - Corrosion
2. Clean or replace (see §5.1 precaution)* as necessary.

6 Appendix

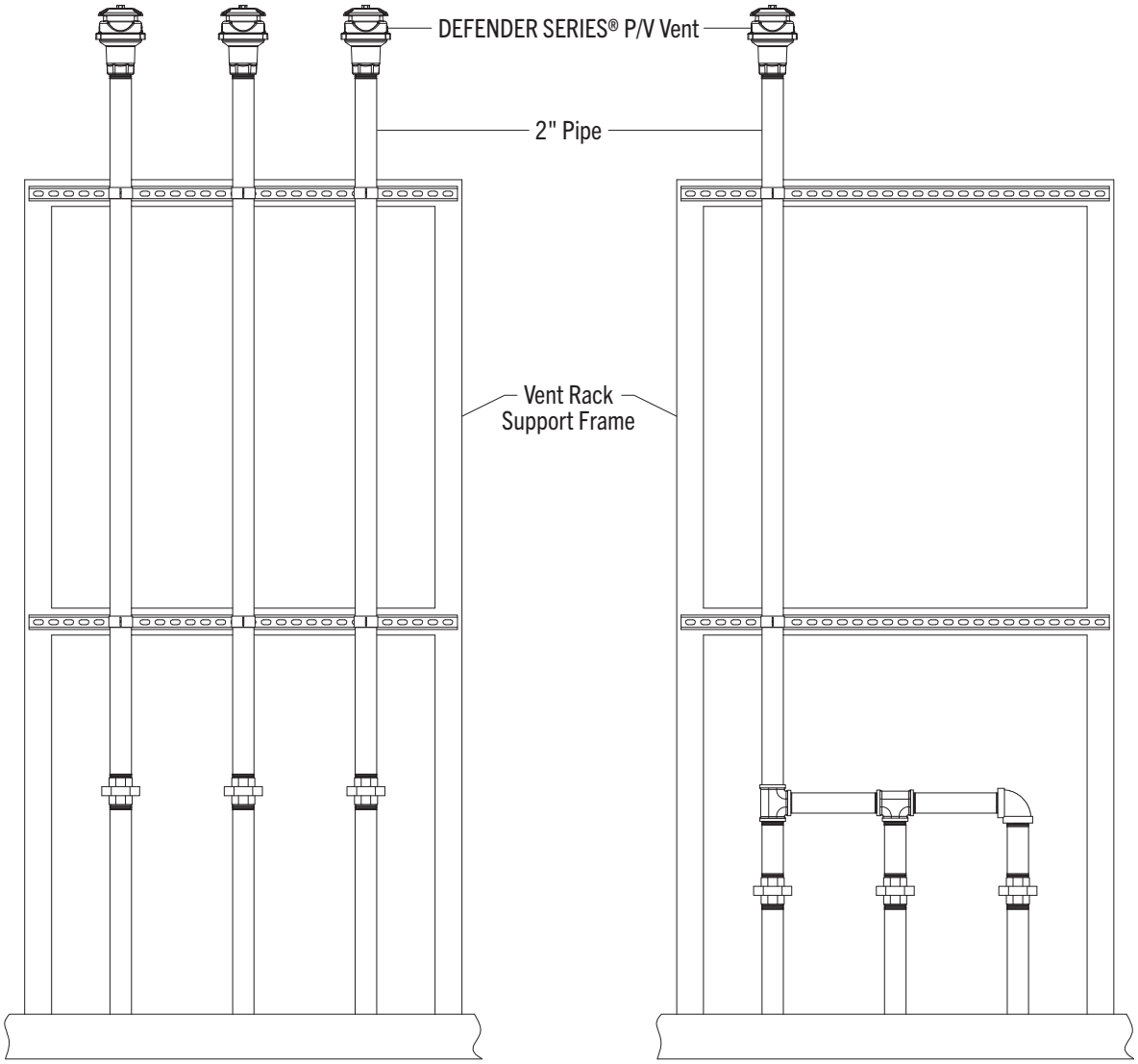
6.1 Related Documents

Documentation can be found online at www.franklinfueling.com.

Part Number	Description
10000007972	DEFENDER SERIES® Flame Arrester Install Guide
TB0223-01	DEFENDER SERIES® P/V Vent Annual Inspection

6.2 Installation Configuration Drawings

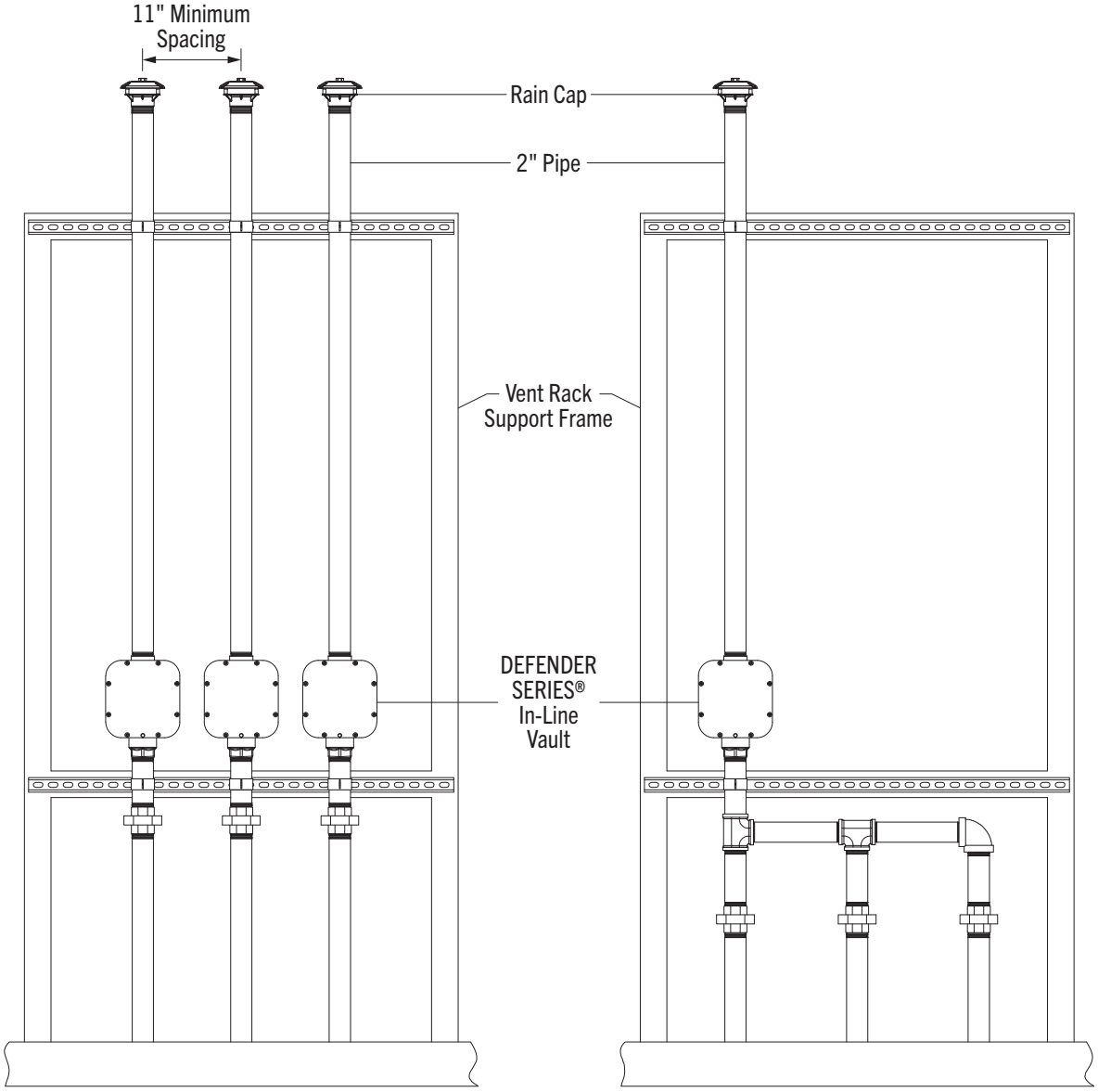
6.2.1 End-Of-Line



Individual P/V Vent Lines

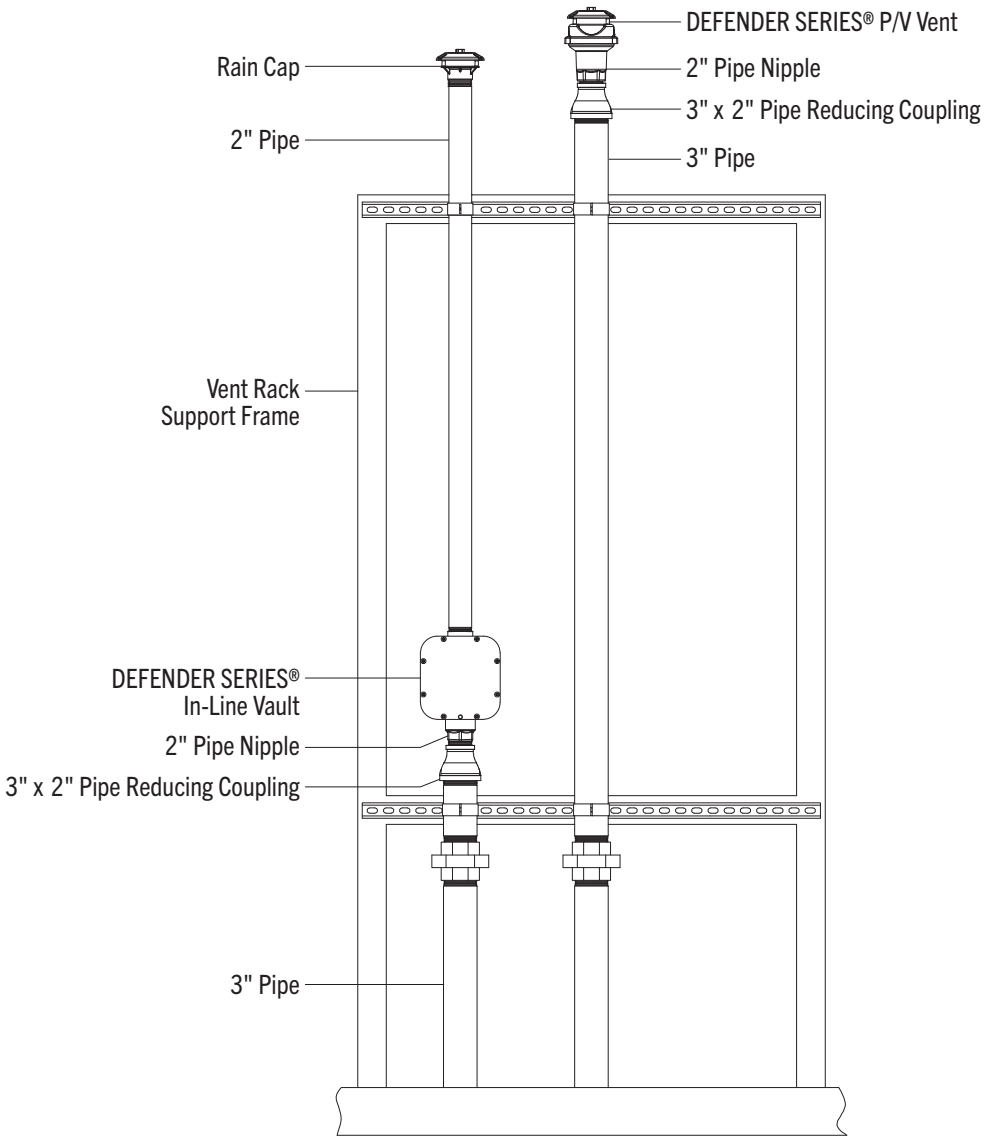
Manifolded P/V Vent Lines

6.2.2 In-Line



Individual P/V Vent Lines **Manifolded P/V Vent Lines**

6.2.3 3" P/V Vent Lines



Individual P/V Vent Lines

804031001 r3

December 9, 2025