A-38.3-0a

# Temporary Vent Stacks



Pacific Gas and Electric Company

Design Standard: A-38.3-0a
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## Purpose and Scope

This gas design standard (GDS) contains the requirements and considerations for temporary vent stack configurations that are used to vent or reduce pressure from transmission and distribution pipeline facilities. Vent stacks that are permanent, welded, and approved by engineering are not in the scope of this document. Stacks used for low pressure systems, fire control stacks, and depressurized pipelines or vessels are also outside the scope of this document.

## General Information

1. See Table 1, Vent Stack Specifications for Applications < 60 psig," and Table 3, "Vent Stack Specifications for Applications ≥ 60 psig," for allowable material for vent stacks based on pressure ranges.

    - Appropriately rated flex hose and plastic piping may also be used to vent pipeline facilities, as long as they are properly secured at or near the vent end. Ensure device used to secure flex hose at vent end can withstand thrust forces that can be expected. See Appendix A for equations used to calculate thrust force.

2. The preferred location of a vent tap for straight vent stacks or vent stacks with angle points is at the 12 o'clock position (perpendicular to the pipeline). If pipe conditions do not allow for this, then the vent tap can be placed between the 10 o'clock and 2 o'clock position.

3. Expand excavation or shoring as needed so vent stacks are located in the proper position to limit stacks with angle points.

4. Locate vent stacks to avoid openings into buildings, overhead power lines, sources of ignition, and in a position that minimizes the impact of noise and/or odor from venting.

5. Vent stacks must be of adequate height to provide enough clearance out of the excavation, and pointed in a safe direction away from any potential hazards. If it is not feasible to extend stack above the excavation due to depth, ensure personnel are at a safe distance away from the location and height of the stack.

6. Flanged connections must be fully bolted and tightened with appropriately rated gasket and welded per appropriate weld procedure. If there are any threaded connections in assembly, follow requirements for threaded components.

7. Use properly rated fittings and components for temporary vent stack configuration based on its application. Steel materials shall be a minimum of Gr B and aluminum materials shall have minimum of 21,000 SMYS, unless otherwise stated in Table 3.

8. Line or gauge taps (gauge, control) associated with valve extensions and body cavity bleeds may be used for the purpose of venting pipelines only if the taps are buried or contain engineered supports.

9. Static buildup in vent stacks can create a potential source of ignition. Ensure vent stack is properly grounded as needed to prevent accidental ignition due to electric discharge.

10. Piping used for vent stacks should not be used for any other intended purpose (e.g., leverage enhancement devices), and should be checked for quality/integrity.

11. Gate valves are recommended for performing venting operations. If using soft-seated ball valves as the pressure control fitting (e.g., Save-A-Valve) control valve, an additional sacrificial valve installed above the control valve is required to prevent control valve seat damage. If using ball valves as the control valve, install and operate valves for vent stack operations as follows:

    A. Install secondary sacrificial valve above control valve as close as practical.

    B. Fully close secondary sacrificial valve.

    C. Slowly, fully open the primary control valve attached to the pressure control fittings.

    D. Perform venting operations using secondary sacrificial valve.

**Vent Stack Requirements for Applications < 60 psig**

1. For threaded straight stack configurations (see Figure 1, “Straight Stack with Gate Valve,” and Figure 2, “Straight Stack with Ball Valves”) up to 2″ nominal pipe size, see Table 1, “Vent Stack Specifications for Applications < 60 psig,” for maximum allowable stack length based on material type used.

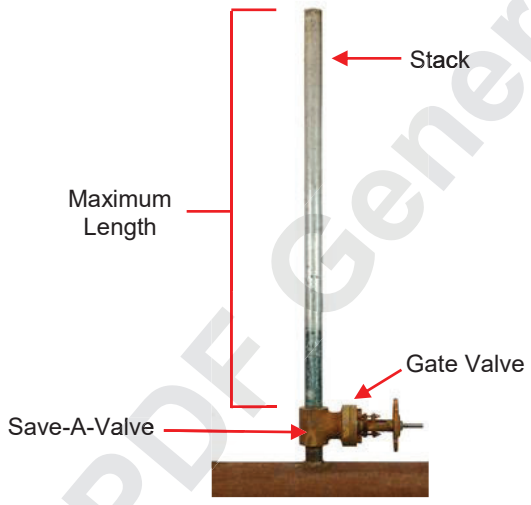


**Figure 1. Straight Stack with Gate Valve**

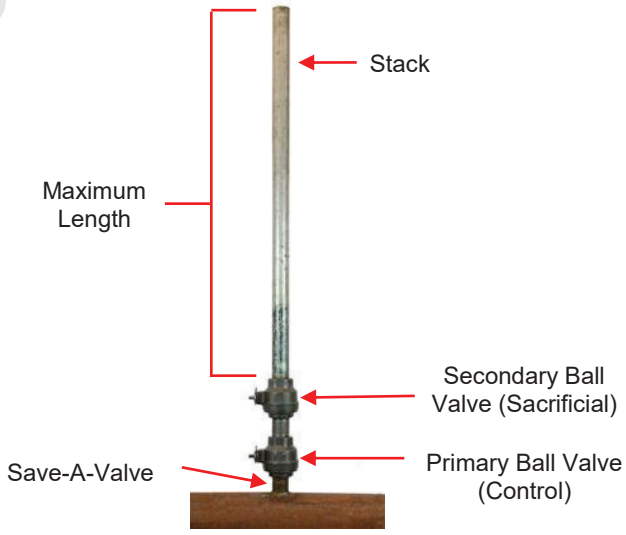


**Figure 2. Straight Stack with Ball Valves**

**Table 1. Vent Stack Specifications for Applications <60 psig**

| Stack Diameter (Nominal) | Connection Type | Stack Material | Minimum Material Schedule | Maximum Stack Height |
|---|---|---|---|---|
| ½ inch | Threaded[1] | Aluminum or Steel | 80 | 25 feet |
| ¾ inch | | | 40 | |
| 1 inch | | | | |
| 1-¼ inch | Threaded[1] or Flanged[2] | | | |
| 2 inch | | | | |

1 For threaded connections, ensure proper thread engagement
2 For flanged connections, ensure proper bolt torque

2. For a vent stack with a single angle point (see Figure 3, “45° Single Angle Point Stack,” and Figure 4, “90° Single Angle Point Stack”), the maximum length allowed between the pipeline connection and the angle point is 2 ft.

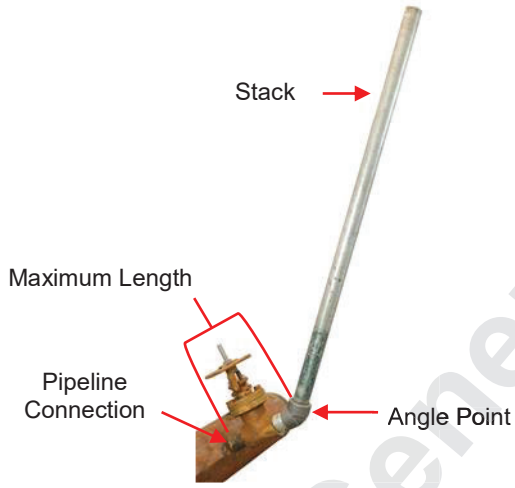


**Figure 3. 45° Single Angle Point Stack**

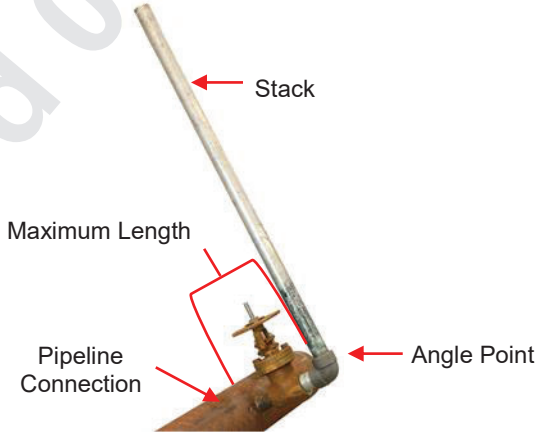


**Figure 4. 90° Single Angle Point Stack**

3. For an offset vent stack with two angle points (see Figure 5, “90° Two Angle Point Offset Stack,” and Figure 6, “Two Angle Point Offset Stack”), the maximum length between the pipeline connection and angle point is 2 ft. The maximum allowable offset nipple lengths and minimum wrench sizes required for installation is shown in Table 2, “Maximum Offset Nipple Length and Minimum Wrench Sizes for Offset Stack.”

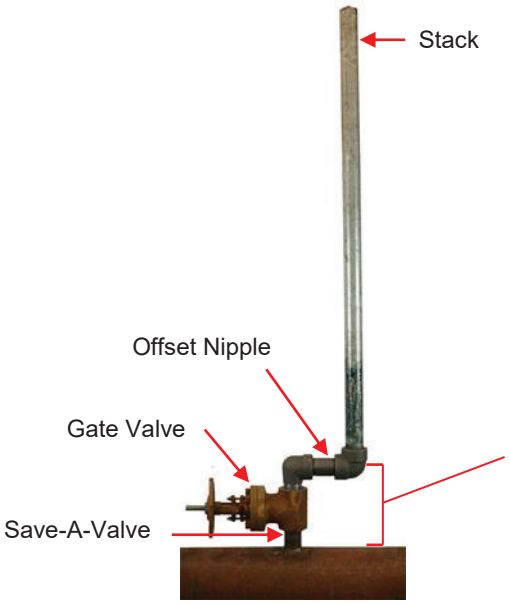


**Figure 5. 90° Two Angle Point Offset Stack (Gate Valve)**

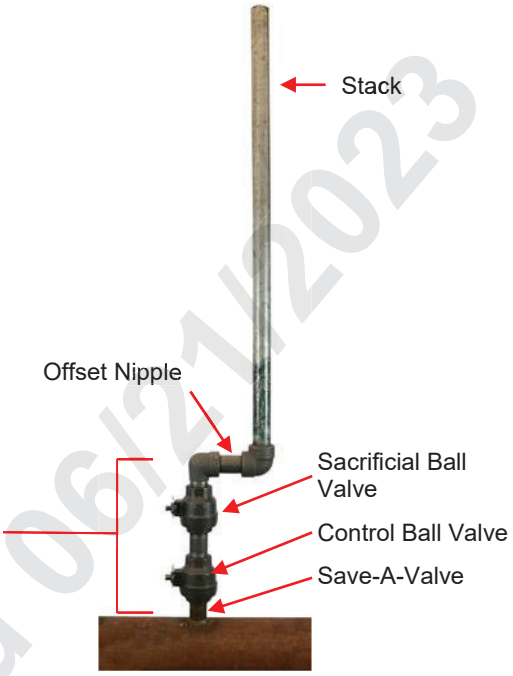


**Figure 6. 90° Two Angle Point Offset Stack (Ball Valves)**

**Table 2. Maximum Offset Nipple Length and Minimum Wrench Sizes for Offset Stack**

| NPS (Stack) (inches) | 14″ Wrench (inches) | 18″ Wrench (inches) | 24″ Wrench (inches) |
|---|---|---|---|
| 1/2 | 96 | 96 | 96 |
| 3/4 | 96 | 96 | 96 |
| 1 | 62 | 86 | 96 |
| 1-1/4 | 42 | 56 | 76 |
| 2 | 4 | 6 | 10 |

## Vent Stack Requirements for Applications ≥ 60 psig

1. Vent stacks in applications > 60 psig can only be in a straight configuration. For straight stack configurations (see Figure 1 and Figure 2), see Table 3, "Vent Stack Specifications for Applications ≥ 60 psig," for maximum allowable stack height based on material type.

2. Angle points and offsets required for temporary vent stacks used in applications > 60 psig need to be engineered for proper support or bracing.

**Table 3. Vent Stack Specifications for Applications ≥ 60 psig**

| Stack Diameter (Nominal) (inch) | Pressure (psig) | Connection Type | Stack Material | Minimum Material Schedule | Maximum Stack Height (feet) |
|---|---|---|---|---|---|
| ≤ 1 | 60 to 400 | Threaded[1] | Aluminum | 80 | 10 |
| | | | Steel | 40 | |
| | 400 to 1000 | | Aluminum | 80 | 5 |
| | | | Steel | 40 | |
| 1-¼ to 2 | 60 to 400 | Threaded[1] or Flanged[2] | Aluminum | 80 | 15 |
| | | | Steel | 40 | |
| | 400 to 1000 | | Aluminum | 80 | 10 |
| | | | Steel | 40 | |
| 3 to 4 | 60 to 400 | Flanged[2] | Steel | 40 | 30 |
| | 400 to 1000 | | | | 20 |
| ≥ 6 | Any | To Be Engineered | | | |
| Any | >1000 | | | | |

1 For threaded connections, ensure proper thread engagement.
2 For flanged connections, ensure proper bolt torque.

## Target Audience

Gas engineering personnel, gas construction (GC) personnel, gas pipeline operations and maintenance (GPOM) personnel, and all other personnel (including contractors) that are involved in design or construction of vent stacks.

## Definitions

**Sacrificial valve** Fully functional secondary control valve to protect integrity of primary control valve.

**Straight stack** Vent stack that comes off perpendicular from the pipeline and contains no angle points.

**Offset stack** Vent stack that comes off perpendicular from the pipeline and contains a fitting that introduces an angle point.

**Fire control stack** Vent stack used to control low pressure for hot work applications.

## Acronyms and Abbreviations

NA

**Compliance Requirement/Regulatory Commitment**

Code of Federal Regulations (CFR) Title 49, Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.629, “Purging of pipelines.”

Code of Federal Regulations (CFR) Title 49, Transportation of Natural and other Gas by Pipeline: Minimum Federal Safety Standards, Section 192.751, “Prevention of accidental ignition.”

**References**

Code of Safe Practices (CSP) 1304

**Appendices**

NA

**Attachments**

NA

**Revision Notes**

Revision 0a:

1. Expanded Table 3 to cover pressures greater than 1000 psig.

Revision 0 (Publication Date:10/18/2017 Effective Date: 11/01/2017):

1. This is a new document.

**Asset Type:** Transmission Pipe, Distribution Mains & Services, Compressed Natural Gas / Liquefied Natural Gas (CNG/LNG), Maintenance and Construction (M&C)

**Function:** Design, Construction, Maintenance, Operation, and Emergency Response

**Document Contact:** Gas Design Standard Responsibility List

## Appendix A: Engineering Equations

Vent Stack Thrust Force Equations:

$$\boldsymbol{F_{Stack}} = [\frac{\dot{\boldsymbol{m}} \times \boldsymbol{V_{exit}}}{\boldsymbol{g_c}}] + [\boldsymbol{P_{exit}} \times \boldsymbol{A_{exit}}] \quad \text{[lbf]}$$

*Where:*

$\dot{\boldsymbol{m}}$ = mass flow rate = $\boldsymbol{V_{exit}} \times \boldsymbol{\rho_{exit}} \times \left(\frac{\boldsymbol{A_{exit}}}{\boldsymbol{144}}\right)$ [lbm/s]

$\boldsymbol{V_{exit}}$ = exit velocity at sonic flow = $\sqrt{\boldsymbol{k} \times \boldsymbol{g_c} \times \boldsymbol{R} \times \boldsymbol{T_{exit}}}$ [ft/s]

$\rho_{exit}$ = $\frac{(P_{exit} + P_{atm}) \times 144}{R \times T_{exit}}$ [lbm/scf]

$\boldsymbol{P_{exit}}$ = pressure of carrier pipe (static pressure) [psig]

$\boldsymbol{A_{exit}}$ = area of vent stack pipe (exit) $[\mathbf{in^2}]$

*Constants:*

k = specific heat ratio of PG&E Natural Gas = 1.306

$g_c$ = gravity constant = 32.2 [lbm·ft/lbf·s²]

R = gas constant = 90.98 [ft·lbf/lbm·°R]

$T_{exit}$ = 451 ºR [lbm·ft/lbf·s²]

$P_{atm} = 14.7$ [psia]

*Assumptions*:

- Choked flow where Mach Number = M = 1, therefore exit temperature and exit velocity are calculated at sonic flow through a nozzle
- No friction loss, so $P_{exit}$ = static pressure (pressure of carrier pipe)
- With k being constant, your velocity and temperature at sonic flow will be constant
- These are conservative assumptions to provide a factor of safety

# Minor Revision Guidance Document Analysis (MRGDA)
## Temporary Vent Stacks
## A-38.3, Rev. 0a

| | |
|---|---|
| ***Document Type*** | Gas Design Standard (GDS) |
| ***Workflow*** | Minor Revision |
| ***Impact*** | ☐ Only Updates Material Codes or Document References (sections 1–5 only)<br>☒ Includes Any Other Changes (complete all sections) |



### 1. Why Is the Document Being Revised?

To address CAP issue 114113617 by expanding Table 3 to cover pressures greater than 1000 psig.

### 2. What Is Changing?

| Section/Step | What to Change/Add/Delete |
|---|---|
| Table 3 | Add cell, row and highlighted text:<br>≥ 6 \| Any \| To Be Engineered<br>Any \| >1000 \| |

### 3. Major New Risks or Changes to Existing Mitigated Risks (such as Process Safety risks)

NA

### 4. Stakeholders

**Table 1. Stakeholder Reviewers**

| Department / Work Center | Title (and Role if applicable) | Name | Review Date |
|---|---|---|---|
| Pipeline Services | Supervisor, Document Steward | [redacted] | 11/2020 |
| Standards Engineering | Senior Engineer, Document Coordinator | | 11/2020 |
| Standards Engineering | Principal Engineer, Lead Engineer | | 11/2020 |
| | Principal Engineer, Document Approver | | |
| Pipeline Services | Manager | | 11/2020 |

### 5. Electronic Document Routing System (EDRS) Reviewers and Approvers

Approvers: [redacted]

**EDRS Routing Number:** 2020-78164

### 6. Cost Information

NA

### 7. Schedule Information

**Priority:** ☒ **Regular** (*monthly publication*) ☐ **High** (*publish within 24 hours of EDRS approval*)
Reason (for High priority only): NA

**Effective Date**: +90 days

## 8. Cancellations

NA

## 9. Manuals

☒ No Change to Manuals

## 10. Document Properties

### *Functional Area*

☒ No Change to Functional Area

| | | | |
|---|---|---|---|
| ☐ CNG-LNG | ☐ Compression and Processing | ☐ Customer Connected Equipment | ☐ Distribution Mains |
| ☐ Distribution Services | ☐ Measurement and Control | ☐ Storage | ☐ Transmission Pipe |

### *Target Audiences*

☒ No Change to Target Audiences

| | | | |
|---|---|---|---|
| ☐ Asset Strategy | ☐ Facility Integrity Management | ☐ Leak Repair | ☐ R&D and Innovation |
| ☐ Associate Distribution Engineers | ☐ GPOM (I&R) | ☐ Leak Survey | ☐ Records and Information Management |
| ☐ Compliance and Risk | ☐ Gas Control Strategy and Support | ☐ Locate and Mark | ☐ Regulatory Compliance |
| ☐ Contract Management | ☐ Gas Distribution Control Center | ☐ Mapping (Transmission and Distribution) | ☐ Risk Management |
| ☐ Corrosion Mechanics | ☐ Gas Emergency Preparedness | ☐ Metering Plant | ☐ Service Planning |
| ☐ Corrosion Services | ☐ Gas Operations Leadership | ☐ Picarro | ☐ Sourcing |
| ☐ Data Quality | ☐ Gas Service Representatives | ☐ Pipeline Engineering | ☐ Super Gas Ops |
| ☐ Dispatch and Scheduling | ☐ Gas Transmission Control Center | ☐ Pipeline Safety Enhancement Plan Engineering | ☐ System Planning |
| ☐ Distribution Construction | ☐ General Construction | ☐ Program Management (Transmission and Distribution) | ☐ Technology and Tools |
| ☐ Distribution Engineering | ☐ Hydrotesting | ☐ Project Management (Transmission and Distribution) | ☐ Transmission Construction |
| ☐ Distribution Integrity Management | ☐ Investment Planning | ☐ Qualifications | ☐ Transmission Engineering |
| ☐ Estimating | ☐ LNG\|CNG Operations | ☐ Quality and Improvement | ☐ Transmission Integrity Management |



  

***Business Processes (GODOCS)***

☒ No Change to Business Processes

| CONSTRUCTION | ENGINEERING | MAINTENANCE & OPERATIONS | EMERGENCY / ADMIN |
|---|---|---|---|
| ☐ As-Builts | ☐ Applicant Design Manual | ☐ Corrosion Control | ☐ Dispatch and Scheduling |
| ☐ Coatings | ☐ Asset Knowledge Management | ☐ Damage Prevention (indicate subtype)[1] | ☐ Emergency Plans |
| ☐ Construction Methods | ☐ Distribution Engineering | ☐ Field Services (GSRs) | ☐ Gas Guidance Document Process |
| ☐ Environmental and Safety | ☐ Engineering for Integrity Management | ☐ Gas Control and Clearances | ☐ Gas Operations Quality Management |
| ☐ Excavation | ☐ Engineering Material Specifications | ☐ Integrity Management (IM) | ☐ Gas Safety Excellence |
| ☐ Gas Design Standards for Construction | ☐ Gas Design Standards | ☐ Leak Survey and Response | ☐ Operator Qualifications (OQ) |
| ☐ Inspection and Operation | ☐ Process Safety | ☐ Major Stations | |
| ☐ Plastic | ☐ System Planning | ☐ Measurement and Regulation (M&R) | |
| ☐ Steel Pressure Control | ☐ Transmission Engineering | ☐ Steel Pipeline Maintenance and Repair | |
| ☐ Strength Testing and Commissioning | | ☐ Valve Maintenance | |
| ☐ Welding and Nondestructive Examination (NDE) | | | |

1. Damage Prevention subtypes: Locate and Mark, Patrolling, Public Awareness



  

| | |
|---|---|
| ***Document Type*** | Gas Design Standard (GDS) |
| ***Workflow*** | New |

1. **Why is the guidance document being written / revised?**

   This new GDA provides guidance on how to properly build temporary vent stack configurations used to vent or reduce pressure from pipeline facilities. The draft GDS was piloted for approximately eight transmission and distribution projects and the applicable pilot feedback has been incorporated.

2. **Is the guidance document new or revised? If it is revised, what will change? If new, what is the topic?**

   This is a new guidance document that includes general requirements and considerations when building temporary vent stack configurations. Topics include: materials, control fitting locations, number of allowable fittings for offsets, and best practices when assembling a temporary vent stack.

3. **Does this project introduce any major new risks or change existing mitigated risks, such as Process Safety risks?**

   The changes to this GDS do not pose any safety risks as long as personnel follow the correct requirements for size, material, and position of the venting installation.

4. **Stakeholder Identification**

**Table 1. Technical Stakeholder Reviewers (required to be considered)**

| Department / Work Center | Role | Name (or reason if NA) | Review Date |
|---|---|---|---|
| Gas Guidance Documents | Document Steward | [redacted] | 03/23/2017 |
| Gas Guidance Documents | Document Coordinator | [redacted] | 03/23/2017 |
| Process Safety | Process Safety Engineer | [redacted] | 03/27/2017 |
| Enterprise Compliance | NA – not applicable for this document | | |
| Quality Management | NA – not applicable for this document | | |
| Operator Qualification | Operator Qualification | [redacted] | 04/11/2017 |
| Gas Strategy and Solutions | NA – not applicable for this document | | |
| Regulatory Compliance | Regulatory Compliance | [redacted] | 03/27/2017 |
| PG&E Academy | NA – not applicable for this document | | |

**Table 2. Target Audience Usability Review (stakeholders that may review)**

| Department / Work Center | Role | Name | Review Date |
|---|---|---|---|
| Field Support | Single Point of Accountability (SPA) | [redacted] | 09/2017 |
| Pipeline Engineering and Design | Manager | | 09/2017 |
| Bay Area Clearance Team | Supervisor | | 09/2017 |
| Construction Welding | Field Training Coordinator | | 08/2017 |
| General Construction (GC) Maintenance and Construction (M&C) South | Supervisor | | 09/2017 |
| Facility Integrity Management Program | Expert Engineer | | 09/2017 |
| Plant Engineering and Design | Principal Plant Engineer | | 03/2017 |
| GC Gas Transmission | Field Engineer | | 03/2017 |
| GC Peninsula | Supervisor | | 03/2017 |
| GT GC South | Superintendent | | 03/2017 |
| Gas Guidance Documents | Welding Specialist | | 03/2017 |
| GC Gas Testing and Maintenance | Lead Tapping Technician | | 09/2017 |
| GC M&C / SCADA Execution | Superintendent | | 04/2017 |
| Compressed Natural Gas / Liquefied Natural Gas (LNG/CNG) | Engineering Supervisor | | 04/2017 |
| Process Safety | Process Safety Engineer | | 09/2017 |

**5. Electronic Document Routing System (EDRS) Reviewers and Approvers**

Approvers: [redacted]

**6. Detail any needed cost or schedule information**

NA

**Effective Date:** 11/01/2017

**7. How often will the guidance document be reviewed?**

At least once every calendar year, not to exceed 15 months, to the date.

# Guidance Tailboard

DOCUMENT NAME: Temporary Vent Stacks

DOCUMENT NUMBER: A-38.3, Revision 0

TAILBOARD ISSUED: 10/18/2017 TAILBOARD BY: NA

## What is changing?

This is a new gas design standard (GDS) that includes general requirements and considerations when building temporary vent stack configurations. Topics include materials, control fitting locations, number of allowable fittings for offsets, and best practices when assembling a temporary vent stack.

## Why does it matter?

This new GDS provides guidance on how to properly build temporary vent stack configurations used to vent or reduce pressure from pipeline facilities. The draft GDS was piloted for approximately eight transmission and distribution projects, and the applicable pilot feedback has been incorporated.

## Required Action

Target audience personnel must review and become familiar with the contents of this GDS.

## Tools and Training

NA

## Timeline

| Date | Activity |
|---|---|
| 10/18/2017 | Publication date. |
| 11/01/2017 | Effective date. |