CITY OF FAIRHOPE

INVITATION TO BID

SEALED BIDS will be received by the City of Fairhope of Baldwin County, Alabama, in the City of Fairhope offices, 555 South Section St. Fairhope, Alabama, until 2:00 P.M. Tuesday, June 21, 2022, and then publicly opened thereafter, for furnishing all labor and materials, and performing all work required by the City of Fairhope and described as follows:

Bid Number 026-22 On Call Contractor for Gas Department

The City of Fairhope Natural Gas Department is seeking contractor assistance with work with various projects on an ON CALL basis throughout the year. Fairhope Natural Gas Department anticipates up to $200,000.00 annual budget for the first year of this contract. Subsequent years (possible two one-year contract extensions) shall be renewed, if all parties agree, based on an amount determined at the time of each renewal cycle.

Bid documents will be posted on the City of Fairhope Website: www.FairhopeAL.gov or a copy may be obtained by e-mailing: Purchasing@FairhopeAL.gov. Specifications are on file and may be seen in the Purchasing Department of the City of Fairhope, Alabama, 555 S. Section Street. Prior to opening, Bid packages may be picked up at that location during normal operation, between 7:00 am and 4:00 pm local time.

Questions or comments pertaining to this bid must be presented in writing, sent as e-mail to the attention of the Purchasing Manager, Erin Wolfe, 555 South Section St., Fairhope, AL 36532, e-mail: Purchasing@FairhopeAL.gov, by Monday, June 13, 2022, at 5:00 P.M. or will be forever waived.

All Bids must be on blank bid forms provided in the Bid documents. Bids shall be accompanied by a BID SECURITY equal to 5% (percent) of the bid price, but in no event more than $10,000.00. BID SECURITY shall be in the form of a Bid Bond signed by a Bonding company authorized to do business in the State of Alabama, or a Cashier's Check payable to the City of Fairhope. NO BID SECURITY is required on bids less than $10,000.00.

A Performance Bond in the form and terms approved by the City of Fairhope in an amount not less than the sum of the bid will be required at the signing of the CONTRACT, and in addition, a Labor and Materials Bond in the form and terms approved by the City of Fairhope in an amount not less than fifty percent (50%) of the CONTRACT price insuring payment for all labor and materials.

The City of Fairhope is an Equal Opportunity Employer and requires that all **BIDDERS** comply with the Equal Employment Opportunity laws and the provisions of the CONTRACT Documents in this regard. The **CITY** also encourages and supports the utilization of Minority Business Enterprises on this and all public bids.

All bids must be on blank bid forms provided in the Bid Documents. All bids, with their guarantee (when required), must be enclosed in a sealed, opaque envelope, clearly identified on the outside as a "**Sealed Bid" with Item Name, Bid Number, City of Fairhope's Name and Address and CONTRACTOR's Name and Address**. Each bid must be in a separate envelope. Bids made out in pencil will not be accepted. Failure to observe the instructions contained herein will constitute grounds for rejection of your bid. The **City** reserves the right to accept or reject all bids or any portion thereof, and to waive informalities and to furnish any item of material or work to change the amount of the CONTRACT, whichever is in the best interest of the City of Fairhope.

No bids will be considered unless the **CONTRACTOR,** whether resident or non-resident of Alabama, is properly qualified to submit a proposal for this type of work in accordance with all applicable laws of the State of Alabama. Where applicable, this shall include evidence of holding a current license from the State Licensing board for General BIDDERS, Montgomery, Alabama, as required by Chapter 8 of Title 34, of the Code of Alabama, 1975. In addition, the Awarded Vendor, if non-resident of the State, and if a corporation, shall show evidence of having qualified with the Secretary of State to do business in the State of Alabama. **CONTRACTOR** must have a current business license or purchase a business license with the City of Fairhope prior to work performed. No bids shall be withdrawn for the period of thirty (30) days subsequent to the opening of proposals without the consent of the City of Fairhope, Baldwin County, Alabama. Once completed, a tabulation of the responsive and responsible bids will be available for public viewing by visiting the following web address: www.FairhopeAL.gov.

INVITATION TO BID
NO. 026-22
ON CALL CONTRACTOR FOR
GAS DEPARTMENT

CITY OF FAIRHOPE
SHERRY SULLIVAN, MAYOR

TABLE OF CONTENTS

ITEM I
INVITATION AND INSTRUCTIONS TO BIDDERS

1.00 **BID INVITATION**

Notice is hereby given that the **City of Fairhope ("CITY")** will receive bids on the project described herein. Qualified **BIDDERS** are invited to bid on this CONTRACT.

1.01 **BID NO.:** **026-22**
NAME: **ON CALL CONTRACTOR FOR GAS DEPARTMENT**

1.02 **SUMMARY**

The City of Fairhope is seeking contractor assistance with work on various projects with the City of Fairhope Natural Gas Department on an ON CALL basis throughout the year.

1.03 **BID DEADLINE**

Bids will be received until **2:00 P.M. local time, Tuesday, June 21, 2022,** at the City Services and Public Utilities Building, 555 South Section St., Fairhope, Alabama, and publicly opened shortly thereafter.

1.04 **AVAILABILITY OF DOCUMENTS**

Bid Documents may be obtained at the City Services and Public Utilities Building, 555 South Section Street., Fairhope, Alabama. One set of Bid Documents can be obtained free of charge. Bidder shall contact the Purchasing Department at purchasing@fairhopeal.gov or phone (251) 928-8003 to request a paper copy.

1.05 **INQUIRIES**

Questions or comments pertaining to this bid must be presented in writing, sent as e-mail to the attention of the Purchasing Manager, Erin Wolfe, 555 South Section St., Fairhope, AL 36532,
e-mail: Purchasing@FairhopeAL.gov, by Monday, June 13, 2022 at 5:00 P.M. or will be forever waived.

1.06 **SITE EXAMINATION**

A pre-bid meeting/site examination is not required for this project. This bid is to provide work for any location serviced by the City of Fairhope Natural Gas Department deemed necessary by the Owner. Before submitting a bid for the project, each Bidder shall carefully examine the Contract Documents, including but not limited to plans, drawings, specifications, contract, etc. and satisfy itself as to the nature of the Project, and the general and local conditions, including weather, the general character and extent of the work being performed or proposed thereon at the time of submission of their bids. The submission of a bid shall be prima facie evidence that the Bidder has made such examination and satisfied himself as to conditions to encountered regarding the character, difficulties, quality, and quantities of work to be performed and the material and equipment to be furnished, and as to the contract requirements and contingencies involved. It shall be the Bidder's obligation to verify for himself and to his complete satisfaction, all information concerning anticipated working conditions.

The City of Fairhope will not furnish any labor, material, or supplies unless specifically stated in the CONTRACT Documents. **BIDDERS** must be properly licensed to perform the work as outlined in the Scope of Work. Awarded Vendor must have a current business license or purchase a business license with the City of Fairhope prior to bid being awarded.

Except for CONTRACTS funded in whole or in part by funds received from a federal agency, preference shall be given to resident **BIDDERS** on the same basis as the nonresident **BIDDERS** state awards CONTRACT to Alabama **BIDDERS b**idding under similar circumstances. Therefore, non-resident **BIDDERS** shall submit with their bid a written opinion of an attorney at law licensed to practice law in the non-resident **BIDDERS** state of domicile as to preferences granted by that state to entities doing business in that state when letting public contracts.

1.07 **BID SECURITY**

Bids shall be accompanied by a Bid Security equal to 5% (percent) of the bid price, but in no event more than $10,000.00. Bid Security shall be in the form of a Bid Bond or a cashier's check payable to The City of Fairhope. No Bid Security is required on bids less than $10,000.00.

1.08 **PERFORMANCE ASSURANCE AND INSURANCE**

The **BIDDER** to whom award is made shall provide a Performance Bond equal to 100% of the CONTRACT Amount and a Labor and Material Bond equal to 50% of the CONTRACT amount.

The accepted **BIDDER** shall also provide insurance as required in ITEM V.

1.09 **DURATION OF OFFER**

Bids maybe withdrawn in written or telegraphic request received from **BIDDER** prior to the time fixed for opening. No bid shall be withdrawn for a period of thirty (30) days subsequent to the opening of bids without the consent of the City Council of the City of Fairhope.

1.10 **EQUAL OPPORTUNITY**

The City of Fairhope is an Equal Opportunity Employer and requires that all **BIDDERS** comply with the Equal Employment Opportunity laws and the provisions of the CONTRACT Documents in this regard. The City of Fairhope also encourages and supports the utilization of Minority Business Enterprises on this and all public bids.

1.11 **BID SUBMISSION AND PREPARATION**

Sealed Bids, signed, executed, and dated, will be received by the City of Fairhope as noted in section 1.03 above. Submit one copy of the executed offer on the Bid Form provided, signed, and with the required Bid Security. **The bid shall be enclosed in a sealed opaque envelope approximately 9x12 inches or larger, clearly identified on the outside** as a **SEALED BID** with **the BID NAME, BID NUMBER, CITY'S NAME AND ADDRESS, CONTRACTOR'S NAME AND ADDRESS.**

Forms furnished, or copies thereof, shall be used, and strict compliance with the requirements of the invitation, these instructions, and the instructions printed on the forms is necessary. Special care should be exercised in the preparation of bids. **BIDDERS** must make their own estimates of the facilities and difficulties attending the performance of the proposed CONTRACT, including local conditions, uncertainty of weather, and all other contingencies. All designations and prices shall be fully and clearly set forth. The proper space in the bid and guaranty forms shall be suitably filled in.

Fill in all blanks on the bid form with non-erasable ink or type. Erasers or other changes must be explained or noted over the signature of the **BIDDER.**

The Bid Form may have a Contingency Allowance listed. Add this amount to the Base Bid to derive the Total Bid. The Contingency Allowance covers unforeseen conditions and shall not be used by the **BIDDER** without the written authorization of the **CITY**. At the conclusion of the project, the unused portion of the Contingency Allowance shall revert to the **CITY**.

Each bid must give the full business address of the **BIDDER** and must be signed by him with his usual signature. Bids by partnerships must furnish the full names of all partners and must be signed with the partnership name by one of the members of the partnership, or by an authorized representative, followed by the signature and designation of the person signing. Bids by corporations must be signed with the legal name of the corporation followed by the name of the State of Incorporation and by the signature and designation of the president, secretary, or other person authorized to bind it in the matter. The name of each person shall also be typed or printed below the signature. A bid by a person who affixes to this signature the word "president," "secretary," "agent," or other designation without disclosing his principal, may be held to be the bid of the individual signing. When requested by the **CITY** satisfactory evidence of the authority of the officer signing in behalf of the corporation shall be furnished.

Each project will be bid separately unless otherwise expressly requested in the CONTRACT document. Combination bids, that is bids on separate projects lumped together as a single bid or on all or none basis, will not be accepted unless the CONTRACT document expressly requests or permits same.

1.12 **BID INELIGIBILITY**

Bids that contain irregularities of any kind may be declared unacceptable at the discretion of the **CITY**. The **CITY** may waive any irregularities and may reject any or all bids. Bids received after the deadline will be returned to the **BIDDER** unopened.

1.13 **CONTRACT TIME**

The **BIDDER** agrees to begin the work, for each sequence of owner submitted work orders, no later than thirty (30) days from the date of submission. The Contract being Three Hundred and Sixty-Five (365) calendar days with a provision to renew the Contract, if agreeable to both parties under the same conditions for not more than three consecutive years (two (2) one (1) year renewals). The Bidder, in submitting the offer, accepts the conditions of the contract period state for performing the work.

1.14 **INQUIRIES/ADDENDA**

All Addenda are part of the CONTRACT Documents. Include resultant costs in the Bid. Addenda will be issued by E-MAIL and posted on the City's website: www.FairhopeAL.gov. It is the responsibility of the **BIDDER** to verify that all Addenda have been received.

Questions or comments pertaining to this bid must be presented in writing, sent via email Purchasing@FairhopeAL.gov by Monday, June 13, 2022 at 5:00 P.M. or will be forever waived.

1.16 **BID ACCEPTANCE**

Bid with lowest Total Bid amount from a responsive and responsible **BIDDER** may be accepted if within the CONTRACT Budget. In the event that alternates are listed on the Bid Form, the lowest combination of Total Bid and Alternate Bids accepted by the **CITY** shall be the accepted bid. Alternates shall be awarded in the order in which they are listed on the Bid Form.

1.17 **BIDDERS INTERESTED IN MORE THAN ONE BID**

If more than one bid is offered by any one party, by or in a name of his clerk, partner, corporation in which he has a substantial interest, or in which he is an officer, or other person, all such bids may be rejected. A party who has quoted prices on materials to a **BIDDER** is not thereby disqualified from quoting prices to other **BIDDERS** or from submitting a bid directly for the materials or work. The **CITY** reserves the right to determine in its discretion whether the provisions of this clause have been violated by any **BIDDER.**

1.18 **ERRORS IN BIDS**

BIDDERS or their authorized agents are expected to examine the maps, drawings, specifications and all other instructions pertaining to the work, which will be open to their inspection. Failure to do so will be at the **BIDDER'S** own risk. In case of error, in the extension of prices, the unit price will govern.

1.19 **CONTRACT AND BOND**

The **BIDDER** to whom award is made must, when requested, enter into written CONTRACT on the standard form as set out herein, with satisfactory security in the amount required, within the period specified, or, if no period be specified, within 15 days after the required forms are presented to him for signature.

1.21 **COLLUSION**

If there is any reason for believing that collusion exists among the **BIDDERS** any or all bids may be rejected, and those participating in such collusion may be barred from submitting bids on the same or other work with the **CITY**.

1.22 **SUBLETTING OR ASSIGNING OF CONTRACT**

Limitations: The CONTRACTOR shall not sublet, assign, transfer, convey, sell, or otherwise dispose of any portion of the CONTRACT, his right, title or interest therein, or his power to execute such CONTRACT, to any person, firm or corporation without written consent of the **CITY**, and such written consent shall not be construed to relieve the **BIDDER** of any responsibility for the fulfillment of the CONTRACT. Unless otherwise stipulated in the proposal or special provisions, the **BIDDER** shall perform with his own organization, and with the assistance of workmen under his immediate superintendence and reported on his payroll, all CONTRACT work of a value not less than 50 percent of the total CONTRACT amount, except that any items designated in the CONTRACT as "Specialty Items" so performed by SUB-CONTRACT may be deducted from the total CONTRACT amount before computing the amount of work required to be performed by the B**IDDER** with his own organization.

SUB-CONTRACTOR'S Status:

A **SUB-CONTRACTOR** shall be recognized only in the capacity of an employee or agent of the **CONTRACTOR** and the **CONTRACTOR** will be responsible to the **CITY** for all of the **SUB-CONTRACTOR's** work, including failures or omissions; and his removal may be required by the Project Manager, as in the case of an employee.

1.23 **PROSECUTION OF WORK**

The **BIDDER** shall prosecute the work continuously and diligently in the order and manner set out in his schedule as approved by the **CITY**. He shall provide sufficient satisfactory materials, labor, and equipment to ensure that the work will be completed in a satisfactory manner within the time specified in the CONTRACT.

Should the **BIDDERS** fail to maintain a satisfactory rate of progress, the **CITY** may require that additional forces and/or equipment be placed on the work to bring the project up to schedule and maintain it at that level.

Should the **BIDDER** fail to furnish sufficient satisfactory equipment and/or labor for maintaining the quality and progress of the work at satisfactory level, the **CITY** may withhold all estimates that may become due until satisfactory quality and progress are maintained; or the CONTRACT may be annulled.

END OF INVITATION AND INSTRUCTIONS TO BIDDERS

ITEM II
SCOPE OF WORK

Bid No. 026-22 On Call Contractor for Gas Department

The City of Fairhope Natural Gas Department is seeking contractor assistance with work on various projects on an ON CALL basis throughout the year. The Natural Gas Department anticipates up to $200,000.00 annual budget for the first year of this contract. Subsequent years (possible two one-year contract extensions) shall be renewed, if all parties agree, based on an amount determined at the time of each renewal cycle. The scope of this contract is to relieve efforts performed by City of Fairhope ("City") Gas Department staff, allowing them to redirect focus in other areas of our gas system.

1. Required Minimum Qualifications and Standards required to fulfill this proposed contract:

    - Contractor shall meet the ASME (American Society of Mechanical Engineers B31Q standard as it pertains to Operator Qualifications (OQ).
    - Contractor shall meet the Drug and Alcohol Testing standards as required in CFR 199.
    - Contractor shall meet or exceed City of Fairhope Standards as described in Attachment A: City of Fairhope Standards.

2. Bidder shall provide the following information with their bid, to be used in determining the qualifications of the Bidder:

    a. A list of key personnel to be used on the project and detailed histories of their experience.
    b. A list of similar work performed by the Bidder within the last five (5) years.
    c. A list of five (5) references, including contact name, current telephone number, current email address, and a description of the work performed for that reference.
    d. A copy of the Bidder's General Contractor's state license.
    e. Operator Qualification (OQ) Training Records for ALL personnel working on the project.

3. Materials:

    a. City shall supply ALL materials that will remain as infrastructure attached to the Natural Gas System to include but not limited to pipe, fittings, taps, tracking wire, anodeless risers, etc. A representative from the City shall conduct tracking and traceability reports for ALL materials used by the selected Contractor. City SHALL NOT have the responsibility to supply consumable materials such as wire wheels, welding rods, rags, shop towels, etc. City shall supply ALL restoration materials, to include gravel, dirt, sod, asphalt and concrete.
    b. In the event a particular product is not available to the City, it can be supplied by the Contractor. Contractor shall provide a mark up percentage for materials on the Bid Response Form.
    c. Should the Contractor provide materials through this contract, a copy of the Contractor's purchase invoice shall be submitted with their invoice for payment, as proof of materials cost. Invoice cost shall match the materials cost listed on the invoice for payment.

4. Pre-Construction:

    a. Utility line locates shall be called in to the Alabama one call center (811). Initiating and updating these dig tickers are the sole responsibility of the Contractor. City shall give a location of where work will be performed and the Contractor will then call the corresponding locates in to 811 and update as needed.
    b. Contractor employees working on or near the City, County or State right of way MUST wear a Class 2 HI-VIZ safety vest at all times on the job site.
    c. Contractor employees shall wear appropriate safety gear on the job site.
    d. Contractor vehicles shall have signage identifying the Contractor as under contract with the City.

5. During Construction:

    a. Contractor shall guarantee mobilization within 72 hours of notification, unless otherwise agreed upon.
    b. Project Lead Times shall be agreed upon with beginning and completion dates set prior to work starting.
    c. Approved work times are from 7:00 a.m. until 4:00 p.m., unless agreed upon by the City. Overtime hours would be 4:01 p.m. until 6:59 a.m. and must be approved by the City prior to work.
    d. All Hot Tapping and Welding MUST BE performed by the selected Contractor. No third party (Sub-Contractor) shall be allowed unless approved by the City.
    e. Work sites shall be secured to ensure pedestrian and motor vehicle safety.
    f. All equipment shall be provided by the Contractor.

ITEM III
BID RESPONSE FORM
(1 of 4)

Date: ____ / _____ / _____

Bid No: 026-22 On Call Contractor for Gas Department

Bids Due: Tuesday, June 21, 2022, 2:00 P.M

Established Area or Rebuild Work				
Main Installation Pricing – Established Work Area or Rebuild Work		**Residential Service Pricing – Established Area or Rebuild Work**		
	Open Cut or Directional Drill Unit Cost per Foot		**< 60 Feet Lump Sum Minimum**	**Cost per Foot After 60 Feet**
Plastic Pipe – 2 Inch		Plastic Pipe – ½" through 1"		
Plastic Pipe – 4 Inch		Plastic Pipe – 1-1/4" through 2"		
Plastic Pipe – 6 Inch				
Steel Pipe – 2 Inch				
Steel Pipe – 4 Inch				
Steel Pipe – 6 Inch				
Steel Pipe – 8 Inch				

BID RESPONSE FORM
(2 of 4)

New Area					
Main Installation Pricing – New Area			**Residential Service Pricing – New Area**		
	Open Cut Cost per Foot	**Misc. Bore Cost per Foot**		**< 60 Feet Lump Sum Minimum**	**Cost per Foot After 60 Feet**
Plastic Pipe – 2 Inch			Plastic Pipe – ½" through 1"		
Plastic Pipe – 4 Inch			Plastic Pipe – 1-1/4" through 2"		
Plastic Pipe – 6 Inch					
Steel Pipe – 2 Inch					
Steel Pipe – 4 Inch					
Steel Pipe – 6 Inch					
Steel Pipe – 8 Inch					

BID RESPONSE FORM
(3 of 4)

Miscellaneous Work			
Tapping		**Restoration**	
	Cost Per Each		**Cost Per Square Foot**
½” to 1” Steel Service Tee		Asphalt Replacement	
2” Top Half Tap		Concrete Replacement	
2” Bottom Out		Sod Replacement	
4” Bottom Out		Seed & Straw	
6” Bottom Out			
8” Bottom Out			
Camera Work		**MOT**	
Camera Work per Day		Lane Closure Hourly Rate	
Cleaning – Main Hourly Rate			
Ditch Safety		**Material**	
Shoring/Trench Box Hourly Rate		Supplied Material Percentage Mark Up	%

BID RESPONSE FORM
(4 of 4)

Labor & Equipment Hourly Rates					
	Regular Rate	**Overtime Rate**		**Regular Rate**	**Overtime Rate**
Superintendent			Laborer		
Foreman			Welder		
Operator			Welder Helper		
Semi-Skilled Laborer			Truck Driver		
Excavator – 316 CAT			Boom Truck		
Rubbertire Backhoe			Trencher – 50 hp		
Mini Excavator – 303.5			Trencher – 75 hp		
1-Ton w/AC			Vermeer 10x15		
2-Ton Dump Truck			Vermeer 24x40		
Pickup			Vermeer 40x55		
Eagle Van w/Tools			Trailer Van		
Skid Steer			Vac Truck		
Tractor Only			2-Ton Mix Truck		
Lowboy Only					

Bid will include all labor, materials, equipment, shipping and postage, overhead, profit, bonds, insurance and all other costs necessary to provide the complete services outlined within this CONTRACT and scope of work.

Receipt of the following Addenda to these documents is hereby acknowledged by the undersigned (CONTRACTOR to complete below):

ADDENDUM NO.	DATE ISSUED	ADDENDUM NO.	DATE ISSUED
_____	_____	_____	_____
_____	_____	_____	_____

Each bid must give the full business address of the CONTRACTOR and must be signed by him with his usual signature. Bids by partnerships must furnish the full names of all partners and must be signed with the partnership name by one of the members of the partnership, or by an authorized representative, followed by the signature and designation of the person signing. Bids by corporations must be signed with the legal name of the corporation followed by the name of the State of Incorporation and by the signature and designation of the president, secretary, or other person authorized to bind it in the matter. The name of each person shall also be typed or printed below the signature. A bid by a person who affixes to this signature the word "president," "secretary," "agent," or other designation without disclosing his principal, may be held to be the bid of the individual signing. When requested by the City of Fairhope, Baldwin County, Alabama, satisfactory evidence of the authority of the officer signing in behalf of the corporation shall be furnished.

The undersigned agrees to furnish the goods/services as requested by you for the City of Fairhope, Baldwin County, Alabama in your invitation to bid, and certifies that they will meet or exceed the specifications called for. The undersigned has read all information pertaining to this bid and has resolved all questions. It is also understood and agreed that all prices quoted are F.O.B. described in the bid documents and specifications. The undersigned also affirms he/she has not been in any CONTRACT or collusion among BIDDERS or prospective BIDDERS in restraint of freedom of competition, by CONTRACT to bid at a fixed price or to refrain from bidding or otherwise.

Witness our hands and seals this _____ day of _____, 2022.

If Individual or Partnership

_____ _____

(Name of Individual or Partnership) (Name of Partner Print)

_____ _____

(Name of Representative Authorized to sign Bids and CONTRACTs for the firm Print) (Name of Partner Print)

Address_____

_____

_____

Phone Number ( )_____ Fax Number ( )_____

E-mail address _____ Alabama Contractor's License No. _____

Foreign Entity ID (if outside of Alabama)_____

If Corporation or LLC

Company_____

State of Incorporation _____

Company Representative_____
(Representative Authorized to sign Bids and CONTRACTs for the firm Print)

Company Representative_____
(Representative Authorized to sign Bids and CONTRACTs for the firm Signature)

Address_____

_____

_____

Phone Number ( )_____ Fax Number(___)_____

E-mail address _____AL CONTRACTOR's License No. _____

Foreign Vendor Id_____

BID PROPOSAL NOTARIZATION:

STATE OF _____}

COUNTY OF _____}

I, the undersigned authority in and for said State and County, hereby certify that_____, as respectively, of _____, whose name is signed to the foregoing document and who is known to me, acknowledged before me on this day, that, being informed of the contents of the document they executed the same voluntarily on the day the same bears date.

Given under my hand and Notary Seal on this _____ day of _____, 2022.

NOTARY PUBLIC _____

MY COMMISSION EXPIRES____/___/_____

ITEM IV
CONTRACTOR INFORMATION

This Section must be printed, completed, and turned in with your bid response to

Business Organization

Name of CONTRACTOR (exactly as it appears on W-9):

_____
Doing-Business-As Name of CONTRACTOR:

_____
Principal Office Address:

_____

_____

_____

LOCAL Telephone Number: _____ Toll- Free_____

LOCAL Fax Number: _____

Email address: _____
Website: _____

Form of Business Entity [check one ("X"]
Corporation ____
Partnership ____
Individual ____
Joint Venture ____
Other (describe): _____

Corporation Statement
If a corporation, answer the following:
Date of incorporation: _____
Location of incorporation: _____
The corporation is held: Publicly ___
Privately ___

Partnership Statement
If a partnership, answer the following:
Date of organization: _____
Location of organization: _____
The partnership is: General ___
Limited ___

Joint Venture Statement
If a Joint Venture, answer the following:
Date of organization: _____
Location of organization: _____
JV CONTRACT recorded? Yes ___ No ___

Contact: _____Email_____

Phone_____Fax_____

END OF CONTRACTOR INFORMATION

ITEM V
INSURANCE

3.0 **INSURANCE REQUIREMENTS**

Awarded **CONTRACTOR**, at its sole expense, shall obtain and maintain in full force the following insurance to protect the **CONTRACTOR** and the City of Fairhope at limits and coverages specified herein. The City of Fairhope will be listed as an additional insured under the **CONTRACTOR'S** general liability insurance and automobile liability insurance policies, and all other applicable policies and certificates of insurance. These limits and coverages specified are the minimum to be maintained and are not intended to represent the correct insurance needed to fully and adequately protect the awarded **CONTRACTOR.**

3.01 All insurance will be provided by insurers by admitted carriers in the State of Alabama, shall have a minimum A.M. Best rating of A-VII and must be acceptable to the City. Self-insured plans and/or group funds not having an A.M. Best rating must be submitted to the City for prior approval.

3.02 **NO WORK IS TO BE PERFORMED UNTIL PROOF OF COMPLIANCE WITH THE INSURANCE REQUIREMENTS HAS BEEN RECEIVED BY THE CITY.**

3.03 **Worker's Compensation and Employers Liability**

Part One: Statutory Benefits as required by the State of Alabama	
Part Two: Employers Liability	$100,000 Each Accident
	$100,000 Each Employee
	$500,000 Policy Limit

3.04 **U.S. Longshoreman & Harbor workers Act (USL&H)-**
Required if CONTRACT involves work near a navigable Waterway that may be subject to the USL&H law.

3.05 **Maritime Endorsement (Jones Act)-**
Endorsement required if CONTRACT involves the use of a Vessel. Or include coverage for "Master or Members or Crew" under "Protection and Indemnity" coverage (P&I), unless crew is covered under Workers Compensation.

Bodily injury by accident	$1,000,000 Each Accident
Bodily injury by disease	$1,000,000 Aggregate

3.06 **Commercial General Liability**
Coverage on an Occurrence form with a combined single limit of (Bodily Injury and Property Damage combined as follows:

Each Occurrence	$1,000,000
Personal and Advertising Injury	$1,000,000
Products/Completed Operation Aggregate	$2,000,000
General Aggregate	$2,000,000

Coverage to include:
Premises and operations
Personal Injury and Advertising Injury
Products/Completed Operations
Independent BIDDERS
Blanket Contractual Liability
Explosion, Collapse and Underground hazards
Broad Form Property Damage
Railroad Protective Liability Insurance if work involves construction, demolition or maintenance operations on or within 50 feet of a railroad.

3.07 **Automobile Liability**

Covering all Owned, Non-Owned, and Hired vehicles with a limit of no less than $1,000,000 combined single limit of Bodily Injury and property damage per occurrence.

3.08 **Certificate of Insurance**

A Certificate of Insurance evidencing the above minimum requirements must be provided to and accepted by the City PRIOR to commencement of any work on the CONTRACT. Each policy shall be endorsed to provide ten (10) days written notice of cancellation to the CITY.

Such insurance as is afforded by the above policies covers the operations undertaken by the insured with respect to the construction of the project above designated. The insurance afforded by the above designated policies, specimen copies of which have been filed with the **CITY**, and to each of which is attached for following endorsement.

The insurer agrees with the insured as follows:

1. That it will furnish to said City of Fairhope a certificate of insurance in triplicate on a form approved for such purpose by said **CITY,** setting forth the pertinent information regarding the policy to which this endorsement is attached, for each project of said **CITY** to which the policy applies.

2. That it will attach to each said certificate of insurance executed copies of any endorsement other than this endorsement which are attached to said policy at the time said policy is issued, provided only that said endorsements affect the coverage of said policy in respect of operations involved in the construction of the projects of said **CITY** to which the policy applies.

3. That it will mail to the City Council of the City of Fairhope three executed copies of each endorsement subsequently issued to become a part of said policy provided only that endorsement affects the coverages of said policy in respect of operations involved in the construction of the project of said **CITY** which the policy applies, and provided further that such endorsement shall not be effective unless such notice is given to the **CITY** at the same time that notice thereof is given to the insured.

4. That it will mail to the City Council of the **CITY** of Fairhope at least ten days before the effective date thereof notice of cancellation of said policy, provided no cancellation shall be effective unless such notice is given to the **CITY.**

END OF INSURANCE REQUIREMENTS

ITEM VI

City of Fairhope
CONTRACT

This **CONTRACT** is made this _____ day of _____, 202__, by and between the City of Fairhope (hereinafter referred to as the "**OWNER**") and _____ (hereinafter referred to as the "**CONTRACTOR**"), for

Bid Number/Name

The **OWNER** and the **CONTRACTOR** agree as set forth below:

1. The CONTRACT consists of all the items contained within this CONTRACT, The Proposal Package, Proposal, Scope of Work and Specifications, drawings (if applicable), Addenda, Amendments, and City of Fairhope Standard Terms and Conditions, which are attached hereto and made a part hereof, as if fully contained herein; for the performance of all work and the furnishing of all labor and materials required for completion of the WORK.

2. The CONTRACTOR shall perform all the WORK described herein.

3. The **WORK** to be performed under this **CONTRACT** shall be commenced upon execution of this **CONTRACT** within number (DAYS) days of the date specified in the *Notice to Proceed* (NTP) to be issued to the **CONTRACTOR** by the **OWNER,** or its authorized representative. The work shall be completed, subject to authorized adjustments, within (DAYS) consecutive calendar days from and after the commencement date stipulated in said *Notice to Proceed.* Liquidated damages for non-completion of the work within this time limit will be assessed at the rate of (DOLLARS) per working day.

4. The **OWNER** shall pay the **CONTRACTOR** in current funds for the performance of the **WORK**, the **CONTRACT SUM** of _____DOLLARS ($). This represents a LUMP SUM payment for performance of the **WORK**, which payment shall be issued after the Contract is fully performed and the **OWNER** has inspected the **WORK**.

5. **General Conditions**
   a. **Indemnity:** The CONTRACTOR hereby agrees to indemnify and save harmless the OWNER, its officers, agent, and employees, from and against any and all liabilities, claims, demands, damages, fines, fees, expenses, penalties, suits, proceedings, actions and cost of actions, including reasonable attorneys' fees for trial and on appeal, of any kind and nature, arising or growing out of, or in any way connected with the performance of this CONTRACT, to the extent caused by a negligent act or omission of the CONTRACTOR, their agents, servants, employees, SUB-CONTRACTORS, or others associated with the CONTRACTOR. The CONTRACTOR shall be responsible for damage to any elevator equipment excluded from this agreement, or damage or injury caused by any equipment excluded from this agreement, to the extent that the damage or injury is caused by a negligent act or omission of the CONTRACTOR.

   b. **Notification and Accident Reports:** In the event of accidents of any kind, the **CONTRACTOR** shall notify the **OWNER** immediately and furnish, without delay, copies of all such accident reports to the **OWNER.** If in the performance of their Work, the **CONTRACTOR** fails to immediately report an accident to the **OWNER**, of which the **CONTRACTOR** has knowledge of and which results in a fine

levied against the **OWNER** then the **CONTRACTOR** shall be responsible for all fines levied against the **OWNER**.

6. **Termination of Agreement**
    a. Termination for Default: Performance of Work under this Agreement may be terminated by the OWNER, in whole or in part, in writing, whenever the OWNER determines that the CONTRACTOR has failed to meet the requirements of this Agreement.
        i. The Owner has a right to terminate for default if the contractor fails to make delivery of material or does not perform the work, or if the Contractor fails to perform the Work within the time specified in the Agreement, or if the Contractor fails to perform any other provision of the Agreement.

        ii. Failure on the part of the Contractor to deliver or perform the Work within the time specified, or within a reasonable time as determined by the Owner, or failure on the part of the Contractor to make replacements of rejected articles, or Work when so requested, immediately or as directed by the Owner, shall constitute authority for the Owner to purchase in the open market, articles or Work of comparable grade to replace the articles or Work rejected, not delivered or completed. On all such purchases, the Contractor shall reimburse the Owner within a reasonable time specified by the Owner for any expense incurred in excess of Agreement prices.

        iii. Such purchases shall be deducted from the Agreement sum. If public necessity demands it, the Owner reserves the right to utilize services or use and/or consume articles delivered, which are standard in quality, subject to an adjustment of price to be determined by the Owner.

    b. Termination for Convenience: The OWNER has the absolute right to terminate the Agreement upon "Award of Contract" another CONTRACTOR, to perform work referenced herein. In such event, payment of the monthly contract fee shall cease on the date of cancellation of the CONTRACT by the OWNER.

7. **Warranty**
    a. The CONTRACTOR warrants that the Work including equipment and materials provided shall conform to the professional standards of care and practice in effect at the time the Work is performed, be of the highest quality, and be free from all faults, defects, or errors. If the CONTRACTOR is notified in writing of a fault, deficiency or error in the Work, the CONTRACTOR shall at the OWNER's option, either re-perform such portions of the Work to correct such fault, defect, or error, at no additional cost to the OWNER, or refund to the OWNER the charge paid by the OWNER, which is attributable to such portions of the faulty, defective or erroneous Work, including costs for re-performance or Work provided by other CONTRACTORS. All equipment and materials provided by the CONTRACTOR shall be merchantable and for the purpose intended and meet all industry quality standards.

8. **Time of Completion**
The OWNER and CONTRACTOR understand and agree that time is of the essence in the performance of this Agreement. The CONTRACTOR or OWNER, respectively, shall not be liable for any loss or damage, resulting from any delay or failure to perform its contractual obligations within the time specified, due to acts of God, actions or regulations by any governmental entity or representative, strikes, fire, water damage, loss of power, loss of funding or any other causes, contingencies, or circumstances not subject to the OWNER or CONTRACTOR'S control, respectively, whether of a similar or dissimilar nature, which prevent or hinder the performance of the OWNER'S or CONTRACTOR'S contractual obligations, respectively. Any such causes of delay, even though existing on the date of the CONTRACT, or on the day

of the start of Work, shall extend the time of the OWNER'S or CONTRACTOR'S performance respectively, by the length of the delays occasioned thereby, including delays reasonably incident to the resumption of normal Work schedules.

However, under such circumstances as described herein, the OWNER may, at their discretion, cancel this CONTRACT for their own convenience.

9. **Insurance Requirements**
   See **ATTACHMENT B**

10. **Acceptance of Work**
    The OWNER will be deemed to have accepted the Work after the OWNER agrees the Work is completed. In the event Work furnished under the CONTRACT is found to be defective or does not conform to the intent of the CONTRACT, the CONTRACTOR shall, within ten (10) days from receipt of notice from the OWNER, correct the deficiencies. Failure on the part of the CONTRACTOR to properly correct the deficiencies within the time period allowed will constitute the OWNER'S right to cancel the CONTRACT immediately, upon written notice to the CONTRACTOR.

11. **Correction of Work**
    The CONTRACTOR shall promptly correct all Work rejected by the OWNER as faulty, defective or failing to conform to the CONTRACT, whether observed before or after completion of the Work. The CONTRACTOR shall bear all costs of correcting such rejected Work.

12. **Right to Audit**
    The CONTRACTOR shall maintain documentation of all work performed. The CONTRACTOR shall make any and all documentation available to the OWNER at all reasonable times, for inspections and audit by the OWNER, during the entire term of the CONTRACT, and for a period of three (3) years after the expiration of this CONTRACT.

13. **CONTRACT Rights and Remedies**
    The CONTRACTOR shall maintain documentation of all work performed. The CONTRACTOR shall make any and all documentation available to the OWNER at all reasonable times, for inspections and audit by the OWNER, during the entire term of the CONTRACT, and for a period of three (3) years after the expiration of this CONTRACT.

14. **Time is of the Essence**
    The Owner and CONTRACTOR agree that time is of the essence in the performance of Work called for under this CONTRACT. The CONTRACTOR agrees that all work will be accomplished regularly, diligently and uninterrupted at such a rate of progress as will ensure full completion thereof within reasonable time periods.

15. **Safety Measures**
    The CONTRACTOR shall take all necessary precautions for the safety of the OWNER'S and CONTRACTOR'S employees at the Work site, and shall erect and properly maintain at all times, all necessary safeguards for the protection of the workmen and the public. The CONTRACTOR shall post signs warning against hazards in and around the Work site.

16. **Extra Work and Associated Costs**
    a. Changes in the Work: The OWNER, without invalidating the CONTRACT, may order changes in the Work within the general scope of this CONTRACT, consisting of additions, deletions, or other revision, the CONTRACT price and time for execution of the Work being adjusted accordingly.

    b. All such changes in the Work shall be authorized by a written Amendment to the CONTRACT or a separate Change Order and shall be executed under the applicable conditions of the CONTRACT.

17. **Familiarity with the Work**
    The CONTRACTOR, by executing this CONTRACT, acknowledges full understanding of the extent and character of the Work required and the conditions surrounding the performance thereof. The OWNER will not be responsible for any alleged misunderstanding of conditions surrounding the performance thereof. It is understood that execution of the CONTRACT by the CONTRACTOR serves as his stated commitment to fulfill all requirements and conditions referred to in this CONTRACT.

18. **Scope of Work**
    See **ATTACHMENT B**

19. **Contractor Liability**
    Nothing in this CONTRACT shall be construed to mean that the CONTRACTOR assumes any liability for damages or otherwise, on account of accidents to persons or property, except those resulting from negligence on the part of the CONTRACTOR or its agents, servants, employees, and subcontractors.

20. **Miscellaneous Provisions**
    a. The CONTRACTOR shall not employ SUB-CONTRACTORS without the express written permission of the OWNER.

    b. The CONTRACTOR shall not assign the CONTRACT or sublet it as a whole without the express written permission of the OWNER. The OWNER may assign the CONTRACT, or sublet it as a whole, without the consent of the CONTRACTOR.

    c. No waiver, alteration, consent, or modification of any of the provisions of the CONTRACT shall be binding unless in writing and singed by the OWNER and CONTRACTOR.

    d. The CONTRACTOR is to procure all permits, licenses, and certificates, or any approvals of plans or specifications as may be required by Federal, State, Local Laws, ordinances, rules, and regulations, for the proper execution and completion of Work covered under this CONTRACT.

    e. The CONTRACTOR shall at all times keep the Work area free from accumulation of waste materials or rubbish caused by his operations, and promptly remove any such materials to an area designated by the OWNER or remove to a waste site as directed by the OWNER. If the CONTRACTOR fails to clean up the Work site, the OWNER will complete the task and charge the CONTRACTOR for such services.

    f. This CONTRACT is considered a non-exclusive Agreement between the parties.

    g. This CONTRACT is deemed to be under and shall be governed by and construed according to the laws of the State of Alabama.

    h. Any litigation arising out of the CONTRACT shall be heard in the Courts of Baldwin County, Alabama.

i. This CONTRACT contains all terms and conditions agreed upon by the OWNER and CONTRACTOR. No other agreement, oral or otherwise, regarding the subject matter of this CONTRACT shall be deemed to exist or to bind either party hereto.

j. This CONTRACT shall not be construed against the party or parties preparing it. It shall be construed as if all the parties and each of them jointly prepared this CONTRACT, and any uncertainty or ambiguity shall not be interpreted against one or more parties.

Section 41-16-5, Code of Alabama 1975, requires that public contracts over $15,000 include the following language:

By signing this Contract, _____ represents and agrees
COMPANY NAME
that it is not currently engaged in, nor will it engage in, any boycott of a person or entity based in or doing business with a jurisdiction with which the State of Alabama can enjoy open trade

IN WITNESS WHEREFORE, the parties hereto have executed this **CONTRACT** as of the day and year first above written.

THE CITY OF FAIRHOPE, ALABAMA

_____ ATTEST: _____
Sherry Sullivan, Mayor **Lisa A. Hanks, MMC, City Clerk**

NOTARY FOR OWNER (CITY OF FAIRHOPE)

STATE OF ALABAMA _____ }
COUNTY OF BALDWIN _____}

I, the undersigned authority in and for said State and County, hereby certify that SHERRY SULLIVAN, Mayor of the City of Fairhope whose name is signed to the foregoing document and who is known to me, acknowledged before me on this day, that, being informed of the contents of the document she executed the same voluntarily on the date the same bears date.

Given under my hand and Notary Seal on this _____ day of _____, 202__.

NOTARY PUBLIC _____

MY COMMISSION EXPIRES _____

IF INDIVIDUAL OR PARTNERSHIP

Individual or Partnership

Print Name of Partner

Print Name of Representative Authorized to Sign Contracts for the firm

Print Name of Partner

Signature of Representative Authorized to Sign Contracts for the firm

Print Name of Partner

Address

Address

City, State, Zip Code

Phone Number

Fax Number

Primary E-mail Address

AL General Contractor License No. (Attach Copy)

AL General Contractor License Major Categories

AL General Contractor Specialties

AL Foreign Corporation Entity ID (Required of Out of State Vendors)

IF CORPORATION OR LLC

Company

State of Incorporation

Company Representative

Print Name of Representative Authorized to Sign Contracts for the firm

Signature of Representative Authorized to Sign Contracts for the firm

Address

Address

City, State, Zip Code

Phone Number

Fax Number

Primary E-mail Address

AL General Contractor License No. (Attach Copy)

AL General Contractor License Major Categories

AL General Contractor Specialties

AL Foreign Corporation Entity ID (Required of Out of State Vendors)

NOTARY FOR INDIVIDUAL, PARTNERSHIP, CORPORATION, OR LLC

STATE OF _____ }
COUNTY OF _____}

I, the undersigned authority in and for said State and County, hereby certify that _____As
Name

_____ respectively of _____
Title Company Name

Whose name is signed in the foregoing document and who is known to me, acknowledged before me on this day, being informed of the contents of the document they executed the same voluntarily on the day the same bears date.

Given under my hand and Notary Seal on this _____ day of _____, 202__.

NOTARY PUBLIC_____

MY COMMISSION EXPIRES _____

ITEM VII
CITY OF FAIRHOPE
STANDARD TERMS AND CONDITIONS

1. ACCEPTANCE OF AGREEMENT

This Agreement contains all terms and conditions agreed upon by the Owner and Winning bidder. No other agreement, oral or otherwise, regarding the subject matter of this Agreement shall be deemed to exist or to bind either party hereto. The Winning Bidder shall not employ Subcontractors without the express written permission of the Owner. No waiver, alteration, consent or modification of any of the provisions of the Agreement shall be binding unless in writing and signed by the Owner and Contractor. This Agreement shall not be construed against the party or parties preparing it. It shall be construed as if all the parties and each of them jointly prepared this Agreement, and any uncertainty or ambiguity shall not be interpreted against one or more parties.

2. ACCEPTANCE OF WORK

The City of Fairhope will be deemed to have accepted the Work after the City of Fairhope agrees the Work is completed by signature on delivery or service tickets. In the event Work furnished under the Contract / Agreement / Purchase Order is found to be defective or does not conform to the intent of the Contract / Agreement / Purchase Order, the awarded vendor shall, after receipt of notice from the City of Fairhope, correct the deficiencies. Failure on the part of the awarded vendor to properly correct the deficiencies within the time period allowed will constitute the City of Fairhope's right to cancel the Contract / Agreement / Purchase Order immediately, upon written notice to the awarded vendor.

3. ADDENDA

All Addenda are part of the Contract Documents. Include resultant costs in the Bid. Addenda will be issued by email to all Bidders on record and posted to the City of Fairhope website www.FairhopeAL.gov. It is the responsibility of the bidder to verify that all addenda have been received, and to include all signed addenda in the bid submission

4. ADDITIONAL ORDERS

Unless it is specifically stated to the contrary in the bid response, the City of Fairhope reserves the option to place additional orders against a contract awarded as a result of this solicitation at the same terms and conditions; to extend the renewal date until a new bid is in place, if it is mutually agreeable.

5. APPLICABLE LAW

This Agreement is deemed to be under and shall be governed by and construed according to the laws of the State of Alabama. Any litigation arising out of the Agreement shall be heard in the Courts of Baldwin County, Alabama.

6. ASSIGNMENT

The awarded vendor shall not assign the Contract / Agreement /Purchase Order or sublet it as a whole without the express written permission of the City of Fairhope. The awarded vendor shall not assign any payment due them hereunder, without
the express written permission of City of Fairhope. The City of Fairhope may assign the Contract / Agreement / Purchase Order, or sublet it as a whole, without the consent of the awarded vendor.

7. ASSURANCE OF NON-CONVICTION OF BRIBERY

The bidder hereby declares and affirms that, to its best knowledge, none of its officers, directors, or partners and none of its employees directly involved in obtaining contracts has been convicted of bribery, attempted bribery, or conspiracy to bribe under the laws of any state or Federal government.

8. AWARD CONSIDERATION

The following factors will be considered in determining the lowest **responsible** bidder: Overall quality, Conformity with specifications both general and specific, Purposes for which materials or services are required, Delivery dates and time required for delivery, Unit acquisition cost, financial ability to meet the contract, previous performance, facilities and equipment, availability of repair parts, experience, delivery promise, terms of payments, compatibility as required, other costs, and other objective and accountable factors which are reasonable.

9. AWARD OR REJECTION OF BIDS

The Bid will be awarded to the lowest responsible bidder complying with conditions of the invitation for bids, provided his bid is reasonable and it is in the interest of the City of Fairhope to accept it. The bidder to whom the award is made will be notified at the earliest possible date. The City of Fairhope, however, reserves the right to reject any and all bids and to waiver any informality in bids received whenever such rejection or waiver is in the interest to the City of Fairhope.

10. BACK ORDERS

If it is necessary to back order any items, the vendor must notify the Purchasing Department and advice as to the expected shipping or delivery date. If this date is not acceptable, the City of Fairhope may seek remedies for default.

11. BID AND PERFORMANCE SECURITY

If bid security is required, a bid bond or cashier's check in the amount indicated on the bid cover must accompany the bid and be made payable to The City of Fairhope of Baldwin County, AL. Corporate or certified checks are not acceptable. Bonds must be in a form satisfactory to the City and underwritten by a company licensed to issue bonds in the State of Alabama. If bid security fails to accompany the bid, it shall be deemed unresponsive, unless the Purchasing Manager deems the failure to be non-substantial. All checks will be returned to the bidders after the contract has been approved. If a performance bond is required, the successful bidder will be notified after the awarding of the contract.

12. BRAND NAMES

Reference to brand names and numbers is descriptive, but not restrictive, unless otherwise specified. Bids on equivalent items meeting the standards of quality thereby indicated will be considered, providing the bid clearly describes the article offered and indicates how it differs from the referenced brands. Descriptive literature or manufacturers specifications plus any supplemental information necessary for comparison purposes should be submitted with the bid or the bid on that item may be rejected. Reference to literature submitted with a previous bid or on file with the Division of Purchasing will not satisfy this requirement. The burden is on the bidder to demonstrate that the item bid is equivalent to the item specified in the ITB. Bids without sufficient documentation to fully support equality, may be considered non-responsive. Reference by the City of Fairhope in the ITB to available existing specifications shall be sufficient to make the terms of such specifications binding on the bidder. Unless the bidder specifies otherwise in its bid, it is understood the bidder is offering a referenced brand item as specified in the ITB or is bidding as specified when no brand is referenced. Failure to examine drawings, specifications and instructions will be at the bidder's risk.

13. BUSINESS LICENSE

The vendor selected to enter into a Contract / Agreement with the City of Fairhope must be licensed to do business in the City of Fairhope prior to commencement of any work under the contract. Delivery of goods or services to the City of Fairhope by Purchase Order have detailed and varied Business License requirements. In all instances that require a business license. Awarded vendor will provide proof of possessing a current City of Fairhope Business License. Prospective bidders will not be required to possess a City of Fairhope Business License prior to award.

14. CANCELLATION OF / CONTRACT / AGREEMENT / PURCHASE ORDER / LEASE

A purchase order can be canceled in whole or in part when awarded vendor fails to deliver or perform as specified. Cancellation of a purchase order can only be made by a written purchase order change (POC) from the City of Fairhope. A term contract, lease or agreement can be canceled by the City of Fairhope, for justifiable cause, or convenience, by written notice.

15. CERTIFICATION PURSUANT TO ACT NO. 2006-557

Alabama law (section 41-4-116, code of Alabama 1975) provides that every bid submitted and contract executed shall contain a certification that the vendor, contractor, and all of its affiliates that make sales for delivery into Alabama or leases for use in Alabama are registered, collecting, and remitting Alabama state and local sales, use, and/or lease tax on all taxable sales and leases into Alabama. By submitting this bid, the bidder is hereby certifying that they are in full compliance with act no. 2006-557, they are not barred from bidding or entering into a contract pursuant to 41-4-116, and acknowledges that the awarding authority may declare the contract void if the certification is false. All corporations must register to do business in Alabama with the Office of the Secretary of State. Their address is:

Office of the Secretary of State
P.O. Box 5616
Montgomery, AL 36103
(334) 242-5324
Fax: (334) 240-3138
http://www.sos.state.al.us/index.aspx

The Foreign Corporation form is online at http://www.sos.state.al.us/downloads/dl1.cfm.

16. COST OF REMEDYING DEFECTS

All defects, indirect and consequential costs of correcting, removing, or replacing any or all of the defective materials or equipment will be charged against the awarded vendor.

17. DELIVERY OF BID

Bids must be received in the Purchasing Office by the date and time specified on the bid cover. All bids will be accepted until the time and date stated on the bid cover. No bids will be accepted that extend past the time and date on the bid cover. The time of receipt shall be determined by the time clock stamp in the Purchasing Department. Bids submitted by U.S. Mail must be received by the City of Fairhope of Baldwin County, Alabama, in the City of Fairhope offices, 555 South Section St., Fairhope, Al., unless otherwise specified.

18. DELIVERY

The number of calendar days required for delivery after receipt of a purchase order shall be stated in the RFQ / ITB / RFP and /or Purchase Orders. When no time is stated in the document, the time shall be fourteen (14) calendar days after receipt of order. If a shipment is not made within the time period specified, the Purchase Order may be canceled.

19. ENVIRONMENTAL REQUIREMENTS

All products will be clearly labeled for their intended use. Each delivery of product or materials will include a Material Safety Data Sheet (MSDS) for all materials that require an MSDS. All manufacturers/distributors of hazardous substances, including any of the items listed on this bid/quote/ contract and subsequent award must include completed material safety data sheet (MSDS) for each hazardous material. Additionally, each container of hazardous materials must be appropriately labeled with:

a) The identity of the hazardous material,

b) Appropriate hazard warnings, and manufacturer, importer, or other responsible party.

20. EQUIPMENT DEMONSTRATION

The City of Fairhope may require equipment/ product materials or service techniques to be demonstrated at a time, date, and location to be specified by the City of Fairhope.

21. EQUIPMENT ELECTRICAL CERTIFICATION

All electrical equipment purchased shall conform to, and be identified in, the applicable standard(s), or otherwise be certified as applicable, as of the bid opening date and time, by Underwriters Laboratories, Inc., or other recognized laboratory facility. Bidder must provide satisfactory documentation with returned bid that all such equipment meets the applicable product standard or has otherwise been certified as outlined above. Unless indicated in the bid document, the above certification shall apply to the equipment itself, not the individual components of that equipment.

22. ERRORS IN BID

Bidders are assumed to be informed regarding conditions, requirements, and specifications prior to submitting bids. Failure to do so will be at the bidder's risk. Bids already submitted may be withdrawn without penalty prior to bid opening. Errors discovered after the bid opening may not be corrected.

23. FORCE MAJEURE

Neither the City nor the awarded vendor shall be deemed in breach of any contract / Purchase Order or Agreement which may result from this proposal submission if it is prevented from performing any of the obligations hereunder by reason of Acts of God, acts of the public enemy, acts of superior governmental authority, strikes or labor disputes, floods, riots, rebellion, sabotage, or any similar other unforeseeable causes beyond its control and not due to its fault or negligence. Each party shall notify the other immediately in writing of the cause of such after the beginning period thereof. The awarded vendor may request cancellation and the City of Fairhope may grant the request if performance is prevented by any of the above referenced causes, or other unavoidable circumstances not attributable to the fault or negligence of the vendor. The burden of proof for such relief rests with the vendor. All correspondence pertaining to cancellation of a purchase order or term contract must be addressed to the City of Fairhope Purchasing Manager.

24. HAZARDOUS AND TOXIC SUBSTANCES

Bidder must comply with all applicable Federal, State, County and City laws, ordinances and regulations relating to hazardous and toxic substances, including such laws, ordinances and regulations pertaining to information hazardous and toxic substances, and as amended from time to time. Bidder shall provide the City of Fairhope with a "Material Safety Data Sheet" for all goods that carry one.

25. INDEMNITY

Indemnity: The awarded vendor hereby agrees to indemnify and save harmless the City of Fairhope, its officers, agent, and employees, from and against any and all liabilities, claims, demands, damages, fines, fees, expenses, penalties, suits, proceedings, actions and cost of actions, including reasonable attorneys fees for trial and on appeal, of any kind and nature, arising or growing out of, or in any way connected with the performance of this Contract / Agreement / Purchase Order, to the extent caused by a negligent act or omission of the awarded vendor, their agents, servants, employees, Subcontractors, or others associated with the awarded vendor. The awarded vendor shall be responsible for damage to any equipment excluded from this agreement, or damage or injury caused by any equipment excluded from this agreement, only to the extent that the damage or injury is caused by a negligent act or omission of the awarded vendor or caused by failure of the awarded vendor's supplied product to perform as specified.

26. INSPECTION

All materials, workmanship, equipment, and supplies are subject to inspection and test at any source or time. Final inspection, acceptance or rejection will be made at delivery destination. Goods that do not meet specifications will be rejected unless substitutions have been approved by the City of Fairhope. Failure to inspect or to reject upon receipt, however, does not relieve the awarded vendor of liability. When subsequent tests, after receipt, are conducted and when such tests reveal a failure to meet specifications, the City of Fairhope will reject the goods and the awarded vendor shall immediately supply goods meeting specifications or the City of Fairhope may seek damages including but not limited to the testing expense, regardless of whether a part of or all of the goods have been consumed through the testing process. Rejected goods shall be removed by the awarded vendor promptly after rejection, at his expense. If not removed in fourteen (14) calendar days, they may be disposed of at the discretion of the City of Fairhope. Disposal costs will be the awarded vendor's responsibility.

27. INSPECTION OF PREMISES

At reasonable times, the City may inspect those areas of the awarded vendor's place of business that are related to the performance of a Contract / Agreement / Purchase Order. If the City makes such an inspection, the awarded vendor must provide reasonable assistance. The City of Fairhope reserves the right on demand and without notice all the vendor's files associated with a subsequent Contract / Agreement / Purchase Order where payments are based on the awarded vendor's record of time, salaries, materials, or actual expenses. This same clause will apply to any subcontractors assigned to the Contract / Agreement / Purchase Order.

28. INSURANCE

If a Contract / Agreement / Purchase Order results from this RFQ /ITB /RFP, or other form of solicitation, the awarded vendor shall maintain such insurance as will indemnify and hold harmless the City of Fairhope from Workmen's Compensation and Public Liability claims from property damage and personal injury, including death, which may arise from the awarded vendor's operations under this Contract / Agreement / Purchase Order, or by anyone directly or indirectly employed by him/her.

29. INVITATION TO BID

Any provisions made in the RFQ / ITB / RFP, or other form of solicitation, supersedes any provisions outlined here in the General Terms and Conditions.

30. INVOICING, DELIVERY, PACKAGING

Invoices shall be prepared only after ordered materials have been delivered. All invoices must show the purchase order number. Unless otherwise specified in writing, vendors shall not ship any material without an authorized Purchase Order from the City of Fairhope Purchasing Department. All packages delivered must show the purchase order number. The awarded vendor will be required to furnish all materials, equipment and/or service called for at the bid price quoted. In the event the awarded vendor fails to deliver within a reasonable period of time, as determined by the City of Fairhope, the right is reserved to cancel the award and subsequent purchase order and purchase from the next lowest responsible bidder the items needed. The original awarded vendor will be back charged the difference between the original contract price and the price the City of Fairhope has to pay as a result of the failure to perform by the original awarded vendor. All bids will remain firm for acceptance for 60 days from the date of bid opening. Prices shall be net F.O.B., Prepaid and Allow, City of Fairhope chosen site, Baldwin County, Al. The title and risk of loss of the goods will not pass to the City of Fairhope until receipt and acceptance takes place at the F.O.B. point.

31. LABELING

Individual shipping cartons shall be labeled with the name "City of Fairhope", Purchase Order Number, and where applicable, Contract Number, date of manufacture, batch number, storage requirements, conditions, and recommended shelf life. Bidders are encouraged to offer product packaging with recycled content.

32. LOSS OR DAMAGE IN TRANSIT

Delivery by a vendor to a common carrier does not constitute delivery to the City of Fairhope. Any claim for loss or damage incurred during delivery shall be between the vendor and the carrier. The City of Fairhope accepts title only after satisfactory receipt at the delivery point. The City of Fairhope shall note all visible damages on the freight bill and may refuse the damaged goods. The vendor shall make immediate replacement of the damaged merchandise or be subject to damages for breach of contract. If damage is to a small portion of a total shipment and the City of Fairhope will not be inconvenienced because of the shortage, the vendor may be permitted by the Purchasing Manager to deduct the amount of damage or loss from its invoice, in lieu of replacement. Risk of loss during delivery is borne by the vendor until the goods have been accepted by the City of Fairhope, unless otherwise specified in the RFQ / ITB / RFP or other form of solicitation.

33. MANDATORY SITE VISIT

If the RFQ / ITB /RFP or other form of solicitation requires a mandatory site visit, bidders must inspect the site where installation or service is to take place to obtain a full understanding of scope of work outlined therein. Date of site visit will be determined by the City of Fairhope.

34 MONITORING OF SERVICES

Performance of services will be monitored by the requisitioning department and/or the Purchasing Department, and evaluation reports may be filed with the Purchasing Department. Performance not meeting specifications will result in cancellation of Contract / Agreement / Purchase Order and may result in vendor being removed from the vendor list.

35. NONCONFORMING MERCHANDISE

When merchandise received from the lowest responsible bidder is not in accordance with the purchase order, it will be returned to the bidder, at bidder's expense.

36. NON-DESCRIMINATION

The City of Fairhope is an Equal Opportunity Employer and requires that all contractors comply with the Equal Employment Opportunity laws and the provisions of the Contract / Agreement / Purchase Order documents in this regard. The City also encourages and supports the utilization of Minority Business Enterprises on this and all public bids.

37. NON-EXCLUSIVE

Unless otherwise specified, this Contract / Agreement / Purchase Order is considered a non-exclusive Contract /Agreement / Purchase Order between the parties.

38. NOTIFICATION AND ACCIDENT REPORTS

In the event of accidents of any kind, in the performance of a Contract / Agreement / Purchase Order, the awarded vendor shall notify the City of Fairhope immediately and furnish, without delay, copies of all such accident reports to the City of Fairhope. If in the performance of their Work, the awarded vendor fails to immediately report an accident to the City of Fairhope, of which the awarded vendor has knowledge of and which results in a fine levied against the City of Fairhope then the awarded vendor shall be responsible for all fines levied against the City of Fairhope.

39. PACKAGING

All goods must be packaged in new packing containers. Packing that meets the requirements of common carriers is acceptable, unless otherwise required. A packing slip or invoice must accompany all shipments and must reference the purchase order number. Unless otherwise specified, goods are to be packaged in cartons meeting federal specifications and shipped on non-returnable pallets.

40. PATENTS

Awarded Vendor guarantees that the sale and / or use of goods will not infringe upon any U.S. or foreign patent. Awarded vendor will at his / her own expense, indemnify, protect and save harmless the City of Fairhope, on any patent claims arising from the purchase of goods or services.

41. PAYMENT

Invoices -- Upon completion of service and delivery of materials specified in the applicable Contract / Agreement / Purchase Order, awarded vendor will submit an invoice and signed delivery ticket to:

City of Fairhope
Accounts Payable Department
P.O. Box 429
Fairhope, Al. 36533

All invoices must reference appropriate Purchase Order Numbers Payment of Invoice: All invoices received by the City of Fairhope are payable within thirty (30) days from the date of receipt by the City of Fairhope, provided they are approved by the City of Fairhope.

42. PAYMENT WITHHELD

Payment may be withheld until all items have been delivered and all requirements of the Contract / Agreement / Purchase Order have been fulfilled

43. PRODUCT TESTING

Vendor shall incur all cost involved in obtaining an Independent Laboratory Test if the City deems necessary during the term of the Contract / Agreement / Purchase Order. The City of Fairhope reserves the right to request a demonstration of any and all items bid before making the award.

44. PERMITS LICENSES AND CERTIFICATES

The awarded vendor is to procure all permits, licenses, and certificates, or any approvals of plans or specifications as may be required by Federal, State, Local Laws, ordinances, rules, and regulations, for the proper execution and completion of Work covered under the Contract / Agreement / Purchase Order.

45. PREPARATION OF BID

All bids / proposals shall be typewritten or in ink on the form(s) prepared by the City of Fairhope. Bids / proposals prepared in pencil will not be accepted. All bids / proposals must be signed by officials of the corporation or company duly authorized to sign bids / proposals. Any bid / proposal submitted without being signed will automatically be rejected. All corrections or erasures shall be initialed and dated by the person authorized to sign quotations /bids / proposals. If there are discrepancies between unit prices quoted and extensions, the unit price will prevail.

46. QUESTIONS / CONTACT

Commencing with the issuance of the RFQ / ITB / RFP, or other form of solicitation, no vendor or anyone acting on a vendor's behalf, shall make direct or indirect contact with City personnel or undertake any activities or take any action to otherwise promote its quotation / bid / proposal to the City or its personnel. All communications shall be made to the contact identified in the quotation / bid / proposal documents. Violation of this requirement may, at the City's sole and absolute discretion, be grounds for disqualifying a vendor from further consideration.

47. RECEIPT BY CITY OF FAIRHOPE

If not otherwise stated in the order, the City of Fairhope will be said to have received goods when they have been delivered, unloaded, and placed on the agency's dock or if there is no dock, inside an accessible building, and signed for by an authorized City employee. Shipments will be checked against the receiving copy of the Purchase Order. If the purchase order requires grading certificates, USDA Stamps, or any proof of quality, such proof must accompany the shipment.

48. REJECTION OF BIDS

The City of Fairhope reserves the right to accept or reject any or all bids in whole or in part for any reason, to waive technicalities or informalities, or to advertise for new proposals, if, in the judgment of the awarding authority, the best interest of the City of Fairhope will be promoted thereby. Bidders may be disqualified and rejection of proposals may be recommended for any of (but not limited to) the following causes: Failure to use the bid forms furnished by the City of Fairhope, Lack of signature by an authorized representative on the bid form, Failure to properly complete the bid form and vendor compliance, Evidence of collusion among bidders, Unauthorized alteration of the bid form.

49. RIGHT TO AUDIT

The awarded vendor shall maintain documentation of all work performed. The awarded vendor shall make any and all documentation available to the City of Fairhope at all reasonable times, for inspections and audit by the City of Fairhope for a period of Three (3) years after expiration of the Contract / Agreement / Purchase Order.

50. SAMPLES

Bidders will not be required to furnish samples at the time of bid opening, unless specifically called for. The City of Fairhope reserves the right to request samples after bid opening to assist in the evaluation of proposals submitted.

51. SAFETY MEASURES

The awarded vendor shall take all necessary precautions for the safety of the City of Fairhope's and awarded vendor's employees at the Work site, and shall erect and properly maintain at all times, all necessary safeguards for the protection of the workmen and the public. The awarded vendor shall post signs warning against hazards in and around the Work site.

52. SET-UP AND INSTALLATION

Unless otherwise specified, bid / quotation to include cost of all uncrating, disposal of shipping materials, set-up, testing and initial instruction to agency personnel.

53. SPILL CLEAN UP

The awarded vendor shall be responsible for spillage caused by their negligence, which occurs during transit or unloading operations. The awarded vendor shall immediately report and clean up any spillage. Upon failure to do so, the awarded vendor shall remain responsible for all actual related costs.

54. SUBSTITUTIONS

Substitutions on a purchase order shall require the approval of the Originating Buyer. The City of Fairhope reserves the right to reject at destination and hold at the vendor's risk and expense any goods supplied by the vendor which do not conform to the specification or description embodied in the order or are inferior in any respect to the good specified. Any good bought by sample which is inferior in quality to the sample submitted by vendor will be rejected. Any goods delivered that do not meet specifications may be returned to the vendor at its expense. When a good is returned, the vendor must make immediate replacement with acceptable merchandise, or the City of Fairhope may seek remedies for default.

55. TABULATION

Bid results are posted on The City of Fairhope's web site: www.FairhopeAL.gov. The awarded vendor will be sent a written notification.

56. TAXES

Prices quoted shall be delivered prices, exclusive of all federal or state excise, sales, and manufacturer's taxes. The City will assume no transportation or handling charges other than specified in the RFQ, ITB, RFP or other form of solicitation. The City is tax exempt by law – Code of Alabama 1975.

57. TERMINATION FOR CONVENIENCE

Any Contract / Agreement / Purchase Order may be terminated for convenience by the City of Fairhope, in whole or in part, by written notification to the awarded vendor.

58. TERMINATION FOR DEFAULT

Performance of Work under the Contract / Agreement / Purchase Order Agreement may be terminated by the City of Fairhope, in whole or in part, in writing, whenever the City of Fairhope determines that the awarded vendor has failed to meet the requirements of the Contract / Agreement / Purchase Order.

59. TERMINATION FOR NON-APPROPRIATION

Termination for Non-appropriation – The continuation of any financial obligation beyond the current fiscal year is subject to and contingent upon sufficient funds being appropriated, budgeted, and otherwise made available by the local source, State Legislature and/or federal sources. The City of Fairhope may terminate any financial obligation, and awarded vendor waives any and all claim(s) for damages, effective immediately upon receipt of written notice (or any date specified therein) if for any reason the City of Fairhope's funding from local, State and/or federal sources is not appropriated, withdrawn or limited.

60. TIME IS OF THE ESSENCE

The City of Fairhope and awarded vendor agree that time is of the essence in the performance of work called for under this Contract / Agreement / Purchase Order. The awarded vendor agrees that all work will be accomplished regularly, diligently, and uninterrupted at such a rate of progress as will ensure full completion thereof within reasonable time periods.

61. TITLE

All titles, fees, as well as other charges, are to be paid by awarded vendor. Awarded vendor is to furnish prepaid certificate of title in the name of the City of Fairhope, Title shall change upon acceptance of delivery at the City of Fairhope approved delivery location.

62. VENDOR LIST

A vendor may be removed from the City of Fairhope's Bidders List if a vendor fails to respond to three (3) consecutive ITB's. A properly submitted "No Bid" is considered as a response and the vendor will receive credit for the response.

63. WARRANTY

The awarded vendor expressly warrants that all articles, materials, and work offered shall conform to each and every specification, drawing, sample, or other description which is furnished to or adopted by the City of Fairhope, and that it will be fit and sufficient for the purpose intended, merchantable, of good material and workmanship, and free from defects. The awarded vendor further warrants all items for a period of one year, unless otherwise stated, from the date of acceptance of the items delivered and installed or work completed. All repairs, replacements, or adjustments during the warranty period will be at the awarded vendor's sole expense. Awarded vendor will provide written warranty for all parts and labor for a period of (1) one year commencing from date of written acceptance of delivery by City of Fairhope. Awarded vendor will provide written copies of all other applicable warranties, such as, Manufacturer's warranty. Those warranties, if any, will be in addition to the awarded vendor's warranty, and the terms of which will not be altered by the awarded vendor's warranty.

64. IMMIGRATION LAW

The Contractor agrees that it shall comply with all of the requirements of the **Beason-Hammon Alabama Taxpayer and Citizen Protection Act, Act No 2011-535**, Alabama Code (1975) Section 31-13-1, et. Seq., (also known as the Alabama Immigration Act) see Section 31-13-9, and the provisions of said Act, including all penalties for violation thereof, are incorporated herein.

ITEM VIII

ALABAMA IMMIGRATION ACT CONTRACT REQUIREMENTS

1.0 Background

The **Beason-Hammon Alabama Taxpayer and Citizen Protection Act, Act No 2011-535**, **as amended by Act No 2012-491, *Code of Alabama* (1975) Section 31-13-1** through **Section 31-13-30** (also known as and hereinafter referred to as "the Alabama Immigration Act") is applicable to CONTRACTs with the City of Fairhope, Alabama. All business entities entering into CONTRACTs with the City of Fairhope, Alabama will comply with the Alabama Immigration Act.

2.0 Definitions

ALIEN. Any person who is not a citizen or national of the United States, as described in 8 U.S.C. § 1101, et seq., and any amendments thereto.

BUSINESS ENTITY. Any person or group of persons employing one or more persons performing or engaging in any activity, enterprise, profession, or occupation for gain, benefit, advantage, or livelihood, whether for profit or not for profit. Business entity shall include but not be limited to the following:

a. Self-employed individuals, business entities filling articles of incorporation, partnerships, limited partnerships, limited liability companies, foreign corporations, foreign limited partnerships, foreign liability companies authorized to transact business in this state, business trusts, and any business entity that registers with the Secretary of State.
b. Any business entity that possesses a business license, permit, certificate, approval, registration, charter, or similar form of authorization issued by the state, any business entity that is exempt by law from obtaining such a business license, an any business entity that is operating unlawfully without a business license.

CONTRACTOR. A person, employer, or business entity that enters into a CONTRACT to perform any service or work or to provide a certain product in exchange for valuable consideration. This definition shall include, but not be limited to, a general CONTRACTOR, SUB-CONTRACTOR, independent CONTRACTOR, CONTRACT employee, project manager, or a recruiting or staffing entity.

EMPLOYEE. Any person directed, allowed, or permitted to perform labor or service of any kind by an employer. The employees of an independent CONTRACTOR working for a business entity shall not be regarded as the employees of the business entity, for the purposes of this chapter. This term does not include any inmate in the legal custody of the state, a county, or a municipality.

EMPLOYER. Any person, firm, corporation, partnership, joint stock association, agent, manager, representative, foreman, or other person having control or custody of any employment, place of employment, or of any employee, including any person or entity employing any person for hire within the State of Alabama, including a public employer. This term shall not include the occupant of a household contracting with another person to perform casual domestic labor within the household.

E-VERIFY. The electronic verification of federal employment authorization program of the Illegal Immigration Reform and Immigrant Responsibility Act of 1996, P.L. 104-208, Division c, Section 403 (a); 8 U.S.C. §1324(a) and operated by the United States Department of Homeland Security, or its successor program.

STATE-FUNDED ENTITY. Any governmental entity of the state or a political subdivision thereof or any other entity that receives any monies from the state or a political subdivision thereof; provided, however, an entity that merely provides a service or a product to any governmental entity of the state or a political subdivision thereof, and receives compensation for the same, shall not be considered a state-funded entity.

SUB-CONTRACTOR. A person, business entity, or employer who is awarded a portion of an existing CONTRACT by a CONTRACTOR, regardless of its tier.

UNAUTHORIZED ALIEN. An alien who is not authorized to work in the United States as defined in 8 U.S.C. § 1324a (h) (3) .

3.0 Mandatory Clause

All CONTRACTS or CONTRACTS to which the state, a political subdivision, or state-funded entity are a party shall include the following clause:

> ***"By signing this CONTRACT, the CONTRACTING parties affirm, for the duration of the CONTRACT, that they will not violate federal immigration law or knowingly employ, hire for employment, or continue to employ an unauthorized alien within the state of Alabama. Furthermore, a CONTRACTING party found to be in violation of this provision shall be deemed in breach of the CONTRACT and shall be responsible for all damages resulting therefrom."***

For purposes of this section, "CONTRACT" shall mean a CONTRACT awarded by the state, any political subdivision thereof, or any state-funded entity that was competitively bid or would, if entered into by the state or an agency thereof, be required to be submitted to the CONTRACT Review Permanent Legislative Oversight Committee.

4.0 CONTRACTs Involving Business Entity, or Employer

As a condition for the award of any CONTRACT, grant, or incentive by the state, any political subdivision thereof, or any state-funded entity to a business entity or employer that employs one or more employees, the business entity or employer shall not knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama.

As a condition for the award of any CONTRACT, grant, or incentive by the state, any political subdivision thereof, or any state-funded entity to a business entity or employer that employs one or more employees within the state of Alabama, **the business entity or employer shall provide documentation establishing that the business entity or employer is enrolled in the E-Verify program.** During the performance of the CONTRACT, the business entity or employer shall participate in the E-Verify program and shall verify every employee that is required to be verified according to the applicable federal rules and regulations.

5.0 CONTRACTS Involving Subcontracting

Any SUB-CONTRACTOR on a project paid for by CONTRACT, grant, or incentive by the state, any political subdivision thereof, or any state-funded entity shall not knowingly employ, hire for employment, or continue to employ an unauthorized alien within the State of Alabama and shall also enroll in the E-Verify program prior to performing any work on the project. Furthermore, during the performance of the CONTRACT, the SUB-CONTRACTOR shall participate in the E-Verify program and shall verify every employee that is required to be verified according to the applicable federal rules and regulations. This subsection shall only apply to SUB-BIDDERS performing work on a project subject to the provisions of this section and not to collateral persons or business entities hired by the SUB -CONTRACTOR.

6.0 Proof of E-Verify documentation will be in the form of a copy of the signed Memorandum of Understanding (MOU) generated upon completion of the E-Verify program.

END OF ALABAMA IMMIGRATION ACT CONTRACT REQUIREMENTS

ITEM IX

INVITATION SUMMARY

Bid No. 026-22
On Call Contractor for Gas Department

Bid Name:	**BID 026-22 On Call Contractor for Gas Department**
Issue Date:	June 3, 2022
Certificate of Insurance Requirements:	See Standard Terms and Conditions and Insurance and Instructions to Vendors
Deadline for Questions Date:	Monday, June 13, 2022, 5:00 P.M.
Bid Due Date:	Tuesday, June 21, 2022, 2:00 P.M.
City Internet Site:	www.FairhopeAL.gov
SEALED Bid Response Copies to submit:	One (1) Original and One (1) Identical Paper Copy
Purchasing Department Contact for questions:	Purchasing@FairhopeAL.gov (251) 928-8003

END OF INVITATION SUMMARY

ITEM X
BID BOND INFORMATION

Bids shall be accompanied by a Bid Security equal to 5% (percent) of the bid price, but in no event more than $10,000.00. Bid Security shall be in the form of a Bid Bond or a cashier's check payable to The City of Fairhope. All bonds and/or cashier's check will be made payable to the City of Fairhope for an amount not less than five (5) percent of the City's or its engineers or architects estimated cost of the Project or of the total bid in the proposal, but in no event more than $10,000.00.

Return of Bid Bonds: All bid bonds, except those of the three lowest bona fide bidders, will be returned immediately after bids have been checked, tabulated and the relation of the bids established. The bid bonds of the three lowest bidders may be retained and if so, will be returned as soon as the contract bonds and the contract documents of the successful bidder have been approved and properly executed.

In the event it is necessary to defer a contract award for longer than fifteen (15) days, after opening of bids, then all bid bonds, except that of the potential successful bidders will be returned.

Award of the contract will be made within the time specified after the opening of bids. In the event no award is made within such time, all bids may be rejected, and all bonds returned.

Provided; however, the potentially successful bidder may enter into a written agreement with the City for an extension of time for consideration of its bid, in which case, the bidder's bond shall remain in full force and effect, or the City may permit said bidder to substitute a satisfactory surety for the cashier's check if submitted as a guaranty to the bid bond.

Forfeiture of Bid Bonds: Should the successful bidder or bidders to whom a contract is awarded fail to execute a contract(s) and furnish acceptable contract securities and evidence of insurance, as required, within thirty (30) days after the prescribed forms have been presented to him/her, the City may retain from the proposal guaranty, if it is a cashier's check or recovered from the principal or the sureties, if the guaranty is a bid bond, the difference between the amount of the contract as awarded, and the amount of the proposals of the new lowest bidder. If no other bids are received, the full amount of the proposal guaranty may be so retained and recovered as liquidated damages for such default. Any sum so retained or recovered shall be the property of the awarding authority.

END OF BID BOND INFORMATION

ITEM X

BID BOND

The PRINCIPAL (Bidder's name and address)

The OWNER
City of Fairhope
P.O. Drawer 429
Fairhope, Al 36533

The PROJECT for which the Principal's Bid is submitted: (Project name as it appears in the Bid Documents)

PROJECT NO.
PROJECT NAME:

KNOW ALL MEN BY THESE PRESENTS, that we, the undersigned Principal and Surety, jointly and severally, hereby bind ourselves, our heirs, executors, administrators, successors, and assigns to the OWNER in the PENAL SUM of five percent (5%) of the amount of the Principal's bid, but in no event more than TEN THOUSAND DOLLARS ($10,000.00).

THE CONDITION OF THIS OBIGATION is that the Principal has submitted to the OWNER the attached bid, which is incorporated herein by reference, for the Project identified above.

NOW, THEREFORE, if, within the terms of the Bid Document, the OWNER accepts the Principal's bid and the Principal thereafter either:

(a) executes and delivers a Construction Contract with the required Performance and Payment Bonds (each in the for contained in the Bid Documents and properly completed in accordance with the bid) and delivers evidence of insurance as prescribed in the Bid Documents, or fails to execute and deliver such Construction Contract with such Bonds and evidence of insurance, but pays the OWNER the difference, not to exceed the Penal Sum of this Bond, between the amount of the Principal's Bid and the larger amount for which the OWNER may award a Construction Contract for the same Work to another Bidder, then, this obligation shall be null and void, otherwise it shall remain in full force and effect.

The Surety, for value received, hereby stipulates and agrees that the obligation of the Surety under this Bond shall not in any manner be impaired or affected by any extension of the time within which the OWNER may accept the Principal's bid, and the Surety does hereby waive notice of any such extension.

SIGNED AND SEALED this _____ day of _____, 202____.

_____
(Principal (Company)

ATTEST
_____ By_____

_____
Print Name and Title

SURETY
ATTEST

_____
Surety Company

_____ By_____

_____
Print Name and Title

CORPORATION

_____
Name of Corporation, Partnership, or Joint Venture

Business Mailing Address: _____
_____

email_____ phone_____

BY: _____ _____

(Signature of Officer Authorized to sign Bids and Contracts for the Firm) (Position or Title)

_____ _____

(General Contractor's License Number) Foreign Corporation Entity Id (Required of out-of-state-vendors)

Attest:

_____ _____

(Secretary) (Name of State under the laws of which incorporated)

_____ BY: _____

(Name of Surety) (Attorney in Fact)

ATTACHMENT B

ITEM XI
PERFORMANCE BOND

KNOW ALL MEN: That _____ as Principal,
(name & address of legal title of contractor)

and _____ and
(name & address of legal title of one or more sureties)

_____
(name & address of legal title of one or more sureties)

Hereinafter called the Surety or Sureties, are held and firmly bound unto the CITY OF FAIRHOPE, ALABAMA, hereinafter called the OWNER in the sum of _____Dollars ($_____), for the payment whereof the Principal and the Surety or Sureties bind themselves, their heirs, executors, administrators, successors, and assigns, jointly and severally, firmly by these presents.

WHEREAS, The Principal has, by means of a written agreement, dated ___/___/____, entered into a contract with the OWNER for **Bid No. 026-22 On Call Contractor for Gas Department**, which agreement is by reference made a part hereof.

NOW THEREFORE, the conditions of this obligation is such that if the Principal shall faithfully perform the contract on his part, and satisfy all claims and demands, incurred for the same, and shall fully indemnify and save harmless the OWNER from all cost and damage which he may suffer by reason of failure to do so, and shall reimburse and repay OWNER all outlay and expense which the OWNER may incur in making good for any such default thence this obligation shall be null and void: otherwise, it shall remain in full force and effect.

PROVIDED, HOWEVER, that no suit, action or proceedings, by reason of any default whatever be brought on his Bond after twelve months from the day on which the final payment under the Contract falls due.

PROVIDED, further, that the said surety or sureties, for value received hereby stipulate and agree that no change, extension of time, or addition to the terms of the Contract or to the work to be performed thereunder of the specifications thereof shall in any way effect their obligations on this bond, and they do hereby waive notice of any such change, extension of time, alteration or addition to the terms of the contract, or to the work, or to the Specifications.

WITNESS our hands this _____day of _____, 202___.

IF INDIVIDUAL

_____, Doing Business As, _____
(SIGNATURE of Individual Bidder) (Business Name)

Business Mailing Address_____

IF CORPORATION

_____
(Name of Corporation, Partnership , or Joint Venture)

Business Mailing Address_____

By:_____ _____
(SIGNATURE of officer authorized to sign Bids and Contracts for the company) (Position or Title)

ATTEST:

_____ _____
(Secretary) (Name of State of incorporation)

_____ By: _____
(Name of Surety) (Attorney in Fact)

ITEM XII
LABOR AND MATERIAL BOND

KNOWN ALL MEN BY THESE PRESENTS, that we, _____ (hereinafter called the "Contractor") of _____ as principal and (hereinafter called the "Surety"), as Surety, do hereby acknowledge ourselves indebted and firmly bound and held unto the City of Fairhope, Alabama, (hereinafter called the "**City**"), a municipal corporation, existing under and by virtue of the Laws of the State of Alabama, for the use and benefit of those entitled thereto, in the penal sum of _____ ($_____) for the payment of which well and truly to be made in lawful money of the United States, we do hereby bind ourselves, or successors, assigns and personal representatives, jointly and severally, firmly by these presents.

BUT THE CONDITION OF THE FOREGOING OBLIGATION OR BOND IS THIS:

WHEREAS, the **City** has entered into a certain written contract with said Contractor for Bid No. 026-22 On Call Contractor for Gas Department in accordance with contract documents heretofore on file in the Office of the **City of Fairhope** at the price of, to-wit: ($_____) as more fully appears in said written Contract bearing date of _____, 2022, which Contract is hereby referred to and made a part hereof to the same extent as if set out herein in full.

NOW, THEREFORE, if said Principal and all subcontractors to whom any portion of the work provided for in said contract is sublet and all assignees of said Principal and of such subcontractors shall promptly make payment to all persons supplying him or them with labor, foodstuffs, or supplies for or in the prosecution of the work provided for in such contract, or in any amendment or extension of or addition to said contract, and for the payment of reasonable attorney's fees, incurred by the claimant or claimants in suits on said bond, then the above obligation shall be void; otherwise, it shall remain in full force and effect.

PROVIDED, however, that this bond is subject to the following conditions and limitations:

(a) Any person, firm or corporation that has furnished labor, foodstuffs, or supplies for or in the prosecution of the work provided for in said contract, payment for which has not been made, shall have a direct right of action in his or their name or names against the principal and surety on this bond, which right of action shall be asserted in a proceeding, instituted in the county in which the work provided for in said contract is to be performed and in any county in which said Principal or Surety does business. Such right of action shall be asserted in a proceeding instituted in the name of the claimant or claimants for his or their use and benefit against said Principal and Surety or either of them (but not later than one year after the final settlement of said Contract) in which action such claim or claims shall be adjudicated and judgment rendered thereon.

(b) In addition to any other legal mode of service, service of summons and other process in suits on this bond brought in Baldwin County may be had on the Principal or the Surety in accordance with Title 27, Chapter 3, Section 24 of the Ala. Code (1975) by serving a copy of the summons and complaint or other pleading or process, with the Commissioner of Insurance of the State of Alabama or his/ her designee and the Principal and Surety agree to be bound by such mode of service above described and consents that such service shall be the same as personal service on the Principal or Surety.

(c) The Surety shall not be liable hereunder for any damages or compensation recoverable under any workmen's compensation or employer's liability statute.

(d) In no event shall the Surety be liable for a greater sum than the penalty of this bond, or subject to any suit, action or proceeding thereon that is instituted later than one year after the final settlement of said contract.

(e) This bond is given pursuant to the terms of Title 39, Chapter 1, Section 1 of the Ala. Code (1975), and all the provisions of law with reference to this character of bond as set forth in said section or as may hereinafter be enacted are hereby made a part hereof to the same extent as if set out herein in full.

IN WITNESS WHEREOF, the said Contractor has hereunder affixed its signature and said Surety has hereunto caused to be affixed its corporate signature and seal, by its duly authorized officers on the ____ day of _____, 2022.

_____
Principal

By:
_____

_____
Title

_____
Surety

ATTEST:

By:
_____

_____
Title

ITEM XIII

CITY OF FAIRHOPE

CLOSEOUT DOCUMENTS

CONSENT OF SURETY COMPANY TO FINAL PAYMENT

CONTRACTOR'S AFFIDAVIT OF PAYMENT

FINAL RELEASE OF LIENS

NOTICE OF COMPLETION ADVERTISEMENT

CITY OF FAIRHOPE
CONSENT OF SURETY COMPANY TO FINAL PAYMENT

COF PROJECT NO: _____

COF PROJECT NAME: _____

OWNER: **City of Fairhope**
P.O. Drawer 429
Fairhope, AL 36533

CONTRACTOR: _____

_____

_____

In accordance with the provision of the Contract between the OWNER and the CONTRACTOR as indicated above, the _____, Surety Company on bond of _____ CONTRACTOR, hereby approved the final payment to the CONTRACTOR and agrees that final payment to the CONTRACTOR shall not relieve the Surety Company of any of its obligations to the City of Fairhope as set forth in said Surety Company's bond dated the _____ day of _____, 202___.

IN WITNESS WHEREOF

The Surety Company has hereunto set its hand this ____ day of _____, 202___.

ATTEST
(Seal)

Surety Company

_____
Signature of Authorized Representative

_____
Title

CITY OF FAIRHOPE
CONTRACTOR'S AFFIDAVIT OF PAYMENT OF CLAIMS & DEBTS

COF PROJECT NO: _____

COF PROJECT NAME: _____

OWNER: **City of Fairhope**
P.O. Drawer 429
Fairhope, AL 36533

CONTRACTOR: _____

_____

_____

STATE OF: _____

COUNTY OF: _____

The undersigned hereby certified that, except as listed below, he has paid in full or otherwise satisfied all obligations for all materials and equipment furnished, for all work, Labor and services performed, and for all known indebtedness and claims against the CONTRACTOR for damages arising in any manner in connection with the performance of the Contract referenced above for which the OWNER or his property might in any way be held responsible.

EXCEPTION: (If none, write NONE) _____

_____
CONTRACTOR

_____ _____
By: Title:

Subscribed and sworn to and before me this ___ day of _____, 202___.

_____
NOTARY PUBLIC

My Commission expires_____/_____/_____

CITY OF FAIRHOPE
FINAL RELEASE OF LIENS

KNOW ALL MEN BY THESE PRESENTS: In consideration of, and contingent upon the receipt of total payments in the amount of _____

Under and pursuant to the following contract:

COF PROJECT NO: _____

COF PROJECT NAME: _____

The undersigned hereby releases _____, its officers, agents, and employees, of and from all liabilities, obligations, and claims whatsoever in law and in equity under or arising out of said contract. We do hereby certify that all labor, materials, equipment, supplies, etc. for this project have been paid in full and there is no outstanding indebtedness.

IN WITNESS WHEREOF, this release has been executed this _____ day of _____, 202___.

_____
CONTRACTOR

_____ _____
By: SIGNATURE PRINTED NAME

_____
Title

STATE OF ALABAMA
COUNTY OF BALDWIN

I. the undersigned authority, a Notary Public in and for said County and State, hereby certify that _____, whose name is signed to the foregoing instrument and who is known to me, acknowledged before me on this day that, being informed of the contents of the within instrument, he executed the same voluntarily on the day the same bears date.

Given under my hand and seal on this the _____ day of _____, 202___.

_____
NOTARY PUBLIC

My Commission Expires: ____/____/____

CITY OF FAIRHOPE
NOTICE OF COMPLETION LEGAL NOTICE

Bid Number: _____

Bid Name: _____

In accordance with Chapter 1, Title 39, Code of Alabama, 1975, for contracts over $50,000 and less than $500,000, Notice is hereby given that _____, CONTRACTOR, has completed the Contract for the above referenced bid for the City of Fairhope, Alabama, OWNER, and has made request for final settlement of said Contract. Any claims for labor, materials or otherwise in connection with this project should be itemized, notarized, and presented to:

OWNER:

CITY OF FAIRHOPE
555 South Section Street
P.O. Drawer 429
Fairhope, AL 36533

On or before (30 days) or same will be barred.

Contractor:

Dates ad was run (one time): _____

Newspapers in which ad run (dates): _____

Contractor to provide Proof of Publication of the Notice of Completion to the City by affidavit of the publisher and a printed copy of the notice published.

REVISION NO.		PROCEDURE NO. MP 001
REVISION DATE 6/29/2021		B31Q COVERED TASK NO. 0001
Pipeline O&M Procedure Corrosion Protection	**Measure Pipe to Soil Electrolyte Potential**	PAGE NO. 1 of 4

SCOPE

The purpose of this procedure is to describe required cathodic protection inspection practices.

OBJECTIVES

To safely and accurately measure pipe to soil electrolyte potential.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Voltmeter / Multi-meter*
- Copper-copper sulfate electrode
- Copper sulfate solution
- Water

* Voltmeter or Multimeter- A voltmeter used for cathodic protection work needs to have an input impedance of at least 10 megaohms and a DC voltage scale.

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Measuring pipe to soil potential
- Verifying test lead continuity
- Verifying that the CP testing equipment is working properly

This procedure may be used as:

- Field Operator guidance

Approval: _____ Approval Date: _____ Next Review Date: _____

Measure Pipe to Soil Electrolyte Potential

This is the general procedure for measuring pipe to soil potential, verifying test lead continuity, and verifying that the CP testing equipment is working properly.

Test leads required for cathodic protection should be maintained to ensure accurate measurements are obtained.

To Measure Soil to Pipe Electrolyte Potential:

1. Check your voltmeter or multi-meter to ensure the battery is good. If the battery is low then a "low battery" indicator will display. Replace the battery as needed. Do not use a voltmeter or multi-meter with a low battery.

2. Select the proper meter settings and range. Set the meter to read DC voltage (DCV).

3. Check the survey electrode by contacting the porous plug of the survey electrode with the porous plug of another electrode and measure the potential difference. A difference of 5 mV or less is acceptable.

   The survey electrode should be checked periodically or when readings are out of expected range.

4. Locate and identify the proper test station, or pipe riser to read.

5. Connect the positive lead from the meter to the pipe or test station and the negative lead to the Copper/Copper Sulfate electrode to obtain the correct polarity.

6. Place the electrode in contact with the soil directly over the pipeline. If good electrical contact cannot be made, wet the ground with water.

7. Record the pipe-to-soil potential, exactly as it appears on the meter, including all decimal points.

8. Report any abnormal operating conditions to the Supervisor immediately.

To Inspect Test Lead Continuity:

1. Check your voltmeter or multi-meter to ensure the battery is good. If the battery is low then a "low battery" indicator will display. Replace the battery as needed. Do not use a voltmeter or multi-meter with a low battery.

2. Locate and identify the proper test station, or pipe riser to read.

3. Make a pipe to soil potential measurement connected directly to the cathodic protection (CP) test station wire lead.

4. Record the pipe-to-soil potential, exactly as it appears on the meter, including all decimal points.

5. A zero DCV reading is an indication of failed test lead continuity.

6. If the test lead fails continuity, verify that the CP testing equipment is working properly as directed below, then proceed to step 7.

7. Make a second pipe to soil potential measurement connected directly to the CP test station wire lead. If the reading is still zero DCV, report the test station failure to the Supervisor and document the reading.

8. Report any abnormal operating conditions to the Supervisor immediately.

To Verify that the CP Testing Equipment is Working Properly:

1. Remove the end cap protector on the copper-copper sulfate reference electrode.

2. Keep the reference electrode ¾ filled with clean supersaturated copper sulfate solution. A clear blue solution with undissolved copper sulfate crystals is desirable.

3. If the solution becomes cloudy or was previously used in an area containing contaminates then the reference electrode should be cleaned as follows:

   a. Disassemble the reference electrode from the top and pour out the old solution.

   b. Rinse out the reference electrode cylinder and copper rod with distilled water.

   c. Shine the copper rod with fine silica (not metallic paper) sandpaper and rinse with distilled water.

   d. Fill approximately ¼ of the reference electrode cylinder with a high-grade of copper sulfate crystals.

   e. Add distilled water to the cylinder to a level over ¾ full.

   f. Reassemble the reference electrode hand tight.

   g. Shake the reference electrode vigorously.

h. The copper sulfate solution is supersaturated when crystals remain after complete dissolution.

4. A clean copper-copper reference electrode (never used in the field) is used to calibrate field reference electrodes. Use a clean container of tap water to measure the voltage difference between the office and a field reference electrode. If there is more than 10 millivolts difference between the electrodes then the field electrode should be cleaned and recharged.

5. The instrument test leads are the portable wires extending from the voltmeter. Test leads should be electrically continuous from the meter to the contact. Any test leads broken or that have questionable electrical integrity (i.e. breaks in insulating coating) should either be repaired or replaced before making further measurements.

6. Replace the end cap protector on the copper-copper sulfate reference electrode.

Reporting / Notification:
Complete documentation in accordance with Operation and Maintenance Manual.

Any pipe-to-soil potential less than negative 850 mV (-0.85 V) should be addressed in accordance with Operation and Maintenance Manual.

Potential Hazards:
- Some test lead stations are located in high grass or near swampy areas. Beware of snakes.
- Do not conduct the survey during a lightning storm. Electricity from the lightning could travel onto the pipe and result in death or injury when electrical contact is made with the pipe during the rectifier inspection.

Abnormal Operating Conditions (AOCs):
- Damaged Test Station
- Fire or explosion
- Unexpected presence of hazardous gas
- CP reading outside of expected ranges
- Component failure: Broken leads, failed rectifier, burnt or charred wires
- Missing test point

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 003
REVISION DATE		B31Q COVERED TASK NO.
6/29/2021		0021
Pipeline O&M Procedure Corrosion	**Measure Soil Resistivity**	PAGE NO. 1 of 6

SCOPE

This procedure outlines the general guidelines for measuring soil resistivity.

OBJECTIVES

To ensure that soil resistivity measurements are conducted in accordance with industry-accepted practice, resulting in a high degree of repeatability for each measurement.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Soil resistance meter
- Soil box
- Steel or stainless steel soil pins
- Insulated test leads
- Writing utensils
- Spare batteries for all DC powered instruments
- Resistivity measurement form

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger, and follows applicable company practice.

COMMENTS

This procedure may be used for measure soil resistivity using the:

- Soil box method
- Wenner four pin method
- Single pin method

Approval:_____ Approval Date: _____ Next Review Date: _____

Measure Soil Resistivity

The purpose of this procedure is to document the steps required to measure soil resistivity. Soil resistivity values may be used for the purpose of designing cathodic protection systems for buried metallic pipeline facilities.

Uses of soil resistivity values include calculating pipeline protective current requirements for new pipelines, determining sacrificial anode size and linear / depth distribution intervals, as well as the size of deep well anode beds associated with impressed current rectifier systems.

The single rod test may be used for rapid accumulation of spot soil resistivity values along a pipeline. It is useful for screening potential sites for cathodic protection installations. The soil box and single rod method measure small local areas for soil resistivity. The Wenner four-pin method is used to measure mass soil resistivity. It is often used to obtain data needed for the final selection of cathodic protection sites and for installation design.

Wenner Four-pin Method:

1. Select a test location where the nearest pin is at least 30 feet from any underground metallic structures.

2. Place the pins in a straight line with equal 5-foot spacing between each pin. The spacing of the pins must be uniform and equal to the soil depth to be tested.

3. Using the longer test lead wires, connect the two outer pins to the C1 and C2 terminals of the resistivity meter.

4. Using the shorter test lead wires, connect the two inner pins to the P1 and P2 terminals of the resistance meter.

   Note: The pin connected to the C1 terminal should be next to the pin connected to the P1 terminal, and the C2 pin should be next to the P2 pin.

5. For extremely dry soil conditions, a small amount of distilled water may be poured on the site of each soil pin to reduce soil contact resistance.

   Note: Only distilled water should be used to remoisten the soil sample to avoid the possibility of adding salts or minerals, which could adversely affect the resistance measurement.

6. Move the spring loaded resistivity meter switch to the battery test position and hold the switch in that position for a moment in order to ascertain battery integrity. Replace batteries as necessary.

7. Adjust the "Ohms" switch to the central position.

8. Adjust the "Range" (multiplier) switch to the lowest available setting.

9. Move the spring loaded resistance meter switch to the "Adjust" position and hold the switch there while moving the "Range" (multiplier) switch from one position to the next until meter needle deflection is observed.

10. While maintaining the spring loaded resistance meter switch to the "Adjust" position, alternate using the "Ohms" switch and the "Range" (multiplier) switch in order to fine tune the meter dial to a "zero" value. Attempt to keep the "Ohms" switch at or near the center of its span.

11. Avoid "Ohms" switch settings that are near the top and bottom of the "Ohms" switch span.

12. Multiply the "Ohms" scale reading by the "Range" (multiplier) switch value. The resulting mathematical product is the soil resistance in units of "Ohms".

13. Use the following mathematical formula to obtain the soil resistivity in units of "Ohm-cm":

$$\rho = 191.5\ (d)\ (R)$$

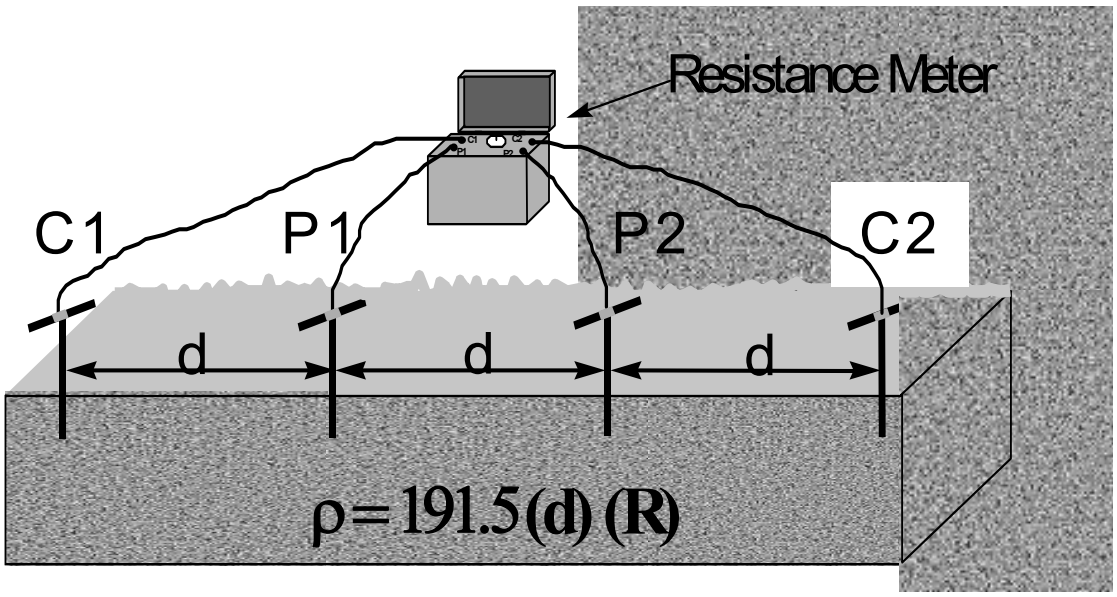
where; ρ = Resistivity, Ohm-cm
191.5 = conversion factor
d = linear distance between soil pins, ft.
R = calculated meter resistance, Ohms

The following table is a list of commonly accepted gas industry values for soil resistivity ranges and associated degrees of corrosivity:

Table 1: Soil Resistivity Range and Degree of Corrosivity

Soil Resistivity, Ohm-cm	Degree of Corrosivity
0-1,000	Very Corrosive
1,000-2,000	Corrosive
2,000-10,000	Mildly Corrosive
>10,000	Progressively less Corrosive

Figure 1: Wenner Four-pin Method



Soil Box Method:
The soil box method is useful for measuring the resistivity of soil samples removed from excavations or post (auger) holes.

1. Collect soil samples by excavations or auger holes, and remove any rocks and other debris. The resistivity may be measured on site or samples may be placed in sealed plastic bags to preserve moisture content, tagged as to location, date of removal, and other pertinent information, and tested later in the laboratory.

2. Pack the soil tightly in the soil box. Do not aggressively compact it such that the box and its parts are damaged.

3. Shave the soil off evenly with the top of the soil box. The box should be full of soil sample and level to the top.

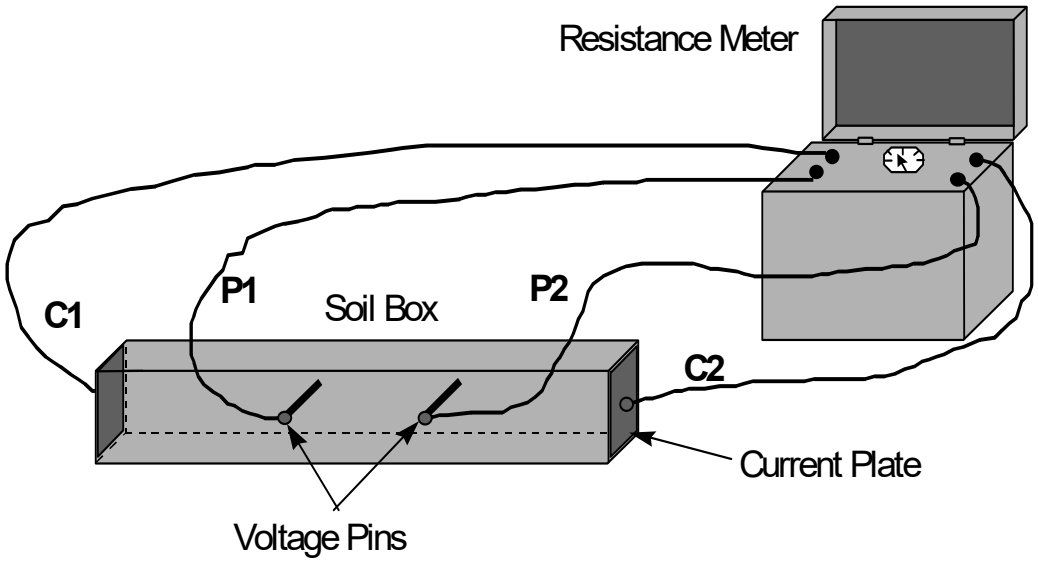
4. For soil boxes having terminal pins at each end of the soil box, connect a resistance meter lead from the C1 terminal to one of the soil box terminal pins and another resistance meter lead from the C2 terminal to the other soil box terminal pin.

5. Connect the P1 and P2 resistance meter leads to metallic probes and insert the probes into the soil sample between the two end terminal pins. This method simulates the Wenner Four Pin Method, but under laboratory conditions.

6. To measure resistance, follow steps 6-13 of the Wenner Four-pin Method above.

7. Prior to disposal of the boxed and compacted soil sample, apply distilled water to the sample and record a supplemental soil resistivity value. This value may be used to simulate soil resistivity of the soil sample when wet at buried pipeline depth.

Figure 2: Soil Box Method



Single Rod Method:
The single rod test may be used for rapid accumulation of spot soil resistivity along a pipeline. It is useful for screening potential sites for cathodic protection installations.

1. Calibrate the single rod in accordance with manufacturer's instructions.

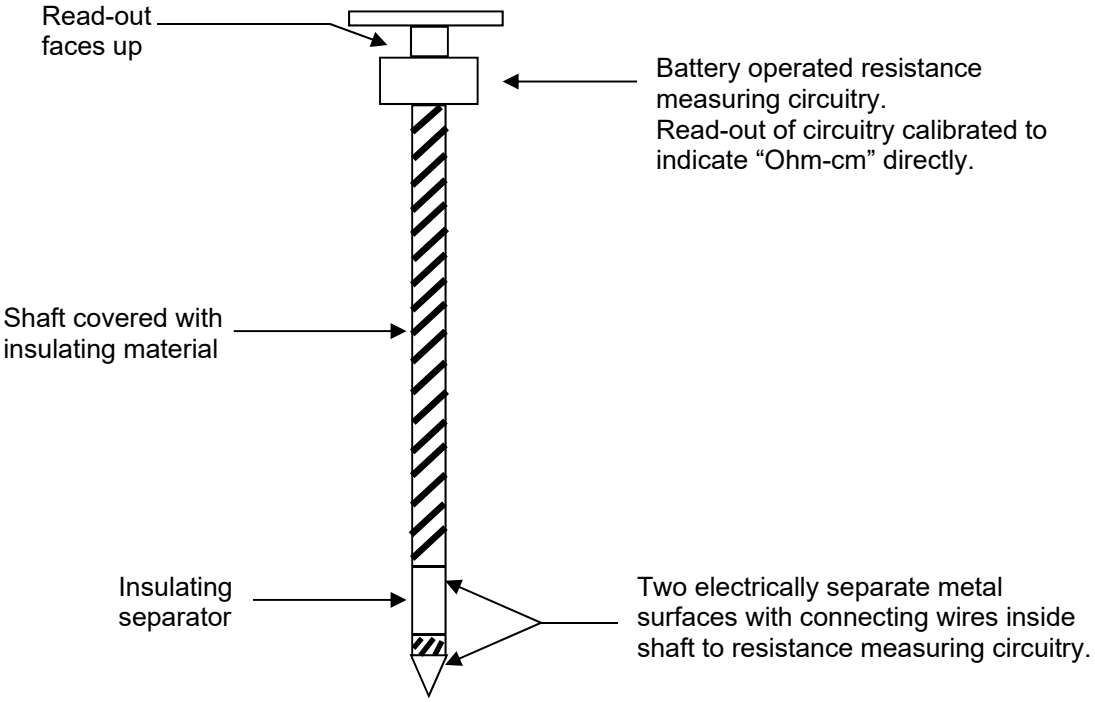
2. Push the rod into the ground to the desired depth (up to three to four feet).

3. Depress the test circuit button fully.

4. Read the resistivity value (Ohm-cm) from read-out.

5. Record the reading on the Company-approved form.

Figure 3: Single Rod Method



Reporting / Notification:
Document the details of soil resistivity measurement as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential ignition hazard. No open flames. No smoking. Remove all potential ignition sources.
- Do not conduct this procedure when lightning is present.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 004
REVISION DATE		B31Q COVERED TASK NO.
6/29/2021		0031
Pipeline O&M Procedure Corrosion Control	**Inspect and Install / Replace Anodes**	PAGE NO. 1 of 10

SCOPE

This procedure outlines the general guidelines for inspecting and installing galvanic or impressed current anodes on an existing pipeline.

OBJECTIVES

To safely install anodes and to ensure continued pipeline integrity.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- *Bedding and Backfill* Procedure
- *Troubleshoot CP System* Procedure
- *Apply Pipe Coating* Procedure
- *Install and Maintain Electrical Connections* Procedure
- CGI Owner's Manual / Operating Procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Burndy Hy-tool or split bolt connectors
- Hand tools
- 3#, 9#, 17#, and 32# magnesium anodes, as required
- Electrical tape
- Duct seal
- Test station (when test stations are required)
- #8 wire (for header cable, when required)
- Cable (length and size as required)
- Two-part epoxy splice kit(s)
- Coke breeze (petroleum or suitable backfill material)
- Carbon, Silicon iron, Junk pipe Anode, or Magnesium Anodes as required
- Compression tap connector
- Combustible Gas Indicator (CGI), e.g. Gascope

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Installing a galvanic anode
- Installing an impressed current anode
- Installing single or multiple anodes

Approval:_____ Approval Date: _____ Next Review Date: _____

Inspect Ground Beds and Anodes

This procedure is to ensure, when personnel inspect and monitor galvanic anode ground beds, that this practice is performed in a manner that produces data substantiating acceptable levels of cathodic protection.

These instructions assume that the galvanic ground bed/anodes have been installed using test leads that terminate at test stations.

1. Set the digital multimeter to measure current from the galvanic anode to the pipeline by connecting the positive multimeter lead to the pipeline test lead and the negative or "common" multimeter lead to the anode lead.

2. Record the current value obtained in order to develop a current output history for the galvanic anodes tested. This data indicates remaining anode life over time.

3. If shunt resistors are installed between the galvanic anode and pipeline lead wires in the test station, set the digital multimeter to measure DC voltage and obtain a reading across the shunt resistor side pins.

4. Divide the voltage drop reading from the shunt resistor by the shunt resistor value typically stamped on the shunt resistor body. The resulting value is the current flowing from the galvanic anode to the pipeline.

5. If a pipe-to-soil potential reading is required, disconnect the anode lead from the pipeline test lead and obtain the pipe-to-soil potential value without the output current influence of the galvanic anode. Attempt to place the Copper Copper-Sulfate reference electrode as directly over the pipeline as is possible in order to account for IR drop across the electrolyte.

6. If multiple galvanic anodes are installed in a bed fashion and each has a shunt resistor installed at the test station along with a shunt resistor installed between the pipeline test lead and the galvanic anode bed, the output current for each individual galvanic anode can be obtained as well as a total output current from the entire anode bed.

7. Galvanic anode life has been depleted when 85% of the original output current value is gone.

8. Graphic representation of the aforementioned output current values for galvanic anodes is used to predict remaining galvanic anode life as well as scheduling of galvanic anode replacement prior to loss of pipe-to-soil potential values that are below required/acceptable criteria.

Install / Replace Anodes

This procedure outlines general guidelines for installing a galvanic (dissimilar metal) and an energized-type (impressed current) anode. Galvanic anodes and the energized-type anodes are used for the cathodic protection of the Company's pipeline system.

Galvanic anodes (i.e., magnesium) will be used when current requirements are small, and also in conjunction with the repair of pipeline leaks.

Impressed current anodes are used when a large amount of current is necessary to protect the system. Prepackaged anodes are permitted for horizontal or vertical anode installations when recommended by qualified corrosion control personnel.

Anodes are installed in bored, vacuumed, or dug holes to a depth such that the anode is below the pipe and as far away as the excavation permits. The anodes may be installed singularly or in multiples, and in either vertical or horizontal positions. The anodes are to be surrounded by an approved backfill material. Anodes may be wetted after being placed in the excavation.

The anode(s) will be connected to a test station as needed or directed.

Installation of a Single Galvanic Anode:

1. Confirm the size and type of anode to be used.
   a. When a bare steel main is exposed for leak repair, and when the bell hole is of a size that would accommodate the proper installation of the larger anode, a 17-pound anode should be installed. If space is limited in the bell hole, the installation of the smaller 9-pound anode is acceptable.

   b. When coated, protected pipe is exposed, install a 17-pound anode.

   c. If a steel service line is exposed, install a 3-pound anode. If a 3-pound anode is unavailable, the installation of a 9-pound anode is acceptable.

2. Inspect the anode prior to installation:
   a. Ensure that the packaging has not been punctured or torn, that the backfill material is intact, and the anode bar is centered in the backfill;
   b. Ensure the anodes were stored in a dry place;
   c. Remove the waterproof shipping bag just before installation;
   d. Inspect the lead wire carefully for any damage to the insulation; and
   e. Repair or replace any anodes with damage or defects in the lead wire or the insulation.

3. Install the anode with the top of the anode below the structure (See Figures 1 and 2).

4. Install the anode at a minimum of 5 feet out, in a vertical or horizontal position, from the pipe. Install below all structures. Where such repairs are made within a bell hole, install the anode as far away both the pipe being protected and any foreign line(s) present as the bell hole permits.

5. Connect the anode wire to a gathering wire that is connected to the pipe through a corrosion control test station. Where determined appropriate by a Supervisor, an anode may be attached directly to the pipe or fitting.

6. If a test station is to be used or installed, connect the gathering wire to a test point. Install the gathering wire and test station cable at a minimum depth of 18 inches.

7. Connect the cable from the test station or anode wire to the pipe by either thermite welding or a mechanical connection, whichever is specified by the installation plan or supervisor. Mechanical connections are used for leak repair sites.

    a. For mechanical connections, attach the cable/wire to a clamp bolt between two nuts.
    b. For thermite welded connections,
        i. Verify that no gas is present prior to starting thermite welding process. Use a CGI (Gascope or other gas detection equipment) to verify no gas is present.
        ii. Attach the cable/wire to the pipe following the *Thermite Welding* section of the *Install and Maintain Electrical Connections* Procedure.

    Note: Avoid damaging the insulation on the cables.

8. Clean and coat each pipe attachment. See the procedure *Apply Pipe Coating.*

9. After completing the installation, cover the entire connection area with an approved backfill material.

Installation of Multiple Galvanic Anodes:

1. Confirm the size and type of anodes to be used.

2. Inspect the anodes prior to installation:
    a. Ensure that the packaging has not been punctured or torn and that the backfill material is intact;
    b. Ensure the anodes were stored in a dry place;
    c. Remove any waterproof material just before installation;
    d. Inspect the lead wire carefully for any damage to the insulation; and
    e. Repair or replace any anodes with damage or defects in the lead wire or the insulation.

3. Install each anode with the top of the anode below the structure (See Figures 1 and 2).

4. Install the anodes at a minimum of 5 feet out, in vertical or horizontal positions, from the pipe. Where such repairs are made within a bell hole, install the anodes as far away from both the pipe being protected and any foreign line(s) present, as the bell hole permits, both horizontally and below all structures.

5. Place multiple anodes in a single bed in a straight line, either perpendicular or parallel to the pipeline. If the right-of-way boundaries are a consideration, the parallel line may be the most feasible.

6. Inspect the header cable (gathering cable) for any damage to the insulation before installing a ground bed for a coated pipeline.

7. Connect each anode wire securely to a gathering wire that is connected to the pipe through a corrosion control test station.

8. Install the gathering wire and test station cable at a minimum depth of 18 inches.

9. Connect the gathering wire to a test point. See the procedure *Install / Replace CP Test Station.*

10. Connect the cable from the test station to the pipe by either thermite welding or a mechanical connection, whichever is specified by the installation plan or supervisor. Mechanical connections are used for leak repair sites.
    a. For mechanical connections, attach the anode to a clamp bolt between two nuts.
    b. For thermite welded connections,
        i. Verify that no gas is present prior to starting thermite welding process. Use a CGI (gascope or other gas detection equipment) to verify no gas is present.
        ii. Attach the anode to the pipe following the *Thermite Welding* Procedure.

    Note: Avoid damaging the insulation on the cables.

11. Clean and coat each pipe attachment. See the procedure *Apply Pipe Coating in the Field (Cold Application).*

12. After completing the installation, cover the entire connection area with an approved backfill material.

Installation of Impressed Current Anodes (General Procedure):

1. The selection of the appropriate anode and the design of the anode bed are performed by qualified corrosion control personnel. This includes the following general steps:
   a. Perform current requirement tests.
   b. Select the appropriate graphite (carbon rod) or mixed metal oxide anode based on the current output required. .
   c. Select anode positions, identify spacing, anode size and amount of conductive fill material.
   d. Verify purchase power availability.
   e. Procure right-of-way.
   f. Develop construction order.

2. Install the header (gathering) cable by either the dig-in or plow-in method. Ensure the cable is buried a minimum of 18 inches deep.

3. Attach the anodes to the header cable. This includes the following steps:
   a. Remove approximately 1½ inches of cable insulation.
   b. Attach the anode lead wire to the header cable using a compression tap or split bolt connector.
   c. Insulate fitting using a two-part epoxy splice kit:
      i. "Rough up" the header cable insulation.
      ii. Attach a plastic mold to the header cable and anode lead wire.
      iii. Tape end with insulating tape.
      iv. Mix two-part epoxy till warm.
      v. Pour the epoxy mixture into plastic mold.
      vi. Allow the epoxy to cure.

4. Connect the header cable to the test station test point (if a test station is used).

5. Connect the test station cable (or header cable) to the pipe by either thermite welding or a mechanical connection, whichever is specified by the installation plan or supervisor. See the procedure *Thermite Welding* as needed.

   Verify that no gas is present prior to starting the thermite welding process. Use a CGI (Gascope or other gas detection equipment) to verify no gas is present.

Installation of Horizontal Impressed Current Anodes:

Prior to installation, the depth of the horizontal anode or anode bed should be determined by soil resistivity test.

1. Excavate the anode connecting-cable trench to a depth sufficient to protect the cable from physical damage (a minimum of 18 inches deep) and to a width that will permit working space. See the procedure *Excavating In-service Pipeline using Heavy Equipment.*

2. Excavate the anode trench adjacent to or within the cable trench to allow for the placement of the anode and for the placement of backfill.

3. Excavate the anode trench to the pre-determined depth.

4. Fill and tamp the bottom of the anode hole or trench with at least three inches of company approved backfill material.

5. Place the anode in center position and fill with prepared backfill until the top of anode is covered with three inches of company approved backfill material. Backfill material should extend one foot beyond each end of the anode. Be careful to avoid damaging the lead wire or the insulation. At least 400 pounds of backfill material should be used per anode (see Table 1 for example calculation).

6. Connect the anode wire to the gathering cable by the method described in the General Procedure above.

7. Insulate the entire connection to produce a waterproof, covered connection, either following by the method described in the General Procedure above, or by a similar company approved method.

8. Fill and tamp the trench with earth backfill to ground level. See the procedure *Bedding and Backfill*.

Installation of Vertical Impressed Current Anodes:
Prior to installation, the depth of the vertical anode or anode bed should be determined by a soil resistivity test.

1. Excavate the anode connecting-cable trench to a depth sufficient to protect the cable from damage (a minimum of 18 inches deep).

2. Bore or dig the anode holes at properly spaced intervals in or adjacent to the cable trench.

3. If a pre-packaged anode is not being used or if high resistivity soil is present, fill the bottom of the anode hole with at least 12 inches of tamped coke breeze or other approved backfill material.

4. Connect the anode wire to the gathering cable by the method described in the General Procedure above.

5. Insulate the entire connection to produce a waterproof, covered connection, either following by the method described in the General Procedure above, or by a similar company approved method.

6. Center the anode in the hole and tamp four inches of backfill material around the anode and eight inches or more on top of the anode.

7. For installation of anodes in series, repeat steps 4 – 5 for each anode to be placed in the same vertical hole.

8. Fill the trench and holes with earth backfill to ground level. See the procedure *Bedding and Backfill.*

Table 1: Example of Coke Breeze Volume & Weight Calculations

- Volume: To calculate the number of cubic feet of coke breeze, select the applicable hole diameter in inches (column 1), look up the cubic feet per lineal foot (column 2), and multiply by the depth of the hole in feet.

- Weight: To calculate the number of pounds of coke breeze, select the applicable hole diameter in inches (column 1), look up the applicable cubic feet per lineal foot (column 3 or 4), and multiply by the depth of the hole in feet.

Hole Diameter in Inches	Cubic Feet per Lineal Foot	Coke Breeze Pounds per Lineal Foot	Coke Breeze Pounds per Lineal Foot
		Asbury 218 or Equal	Loresco SC-3 or Equal
6.0	0.200	12.00	15.00
6.5	0.230	14.00	17.25
7.0	0.270	16.00	20.25
7.5	0.310	19.00	23.25
8.0	0.350	21.00	26.25
8.5	0.400	24.00	30.00
9.0	0.440	27.00	33.00
9.5	0.490	30.00	36.75
10.0	0.550	33.00	41.25
10.5	0.600	36.00	45.00
11.0	0.660	40.00	49.50
11.5	0.720	43.00	54.00
12.0	0.785	47.00	59.00
12.5	0.850	41.00	64.00

Note: These numbers include an approximate 10% overage factor for downhole coke loss and waste.

Reporting / Notification:
Document the details of installing anode as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Collapse of bell hole walls.
- Do not conduct this procedure during a lightning storm. Electricity from the lightning could travel onto the pipe and result in death or injury when electrical contact is made with the pipe.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure
- Damaged Test Station

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

Figure 1: Anode Placement

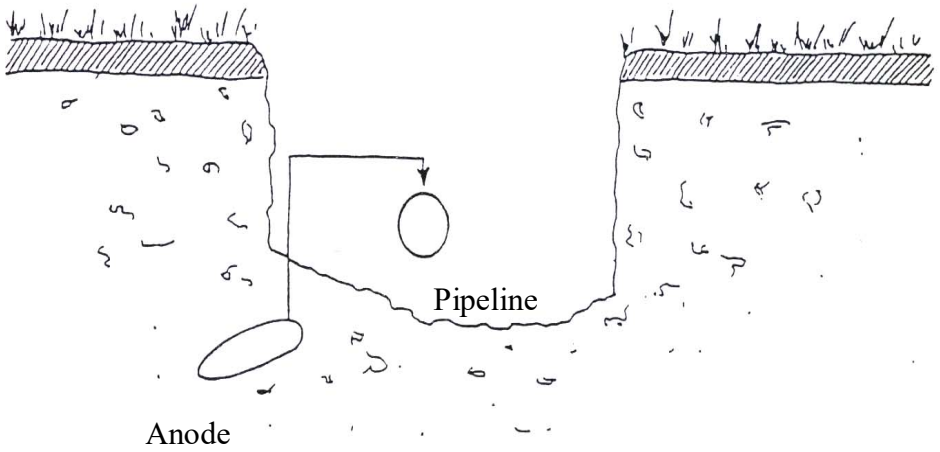
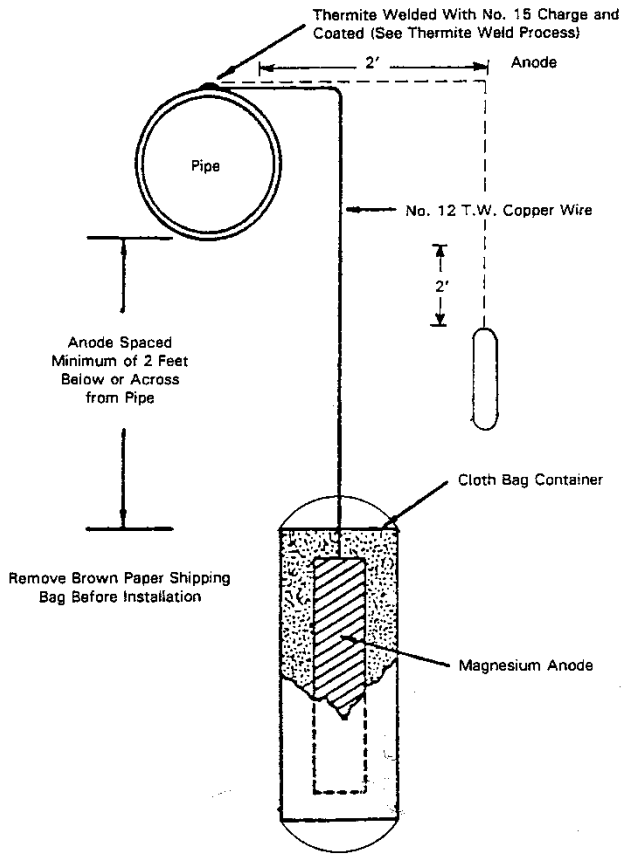


Figure 2: Detail of Anode Connection



REVISION NO.		PROCEDURE NO.
		MP 005
REVISION DATE		B31Q COVERED TASK NO.
6/29/2021		0041, 0051
Pipeline O&M Procedure	**Install and Maintain Electrical Connections**	PAGE NO. 1 of 7

SCOPE

This procedure outlines general guidelines for securing electrical connections via thermite welding and mechanical connections for steel facilities.

OBJECTIVES

To ensure electrical connections for steel facilities are installed and maintained with minimal impact to pipeline integrity.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- CGI Owner's Manual / Operating Procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Copper sleeve (one required, #8 or #12 American Wire Gauge (AWG))
- Disc (one required)
- Thermite cartridge (15 gram size only)
- Copper lead wire (#6 AWG maximum)
- Crucible
- Crucible cleaning tool
- Flint gun igniter or electronic igniter
- File with handle
- Clean, dry rag or paper towel
- Pliers or crimpers
- Duct seal
- Fire extinguisher for fire watch
- Combustible gas indicator (CGI)

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Thermite welding generates extremely high temperatures (4000-5000°F). Never thermite weld on a wet or damp surface. A fire extinguisher should be on job site.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

Ensure a fire watch is standing by during welding activities.

COMMENTS

This procedure may be used for attaching anodes, permanent bond wires, or test leads to steel pipelines.

Approval:_____ Approval Date: _____ Next Review Date: _____

Thermite Welding

Thermite welding is a brazing technique based on the intense heat (5,000°F) developed by the chemical reaction between powdered aluminum and copper oxide. It is used for attaching anodes, permanent bond wires, or test leads to steel facilities. Thermite welding is a fast and simple procedure; however, corrosion control coating requirements must be followed to assure a serviceable weld.

CAUTION: Thermite welding generates extremely high temperatures in the 4000°-5000°F range. Never thermite weld on a wet or damp surface. Care should be taken to remove flammable materials from the work area and to use company approved PPE. A fire extinguisher should be on job site.

CAUTION: Before using thermite welding, use a combustible gas indicator (CGI) or other gas-detection equipment to verify that no combustible gas is present.

Thermite Welding Procedure (see Figure 1 for an example setup):

1. Test the atmosphere for the presence of a flammable / explosive gas mixture.
   a. If a combustible gaseous atmosphere exists, the lead wire must be attached by a mechanical method.
   b. If atmosphere is free from gas, go to step 2.

2. File the top of the pipe to a shiny-bright surface, removing all scale, rust, and paint from the pipe. A 3 x 3 inch area is sufficient.

3. Finish cleaning the pipe with a clean, dry rag or paper towel. Never thermite weld on a wet or damp surface.

4. Strip approximately 1 inch of insulation away from the end of the copper wire and insert the wire into the copper sleeve with approximately ⅛ inch of conductor protruding beyond the end of the sleeve.

5. Crimp the sleeve onto the wire.

6. Center copper sleeve under the tap hole on crucible and place the crucible on the clean, exposed portion of the pipe.

   Note: Use a curve bottom crucible for pipe sizes 6 inches diameter and under. Use a flat bottom crucible for pipe sizes over 6 inches.

7. Use duct seal to produce a seal around the base of the crucible.

8. Open the top of the crucible and insert the metal disc over the tap hole, or use prepackaged thermite cartridges with electronic igniter.

9. Dump the contents of the cartridge into the crucible. Be sure to remove all the starting powder from the cartridge.

10. Close the cover of crucible and ignite thermite charge with the flint gun or electronic igniter. Do not tap on the crucible after igniting the charge.

    CAUTION: Move to a safe position to prevent injury from flying sparks and / or falling molten metal. Personal protection is required.

11. Wait at least 1 minute for the weld to cool.

12. When weld has cooled, remove the crucible and check the weld for tightness.

13. Clean out crucible and tap hole with cleaning tool.

14. Remove slag from thermite weld and coat all bare metal surfaces. Follow the Field Application and Field Repair of Pipe Coating Procedure, as appropriate.

Notes:

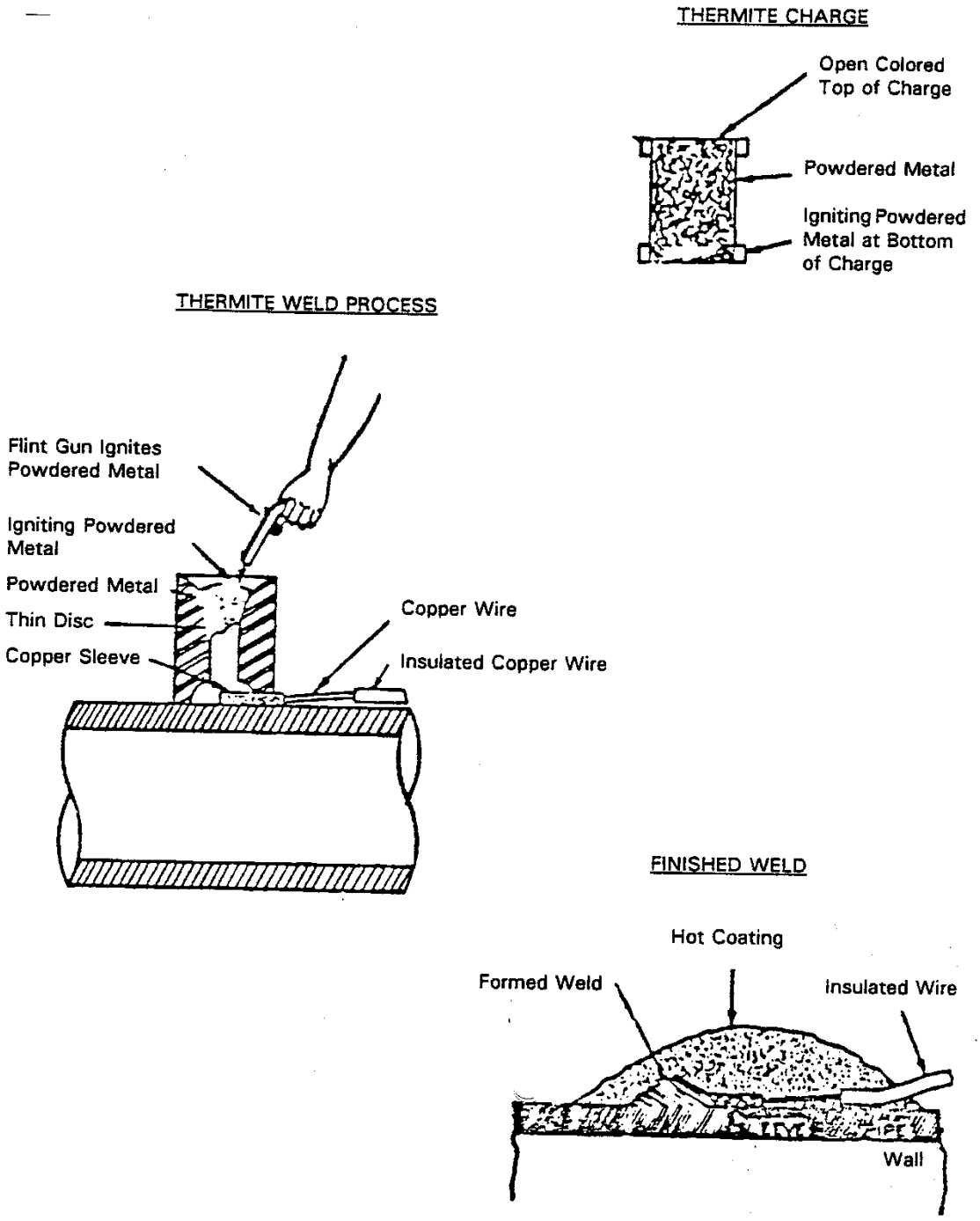
1. Multiple thermite welds must be spaced at least 4 inches apart on the pipe.

2. Unsuccessful welds should be abandoned and moved to another prepared surface at least 4 inches away.

3. Cable strands are to be arranged in groups of approximately #6 AWG.
   - #0 (1/0) cable: Strip approximately 9 inches of cable and divide the 19 strands into bundles of 6, 7, and 6 strands. No copper sleeves are required.
   - #2 cable: Strip approximately 6 inches of cable and divide the 7 strands into bundles of 3 and 4 strands. No copper sleeves are required.
   - #4 cable: Strip approximately 6 inches of cable and divide the 7 strands into bundles of 3 and 4 strands. A #8 copper sleeve is required on the 3-strand bundle.

4. Attach the cable strand groups as per the above Thermite welding procedure.

Figure 1: Thermite Weld Process



Mechanical Electrical Connections

Mechanical electrical connections can be installed in a manner that provides mechanical security and electrical conductivity.

Ensure that a strain loop or tension restraint is to be incorporated with the mechanical electrical wire connection near the pipe connection area.

Crimp Connectors

1. Install the crimp connector using the same gauge of wire into each end of the crimp connector. Take care not to over-crimp the connector and wire.

Threaded (screw) Compression Connectors

1. Ensure that when tightening wire inside a threaded compression connectors that the wire is not over tightened.

Split Bolt Connectors

1. Split bolt connectors function much the same as threaded compression connectors except that wire can be inserted from either or both side of the connector and when tightening the connector screw, wire damage is minimized since the connector has a non-threaded face in contact with the wire.

Solder Connections

1. Ensure that wire composition is compatible with the particular solder material to be used to make the connection.

2. Thoroughly clean and apply flux to the wire surfaces to be soldered together.

3. Heat the wire surfaces to be soldered to a temperature that allows solder to flow onto the wire.

4. Clean all acid flux from the wire after soldering and appropriate cooling time as acid flux can accelerate corrosion.

Wire Nut Connectors

1. Strip the wire ends to a suitable length that is compatible with the wire nut to be used.

2. Twist the solid or stranded wire ends together in a clockwise direction and twist the wire nut connector onto the stripped wire ends also in a clockwise direction until snug.

3. Do not over tighten the wire nut. Metallic insert wire nuts are preferable to plastic internal threaded wire nuts for added mechanical strength.

4. Some operators perform an electrical continuity test on mechanical electrical connections and associated electrical wire systems prior to backfilling.

MAINTENANCE INSTRUCTIONS

1. All mechanical electrical connections must be protected from atmospheric or earthen electrolyte corrosion.

2. When using wire nuts, consider those that are filled with a dielectric lubricant in order to avoid corrosion over the wire ends or insert the wire nut cover tube filled with dielectric grease that is specially made for this purpose.

3. All other splice types including; crimp, threaded (screw), split bolt, and solder connections require the application of either a dielectric grease, suitable petroleum mastic, or "liquid electrical tape" to act as a water proof coating followed by an ample wrap of non-conductive tape.

4. Additional future maintenance requirements are commonly due to damage by outside forces and may not always be avoided, but can be remedied when the operator has knowledge of such damage.

5. Mechanical electrical connections that are installed for the purpose of monitoring cathodic protection systems can be electrically tested for discontinuity indicating separated connections.

Reporting / Notification:

Document the details of the thermite welding as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:

- Thermite welding generates extremely high temperatures (4000-5000°F). Care should be taken to remove flammable materials from the work area and to use company approved PPE.
- Mixing water with thermite or pouring water onto burning thermite can cause a steam explosion. Never thermite weld on a wet or damp surface.
- It is extremely difficult to smother a reaction once initiated. Keep thermite powder away from sources of ignition.

Abnormal Operating Conditions (AOCs):

- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure
- Improper Certification

Personal Protective Equipment:

- Gloves
- Safety Glasses / Safety Goggles (as needed)
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 006
REVISION DATE		B31Q COVERED TASK NO.
6/29/2021		0061
Pipeline O&M Procedure Corrosion Control	**Inspect and Test Cathodic Protection Bonds**	PAGE NO. 1 of 5

SCOPE

This procedure outlines the general guidelines for inspecting and testing interference bonds.

OBJECTIVES

To safely inspect and test bonds with minimal environmental impact.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- *Inspect Rectifier and Obtain Readings* Procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Voltmeter / Multi-meter *
- DC-Amp clamp
- System maps and records

* Voltmeter or Multimeter- A voltmeter used for cathodic protection work needs to have an input impedance of at least 10 megaohms and a DC voltage scale.

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for inspecting interference bonds.

Approval:_____ Approval Date: _____ Next Review Date: _____

Inspect Interference Bonds

This procedure outlines the general guidelines for inspecting and testing interference bonds. Bonds are used to ensure the continuity of the cathodic protection system across pipe joints.

General Procedure:

1. Locate and access the test box or facility that contains the cathodic protection interference bond.

2. Visually inspect the equipment for signs of overheating, discolored wire or shunt material, corrosion that could cause connections to fail, or other undesirable conditions.

3. Examine resistance wire(s) or potentiometers for burned or broken wires that would indicate a lightning strike or power surge. Repair any defect as necessary.

4. If the test box or facility contains a shunt resistor designed to measure current, read the voltage across the shunt side pins and calculate the current flow across the shunt resistor following the steps in the section "Measure Bonds with a Permanent Current Shunt in Series" of this procedure.

5. If the bond does not have a shunt resistor, following the steps in the section "Measure Bonds Without a Permanent Current Shunt in Series" of this procedure.

6. Compare all gathered data for the bond with historical values to determine if the bond circuit is performing within the expected parameters.

7. If the new data is not in agreement with historical values, the bond circuit may need to be repaired or replaced.

Measure Bonds with a Permanent Current Shunt in Series:

1. Set the voltmeter to millivolts (mV) on the DC scale. Most multi-meter instruments have a 200-mV scale.

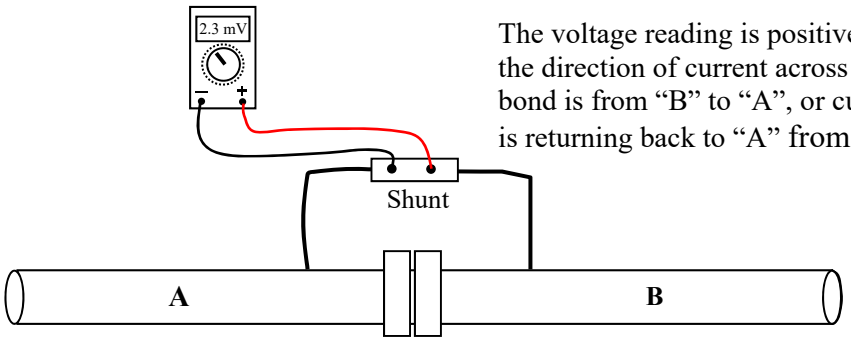
2. Connect the voltmeter test leads to the measuring points on the shunt, usually two inner screws or connection points.

3. If the potential is negative then reverse the voltmeter test leads for a positive voltage reading.

4. The voltage measurement should be steady, non-fluctuating. If there is fluctuation in the reading, then clean the connection points for a metallic tight and secure connection.

5. If the voltage reading is positive then the direction of current across the bond is from the side connected to the positive test lead to the side connected to the negative test lead.

   Refer to the following drawing.



The voltage reading is positive, so the direction of current across the bond is from "B" to "A", or current is returning back to "A" from "B".

6. Record the direction of current across the bond.

7. Calculate and record the magnitude of current through the bond.

8. The magnitude is calculated using the shunt value and the voltage reading across the shunt.

   - If the shunt value is in ohms:
     Current (milliamps (mA)) = Voltage across shunt (mV)/Shunt Resistance (ohms)

     Example 1: Shunt = 0.01 ohms, Voltage = 2.3 mV (as read from the voltmeter)
     Current = 2.3 mV / 0.01 ohms
     Current = 230 mA

     Example 2: Shunt = 0.001 ohms, Voltage = 0.23 mV (as read from the voltmeter)
     Current = 0.23 mV / 0.001 ohms
     Current = 230 mA = .23 amps (A)

   - If the shunt value is in A/mVs:
     Current (A) = Voltage across shunt (mV) * Shunt (A/mV)

     Example 1: Shunt = 30A/50mV, Voltage = 0.38 mV (as read from the voltmeter)
     Current (A) = 0.38 mV * 30 A / 50 mV
     Current = 0.228 A = 0.23 A

     Example 2: Shunt = 50A/50mV, Voltage = 0.23 mV (as read from the voltmeter)
     Current (A) = 0.23 mV * 50 A / 50 mV
     Current = 0.23 A

9. Document the bond current, including a description of the current direction, magnitude of current and units.
   Example: 0.23 Amps from Company B to Company A

Measure Bonds Without a Permanent Current Shunt in Series:

1. If possible break the bond and install a temporary shunt in series and use the above procedure for measuring the direction and magnitude of current.

2. Use a DC-Amp clamp.

3. Orient the clamp, as it will be when installed on the bond.

4. Zero out the meter.

5. Place the clamp around the bond with the bond wire centered in the clamp loop.

6. Read the magnitude of the current from the meter.

7. The direction of current through the bond depends on the sign on the meter display and designated direction of the current arrow on the clamp. If the meter is showing a positive sign then the current is in the direction of the arrow. If the meter is showing a negative sign then the current is in the opposite direction of the arrow.

8. Calculate the magnitude of the current as described the section "Measure Bonds with a Permanent Current Shunt in Series" of this procedure.

Reporting / Notification:

Document the details of bonds inspection as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:

- Do not conduct this procedure during a lightning storm. Electricity from the lightning could travel onto the pipe and result in death or injury when electrical contact is made with the pipe during the rectifier inspection.

Abnormal Operating Conditions (AOCs):

- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damaged Test Station

REVISION NO.		PROCEDURE NO.
		MP 006
REVISION DATE		B31Q COVERED TASK NO.
6/29/2021		0061
Pipeline O&M Procedure Corrosion Control	**Inspect and Test Cathodic Protection Bonds**	PAGE NO. 5 of 5

Personal Protective Equipment:

- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 007
REVISION DATE		B31Q COVERED TASK NO.
6/29/2021		0071
Pipeline O&M Procedure Corrosion Control	**Inspect and Test Cathodic Protection Electrical Isolation Devices**	PAGE NO. 1 of 3

SCOPE

This procedure describes the inspecting and testing of electrical isolation devices on cathodically protected pipelines.

OBJECTIVES

To safely inspect cathodic protection electrical isolation devices with minimal environmental impact and minimal down time and to ensure the new isolation devices are working properly.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- *Install Cathodic Protection Electrical Isolation Devices* Procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- System maps and records
- 10 mega ohm input impedance digital multimeter
- Automotive battery circuit (12-volt wet-cell battery)
- Magnetic isolation tester with headphones
- Other equipment and materials, as needed

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Repaired sections of pipeline needing cathodic protection
- New sections of pipeline needing cathodic protection
- Areas of the pipeline where stray currents may be present
- Electrically isolating house piping from customer services lines

Approval:_____ Approval Date: _____ Next Review Date: _____

Inspect Cathodic Protection Electrical Isolation Devices

This is the general procedure to inspect or test a cathodic protection electrical isolation device to ensure it is working properly.

Above Ground Isolation Devices

1. Perform a visual inspection of the isolation device for general condition, including corrosion, mechanical damage, or any other condition that might impair the operation of the device. Correct as necessary.

   (Note: Metallic based paints can cause shorting of isolation devices and should be avoided)

2. Measure the pipe–to–soil potential on both sides of the isolation device and confirm that the difference is adequate to assure positive isolation. (Note: Pipelines with cathodic protection on both sides of an isolation device can have the same potential on both sides and NOT be shorted.
   a. Connect an automotive battery circuit (12-volt wet-cell battery) with the negative terminal connected to the pipeline, and with the positive terminal connected to a temporary ground rod.
   b. Check the voltage on the side of the isolation device where the automotive battery circuit (12-volt wet-cell battery) is connected. If this side of the isolation device has a voltage value in excess of the minimum threshold, the isolation device is operating properly. Otherwise, the isolation device is shorted and must be repaired or replaced.

3. A magnetic isolation tester with headphones can also be used to test for proper isolation by connecting the needle points to each side of the isolation device and listening for a 60 cycle AC power humming noise or a scratching sound when the needles are moved across the sides of the isolation device. Either sound confirms that the isolation device is performing properly.

Casing Spacers

1. This inspection/test assumes that cathodic protection test leads are installed on both the carrier pipe and the casing pipe. A vent riser attached to the casing can also be used for a test lead.

2. Read the pipe–to–soil potential of the carrier pipe and record the value.

3. Using an automotive battery circuit, connect the positive terminal of the battery to the casing vent or casing test lead. Connect the negative terminal to a temporary ground rod. DO NOT use the carrier pipe for the negative connection in case the casing and carrier are shorted.

4. Check the pipe–to–soil potential of the carrier pipe again.

5. If the carrier pipe–to–soil value has not changed, the casing spacers are performing properly and the casing is not shorted to the carrier pipe.

6. If the carrier pipe–to–soil value has shifted to a positive voltage value, the casing is shorted to the carrier pipe and excavation and repair must be scheduled.

Reporting / Notification:
Complete documentation in accordance with Operation and Maintenance Manual.

Potential Hazards:
- Beware of lightning and thunder. Do not inspect cathodic protection electrical isolation devices if lightning is present.
- Beware of electrical shock hazard due to stray current. Check for stray currents before attempting to install electrical isolation devices.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Damaged Test Station

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 008
REVISION DATE		B31Q COVERED TASK NO.
6/29/2021		0081
Pipeline O&M Procedure Corrosion Control	**Install Cathodic Protection Electrical Isolation Devices**	PAGE NO. 1 of 5

SCOPE

This procedure describes the installation of welded and non-welded electrical isolation devices on cathodically protected pipelines.

OBJECTIVES

To safely install cathodic protection electrical isolation devices with minimal environmental impact and minimal down time, and to ensure that new isolation devices are working properly.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- *Apply Pipe Coating* Procedure
- Installation Standards, Gas Piping and Appliances, Customers' Premises

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Hand tools
- Flange insulation kits
- Radio Frequency (RF) insulation tester
- Approved coating materials
- Other equipment and materials as needed
- Fire extinguisher for fire watch

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

Ensure a fire watch is standing by during welding activities.

COMMENTS

This procedure may be used for:

- Repaired sections of pipeline needing cathodic protection
- New sections of pipeline needing cathodic protection
- Areas of the pipeline where stray currents may be present
- Electrically isolating house piping from customer services lines
- Installation of isolation devices during installation of company meters

Approval:_____ Approval Date: _____ Next Review Date: _____

Install Cathodic Protection Electrical Isolation Devices

This procedure is for the installation of welded and non-welded cathodic protection electrical isolation devices. Cathodic protection significantly decreases corrosion on metal pipe and is used for the pipe's protection.

Each buried or submerged pipeline must be electrically isolated from other underground metallic structures unless the pipeline and the other structures are electrically interconnected and cathodically protected as a single unit.

An insulating device must be installed where electrical isolation of a portion of a pipeline is necessary to facilitate the application of corrosion control to such portion(s).

Installing a Weld-in Insulator (Manufactured Insulated Pipe Segment):

1. Inspect the insulated pipe segment for defects.

2. Use a RF Insulation Tester to check for the absence of conductivity prior to welding.

3. Always use an API 1104 qualified welder to perform all welding functions.

4. After welding is completed and cooled, test the fitting under operating pressure by following the appropriate Pressure Testing procedure.

5. Check the effectiveness of the insulator.

6. If checking the insulator indicates that there is electrical conductivity across the fitting, the device is faulty and should be replaced.

7. Apply protective coating, as appropriate, for above or below ground service. See the procedure *Apply Pipe Coating* for more information.

Installing an Insulated Flange Assembly:

1. Inspect the insulating gasket and flanges for defects.

2. Align flanges so that the faces are parallel to each other and the bolt holes line up. Do not force flanges into alignment using mechanical devices such as jacks or other tools that place excessive strain in the completed assembly.

3. Insert the full-face gasket between the flanges.

4. Insert several bolts, install nuts and tighten to hold the flanges in alignment. Insulating tubes and washers need not be installed on these bolts as they will be removed later in this procedure.

5. Insert insulating tubes on remaining bolt holes.

6. Insert bolts through the insulating tubes.

7. Place insulating washers onto the bolts.

8. Place steel washers and nuts on bolts and hand tighten.

9. Remove the bolts installed in step 4 and repeat steps 5-8 for these bolts.

10. Partially tighten the nuts on the bolts in sequence starting with the bolt at 12 o'clock, then 6 o'clock, then 3 o'clock, then 9, o'clock, etc. Tighten bolts per manufacturer specifications.

11. Check the effectiveness of the insulator.

12. If the check indicates there is electrical conductivity across the flange assembly, disassemble the flanges and start over at step 1.

13. Apply protective coating, as appropriate, for above or below ground service. See the procedure *Apply Pipe Coating in the Field (Hot Application)* or *Apply Pipe Coating in the Field (Cold Application)* for more information.

Installing an Insulated, Bolted, Compression Coupling (Pipe Joining):

1. Inspect the surfaces of the pipe and coupling where the gasket is to sit to ensure they are free of grease, coating, scale, dirt or other materials. Remove any irregularities in the pipe that might damage the gasket. If the pipe ends are ragged, smooth them off to prevent damage to the gasket.

2. Apply soapy water to the pipe ends to aid in positioning the gasket without damaging it.

3. Install both the skirted gasket and the polyethylene insulator to one of the pipe ends. The middle sleeve must be positioned equally over both pipe ends. Leave no more than 1-inch of gap between pipe ends.

4. Partially tighten the nuts on the bolts in sequence starting with the bolt at 12 o'clock, then 6 o'clock, then 3 o'clock, then 9, o'clock, etc. Tighten bolts per manufacturer specifications.

5. Check the effectiveness of the insulator.

6. If this check indicates there is electrical conductivity across the fitting, disassemble the fitting and start over at step 1.

7. Test the coupling under operating pressure, following the appropriate Pressure Testing procedure.

8. Apply protective coating, as appropriate, for above or below ground service. See the procedure *Apply Pipe Coating* for more information.

Installing an Insulated, Stab-fitting, Compression Coupling (Pipe Joining):

1. Clean pipe surfaces where coupling is to be installed. Ensure pipe is free of grease, coating, scale, dirt or other materials.

2. Disassemble the coupling and slide the end nuts onto each piece of pipe so that the threaded ends face each other.

3. Ensure the gaskets on each pipe end are in the same position that they were in when disassembled.

4. Apply soapy water to the gaskets.

5. Stab pipe ends into the coupling body until contact is made with the pipe end spacer.

6. Tighten end nuts using a smooth-jawed wrench while holding the coupling body from rotating using a pipe wrench.

7. Check the effectiveness of the insulator.

8. If this check indicates there is electrical conductivity across fitting, disassemble the fitting and start over at step 1.

9. Test the coupling under operating pressure, following the appropriate Pressure Testing procedure.

10. Apply protective coating, as appropriate, for above or below ground service. See the procedure *Apply Pipe Coating* for more information.

Reporting / Notification:
Complete documentation in accordance with Operation and Maintenance Manual.

Potential Hazards:
- Beware of lightning and thunder. Do not install cathodic protection electrical isolation devices if lightning is present.
- Beware of electrical shock hazard due to stray current. Check for stray currents before attempting to install electrical isolation devices.
- Do not watch the welding process with unprotected eyes. Doing so will cause painful and harmful burns to the eyes. Be especially careful if you are wearing contact lenses.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Damaged Test Station

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 009
REVISION DATE 6/29/2021		B31Q COVERED TASK NO. 0091
Pipeline O&M Procedure Corrosion Protection	**Troubleshoot In-Service Cathodic Protection System**	PAGE NO. 1 of 9

SCOPE

The purpose of this procedure is to give guidelines for troubleshooting a cathodic protection system.

OBJECTIVES

To describe steps to thoroughly investigate and remedy cathodic protection issues when deficiencies are discovered.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- System maps and cathodic protection inspection records
- Voltmeter / Multi-meter*
- Copper-copper sulfate electrode
- Copper sulfate solution
- Ground rod
- DC battery supply
- Electrical ammeter

* Voltmeter or Multimeter- A voltmeter used for cathodic protection work needs to have an input impedance of at least 10 megaohms and a DC voltage scale.

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Measuring pipe to soil potential
- Verifying test lead continuity
- Verifying that the CP testing equipment is working properly

This procedure may be used as:

- Field Operator guidance

Approval: _____ Approval Date: _____ Next Review Date: _____

Troubleshoot Cathodic Protection Issues

This is the general procedure for troubleshooting cathodic protection issues. When a test station gives a pipe-to-soil CP reading of less than -0.85 V, investigatory work must be performed in order to correct the situation.

Before starting troubleshooting procedure, confirm test lead continuity and that CP testing equipment is working properly.

To Inspect Test Lead Continuity:

1. Check your voltmeter or multi-meter to ensure the battery is good. If the battery is low then a "low battery" indicator will display. Replace the battery as needed. Do not use a voltmeter or multi-meter with a low battery.

2. Make a pipe to soil potential measurement connected directly to the cathodic protection (CP) test station wire lead.

3. A zero DCV reading is an indication of failed test lead continuity.

4. If the test lead fails continuity, verify that the CP testing equipment is working properly as directed below, then make a second pipe to soil potential measurement connected directly to the CP test station wire lead. If the reading is still zero DCV, report the test station failure to the Supervisor and document the reading.

To Verify that the CP Testing Equipment is Working Properly:

1. Remove the end cap protector on the copper-copper sulfate reference electrode.

2. Keep the reference electrode ¾ filled with clean supersaturated copper sulfate solution. A clear blue solution with undissolved copper sulfate crystals is desirable.

3. If the solution becomes cloudy or was previously used in an area containing contaminates then the reference electrode should be cleaned as follows:

    a. Disassemble the reference electrode from the top and pour out the old solution.
    b. Rinse out the reference electrode cylinder and copper rod with distilled water.
    c. Shine the copper rod with fine silica (not metallic paper) sandpaper and rinse with distilled water.
    d. Fill approximately ¼ of the reference electrode cylinder with a high-grade of copper sulfate crystals.
    e. Add distilled water to the cylinder to a level over ¾ full.
    f. Reassemble the reference electrode hand tight.
    g. Shake the reference electrode vigorously.

h. The copper sulfate solution is supersaturated when crystals remain after complete dissolution.

4. A clean copper-copper reference electrode (never used in the field) is used to calibrate field reference electrodes. Use a clean container of tap water to measure the voltage difference between the office and a field reference electrode. If there is more than 10 millivolts difference between the electrodes then the field electrode should be cleaned and recharged.

5. The instrument test leads are the portable wires extending from the voltmeter. Test leads should be electrically continuous from the meter to the contact. Any test leads broken or that have questionable electrical integrity (i.e. breaks in insulating coating) should either be repaired or replaced before making further measurements.

6. Replace the end cap protector on the copper-copper sulfate reference electrode.

Troubleshooting Procedure:

1. Examine historical pipe-to-soil reading data in order to ascertain the extent of the discrepancy.

2. An abrupt decrease in pipe-to-soil readings for any type of cathodic protection system generally indicates either a faulty test station connection, or a foreign contact short.

   Gradually decreasing pipe-to-soil readings for a galvanic anode cathodic protection system generally indicates normal degradation of the current output capacity of the installed galvanic anodes.

   An abrupt decrease in pipe-to-soil readings for an impressed current rectified cathodic protection system generally indicates either a failed anode ground bed or a failed pipe coating system.

3. Connect the DC battery with the positive terminal lead to the temporary ground rod, and the negative terminal lead to the pipeline to be protected.

4. Install the electrical ammeter into the DC battery circuit. Start at the highest range on the meter and work downward to prevent damage to the ammeter if the current output is higher than expected.

5. Connect the digital multimeter and the Copper Copper-Sulfate reference electrode to monitor the pipe-to-soil potentials on the pipeline being tested.

6. Record the current value on the ammeter.

7. Allow the current to flow for about one minute and then turn the current supply off.

8. When the current supply is turned off, immediately observe the digital multimeter voltage value and monitor the pipe-to-soil potential value of the pipeline.

9. The pipe-to-soil potential value should fall from the initially observed output voltage value and stabilize momentarily at the polarized voltage value.

10. If the polarized voltage potential value is within required criteria levels, and the current value is not too excessive, the testing is has been completed.

11. The number of anodes needed to produce the required protective current must now be determined and installed; otherwise the required increase in rectifier current output must be supplied.

12. Report any abnormal operating conditions to the Supervisor immediately.

Interference Current Testing

Cathodic Protection issues could be caused by stray currents. This procedure provides general guidelines for testing to detect interference. Stray current corrosion (interference) occurs as a result of the influence of a foreign voltage gradient in the earth. Potential sources of stray current include, but are not limited to:

- Other pipeline cathodic protection systems
- DC traction systems (e.g. subways, light rail systems, trolley)
- Telluric (natural earth) currents
- High-voltage DC transmission
- Welding

The Company's cathodic protection (CP) systems are designed and installed so as to minimize any adverse effects of stray currents on adjacent underground and nearby metallic structures, see Figures 2 & 3 for examples of current interference. Interference current testing is conducted to confirm the proper operation of the CP systems, to monitor potential stray currents, and to identify new stray currents.

Interference Current Testing:
To distinguish the current in a foreign pipeline from the current in the company pipeline, install an automatic current interrupter in the output of the rectifier. This device automatically opens and closes an electrical circuit at a preset time.

With the current interrupter operating, measure the potential of the lines under both on and off conditions.

These tests are performed using a copper sulfate electrode placed over the crossing point of the lines. Use a pipeline locator to determine the exact location of the crossing.

1. Working with a representative of the foreign pipeline company, install a current interrupter in series with the cathodic protection circuit (usually the rectifier) of the identified foreign current source.

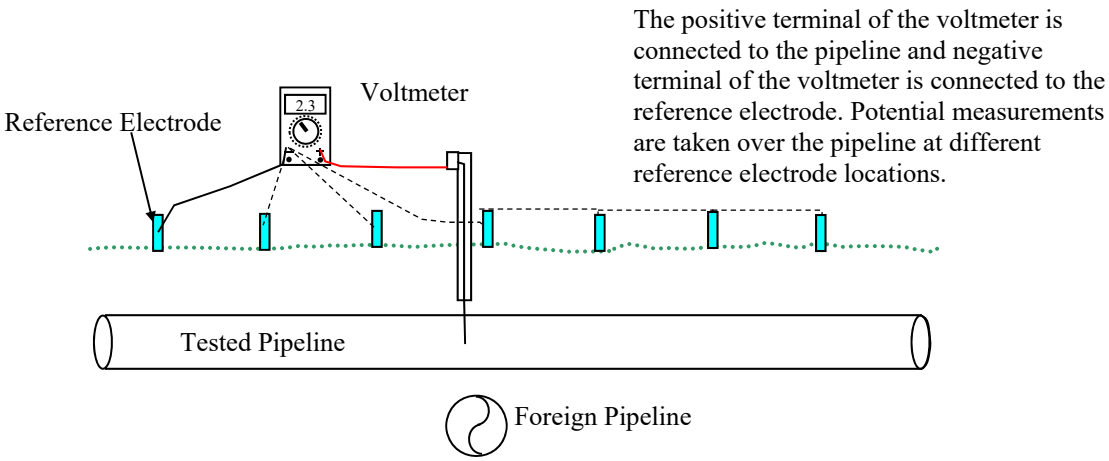
2. The "on" and "off" cycle should be distinguishable. Also, current can be manually interrupted with radio communication between the person interrupting the current and the person measuring potentials.

3. Measure pipe-to-soil potentials in the affected area with the current interrupter in both the "on" and "off" cycles. Record the change in voltage. A large change in voltage is a strong indicator of an interference current.

4. Obtain the pipe-to-soil potentials following the *Measure Pipe-to-Soil Electrolyte Potential* procedure.

5. This may be a single potential or a potential profile. Refer to Figure 1 below for an illustration of a potential profile.

Figure 1: Potential Profile



6. Document the reading during the current interrupted potentials and record the location(s) of the reference electrode using GPS mapping (lat. / long.).

7. Potentials shifting with the foreign current are an indication of interference.

8. Potentials that are more negative with the foreign current "on" than when "off" indicates an area of current pickup and is referred to as "shifting with the current".

9. Potentials that are more positive with the foreign current "on" than when "off" indicates an area of current discharge and is referred to as "shifting against the current".

10. Potentials indicating interference should be reported immediately to the supervisor for further testing and evaluation of the severity of it.

11. Report any Abnormal Operating Condition to the Supervisor immediately.

Interference Current Mitigation:
Ensure the representative of the foreign pipeline company is onsite before proceeding to correct the problem on the affected line.

Conduct joint cooperative interference tests with the representative of the foreign company to determine the location of current discharge and the magnitude of the interference current. Mitigate any adverse electrical interference from foreign structures.

1. Check for the presence of dynamic current (DC) interference.

2. Install test wires on both structures at the location of the current discharge.

3. Attach test wires to the structure to yield a permanent, low-resistance connection.

4. Terminate test wires inside of the appropriate test box that is accessible to both structures and representatives of both companies.

5. Install shunts for the measurement of current flow inside of the test box.

6. Install a resistance wire inside of the test box as needed in order to limit current interchange.

7. Install blocking diodes as required.

8. Conduct tests to determine the effectiveness of the installed interference bond.

9. Install rectifiers or reverse current switches in unusual situations where a conventional metallic bond is not effective.

10. Identify potential abnormal operating conditions and determine the appropriate actions to be taken.

Indications of Interference:

Normal Operation – Pipe-to-soil potentials are a measure of the cathodic protection level on a pipeline. Potentials will usually be higher at the cathodic protection current source with potentials reducing in the direction away from the current source or in between current sources. Indications of interference are potential measurements that do not follow this usual pattern.

Interference Current Pickup – Potentials are unusually higher than is anticipated under normal operating conditions. If interference current pickup is suspected then testing should be performed to confirm.

Interference Current Discharge – Potentials are unusually higher than is anticipated under normal operating conditions. If interference current discharge is suspected then testing should be performed to confirm.

Identification of Interference Source – interference testing requires identification of the foreign current source. There are two voltage gradients associated with foreign cathodic protection systems.

- Voltage Gradients of the Structure – a pipeline near or crossing a foreign cathodically protected structure can result in interference current discharge referred to as cathodic interference. An indication is depressed potentials near the foreign structure.

- Voltage Gradients of Anodes – a pipeline near a foreign anode bed can result in interference current pickup referred to as anodic interference. An indication is elevated potentials near the foreign anode bed.

Reporting / Notification:
Complete documentation in accordance with Operation and Maintenance Manual.

Any pipe-to-soil potential less than negative 850 mV (-0.85 V) should be addressed in accordance with Operation and Maintenance Manual.

Potential Hazards:
- Some test lead stations are located in high grass or near swampy areas. Beware of snakes.
- Do not conduct the survey during a lightning storm. Electricity from the lightning could travel onto the pipe and result in death or injury when electrical contact is made with the pipe during the rectifier inspection.

Abnormal Operating Conditions (AOCs):

- Damaged Test Station
- Fire or explosion
- Unexpected presence of hazardous gas
- CP reading outside of expected ranges
- Component failure: Broken leads, failed rectifier, burnt or charred wires

Personal Protective Equipment:

- Steel-toed boots
- Company Approved Fire Retardant Clothing

Figure 2: Anodic Interference

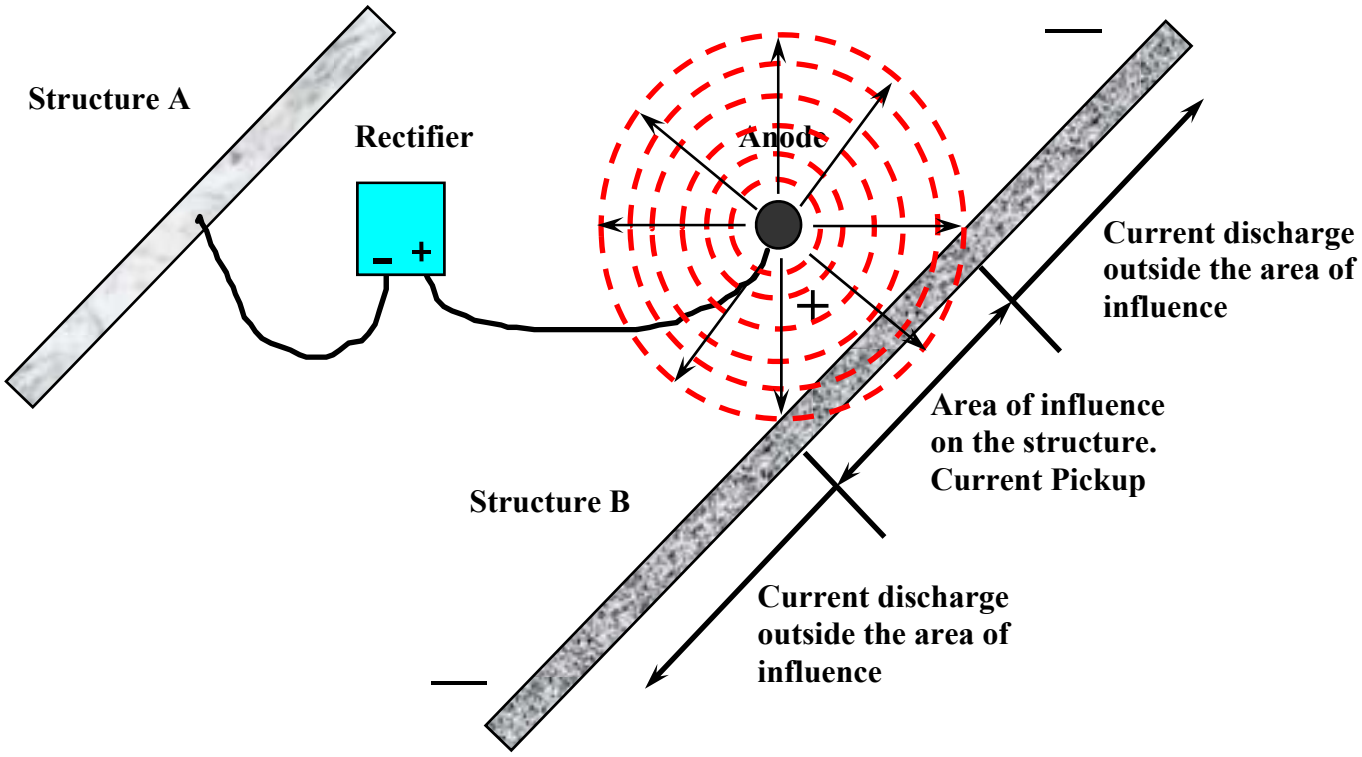
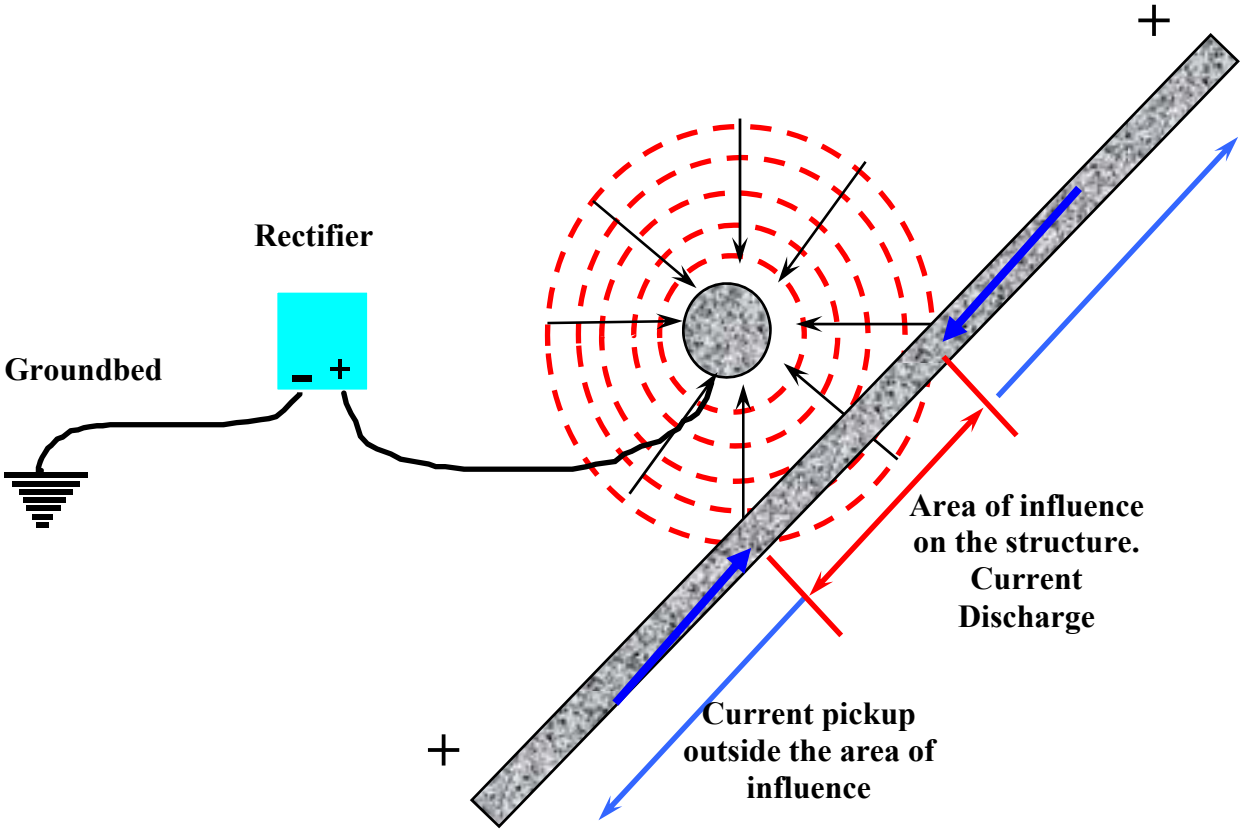


Figure 3: Cathodic Interference



REVISION NO.		PROCEDURE NO.
		MP 010
REVISION DATE		B31Q COVERED TASK NO.
6/29/2021		0101, 0111
Pipeline O&M Procedure Corrosion Control	**Inspect and Maintain Rectifier**	PAGE NO. 1 of 7

SCOPE

This is the general procedure for bi-monthly rectifier inspections and maintenance of rectifiers. Bi-monthly inspections should be made to assure desired operation and prevent any overloading. It describes required cathodic protection inspection practices.

OBJECTIVES

To safely inspect and maintain rectifiers and obtain readings. The rectifier must be maintained within the manufactures written specifications.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS sheet(s) if applicable
- *Measure Pipe-to-Soil Electrolyte Potential* procedure
- Manufacturer's rectifier instruction manual and wiring diagrams

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Voltmeter / multi-meter / data-logger
- Hand tools
- Writing utensil and inspection forms
- Cell phone, radio or other communication gear

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: SHOCK HAZARD The rectifier is powered by high voltage A.C. power. Whenever the rectifier case is opened, there is a potential shock hazard to personnel performing rectifier maintenance.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Inspecting rectifiers
- Maintaining rectifiers
- Conducting regular CP surveys
- Verifying that CP testing equipment is working properly

Approval:_____ Approval Date: _____ Next Review Date: _____

Inspect and Maintain Rectifier

This is the general procedure for bi-monthly rectifier inspections. Bi-monthly inspections should be made to assure desired operation and prevent overloading.

This procedure also describes the general steps required for routine maintenance of oil immersed and air-cooled rectifiers. The manufacturer's recommendations should be followed in order to ensure personal safety and the continued operation of the rectifier. The manufacturer's instruction manual should be consulted for additional information about routine inspection and maintenance activities.

CAUTION: The rectifier poses an electrical shock hazard. Contact with this high voltage can produce severe or fatal shock.

Only experienced electrical personnel should attempt location and repair of electrical difficulties, should they occur.

General Inspection Procedure:

1. Check your voltmeter or multi-meter to ensure the battery is OK. If the battery is low then a "low battery" indicator will display. Replace the battery as needed. Do not use a voltmeter or multi-meter with a low battery.

2. Check for external damage to the rectifier unit.

3. Before making any contact with the rectifier, check with a voltmeter that the rectifier case is not shorted to the ground.

   If there is a voltage reading, do not touch the rectifier -- there may be a short.

4. Unlock and open the access door. For oil immersed units, check cleanliness of tank interior.

5. Verify that the A.C. power supply is switched to the "On" position.

6. Verify that the NEGATIVE output terminal is connected to the structure (pipeline) to be protected.

7. Verify that the POSITIVE terminal is connected to the anodes.

8. Check the current and voltage readings. Voltage and amperage readings should be taken with the multimeter or datalogger. Record these measurements in the Bi-monthly Rectifier Inspection Report. Do not rely on the rectifier voltage or Amp gauges for monthly readings or for current flow.

9. A zero D.C. voltage or D.C. current meter reading indicates a problem that should be reported to the Supervisor.

10. For oil immersed rectifiers, check the oil level. If necessary, fill the tank to proper level with electrical insulating transformer oil. Report any indications of a leak to your supervisor.

11. Close the access door and replace security lock.

12. Any abnormal operating condition should be reported to a Supervisor immediately.

Checking the Rectifier Output Current:

1. Select the proper meter settings and range (Set to read DC millivolts (mV)).

2. Locate the shunt and verify the shunt amperage and millivolt rating

3. Measure the voltage across the shunt.

4. Calculate the current output by multiplying the millivolt reading across the shunt by the shunt amperage rating and divide by the shunt millivolt rating. Example: With a shunt rated at 50mV and 15A and a meter reading across the shunt of 34 mV:
   34mV x 15A / 50mV = 10.2 Amps.

5. Record the current on the proper forms.

General Maintenance Procedure and Recommendations:

1. Voltage, current and ambient temperature ratings of unit should not be exceeded. See the Manufacturer's Installation and Maintenance Manual for acceptable limits.

2. Check all electrical connections and tighten them if they are loose.

3. Maintain routine cleanliness.

4. Keep screened ventilation openings free of obstructions to ensure adequate ventilation.

5. Do not overload the rectifier. Severe overloads can permanently damage rectifiers and special precautions may be required for abnormal or persistent overload exposures. If the overload protection trips repeatedly, investigate and eliminate the cause before attempting further operation of rectifier.

6. Do not operate the rectifier at higher than nameplate ratings, it will result in eventual failure of the rectifier.

7. Do not exceed A.C. or D.C. ratings of the rectifier.

8. If rectifier components overheat, or there is any evidence of electrical failure, turn rectifier "OFF" and report overheating problem to the Supervisor immediately.

9. For oil immersed units, the oil should be inspected periodically and oil should be replaced when contaminated.

Adjusting D.C. Voltage and Current:
The rectifier unit will respond to electrical changes in the system external to the unit, such as pronounced fluctuation of A.C. line voltage or changes in ground bed resistance. Such changes can alter the operating D.C. voltage and/ or current output of the rectifier.

Monthly inspections should be made to assure desired operation and prevent any overloading. Voltage adjustments should be made as required.

1. Before increasing coarse control setting, return the fine control setting to the lowest position.

2. Change coarse control setting to next higher position.

3. With coarse control at lowest setting, increase the fine control setting in progressive steps throughout its full range and observe D.C. output voltmeter and ammeter.

4. Repeat the above steps in this manner until the desired current output is obtained.

5. Document the monthly inspection, recording the current and voltage readings.

6. Review the permanent records for the rectifier. Any pronounced change that is not attributable to voltage adjustment should be reported and investigated.

7. Any abnormal condition shall be reported to management immediately.

Troubleshooting:

1. Perform a complete visual inspection first. Many rectifier problems can be identified through visual inspection. As the rectifier is approached, listen for the hum associated with the transformer operation. If it is there, the power is on and the high voltage side is working. Check for blown circuit breakers, blown fuses, and test the cable connections for tightness first. Visually check for the following:
   a. Arcing;
   b. Broken or missing gauges;
   c. Tripped breakers;
   d. Bad mounting brackets;
   e. Burned wires / smell of burned electrical parts; and
   f. Animals or insects.

2. Rectifiers are shipped with a schematic diagram, usually located in one of the doors. Personnel can refer to this information for guidance.

3. Check the output surge suppresser, or lightning arrester for signs of operation – burn marks, missing pieces, or complete failure. Surges often enter a rectifier from the pipeline.

4. Troubleshooting should be performed from the DC voltage side first. Check for DC output voltage. If it is near normal, check the DC current output. If the DC current is near "zero", look for a blown DC output fuse, or a cut cable.

5. Using the digital multimeter, test the voltage across the tap bars. This is the AC output directly downstream of the transformer. This voltage should be 20 % to 50 % higher than the expected DC output voltage at the DC connection cables to the anode ground bed and the pipeline.

6. If the rectifier has selenium plates, (the green plates stacked together with 4 wires coming out), examine the plate surfaces for burned spots that might indicate a power surge or lightning strike problem. Rectifier plates and diodes are usually soldered into the circuits and do not lend themselves well to field replacement.

7. The list below represents the troubleshooting sequence used to test the entire electrical circuitry of a rectifier.
   a. High voltage input, lightning arrester, circuit breaker.
   b. Transformer, and taps.
   c. Full wave rectifier circuit, plates, diodes.
   d. Measuring circuit, voltmeter, ammeter, shunts, switches.
   e. Output circuit, fuses, lightning arrester, cable terminals.

When each sequential part of the electrical circuit is found to be operational, the next successive item on the list is likely where any electrical circuit problem exists.

Troubleshooting Symptoms & Remedies:
Some symptoms of elementary trouble and the possible remedy are listed below:

Symptom: No D.C. Current Or D.C. Voltage Output.
Remedy: Check A.C. overload protection for blown fuses or tripped circuit breaker, check A.C. power supply.

Symptom: D.C. Voltage But No D.C. Current Reading.
Remedy: Check D.C. ammeter, check D.C. connections and external D.C. circuit for electrical continuity.

Symptom: D.C. Current reading, but no D.C. Voltage reading.
Remedy: Check your D.C. Voltmeter.

Symptom: Maximum rated D.C. Voltage cannot be attained.
Remedy: Check the A.C. line voltage, check the voltage adjustment settings for maximum, check the accuracy of D.C. Voltmeter.

Symptom: Maximum rated D.C. Current cannot be obtained at maximum D.C. voltage.
Remedy: Check load resistance of external D.C. circuit.

Symptom: Overload protection trips repeatedly.
Remedy: Investigate and eliminate cause before attempting further operation of rectifier

Reporting / Notification:
Document the results of the rectifier inspection as required by DOT regulation and Company practice. See the Operations and Maintenance Manual for more information.

Potential Hazards:
- The rectifier poses an electrical shock hazard. Contact with this high voltage can produce severe or fatal shock.
- Never touch the rectifier before first checking for a short. Any contact with a shorted rectifier could result in a severe electrical shock.
- Do not tamper with A.C. power supply terminals of A.C. circuit within the rectifier unless the A.C. power, external to the unit, is turned "OFF". Contact with this high voltage can produce severe or fatal shock.
- Beware of black widow spiders and snakes.

Abnormal Operating Conditions (AOCs):
- Rectifier Malfunction
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 012
REVISION DATE 6/29/2021		B31Q COVERED TASK NO. 0131
Pipeline O&M Procedure Corrosion Control	**Insert and Remove Coupons**	PAGE NO. 1 of 5

SCOPE

The purpose of this procedure is to describe how to install and remove weight loss coupons.

OBJECTIVES

To safely and accurately measure pipeline internal corrosion using weight loss coupons.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- *Visual Inspection of Pipe and Components* Procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Weight loss coupon
- Coupon holder
- Hand tools

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used as:

- Field Operator guidance
- Corrosion Technician guidance

Approval: _____ Approval Date: _____ Next Review Date: _____

Inspect Internal Corrosion with Coupons

This is the general procedure for measuring internal corrosion using weight loss (evaluating and monitoring or EM) coupons. Scheduling of the coupon installation and removal shall be coordinated by a Qualified Corrosion Person.

This is a general procedure to insert and remove using retractable coupon holder, refer to the manufacturer's instruction manual should be consulted for additional information about detailed procedures.

Inserting Coupon Holders:

1. Select the type of coupon holder to install.

2. Install corrosion coupons on the insulator portion of the retractable coupon holder.

   Note: Do no touch the coupon with your bare hand. External contaminants can affect weight loss of the coupon.

3. The rod should be fully retracted to protect the coupon inside the coupon holder housing.

4. Tighten the packing gland until the probe rod will not move.

5. Apply appropriate amount of thread sealant.

6. When installing the coupon holder in an existing system valve, use a new flange gasket.

7. Verify that the bleed valve is closed and the plug removed.

8. Verify that the probe rod is completely retracted.

9. Slowly open the system valve. Carefully observe and stand close to the side of the coupon holder when open the valve.

10. Check for leaks when you can hear that the coupon holder has reached line pressure.

11. Take the following measures when leaks occur:
    a. A leak at the threaded connection:
        i. Shut the system valve,
        ii. Bleed pressure through the bleed valve,
        iii. Remove the probe,
        iv. Re-tape the probe with thread tape and dope, then
        v. Repeat steps 4 through 10 listed above.

b. A leak at the bleed valve: close the valve.

c. A leak at the packing gland: tighten the packing slightly until the leak stops.

d. A leak at the flange faces,
   - Bleed the pressure down,
   - Remove the tool, and
   - Clean the gasket and flange faces.

e. Replace the retractable coupon holder and re-torque the bolts according to the flange manufacture's recommendation.

Note: Ensure there is no trash or other foreign matter is on either of the gasket.

12. Slightly loosen the packing gland.

13. Insert the coupon to the desired depth.

14. Coupon should be in the proper location in accordance with company specification. Care should be taken to position the coupon properly in the flow. Do not allow metal-to-metal contact.

15. Bleed out air through the bleed valve, then close it.

16. Follow company procedure to tag the probe and valve.

17. On lines that can be pigged, if the probe could be damaged during the pigging process, tag both the upstream and downstream pig launching traps with a warning about devices in the lines.

18. To provide an indication if the instrument has moved, mark the shaft of the coupon holder just above the packing gland with an indelible marker.

Removing the Coupon:

1. Look at the mark drawn above the packing gland and check to see if the coupon holder has moved.

2. If the mark has moved, tighten the large packing nut until the coupon holder is held securely. If mark has not moved, proceed with caution.

3. While holding the handle securely, loosen the packing nut slightly. The packing should not be leaking.

4. Remove the coupon.

5. As soon as the probe is removed, shut the system valve. The coupon holder is now isolated from the main line.

   Note: Remember that the coupon assembly is still pressurized.

6. Bleed off the pressure using the bleed valve. Leave the valve open after bleeding off pressure.

7. If the system valve leaks, you will hear pressure escaping from the bleed valve. If pressure does not bleed off: shut the bleed valve, open and shut the system valve a couple of times, then shut the system valve and slowly re-bleed the coupon.

8. Remove the coupon holder from the valve.

9. Clean the probe rod thoroughly before reuse. Inspect the rod during cleaning. A badly pitted or bent rod may not seal at the packing gland.

10. Visually inspect the entire coupon holder for problems.

11. Remove the coupon and replace it in its storage sack.

12. Record the date installed and removed, as well as any other pertinent observations in the space provided.

13. Replace the coupon and reinstall the coupon holder.

14. If the coupon holder will be left for any length of time, plug the system valve with a bull plug, using thread tape, thread dope, or a blind flange.

15. Send the coupons to the approved third party laboratory and data submitted to a Qualified Corrosion Person for review. Again, do not touch the coupon with your bare hands.

Reporting / Notification:
Complete documentation in accordance with Operation and Maintenance Manual.

Potential Hazards:
- Unexpected leak encountered.

Abnormal Operating Conditions (AOCs):

- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Environmental Incident: uncontrolled spill/release of environmentally hazardous materials
- Damage to Facilities
- Mishandling Coupon

Personal Protective Equipment:

- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 013
REVISION DATE 6/29/2021		B31Q COVERED TASK NO. 0141, 0151, 0161, 0201, 0641
Pipeline O&M Procedure	**Visually Inspect Pipe and Components**	PAGE NO. 1 of 5

SCOPE

This is the general procedure for visually inspecting pipe and components for corrosion and other damages.

OBJECTIVES

To safely inspect for damage.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Environmental and Safety Manual

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- N/A

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Conducting visual inspections

This procedure also may be used as:

- Field Operator guidance

Approval:_____ Approval Date: _____ Next Review Date: _____

Inspect for Corrosion and Mechanical Damage

This is the general procedure for inspecting pipe for atmospheric, external, and internal corrosion, mechanical damage and any other irregularities. Anytime the pipeline is exposed, visual inspections must be conducted. Anytime part of the pipeline is cut out and replaced, the internal surface must be inspected for internal corrosion. All pipe and components must be inspected prior to and after installation for any mechanical damage that may occur. Pipe or components that are exposed to the atmosphere must be regularly inspected for evidence of atmospheric corrosion at least once every 3 calendar years, but with no interval exceeding 39 months.

General Procedure for Atmospheric Corrosion Inspections:

1. Perform a visual examination of the pipeline area for conditions that may contribute to atmospheric corrosion.

2. Visually examine exposed portions of pipelines and soil-to-air interfaces located at aboveground block valves, pig traps and station pump piping.

3. Visually and physically examine other above-ground facilities for the presence of the following:
   - General “uniform” corrosion – large areas of pipe are rusting or pitting uniformly
   - Localized “non-uniform” corrosion – pipe is rusting or pitting only in one or more specifically defined areas
   - Faded or thinning paint or coating
   - Flecking or small patches of paint or coating missing, or light rust bleed through
   - Paint or coating totally absent from entire section or large section of facility
   - Paint or coating totally absent from entire section or large section of facility and a percentage of pipe diameter of the original wall thickness has eroded

4. If localized pitting is noted:
   a. Measure the corroded areas of the pipe to determine the effect on the pipe’s integrity.
   b. Use a pit depth gauge to determine the severity of the corroded area.
   c. Determine the longitudinal extent of the pitted area and the maximum pit depth caused by the corrosion.
   d. Contact a Supervisor to calculate the remaining pipe strength (using either the ASME/ANSI B31G method or the RSTRENG method) to determine if the pitting has affected the MAOP of the pipeline.

5. Notify Management of any corrosion problem that is sufficient to affect the integrity (MAOP) of the pipeline.

6. If conditions indicate that the coating is damaged or ineffective, remedial action should be taken to maintain protection.

7. Document the conditions as Good, Fair or Poor
   - Good – No repairs needed, no remediation necessary
   - Fair – Minor surface rust, minor paint scaling - spot painting or wrapping needed. Remediate prior to next 3 year scheduled inspection.
   - Poor – Pitting, extensive paint scaling - Remediate within 12 months

8. For small areas, the surface should be wire brushed and coated with an appropriate hot coating & covered with an appropriate top coating. Various coatings can be used here such as shrink sleeves, cold applied wax tape, or R95 (Powercrete R95 epoxy).

9. For more extensive areas on above-ground piping, the surface should be grit blasted, primed, and repainted following the procedure "Coating Application and Repair".

10. Portions of the pipelines and station pump piping that show corrosion at a soil-to-air interface may also require the application of protective coatings.

11. Any abnormal operating condition should be reported to the Supervisor immediately.

General Procedure for Exposed Pipe Inspections:

1. Visually inspect the entire length of the pipeline section to ensure that there are no wrinkles, gouges, or other apparent physical damages.

2. Inspect for minor scrapes, grooves, and gouges to the pipe wall that may be removed by grinding, filing, or sanding sharp edges until they are smooth.

3. If a pipeline has been moved, pay special attention to the newly introduced longitudinally stressed areas at the end of each section was moved.

4. Depending on the movement reported or suspected, the following characteristics should be observed:
   - Pipe clearance
   - Pipe supports
   - Support structures
   - Horizontal alignment
   - Vertical alignment
   - Pipe movement
   - Pipe depth
   - Pipe bending
   - Insulation damage

5. If any damage is observed along the pipe, notify appropriate personnel according to company policies and procedures.

6. Visually inspect the pipe components. This visual inspection must ensure that:
   - The welding is performed in accordance with the qualified welding procedures.
   - The weld is acceptable to API and DOT requirements as applicable.
   - The appropriate pipe supports or backfill material is in place to minimize stress on the pipe.

7. Verify that the replacement pipe or component(s) used is of comparable material, wall thickness, grade, and pressure rating that meets or exceeds the requirements for MAOP.

8. Verify that each replacement component is installed in a manner that ensures ease of access to the operating mechanism, replacement filters, replacement parts, lubrication ports and other designed maintenance requirements.

9. Verify that for each pipe segment removed due to defect by cutting out a cylindrical section of pipe that contains the defect, the pipe was cut at least one pipe diameter on either side of the defect. Ensure the inside of the pipe is inspected for internal corrosion during this process.

10. Verify that the minimum length of the replacement pipe was the defect length plus two pipe diameters.

11. Welds should be inspected per company practice. Keep in mind that:
    - All arc burns shall be cut out as a cylindrical section of pipe and replaced with a new section of pipe.
    - The section of pipe that has crack(s) should be cutout and replaced.
    - Each weld that is unacceptable must be removed or repaired. A weld must be removed if it has a crack that is more than 8% of the weld length.

12. Visually inspect the entire length of the pipeline section to ensure that the coating has not been damaged.

13. Allow the proper drying time for any new pipe coating.

14. Use a holiday detector to check the new or repaired coating.

15. If coating damage is noted, take necessary steps to repair the coating.

16. If damage is discovered, it should be documented, reported to management and repaired in a timely manner.

17. Inspect the ditch and the backfill material to ensure that materials capable of damaging the pipeline coating are not present.

Reporting / Notification:
Document the results of the corrosion inspection as required by DOT regulation and company practice. See the Operations and Maintenance Manual for more information.

Potential Hazards:
- Wear a hard hat and high visibility safety vest when exposed to vehicular traffic or construction activity.
- Snakes.
- Black widow spiders. Beware of spider webs with a trashy appearance.

Abnormal Operating Conditions (AOCs):
- Presence of corrosion
- Fire or Explosion: Ignition of hydrocarbons
- Unexpected hazardous gas encountered
- Coating Damage

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 014
REVISION DATE		B31Q COVERED TASK NO.
6/29/2021		0171, 0181, 0191
Pipeline O&M Procedure	**Measure Corrosion**	PAGE NO. 1 of 4

SCOPE

This procedure outlines the general guidelines for measuring corrosion pit depth using a pit gauge.

OBJECTIVES

To accurately and efficiently measure the degree of corrosion to assist in determining the remaining wall strength of the pipeline.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- *Visually Inspect Pipe and Components* Procedure
- Operation and Maintenance Manual
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Mechanical pit gauge or dial pit gauge
- Writing utensils

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: If the depth is equal to 80% or more of the original pipe wall thickness, the affected area of the pipe must be replaced immediately.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for measuring corrosion pit depth on a steel pipe.

Approval:_____ Approval Date: _____ Next Review Date: _____

Measure Depth of Pitting with Pit Gauge

The purpose of this procedure is to ensure accuracy in measuring pit depth using a mechanical pit gauge or a dial pit gauge.

Measurements obtained with a pit gauge are often used to determine the structural integrity of the pipe. This data is required for accurate calculations of the remaining wall strength using the Company approved corrosion assessment methods B31G or RSTRENG.

CAUTION: If the depth is equal to 80% or more of the original pipe wall thickness, the affected area of the pipe must be replaced immediately.

Mechanical Pit Gauge

1. Select a pit gauge with a tip small enough to reach the bottom of the corrosion pit being examined. Also ensure the pit gauge can fit entirely inside the pipe if internal corrosion is being measured.

2. Inspect the pit gauge for wear. The pit gauge should not be bent, misaligned, warped or damaged. If the point is dull or worn, replace the gauge.

3. Clean the pipe and/or fitting sample by removing burrs, corrosion deposits, dirt and coating.

4. Align the straight edge (or arm) of the gauge lengthwise with the pipe to be inspected.

5. Rest the gauge squarely on the pipe surface.

6. Position the arm of the gauge so that the pointer is at the deepest part of the pit.

7. Read and record the corresponding number from the scale of the gauge.

8. Repeat this process to verify the deepest pit measurement. This also helps you obtain the average pit depth.

9. Determine the remaining wall thickness by subtracting the pit depth from the original wall thickness.

10. With the pointer of the pit gauge in the pit, observe the length of the pit on the bottom scale of the mechanical pit gauge.

11. Document the depth and length of the pit in accordance with Company practices.

Dial Pit Gauge:
Dial pit gauges are designed to provide a more accurate measurement of corrosion pit depth than a mechanical pit gauge. When pit depth measurements are critical and accuracy is a priority, a dial pit gauges should be used.

Dial pit gauges are more fragile than mechanical gauges and should be handled with care to ensure their repeated accuracy. Follow the manufacturer's recommendations for care, handling and calibration.

1. Calibrate the dial pit gauge in accordance with manufacturer's instructions.

2. Place the pit gauge squarely on the pipe surface.

3. Push the pointer into the pit to be measured such that the control button is on the side of the gauge.

4. Record this measurement.

5. Continue this process until you have recorded an adequate sample of readings to establish a pit profile.

6. When measuring multiple defects, always follow Company practices.

7. Determine the remaining wall thickness by subtracting the pit depth from the original wall thickness.

8. Document the pit depth readings in accordance with Company practices.

Gathering Remaining Wall Strength Data:
If the B31G method is used, the length of the defect (pit) and the maximum pit depth are required.

If the RSTRENG method is used, the length of the defect (pit) and multiple measurements along the axis of the pipe within the pit area are required for analysis.

See the Operation and Maintenance Manual for more information.

REVISION NO.		PROCEDURE NO.
		MP 014
REVISION DATE		B31Q COVERED TASK NO.
6/29/2021		0171, 0181, 0191
Pipeline O&M Procedure	**Measure Corrosion**	PAGE NO. 4 of 4

Reporting / Notification:
Document the details of pit depth measurement as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential ignition hazard. No open flames. No smoking. Remove all potential ignition sources.
- Wear a hard hat and high visibility safety vest when exposed to vehicular traffic or construction activity.

Abnormal Operating Conditions (AOCs):
- Component Failure
- Damage to Facilities
- Fire/Explosion
- Pipeline System Damage
- Unexpected Hazardous Gas Encountered

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 018
REVISION DATE		B31Q COVERED TASK NO.
7/16/2021		0301
Pipeline O&M Procedure	**Operating Valves**	PAGE NO.
		1 of 3

SCOPE

This procedure is to ensure the proper manual operation of valves (opening and closing), and for adjusting and monitoring flow or pressure by manually operating valves.

OBJECTIVES

To ensure that valves are in good working condition and operate properly. To control and monitor flow or pressure in a pipeline by manually operating valves.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- *Inspect and Maintain Valves* Procedure
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Valve key wrench
- Pressure gauge

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used as:

- Field Operator guidance

Approval:_____ Approval Date: _____ Next Review Date: _____

General Procedure for Operating Valves:

1. Prior to opening or closing a valve, identify the valve to be operated. Identify the valve type (plug, ball, or gate), as the valve type will have a bearing on "how" this valve is operated (1/4 turn, multiple turn, etc).

2. Confirm that the valve chosen is the correct valve to control the desired segment of pipeline. If the valve is an emergency valve, verify that it is clearly identified and documented as an emergency valve. Determine whether the valve is normally open or closed.

3. If possible, notify the following personnel that may be affected by this operation:
    - Operating Personnel
    - Customers

Opening Valves:

1. Verify the original position of the valve before operating.

2. Ensure that the valve is free of visible debris, corrosion, or damage that may hamper the operation of the valve.

3. Verify that:
    - Any maintenance work has been completed and the valve is ready to be opened;
    - Any and all meter sets affected by this operation have been turned off at the service riser; and,
    - Appropriate personnel are notified.

4. Using the appropriate tool, slowly open the valve.

5. Verify the segment involved is operating at its correct pressure.

6. Perform "lock-out" -"tag-out" procedure, as required.

Closing Valves:

1. Verify the original position of the valve before operating.
    - "Valve-stops", common in larger valves, enable the user to determine the position of the valve(s) – Turn clockwise to "Close" and counter-clockwise to "Open".
    - Small valves at service risers may or may not be equipped with "valve-stops", but the position of the valve can be determined by observing the position of the wrench-tab in relation to the service riser.

2. Ensure that the valve is free of visible debris, corrosion, or damage that may hamper the operation of the valve.

3. Using the appropriate tool, close the valve.

4. Perform “lock-out” -“tag-out” procedure, as required.

Reporting / Notification:
Document the details of valve operation as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential ignition hazard. No open flames. No smoking. Remove all potential ignition sources.
- Do not conduct this procedure when lightning is present.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 019
REVISION DATE 7/19/2021		B31Q COVERED TASK NO. 0321, 0331
Pipeline O&M Procedure	**Inspect and Maintain Valves**	PAGE NO. 1 of 5

SCOPE

This procedure describes the steps required to properly inspect and maintain valves.

OBJECTIVES

To safely inspect and maintain valves with minimal impact on operations and the environment. To ensure the proper operation of emergency valves and valves required for the safe operation of the pipeline. This may include the operation of valves on pipelines under pressure.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) for products contained in pipe
- *Repair and / or Replace Valves* Procedure
- Valve records
- Manufacture's instruction manual

MATERIALS AND EQUIPMENT

Material/Equipment typically needed to perform this procedure:

- Grease or appropriate valve lubricant
- Tools for removing and attaching fittings
- Appropriate fittings
- Leak detector equipment

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Inspecting non-operating valves
- Identifying damaged or broken valve components
- Inspecting valves deemed problematic by management
- Lubricating valves

Approval:_____ Approval Date: _____ Next Review Date: _____

Inspect and Maintain Valves

This is the general procedure for inspecting and maintaining valves. Valve maintenance is typically limited to cleaning, lubricating and operating the valve.

The manufacturer's recommendations should be consulted prior to the start of any maintenance activity.

CAUTION: Do not operate valves that are in the closed position or are equipped with a locking device without proper authorization. Check with a supervisor, Operations or Gas Control before attempting to operate the valve.

Valve Inspection Procedure:

1. Verify the location of the valve to be inspected.

2. Check the accessibility of the valve.

3. Manually inspect the valve for external leakage.

4. Emergency valves should be numbered. Verify that the valve number, valve type, valve manufacturer and location are consistent with current records.

5. For automatic valves, check for damage to the valve actuator due to vandalism, damaged or leaking control line(s) or sense line(s), leakage on any pneumatic actuator's components.

6. Check for missing or damage valve components including; hand wheel, square nut, grease fitting, valve position indicator, gear box and valve data tag.

7. Check for atmospheric corrosion on valves including; grease fitting damaged by corrosion, gear box frozen, hand wheel damaged, pitting and oxidation to valve.

8. For valves installed below ground, clean out the valve box, verify that information on tag is legible and that the valve operator is accessible.

9. Check the security of the valves:
   a. Unfenced aboveground valves and valves in unlocked pits should be chained and locked or equipped with a locking device.

   b. Emergency valves that separate pipeline sections with different MAOPs should be locked/secured in the closed position.

10. Notify a supervisor if the valve did not pass inspection, leaks, is damaged, or vandalized.

Valve Partial Operation and Maintenance Procedure:

1. If the valve requires lubricant as a primary sealing mechanism, lubricate the necessary ports with an approved lubricant in accordance with the manufacturer's recommendations.

2. If the actuator includes geared mechanisms, properly lubricate the gears in accordance with the manufacturer's specifications.

3. Prior to operating any valve, request authorization from a supervisor. Proceed with valve operation only after receiving authorization, and notification of any personnel participating in the operation of the valve you may proceed.

4. Upon receiving authorization, unlock the valve as needed to operate the valve.

5. Verify that there is an operating position indicator.

6. If there is no visible indication of the valve's position, note the position of the valve before moving the valve to insure that the valve can be returned to its original position.

7. Slowly open or close manual valves as follows to ensure that there are no sudden increases or decreases in gas flow or pressure. Ensure the pressure does not exceed the designated MAOP of the pipeline, does not actuate an overpressure protection device, or cause leakage. Also, ensure the pressure does not fall below the minimum pressure specified for the pipeline section. Valves shall not be fully operated without the direct permission of a supervisor:
   a. Gate valves and gear operated butterfly valves must be operated two complete turns.

   b. Gear-Operated plug or ball valves must be operated at least until the plug or ball initially "breaks away" from seat.

   c. One quarter turn plug and ball valves must be operated at least until the plug or ball initially "breaks away" from seat.

8. Verify that the operating position indicator works properly.

9. Slowly return the valve to its original position to ensure that there are no sudden increases or decreases in gas flow or pressure.

10. Re-lock the valve, as needed, in the proper position.

11. Notify a supervisor and others concerned that the valve is back in the normal operating position.

12. Report any valve that fails to operate, leaks, is damaged, or vandalized to Management.

Valve Partial Operation (Remote) and Maintenance Procedure:
When inspecting remote control valves, the following actions should be taken:

1. Contact Gas Control prior to valve maintenance work.

2. Obtain permission from Gas Control to place valve into local operating mode.

3. Upon confirmation, place valve in local operating mode.

4. Follow steps 1-7 of Valve Maintenance (Manual Operation) Procedure.

5. Notify Gas Control that the valve is back in the original operating position.

6. Obtain permission from Gas Control to place valve back into remote operating mode.

7. Upon confirmation, request that Gas Control partially operate the valve.

8. Visually confirm the valve operates

9. Notify Gas Control and Operations Management that the valve is back in the original operating position.

10. Report any valve that fails to operate properly, leaks, is damaged, or vandalized to Operations Management and Gas Control. Operations will work with Gas Control to plan and prioritize repair.

11. Document the results on the valve inspection form.

Lubricate Valves:
This is the general procedure for lubricating valves. The manufacturer's recommendations should be followed for any type of valve maintenance. See the manufacturer's documentation for recommended type of lubricant and recommended lubrication schedule.

1. Verify the valve type and manufacturer. Verify documentation to ensure proper maintenance procedures for the valve being maintained. Contact Supervisor for support if needed.

2. Obtain records of the valve(s) to be lubricated along with other documentation needed to record the actions taken on the job site.

3. Verify that the type of lubricant or grease is appropriate for each valve and the environment (e.g. temperature) the valve is subjected to.

4. Verify the location of the valve to be lubricated. Ensure the proper valve is located.

Reporting / Notification:
Document the results as required by DOT regulation and company practice, especially as noted in the Operations and Maintenance Manual.

Potential Hazards:
- Beware of lightning and thunder. Do not perform valve maintenance if lightning is present.
- Upon approaching a valve or valve enclosed in a valve box, check the atmosphere around the valve or valve box for the presence of a gas leak.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Damage to Facilities
- Component Failure
- Unintended Valve Closure
- Unintended Shutdown of a Pipeline System
- Operation of an Alarm or Shutdown Device
- Valve Inoperable

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 020
REVISION DATE		B31Q COVERED TASK NO.
7/19/2021		0341
Pipeline O&M Procedure	**Repair and/or Replace Valves**	PAGE NO. 1 of 4

SCOPE

This procedure outlines the general guidelines to repair or replace valves.

OBJECTIVES

To safely repair and/or replace valves with minimal impact on operations and the environment.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- *Inspect and Maintain Valves* Procedure
- *Purging / Blowdown* Procedure
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Tool for disassembly and/ or assembly of valves
- Appropriate fittings, gaskets and packing
- Appropriate lubricant
- Valve lubrication tool / gun
- Hand tools
- Combustible Gas Indicator (CGI), e.g. Gascope

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Ensure ignition sources are not present; a spark could ignite any flammable vapor present in the piping.

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable Company practice.

COMMENTS

This procedure may be used to repair or replace valves, including designated emergency valves.

Approval:_____ Approval Date: _____ Next Review Date: _____

Repair and/or Replace Valves

This procedure outlines the process to repair or replace valves. This is a general procedure and you should always follow the manufacturer's instructions.

General Procedure:

1. Notify management prior to repairing or replacing a valve.
2. Manufacturer's recommendations should be consulted prior to replacing the valve.
3. Ensure all the anticipated fittings, components, valve boxes, etc. are available.
4. The Operator should identify the type, model, pressure rating, location and accessibility of the valve to be replaced.
5. Ensure all the tools and materials are available prior to the valve repair / replacement to minimize downtime.
6. Contact Supervisor to determine if there is a need to install an insulating kit.
7. Verify the accessibility of the valve by removing any obstructions in the work area.
8. Verify the valve number and nameplate data.
9. Verify the valve type and manufacturer per Company's documentation.
10. Notify Gas Control and other appropriate personnel prior to beginning the valve repair or replacement.
11. Isolate the affected valve.
12. Depressurize, and/or purge the affected piping/system (see Purging / Blowdown Procedures).

    CAUTION: Ensure ignition sources are not present; a spark could ignite any flammable vapor present in the piping.

    CAUTION: Use extreme care to ensure an electrical arc from the Cathodic Protection current does not ignite any remaining gas

13. Check the body bleed valve (if present) for zero body pressure.
14. If the valve is to be repaired, a manufacturer's trained and operator qualified representative will repair or supervise the valve repair according to the manufacturer's specifications.

15. Remove the existing valve.

16. Follow the manufacturer's instructions for removing, cleaning, installing gaskets, and replacing the valve. Flange bolts must be tightened carefully to avoid warping or breaking the flange.

    Note: Never attempt to align flange bolt holes with fingers, injury could occur.

17. Ensure all appropriate bolts/nuts are tightened and secured using appropriate torque settings in accordance with manufacturer's recommendations.

18. Inspect the valve closely and make any other necessary adjustments.

19. Operate the valve fully several times to verify that the mechanism is functioning properly (see *Inspect and Maintain Valves* Procedure).

20. Conduct a leak test in accordance with the appropriate leak testing procedure,

21. If the valve is leak free, purge air / nitrogen as needed, replacing with 100 percent gas in the piping system before returning the line to service. (See Purging / Blowdown Procedures).

22. Resume normal operation and check for any abnormal conditions.

23. Document results as per standard Company practice.

Reporting / Notification:
Document the details of the repair or replacement of the valves as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- If purging procedure is not completed properly, gas may be released when the valve is removed. Ensure ignition sources are not present. A spark could ignite any flammable vapor present in the piping.
- Changing the position of a valve quickly may result in pressure variations. This may result in shutting down the pipeline.
- Valves in service on an operating pipeline may be under pressure. Sudden operation of valves used infrequently may result in a leak. Care should be taken when operating older valves.

Abnormal Operating Conditions (AOCs):

- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Activation of a safety device
- Component failure: valve stem or actuator failure, worn, defective components

Personal Protective Equipment:

- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 024
REVISION DATE		B31Q COVERED TASK NO.
7/19/2021		0381, 0391, 0411, 0421
Pipeline O&M Procedure	**Inspect, Test, and Maintain Spring-Loaded, Pneumatic-Loaded, and Pilot-Operated Pressure Regulators and Relief Valves**	PAGE NO. 1 of 8

SCOPE

This procedure outlines the general guidelines for inspecting and testing spring-loaded and pilot-operated pressure regulators and relief valves.

OBJECTIVES

To safely inspect and test pressure regulators and relief valves with minimal impact on operations and the environment.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- *Inspect and Maintain Valves* Procedure
- Pipeline map
- Last inspection record

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Leak detection liquid (soap solution)
- Gauges
- Various wrenches
- Repair kits
- Hand tools

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Follow the *Lockout / Tagout* procedure when isolating or securing any part of the station for inspection or maintenance activities.

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used to inspect and test pressure regulator stations and relief valves.

Approval:_____ Approval Date: _____ Next Review Date: _____

Inspect and Test Pressure Regulator Stations

This procedure is to ensure that each pressure regulator station and relief device is inspected and/or tested properly. All regulator stations must be inspected at intervals not exceeding 15 months, but at least once each calendar year, to ensure each station is in good mechanical condition, adequate in terms of capacity and reliability of operation, set to control or relieve at the correct pressure consistent with the pressure limits of the pipeline, and properly installed and protected from dirt, liquids, or other conditions that might prevent proper operation.

The capacity of pressure relief devices must be determined by testing the devices in place or by review and calculations. After the initial calculations, subsequent calculations need not be made if the annual review verifies that parameters have not changed.

All equipment must be operated and maintained in accordance with the manufacturers' instructions.

CAUTION: Follow the *Lockout / Tagout* procedure when isolating or securing any part of the station for inspection or maintenance activities.

Inspect Pressure Regulator Station:

1. Verify the regulator station location and valve number(s) to be inspected with previous documentation.

2. Upon approaching the site, verify that the area is secured. Ensure adequate protection exists against accidental damage by vehicular traffic or other similar causes. If the station is inside a building or inside a fence, verify that the building or fence gate is locked.

   If the station is in an open area, verify that all valves required for the safe operation of the station are tamper resistant. Valves with required locking devices are:
   - Monitor By Pass Valve-Locked Shut;
   - Primary By Pass Valve-Locked Shut;
   - Relief Valve-Locked Open; and
   - Control Lines Valve-Locked Open.

3. Ensure the appropriate signage / line markers (No Smoking, Danger, etc.) are in place, legible, and contain the appropriate information.

4. Visually inspect the regulator station for any conditions that may prevent proper operation, such as, but not limited to:
    - Visible damage;
    - Deterioration;
    - Atmospheric corrosion; or
    - Blocked vents.

5. Before any procedures are started, note the station's current operating conditions (see Figure 2 for an example form).
    a. Is the station flowing, if so, which run is flowing?
    b. What is the station's inlet and outlet pressures?
    c. Do all pressure gauges / recorders agree?
    d. Are there any leaks in the station?
    e. Note the position of each valve on the station.
    f. Note the set pressure tagged on the regulators and relief valve.

6. Inspect valves required for regulator station operation:
    a. Remove locking devices on valves necessary for the performance of this task.
    b. Lubricate the valves and check for ease of operation and shutoff, following the procedure *Inspect and Maintain Valves*.
    c. Operate the valve(s) only to the extent necessary to verify proper operation.
    d. For buried valves, check the condition of valve box for access and operation.
    e. Ensure all valves are returned to normal operating positions.

7. Install pressure gauges as needed to verify and monitor the system's pressure during the regulator inspection.

8. Confirm or determine and record the current regulator set points (see Figure 2 for an example form).

9. Slowly close the outlet valve to the regulator station. Monitor the outlet system pressure. Operate bypass valves as needed.

10. Monitor the pressure gauge and record the pressure when the regulator achieves lockup, if it is designed to do so.

11. Each regulator should be in good working order, should control at its set pressure, operate smoothly, and shut off within acceptable limits.

12. If acceptable operation is not obtained during this check, report the findings to your Supervisor. The Supervisor shall determine if the equipment is to be dismantled for an internal inspection or replaced with new or shop tested equipment. See the "Internal Inspection" section of this procedure as needed.

13. Inspect and clean filters, cleaners and dryers internally following Company approved methods.

14. Check differential pressures across elements (when connections are available) to determine whether the elements need to be cleaned or replaced.

15. Inspect gauges for accuracy. Recalibrate any gauge with an error greater than 2% of the normal system operating pressure in accordance with Company practice and manufacturer's instructions.

16. Replace or repair any damaged parts in accordance with Company practice and manufacturer's instructions.

17. If the regulator passes inspection, slowly open the outlet valve. Monitor the pressure gauge to ensure that regulator assumes control and does not exceed the MAOP.

18. Record results of inspection and tests on the regulator inspection form.

Inspect and Test Pressure Relief Valves:

Test the relief valve in place where possible. If the relief valve cannot be tested in place, remove the valve and transport it to a shop or lab to be tested and returned to service.

1. Check and record the relief valve set point.

2. Install pressure gauges as needed to monitor the pressure at which the relief valve activates.

3. Ensure that the relief valve isolation valve is closed.

4. Test for the correct relief setting by one of the following methods:
   a. Increase the pressure in the segment until the device is activated. This method will require the isolation valve to be open during the test.

   b. Apply pressure from a secondary source to the pilot or control line until the device is activated:
      i. Connect test gas cylinder hose to tap located between shut off valve and relief valve.
      ii. Slowly turn test gas cylinder valve to flow test gas.

iii. Watch gauge connected to cylinder and determine if relief valve relieves at proper set point.
iv. If the relief valve does not relieve at proper set point, adjust relief valve set point in accordance with manufacturer's instructions and repeat test.
v. After relief valve relieves at proper set point, close tap valve.
vi. Remove test gas cylinder hose from tap.

5. Monitor the pressure gauge and record the pressure at which the relief valve opens and begins relieving pressure. If the relief valve does not relieve at proper set point, adjust relief valve set point in accordance with manufacturer's instructions and repeat test.

6. Ensure each relief valve is in good working order and opens smoothly at its set pressure.

7. Remove the pressure from the relief valve and verify that the relief valve "closes" and stops relieving pressure.

   If acceptable operation is not obtained during this check, report the findings to your Supervisor. The Supervisor shall determine if the equipment is to be dismantled for an internal inspection or replaced with new or shop tested equipment. See the "Internal Inspection" section of this procedure as needed.

8. Open the relief valve isolation valve (as needed).

9. Install locking devices as required to prevent unauthorized operation of any stop valve that will make the pressure relief valve or pressure limiting device inoperative.

10. Re-verify that all valves that should be "Open" are open and all valves that should be "Closed" are closed.

11. Re-verify that all valves that are required to have locking devices are locked to prevent unauthorized access.

12. Ensure that ID tags denoting set-pressure(s) are installed as needed.

13. Record results on regulator or relief valve form and note any corrective actions needed or taken.

Internal Inspection:
This includes the inspection of pilot regulators, inner valves, valve seats, valve stems, and diaphragms.

Once the regulator run has been removed from service, pressures are holding satisfactorily, and the run has been depressurized, the regulator may be removed from the piping system or the cage / seat components may be removed from the piping for inspection or maintenance procedures.

1. Isolate the regulator(s) requiring internal inspection. Operate bypass valves as needed. Monitor the outlet system pressure.

2. Once the system pressure is stable, safely vent gas in the isolated segment to the atmosphere.

3. Disconnect associated tubing or supply / sense tubing or piping.

4. Remove the regulator or cage / seat components from the piping system.

5. Disassemble the regulator and / or cage and pilot.

6. Inspect the regulator components.

7. Replace worn or damaged parts in accordance with Company practice and manufacturer's instructions.

8. Reassemble the regulator and / or cage and pilot.

9. Replace the regulator or cage / seat components from the piping system.

10. Reconnect associated tubing or supply / sense tubing or piping.

11. Repair any leaks discovered in accordance with Company practice and manufacturer's instructions.

12. Test the regulator. Follow the manufacturer's start-up procedure and check the regulator for proper operation. The regulator should:

    - take control of the flow of gas; and
    - demonstrate proper lock-up.

13. Set the regulator to the correct system pressure.

14. Verify that all leaks have been repaired.

15. Ensure that ID tags denoting set-pressure(s) are installed as needed.

Notes:

- All parts installed / replaced in a regulator must be of the correct composition, size, pressure rating in order for the relief to operate properly.

- Incorrect parts have a direct effect on the capacity and safety of a regulator. Ensure all moving parts move freely before re-assembly

- All regulators must be repaired using approved replacement parts and in accordance with the manufacturers recommended practices

Reporting / Notification:

Document the details of the pressure regulator stations inspection and testing as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:

- Use care when isolating lines and valves. Failure of isolation could create a hazardous situation. Follow the Lockout/Tagout procedure.
- Avoid pressure build-up or wide pressure variations. Open and close station valves slowly.
- Valves in service on an operating pipeline may be under pressure. Sudden operation of valves used infrequently may result in a leak. Take care when operating older valves.

Abnormal Operating Conditions (AOCs):

- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure
- Unintended Valve Closure
- Unintended Shutdown of a Pipeline System
- Operation of an Alarm or Shutdown Device

Personal Protective Equipment:

- Steel-toed boots
- Company Approved Fire Retardant Clothing

Figure 1: Example Regulator Inspection Report Form

COMPANY: _____

Location: _____

Regulator Information

Make: _____ **Type:** _____

Size: _____ **Office Size:** _____

Pressure Rating: Inlet: _____ **Outlet:** _____

M.A.O.P. of System to which it is Connected: _____

_____

Operating Pressure: Inlet: _____ **Outlet:** _____

Lock Up Pressure: _____

Monitoring Regulator or Relief Setting: _____

Was the Regulator Stroked (to fully open)? Yes _____ **No** _____

General Condition of the Station:

Atmospheric Corrosion: **Yes** _____ **No** _____

Support Piping Rigid: **Yes** _____ **No** _____

Station Guards: **Yes** _____ **No** _____

Area Clean of Weeds and Grass: **Yes** _____ **No** _____

Capacity at Inlet and Outlet pressure: _____

Corrections Made: _____

Remarks: _____

_____

_____

_____

Inspector: _____

Signature: _____ **Date:** _____

REVISION NO.		PROCEDURE NO.
		MP 032
REVISION DATE		B31Q COVERED TASK NO.
7/19/2021		0561, 0571
Pipeline O&M Procedure	**Pressure Test-Using Non-Liquid Medium**	PAGE NO. 1 of 14

SCOPE

This procedure outlines the general guidelines for pressure testing using a non-liquid medium.

OBJECTIVES

To safely pressure test a pipeline with minimal impact on operations and the environment.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Pipeline map
- Pipeline Repair Procedures
- *Leak Test at Operating Pressure* Procedure
- Operation and Maintenance Manual

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Leak-detection fluids (soap solution)
- Combustible gas indicator (CGI), e.g. Gascope, Sensit Gold CGI
- Test medium (nitrogen, air, etc.)
- Test device / gauges / recording instruments
- Fittings
- Kulman gauge with various attachments
- Pressurizing device
- Bonding cable
- Pipe joint compound
- Repair tools

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used to pressure testing.

Approval:_____ Approval Date: _____ Next Review Date: _____

Pressure Test-Using Non-Liquid Medium

The purpose of this procedure is to ensure adequate pressure testing of pipeline systems using a non-liquid medium and to ensure discovery of all potentially hazardous leaks in the segment being tested.

General Procedure:

1. Before testing, evaluate for thrust restraint of the piping, and vertical offsets. Both embedment and harnessing should be considered. Only horizontal piping is to be considered for embedment. Minimum embedment distances are established in Table 1. Harnessing specifications for pipe other than plastic are established in Table 2.

2. Verify the following information prior to beginning the pressure test:
   a. Maximum Allowable Operating Pressure (MAOP) of the segment to be pressure tested;

   b. The minimum and maximum test pressure for the segment to be pressure tested;

   c. The test duration of the segment to be pressure tested; and

   d. The test medium to be used for the pressure test.

3. Ensure that pressure gauges / recording instruments have been calibrated in accordance with company procedures and manufacturers' specifications. Use Kuhlman gauges for the testing of pipe segments and / or hot tap tie-ins that are less than 50 feet in length.

4. Ensure that segment to be pressure tested is:
   a. Isolated from any customer piping to prevent the pressure test from being introduced into customer piping.

   b. Isolated from the source of gas (to prevent the pressure test from being introduced into the gas stream).

5. For the segment to be pressure tested, ensure that:
   a. For steel pipe, end caps have been welded on end(s), manifold section has been welded on the end(s), and the tie-in segment has been constructed and tested in accordance with appropriate company practice (see Figures1-3).

   b. For plastic pipe, end caps have been fused on the end(s) of the segment, and the manifold section has been welded on the end(s) (see Figures1-3).

6. Ensure that the pipe end receiving the test gauge is cleaned prior to the installation of the test gauge.

7. Install test gauge on the isolated segment to be pressure tested.

8. Using the test medium (air, nitrogen), pressurize the isolated segment (blow down pressure between ball valve #1 and #2 on test tree in Figure 4) according to the Tables 3-5.

9. Record the initial time of the pressure test.

10. Soap-test the test-gauge and related fittings in accordance with the *Leak Test at Operating Pressure* Procedure.

11. Maintain and observe the test pressure for the required test duration (see Tables 4-5).

12. Investigate and repair all leaks discovered during the pressure test in accordance with appropriate Company practice.

13. Apply a new pressure test once leaks have been repaired.

14. If the pressure test reveals that the isolated segment being pressure tested is free of leakage, slowly relieve the pressure from the isolated segment.

15. At the successful completion of the pressure testing, slowly decrease the pressure to atmospheric conditions.

16. Remove testing device, gauges, and other related fittings.

17. Reconnect the isolated section to the pipeline.

18. Test the final connection(s) for leaks using a soap-test or other leak detection equipment in accordance with the procedure *Leak Test at Operating Pressure*.

19. Purge the test medium from the previously isolated segment in accordance with the appropriate Company purging procedures.

Reporting / Notification:
Document the details of pressure testing as required by Company practice (see Figure 5 for Example Pressure Test Form). See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Explosive release of pressurized gas.
- Presence of poisonous, flammable or explosive gases.
- Asphyxiation hazard exists with nitrogen use.

Abnormal Operating Conditions (AOCs):
- Damage to Facilities
- Component Failure
- Unintended Valve Closure
- Gauge Failure

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

Table 1: Embedment Distance *(100 psig Test Pressure)*

Pipe Diameter (Normal)	Trench Width	Depth				
		2'	3'	4'	5'	6'
		Coupling Distance From Angle or End (In Feet)				
3"	18"	9	6	5	4	4
4"	18"	15	11	8	7	6
6"	18"	34	24	19	16	15
8"	24"	42	29	23	20	17
10"	24"	64	46	36	31	27
12"	24"	90	65	52	44	38
16"	36"	99	67	53	43	38
20"	36"	155	105	84	67	59
24"	36"	222	151	120	97	86
30"	42"	300	197	149	131	113
36"	48"	368	248	195	155	139

Note: For pressures other than 100 psig, multiply values in Table 1 by the ratio

$$\text{(Depth from Table 1) X } \frac{Actual\ \text{Pr}essure(psig)}{100}$$

Example – 12" Pipe, Trench Width 24", Depth 2', Test Pressure 200 psig.

$$90' \text{ X } \frac{200\ \text{psig}}{100\text{psig}} = 180'$$

Table 2: Harnessing Specifications (Using CSI harness assemblies only)

PIPE SIZE	TEST PRESSURE (in psig)				
	0 to 50	51 to 75	76 to 100	101 to 150	151 to 200
2"	2	2	2	2	2
4"	2	2	2	2	2
6"	2	2	2	2	2
8"	2	2	2	2	2
10"	2	2	2	2	2
12"	2	2	2	2	3
16"	2	2	3	4	5
20"	2	3	4	5	7
24"	3	4	5	7	10

Note: Refer to operating standard drawing f-592 for installation requirements.

Table 3: Company Test Requirements

	Steel Pipe			Plastic Pipe
	Under 30% SMYS		Greater than 30%	
MAOP	**Less than 100 psig**	**100 psig and greater**	**All pressures**	**All pressures**
Maximum Test Pressure	Consider design pressure of pipe and pipe components	Factor of Actual Class Location and type of test medium	Factor of Actual Class Location, type of test medium, existence and status of occupied buildings within 300 feet of pipeline	No more than 3x the design pressure for plastic pipe described in 192.121
Minimum Test Pressure	90 psig	150% MAOP	150% MAOP	The greater of 150% MAOP or 50 psig
Minimum Test Duration**	As per Table 5	1 hour or longer	No less than 8 hours*	As per Table 4
Other considerations		* If test pressure is 20% SMYS or greater: (1) Leak test must be performed at a pressure between 100 psig and the pressure required to produce 20% SMYS (2) The line must be walked to check for leaks while hoop stress is held at 20% SMYS	See 192.505 * Fabricated units must be tested to 4 hour minimum	Thermoplastic material temperature must not exceed100°F for PE2406/2708 and 73°F for PE3408/3608/ PE100

**Does not account for time period for allowing for temperature stabilization, particularly for air tests.

Maximum Hoop Stress Limitations During Non-Liquid Pressure Testing [192.503(c)]

Class location	Maximum hoop stress allowed as percentage of SMYS	
	Natural gas	Air or inert gas
1	80	80
2	30	75
3	30	50
4	30	40

Table 4: Minimum Pneumatic Pressure Test Duration (hours) for Polyethylene Pipe Having an MAOP of Less than 100 psig

Nominal Pipe Size	Length of Pipeline (feet)									
	50ft or Less	50 ft to 500 ft	1,000 MAX	1,500 MAX	2,000 MAX	2,500 MAX	3,000 MAX	3,500 MAX	4,000 MAX	4,500 MAX	5,000 MAX
1-¼"	30 min	1	1	1	1	1	1	1	1	1	1
2"	30 min	1	1	1	1	1	1	1	1	1	1
3"	30 min	1	1	1	1	1	1	1	1	1	1
4"	30 min	1	1	1	1	1	1	1	2	2	2
6"	30 min	1	1	1	2	2	2	2	2	2	2
8"	30 min	1	1	2	2	2	2	2	2	3	3
10"	30 min	1	2	2	2	2	2	3	3	3	3
12"	30 min	2	2	2	2	3	3	3	4	4	4

Note: If a section of main to be tested is of various diameters, the actual test duration shall be determined from the table using the total length of main and the largest diameter pipe.

For lengths greater than 50 feet, the pressure test durations indicated in the above table include approximately 1 hour for time necessary for temperature stabilization.

Table 5: Minimum Pneumatic Pressure Test Duration (hours) for Steel Pipe Having an MAOP of Less than 100 psig

Nominal Pipe Size	Length of Pipeline (feet)										
	50ft or Less	50 ft to 500 ft	1,000 MAX	1,500 MAX	2,000 MAX	2,500 MAX	3,000 MAX	3,500 MAX	4,000 MAX	4,500 MAX	5,000 MAX
1-¼"	30 min	1	1	1	1	1	1	1	1	1	1
2"	30 min	1	1	1	1	1	1	1	1	1	1
3"	30 min	1	1	1	1	1	1	1	1	1	1
4"	30 min	1	1	1	1	1	1	2	2	2	2
6"	30 min	1	1	2	2	2	2	2	2	2	2
8"	30 min	1	2	2	2	2	2	2	3	3	3
10"	30 min	1	2	2	2	3	3	3	3	4	4
12"	30 min	2	2	3	3	3	4	4	4	5	5
16"	30 min	2	3	3	4	4	5	6	6	7	8
20"	30 min	2	3	4	5	6	7	8	9	10	11
24"	45 min	3	4	6	7	9	10	12	13	15	16

Note: If a section of main to be tested is of various diameters, the actual test duration shall be determined from the table using the total length of main and the largest diameter pipe.

For lengths greater than 50 feet, the pressure test durations indicated in the above table include approximately 1 hour for time necessary for temperature stabilization. Actual conditions may warrant additional time for stabilization.

This table does not account for the possible need of an 8 hours minimum test requirement consideration as per certain requirements of 49CFR192

Figure 1: Pressure Testing Method When Extending Tie-in Fitting From Main Line

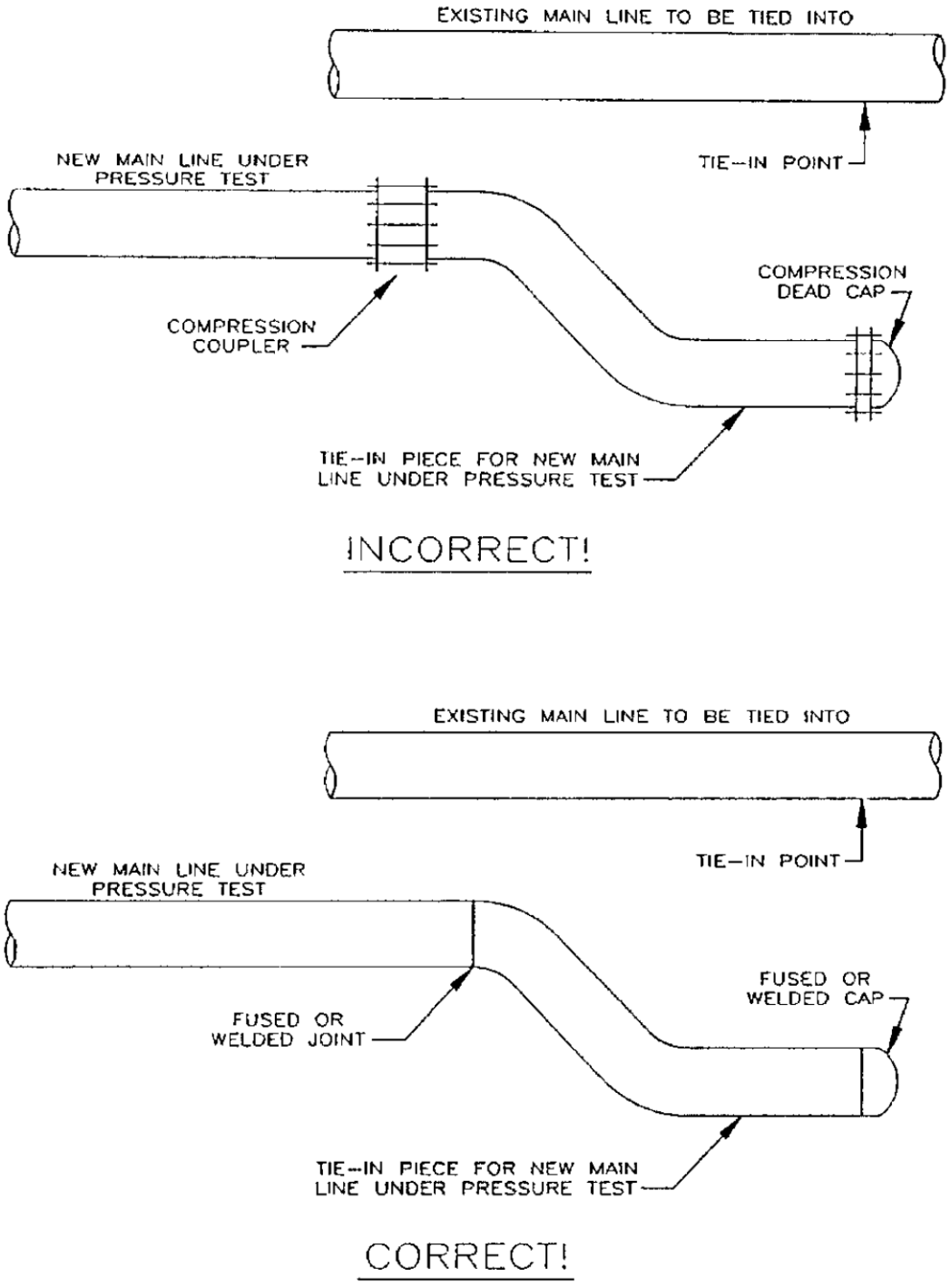


Figure 2: Pressure Testing Method When Isolating Tie-in Fitting From Main Line

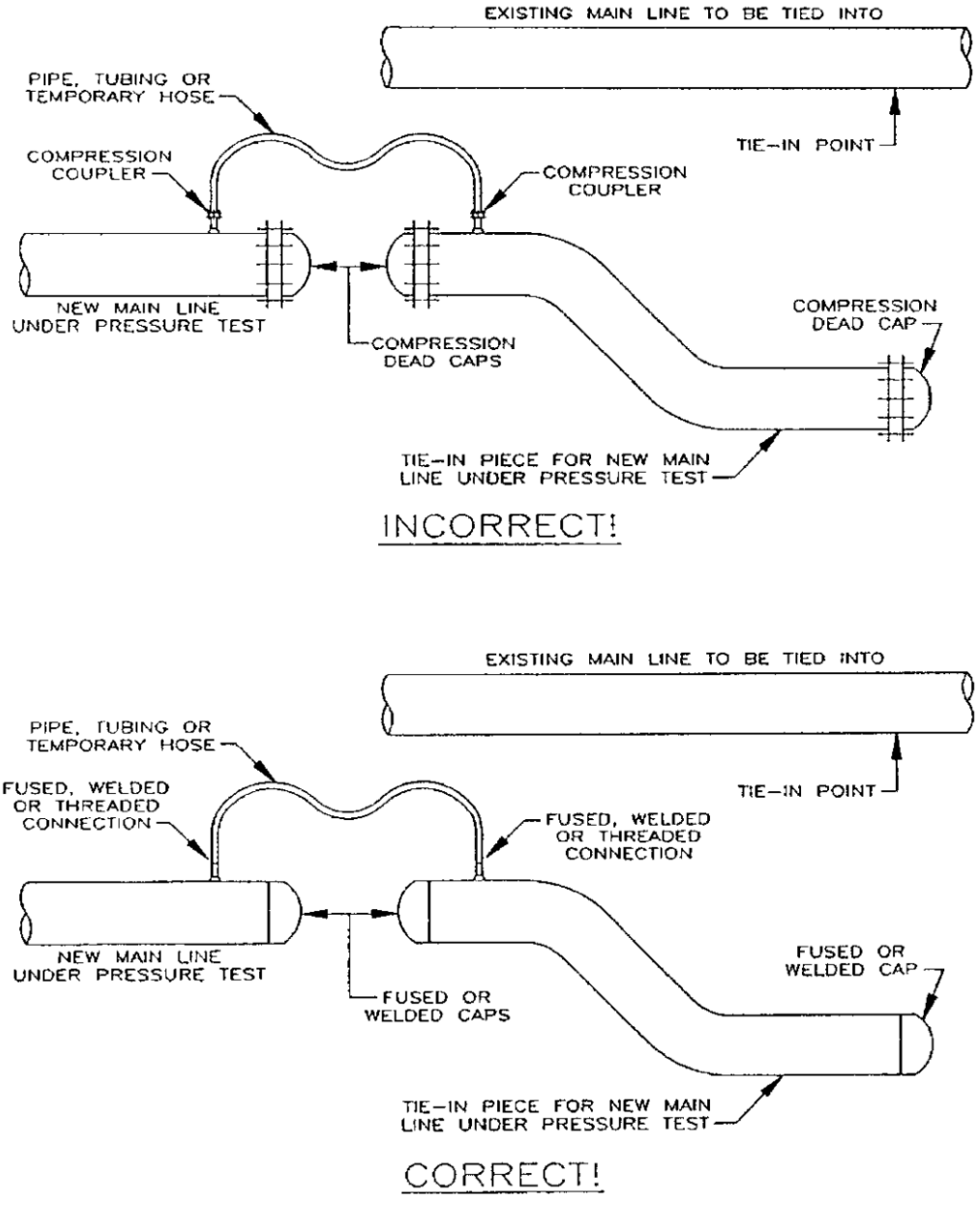
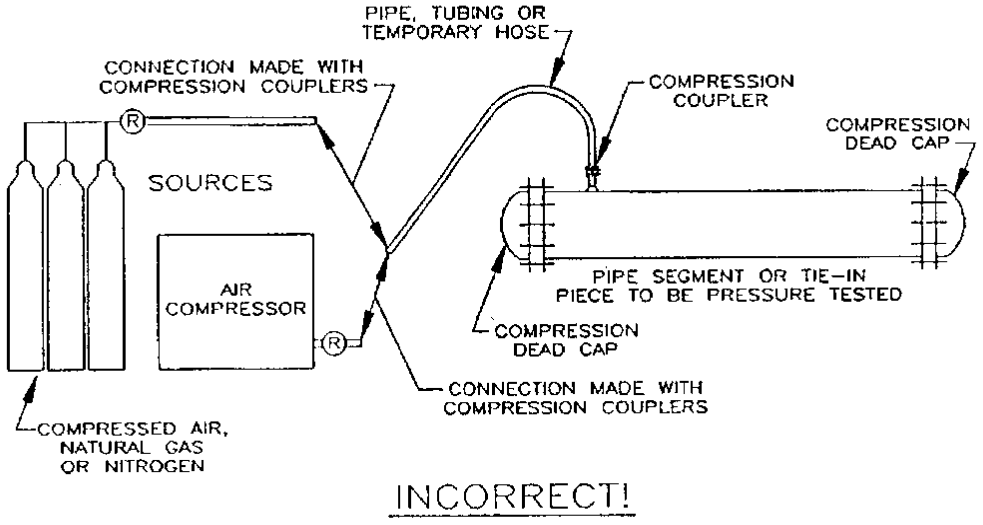


Figure 3: Pressure Testing Method When Pre-testing Pipe or Separately Testing Tie-in Fittings



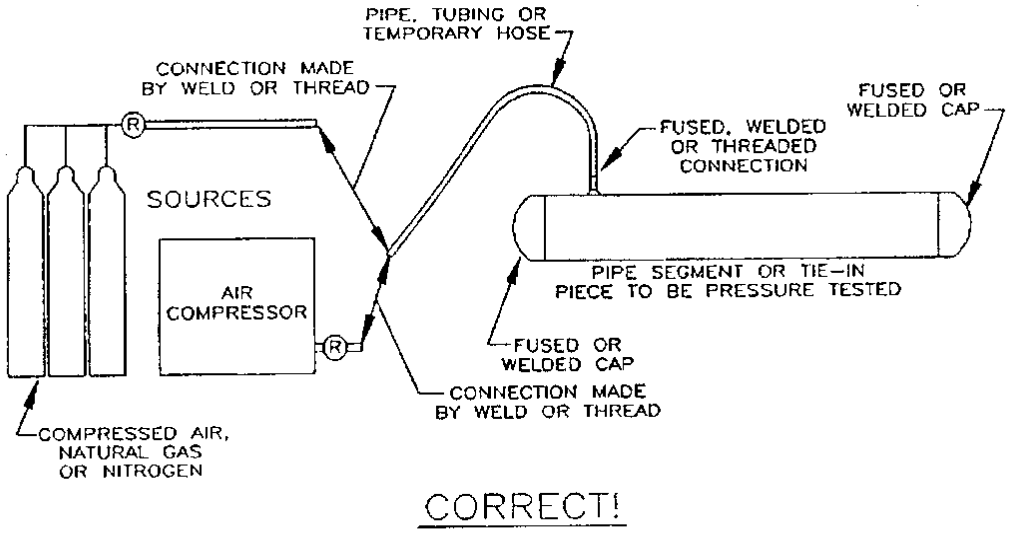


Figure 4: Typical 1 Inch Test Tree

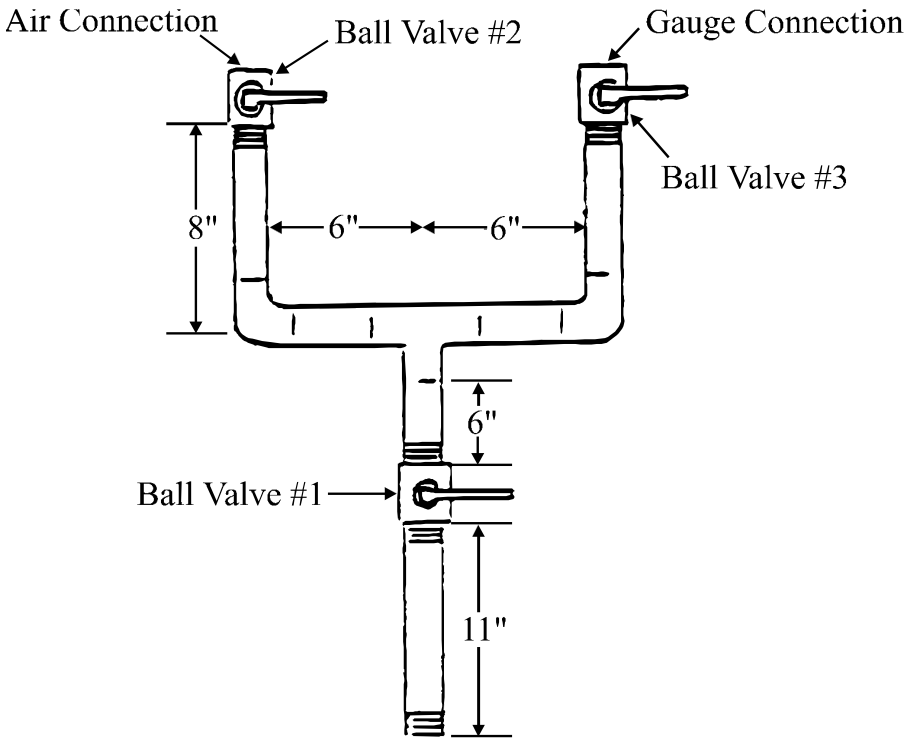


Figure 5: Example Pressure Test From

_____ COMPANY
KUHLMAN GAUGE / MODULAR CALIBRATION
TEST RECORD

Line No. or Location _____ CONo. _____

Diameter _____ Length _____

Test Pressure _____ Duration _____

Test Medium Air Inert Gas Natural Gas

Test Gauge Type Kuhlman gauge Modular Calibration Unit

Test Gauge No. _____

Test on by _____ Date _____

Test off by _____ Date _____

Result Pass Fail

Leaks or Failures and Method of Repair _____

_____

Original copy of test record to be attached to the "As Built" drawing for inclusion permanent record file.

REVISION NO.		PROCEDURE NO. MP 034
REVISION DATE 7/19/2021		B31Q COVERED TASK NO. 0591
Pipeline O&M Procedure	**Leak Test at Operating Pressure**	PAGE NO. 1 of 4

SCOPE

This procedure outlines the general guidelines to conduct a leak test at operating pressure.

OBJECTIVES

To safely conduct a leak test to verify that each potentially hazardous leak has been located and eliminated.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Pipeline map
- Pipeline Repair Procedures
- *Pressure Test Using Non-Liquid Medium* Procedure
- Operation and Maintenance Manual

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Leak-detection fluids (soap solution)
- Combustible Gas Indicator (CGI), e.g. Gascope
- Oxygen meter (if gas or nitrogen are used)
- Pressure gauge (e.g. Kuhlman gauge)
- Pipe joint compound
- Repair tools
- Intrinsically safe communications equipment

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: This test is normally conducted with gas at operating pressure. Any leak will create a potentially flammable atmosphere.

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used for leak tests using gas, air or nitrogen at normal operating pressure.

Approval:_____ Approval Date: _____ Next Review Date: _____

Leak Test at Operating Pressure

This procedure outlines the process to test a pipeline for leaks at operating pressure. The purpose of this procedure is to verify that each potentially hazardous leak has been located, classified, and eliminated and to ensure the safety of the pipe section or pipe connections tested.

Often the final joint or fitting used to tie in a segment of pipeline is not subjected to a pressure test. For these joints or fittings, a leak test may be conducted at operating pressure using the soap test, CGI test or static pressure test.

CAUTION: This test is normally conducted with a flammable gas at operating pressure. Any leak may create a flammable atmosphere. Eliminate all ignition sources prior to conducting test.

CAUTION: If the leak test is conducted in a bell hole or excavation, the atmosphere must also be tested for oxygen deficiency, following Company practice. Do not proceed if a flammable, poisonous or oxygen deficient atmosphere is detected.

If the testing medium is air or nitrogen, the testing medium must be purged following Company practice prior to introducing gas into the line.

General Procedure – Soap Test:

1. Eliminate all ignition sources before re-pressuring the pipeline.

2. Re-pressurize the pipeline following Company practice.

3. Once the operating pressure has been introduced to the pipeline segment, wait for the pressure to stabilize.

4. Generously coat the joint or fitting with a soap solution using a clean rag, brush or squirt bottle.

5. Visually inspect the wetted joint or fitting for bubbles. The presence of any bubbles will indicate a leak.

6. If no bubbles are detected, apply a second coating of soap solution to confirm that the joint or fitting is leak free.

7. If bubbles are detected, repair any leaks discovered in accordance with Company practice, and repeat the soap test after repairs are completed.

General Procedure – CGI Test:
Do not use the CGI test if the pressure testing medium is air or nitrogen.

1. Calibrate the CGI or gas detector to be used, following the manufacturer's recommendations. Ensure Calibration of the CGI or gas detector to be utilized.

2. Check the batteries, replace as needed.

3. Eliminate all ignition sources before re-pressuring the pipeline.

4. Re-pressurize the pipeline following Company practice.

5. Using the CGI or other gas detector, obtain samples of the air around the joint or fitting to check for signs of leakage. Follow the manufacturer's operating instructions to ensure proper use of the CGI. A reading greater than 0.0 on the instrument indicates a leak.

6. If no leak was identified, sample the air around the joint or fitting again to confirm that the joint or fitting is leak free.

7. If the presence of gas is indicated, repair any leaks discovered in accordance with Company practice, and repeat the CGI test after repairs are completed.

General Procedure – Static Pressure Test:
1. Eliminate all ignition sources before re-pressuring the pipeline.

2. Connect a pressure gauge to the line, as needed.

3. Open the supply valve.

4. Re-pressurize the line to normal operating pressure, then close the supply valve.

5. Note the line pressure.

6. Observe the gauge for a pressure drop for at least 3 minutes. A decrease in line pressure will indicate the presence of a leak.

7. If the pressure decreases during the test, locate the leak(s).
   a. Repair any leaks discovered in accordance with Company practice.
   b. Repeat the static pressure test after repairs are completed.

REVISION NO.		PROCEDURE NO. MP 034
REVISION DATE 7/19/2021		B31Q COVERED TASK NO. 0591
Pipeline O&M Procedure	**Leak Test at Operating Pressure**	PAGE NO. 4 of 4

Reporting / Notification:
Document the details of the leak test as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential release of flammable gas through leaking joint or fitting. Eliminate all ignition sources prior to conducting test. No smoking. No open flames. Use only intrinsically safe communications equipment and non-sparking tools.
- Asphyxiation hazard (if nitrogen or gas other than air is used for pressure test). Use an oxygen meter to confirm check for the presence of an oxygen deficient atmosphere.
- Presence of poisonous, flammable or explosive gases.

Abnormal Operating Conditions (AOCs):
- Damage to Facilities
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Activation of a Safety Device

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 039
REVISION DATE 7/19/2021		B31Q COVERED TASK NO. 0681
Pipeline O&M Procedure	**Joining of Plastic Pipe – Stab Fittings**	PAGE NO. 1 of 3

SCOPE

This procedure outlines the general guidelines for joining plastic pipe by the use of stab fittings.

OBJECTIVES

To safely join plastic pipe with stab fittings and inspect the completed joint.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- Pipeline map
- *Leak Test at Operating Pressure* Procedure
- Operation and Maintenance Manual

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Stab fitting
- Chamfer tool
- Pipe/tubing cutter
- Soft felt-tip pen, crayon, or other markers

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used for joining plastic pipe with stab fittings.

Approval:_____ Approval Date: _____ Next Review Date: _____

Joining Plastic Pipe with Stab Fittings

This procedure outlines the process to join plastic pipe with stab fittings. The purpose of this procedure is to ensure that the proper sized fitting is chosen, the pipe is prepared properly, the joint is made correctly and verified by inspection.

Installation of stab fittings should always be performed in accordance with the manufacturer's instructions.

General Procedure:

1. If replacing a joint, ensure the flow of gas has been stopped before beginning work.

2. Verify that the fitting selected is the correct size and SDR.

    a. SDR (Standard Dimension Ratio) is the ratio of pipe diameter to wall thickness. Ex: Pipe size = ¾ IPS (iron pipe size), SDR = 11
    b. The size and SDR should match both the pipe and the fitting.

3. Prepare the pipe:

    a. Cut the pipe end(s), ensuring that the pipe end(s) is square,
    b. Clean the pipe where fitting will be installed.
    c. Inspect the plastic pipe for damage; cut out any damage found.

4. If the stab fitting requires the use of a chamfering tool, chamfer the pipe in accordance with the manufacturer's instructions.

5. Mark the stab depth in accordance with the manufacturer's instructions.

6. Stab the plastic piping completely into the fitting until the plastic piping "bottoms out" in the fitting.

    a. The stab depth mark should be visible, generally within 1/8" from the entrance of the fitting (this distance may vary by fitting manufacturer).

7. Inspect the completed joint to ensure the fitting has completely bottomed out and the joint is secure.

8. Follow the *Leak Test at Operating Pressure* procedure if replacing the joint, or the appropriate pressure test for installing a stab fitting on a new line.

Reporting / Notification:
Document the details of the leak test as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential release of flammable gas through leaking joint or fitting. Eliminate all ignition sources prior to beginning work. No smoking. No open flames. Use only intrinsically safe communications equipment and non-sparking tools.

Abnormal Operating Conditions (AOCs):
- Damage to Facilities
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 040
REVISION DATE 7/19/2021		B31Q COVERED TASK NO. 0711
Pipeline O&M Procedure	**Joining of Pipe – Compression Couplings**	PAGE NO. 1 of 4

SCOPE

This procedure outlines the general guidelines for joining and inspecting pipe using bottom-out and non-bottom out compression couplings.

OBJECTIVES

To safely join pipe using compression couplings.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Pipeline map
- *Leak Test at Operating Pressure* Procedure
- Operation and Maintenance Manual

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Couplings/stiffeners as needed
- Wrenches
- Pipe/tubing cutter
- Soft felt-tip pen, crayon, or other markers
- Other equipment and materials as needed

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used to join pipe with compression couplings.

Approval:_____ Approval Date: _____ Next Review Date: _____

Joining Pipe with Compression Couplings

This procedure includes the joining and inspection of steel and HDPE (High Density Polyethylene) pipe greater than 2-inch with compression couplings and inspection of completed joints. This procedure also includes the joining and inspection of pipe 2-inch and less with bottom out & non-bottom out compression couplings and inspection of completed joints. It describes the practices required by §192.273(b) & (c).

HDPE Pipe expands and contracts much more from temperature and/or pressure changes than other piping materials. Great care must be taken when installing a conventional fitting on HDPE pipe. Try to install fittings when the pipe is at its coldest.

CAUTION: Fire or Explosion Hazard: static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

Personnel making and inspecting polyethylene pipe joints must be qualified.

These are general procedures and you should always follow the manufacturer's instructions.

Non-Bottom Out Compression Coupling

A non–bottom out compression coupling is one that requires tightening to a specified torque or number of turns.

1. Verify that the coupling selected is the correct coupling for the application. Verify the size and type of coupling.

2. Prepare the pipe:
   - Cut the pipe end(s), ensuring that the pipe end(s) is square (within coupling manufacturer's tolerances)
   - Inspect the pipe for damage; cut out any damage found
   - Clean the pipe surface in the area of the coupling installation
   - Ensure that the piping is free of foreign materials and construction debris
   - Complete the pipe preparation in accordance with the coupling manufacturer's instructions

2. Using an appropriate type marker, mark the insertion depth in accordance with the manufacturer's instructions.

3. Assemble the coupling on the pipe following the coupling manufacturer's instructions.

4. Tighten the coupling to the specified torque as per the manufacturer's instructions.

5. Visually inspect completed joint, checking for signs of damage, deformities, defects, and any other condition that may impair a gas tight connection.

6. Slowly pressurize the line to working pressure, and check for leaks using a soap test or CGI test as required by the procedure *Leak Test at Operating Pressure*.

Bottom Out Compression Coupling

A bottom out compression coupling is one that is designed to prevent over tightening by contact (bottoming out) of the nut with a square shoulder or mating face.

1. Verify that the coupling selected is the correct coupling for the application. Verify the size and type of coupling.

2. Prepare the pipe:
   - Cut the pipe end(s), ensuring that the pipe end(s) is square (within coupling manufacturer's tolerances)
   - Inspect the pipe for damage; cut out any damage found
   - Clean the pipe surface in the area of the coupling installation
   - Ensure that the piping is free of foreign materials and construction debris
   - Complete the pipe preparation in accordance with the coupling manufacturer's instructions.

3. Using an appropriate type marker, mark the insertion depth in accordance with the manufacturer's instructions.

4. Assemble the coupling on the pipe following the coupling manufacturer's installation instructions.

5. Tighten the coupling until the tightening nut contacts the square shoulder or mating face as per the manufacturer's instructions.

6. Visually inspect completed joint, checking for signs of damage, deformities, defects, and any other condition that may impair a gas tight connection.

7. Slowly pressurize the line to working pressure, and check for leaks using a soap test or CGI test as required by the procedure *Leak Test at Operating Pressure*.

Reporting / Notification:
Document as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Explosive release of pressurized gas.
- Presence of poisonous, flammable or explosive gases.

Abnormal Operating Conditions (AOCs):
- Damage to Facilities
- Component Failure
- Unintended Valve Closure
- Gauge Failure

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 041
REVISION DATE		B31Q COVERED TASK NO.
7/19/2021		0721, 0731
Pipeline O&M Procedure	**Joining of Pipe – Threaded or Flange**	PAGE NO. 1 of 8

SCOPE

This procedure outlines the general guidelines for joining pipe using a flange assembly or threaded joints.

OBJECTIVES

To safely join pipe by flange or threaded joint and to ensure a gas-tight fit.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- *Leak Test at Operating Pressure* Procedure
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Flanges
- Flange gaskets, as needed
- Flange bolts & nuts
- Washers, as needed
- Couplings / stiffeners
- Soft felt-tip pen or other markers
- Thread fittings
- Pipe / thread sealant (if applicable)
- Torque wrench
- Various wrenches
- Pipe / tubing cutter
- Combustible Gas Indicator (CGI), e.g. Gascope, Sensit, Gastrack

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used to join pipe using:

- Flange fittings
- Threaded pipe and fittings

Approval:_____ Approval Date: _____ Next Review Date: _____

Joining Pipe Using Mechanical Connections

This procedure outlines the general guidelines for joining steel and HDPE pipe using mechanical connections, including flange assembly or threaded joints. These are the general procedures and you should always follow the manufacturer's instruction.

High Density Polyethylene (HDPE) Pipe expands and contracts much more from temperature and/or pressure changes than other piping materials. Great care must be taken when installing a conventional fitting on HDPE pipe. Try to install fittings when the pipe is at its coldest temperature.

CAUTION: Fire or Explosion Hazard: static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

Installation of Stiffeners on Plastic Pipe:
When connecting PE pipe to the end of steel or ductile iron, a stiffener may be added to the inside diameter (ID) of the pipe to ensure a good connection between the seal in the bell and the pipe. Stiffeners may also be used for couplings between HDPE pipe sections.

1. Verify that the proper mechanical joints have been selected. Check the diameter of pipe to ensure the correct size and type of coupling is used.

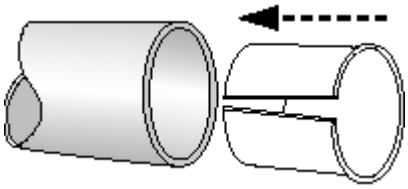
2. Visually examine the mechanical joints for possible defects or missing parts.

3. Inspect pipe and fittings for unacceptable cuts, gouges, deep scratches or other defects. Cut out any damaged pipe section, ensuring that the pipe end is square. Damaged pipe should not be used.

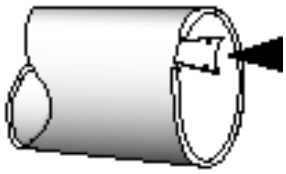
4. Clean the pipe where the fitting will be installed with a clean lint-free cloth. Clean pipe ends for a distance of 2 inches beyond where the coupling will end.

5. Check area where gaskets will seat to make sure there are no dents, projections, gouges, or other defects that will interfere with the gasket seal.

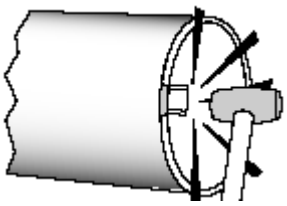
6. Insert stiffeners on each pipe being joined so that the stiffener lip touches the pipe end. Ensure the stiffener being used is appropriate for the application. See the manufacturer's recommendations.



7. Insert a wedge into each stiffener. Make sure wedges are not directly opposed.



8. Fix each the wedge firmly into the stiffener by striking it with a rubber hammer. When properly installed, no gap should exist between the back of the wedge and the inside of the pipe.



9. Place a reference mark on each pipe an equal distance from each pipe end for centering the coupling over the pipe ends. Allow a minimum of 2" inches of pipe insertion for each coupling end.

10. Insert a restraint coupling and gasket if required.

11. Install mechanical joints in accordance with the manufacturer's instructions.

12. Hand-tighten bolts in pairs opposite each other, moving around the flange circumference to ensure that the flanges come together evenly.

13. Using a torque wrench, tighten the bolts evenly, alternating to diametrically opposite positions at approximately 20 ft-lbs increments.

14. Apply bolt torque evenly across the flange. Follow the gasket manufacturer's recommendations for tightening of flanges with nut and bolt. If the manufacturer does not recommend a final torque value, see Table 1 for the Appropriate Torque value.

15. For best results, wait 10 minutes and retighten bolts to the manufacturer's recommended torque.

16. Visually inspect the connections. Replace or repair any defective connection.

17. Conduct a leak test in accordance with the appropriate Company leak test procedures.

Steel Flange Assembly:
Always follow company policies and procedures. Used studs that are in good condition may be re-used. Never re-use a gasket.

1. Follow these steps to prepare for flange tightening:
   a. Ensure that the piping is free of foreign materials and construction debris.
   b. Examine the studs for correct size and material specification.
   c. Examine the studs for mechanical damage, such as burrs or nicks, dirt or rust. Replace if necessary.
   d. Check that the studs have sufficient length for the tensioning tool.
   e. Ensure that the gaskets are the correct size, type, and material for the application.
   f. Clean the flange faces using a steel scraper or wire brush.
   g. Wipe the flange faces with a clean rag, and check for surface damage, tureens, and out-of-parallel alignment.
   h. Torque specifications are based on clean, dry threads. If recommended my manufacturer, lubricate the following with the appropriate Company approved low-friction lubricant:
      - Threads of bolts (studs)
      - Faces of nuts
      - Contact area of flanges

2. Verify that the flange selected is the correct flange for the application (correct size, ANSI Class etc.), and all necessary and appropriate bolts, nuts, and gaskets are installed.

3. Clean the sealing surfaces of the flanges and verify that they are clean and smooth.

4. Install the sealing faces of the flanges parallel to each other.

5. Align the flanges so that all flange bolts will fit through the flange bolt-holes.

6. Using the appropriate gasket, insert the gasket between the two flanges, and install the studs and nuts in the remaining holes. If the pipe run is horizontal, install the bottom studs first to retain the gasket.

7. When installing insulating kit(s), a post-installation continuity check must be performed to ensure the integrity of the electrical isolation.

8. Tighten all nuts hand tight, including any insulating kits, taking care that the bolts or studs extend completely through the nuts.

9. Tighten four studs at 90 degrees to each other until there is no visible gap at the gasket. It may be necessary to tighten more than four studs to close the gap.

10. Measure the distance from face to face at the flange outside diameter.

11. Tighten studs in pairs opposite each other, moving around the flange circumference to ensure that the flanges come together evenly.

    Apply bolt torque evenly across the flange. Follow the gasket manufacturer's recommendations for tightening of flanges with nut and bolt. If the manufacturer does not recommend a final torque value, see Table 1 for the Appropriate Torque value.

12. Tighten all bolts and nuts to approximately 30% of the final torque value using a torque wrench.

13. Tighten all bolts and nuts to approximately 60% of the final torque value.

14. Follow a circular pattern and ensure that all bolts are tightened to 100% of the final torque value.

15. Check the torque of each nut, moving to each adjacent nut around the flange in clockwise rotational sequence. Use one or more passes to ensure that the studs are evenly tightened.

16. Verify that the gasket is installed against the sealing surfaces of the flanges.

17. Visually inspect completed joint, checking for signs of damage, deformities, defects, and any other condition that may impair a gas tight connection.

18. Slowly pressurize the line to working pressure, and check for leaks, using the appropriate Pressure Testing procedure.

19. If there is a leak, check the stud tension. If the leak cannot be stopped by further tightening (do not exceed 100% of recommended torque):
    a. Relieve the pressure
    b. Remove the studs and gaskets
    c. Check for flange face defects and gasket defects
    d. Make the necessary repairs or replacements
    e. Repeat the installation

20. If the flange assembly is in a high-pressure or high-temperature application, re-torquing after the assembly has reached normal operating conditions may be necessary after startup to compensate for any relaxation or creep in the assembly.

Threaded Joint Assembly:

1. Verify that the fitting selected is the correct fitting for the application. Verify the size shape and type of fitting.

2. Inspect the pipe and pipe threads for damage, deformities, defects, or any other condition that may impair a gas tight connection. Repair or replace any section of pipe found to be defective.

3. Inspect the fitting and fitting threads for damage, deformities, defects, or any other condition that may impair a gas tight connection. Remove or replace any fitting found to have any condition mentioned above.

4. Ensure that the piping is free of foreign materials and construction debris.

5. Clean the pipe and fittings thoroughly inside and out. Remove any surface rust or dirt from threaded surfaces.

6. Apply pipe thread sealant or Teflon® tape in accordance with the pipe thread sealant manufacturer's instructions.

7. Assemble the joint and start the fitting on the pipe by hand.

8. Tighten the fitting slowly, using the appropriate wrenches. Do not over tighten.

   Note for steel pipe: Unless the pipe / fitting is being installed with the use of a pipe vise or other acceptable method, it is recommended that two wrenches be used to tighten the fitting to the pipe. One wrench is used to hold the pipe to help prevent other fittings from being loosened while the other wrench is used to tighten the fitting to the pipe.

9. Visually inspect completed joint, checking for signs of damage, deformities, defects, and any other condition that may impair a gas tight connection.

10. Slowly pressurize the line to working pressure, and check for leaks, using a soap test or CGI test as required by the procedure *Leak Test at Operating Pressure*.

11. If there is a leak, check the tightness of the connection. If the leak cannot be stopped by further tightening:
    a. Relieve the pressure
    b. Remove the thread sealant or Teflon® tape
    c. Check for thread defects on both the pipe and fitting
    d. Make the necessary repairs or replacements
    e. Repeat the installation

12. If the flange assembly is in a high-pressure or high-temperature application, re-tightening may be necessary after startup to compensate for any relaxation or creep in the assembly.

Reporting / Notification:
Document the details of joining pipe as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential ignition hazard. No open flames. No smoking.
- Collapse of bell hole walls
- Presence of poisonous, flammable or explosive gases in bottom of excavated area
- Presence of oxygen deficient atmosphere in bottom of excavated area
- Drop / fall hazard

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

Table 1-Appropriate Torque Values

Stud Size (in.)		Torque(ft-lb)
0.750	¾	175
0.875	7/8	300
1.000	1	450
1.125	1 1/8	625
1.250	1 ¼	875
1.375	1 3/8	1,200
1.500	1 ½	1,400
1.625	1 5/8	1,925
1.750	1 ¾	2,625
1.875	1 7/8	3,500
2.000	2	3,850
2.250	2 ¼	5,600
2.500	2 ½	7,700
2.750	2 ¾	9,275
3.000	3	12,225
3.250	3 ¼	15,650
3.500	3 ½	19,250

REVISION NO.		PROCEDURE NO.
		MP 043
REVISION DATE		B31Q COVERED TASK NO.
7/19/2021		0751, 0761
Pipeline O&M Procedure	**Joining of Plastic Pipe: Butt Heat Fusion**	PAGE NO. 1 of 7

SCOPE

This procedure outlines the general guidelines for joining plastic pipe using the butt heat method.

OBJECTIVES

To join plastic pipe by butt heat fusion in a safe and efficient manner so as to minimize anticipated stresses upon the piping and associated fittings and eliminate leakage.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Pipe cutting tools
- Cleaning tools
- Fusion equipment
- Fittings
- Hand tools
- Non-petroleum marker

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Static electricity discharge can ignite a flammable gas or combustible dust atmosphere.

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used for the joining of polyethylene pipe by butt heat fusion.

This procedure must be qualified by subjecting a specimen joint made according to the procedure to one of the strength tests described in 192.283(a).

An individual not be qualified for this procedure until a specimen joint made by that person and according to the procedure is tested according to 192.283(a).

Approval:_____ Approval Date: _____ Next Review Date: _____

Joining of PE Pipe: Butt Heat Fusion

This purpose of this procedure is to describe the general steps required to join polyethylene pipe and associated fittings using butt heat. Personnel making and inspecting polyethylene pipe joints must be properly qualified. This is a general procedure. Always follow the manufacturer's instructions.

The principle of butt heat fusion is to heat the surfaces of the pipe to be joined to a certain temperature, then press them together, causing the pieces to become fused together.

CAUTION: Fire or Explosion Hazard: static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

General Procedure for Manual Butt Heat Fusion Machine:

1. Inspect pipe lengths and fittings for unacceptable cuts, gouges, deep scratches or other defects. Replace or cut out any damaged pipe. Damaged pipe should not be used.

2. Select and install appropriate clamping inserts for the pipe that is being fused.

3. Clean the pipe ends and inside and outside surfaces with a clean, dry, lint-free non-synthetic cloth such as cotton. If further cleaning is needed, wash the pipe with water and a clean cloth or paper towel. Use 90%+ isopropyl alcohol on a clean cloth to clean contaminants such as oil off the pipe.

4. Load pipe ends into the unit leaving approximately 1 inch of each pipe end protruding through the jaws, and close both jaw clamps.

5. Place the facer onto the guide rods and lock into position.

6. Using the torque handle, move pipe ends against the facer (observing the gap between the facer stops and the pipe clamping jaws) until only enough gap remains to adequately face off the pipe ends.

7. Snug down pipe clamps until firm resistance is felt.
   Note: The pipe clamps are designed with thrust bearings; this allows for a significant mechanical advantage for the operator. To preserve these bearings**, do not over tighten**.

8. Engage the facer motor and apply firm pressure to the torque handle (a leverage handle is available to provide a sufficient operator advantage). Continue facing until the facer stops have bottomed out against the clamping jaws, then remove pipe ends from facer and shut off the facer.

9. Remove the facer and extract shavings from the pipe ends, using caution not to introduce any contamination to the pipe face.

10. Bring the pipe ends together and inspect for alignment and slippage. A high / low misalignment must not exceed 30 mils (1/32 inch or the approximate thickness of a credit card). An end gap must not exceed 5 mils (approximate thickness of a doubled-over dollar bill). If an excessive misalignment or end gap exists, repeat steps 1 through 8.

    Note: If a minimal misalignment exists, tighten the appropriate clamp, then snug both clamps simultaneously to ensure against pipe slippage. **Do not over tighten!** Whenever a misalignment has been compensated, an end gap may be produced at the bottom of the pipe ends. If this occurs, reface the pipe ends (without readjusting pipe clamps) and inspect for end gapping. If the end gap is still greater than 5 mils, repeat steps 1 through 8.

11. Retract pipe clamp and position the heating tool between pipe ends.

12. Heating pressure: For PE 2406 (orange or yellow) and PE 3408 (black), bring pipe ends firmly into contact with the heater face. **Do not** apply any pressure to the pipe ends during the heating cycle.

13. Begin the heating cycle after a slight melt bead is visible completely around the circumference of both pipe ends.

    Note: Refer to Table 1 for heating-cycle and bead-development sizes.

14. At the end of the heating cycle, quickly retract the pipe ends from the heater face and remove the heating tool. Visually inspect both pipe ends quickly (no more than 3 seconds) to ensure a 100% melt pattern.

    CAUTION: Do not allow the heating tool to contact the melted pipe ends. If melted material is pulled off the pipe or if the melt is damaged, allow the pipe ends to cool; reface and repeat steps 1 through 13.

15. Fusing: Bring the melted pipe ends together quickly but **do not slam the ends together**. Apply sufficient pressure to form a double rollback bead of proper size that rolls back onto the surface of the pipe. Hold this pressure by engaging the locking cam. Maintain this pressure until a hard bead is achieved.

16. Upon reaching a hard bead, disengage the locking cam.

17. Visually inspect the joint for integrity and quality. See *Inspecting PE Fusion Joints* Procedure for additional information. A uniform bead of proper size rolled back onto the axis of the pipe with no gaps, voids, contaminants, or misalignment should be visible. If any doubt as to the integrity or quality of the joint exists, reject the joint and make a new fusion.

General Procedure for Hydraulic Butt Heat Fusion Machine:

1. Clean and dry each pipe end to be fused and ensure the pipe is free of scratches and gouges. Brush, scrape, or wipe away any accumulated dirt and contamination. Discard oil-soaked, cracked, or damaged areas of pipe.

2. Verify that the air-breather vent on the pump reservoir is open.

3. Set hydraulic selector valve to “open” position.

4. Open shell halves.

5. Swing the facing unit into place and lock.

6. Position pipe ends in the shells and in light contact with the cutter face.

7. Close the shells and tighten firmly.

   Note: In the case of coiled or out-of-round pipe, wait two minutes for pipe relaxation and retighten the shells.

8. Turn on facing motor, set selector valve to “close” position, and advance movable shell and pipe against the facing unit.

9. Maintain a pressure of 200 to 400 pounds per square inch gauge (psig) during facing operations.

10. Maintain the pressure (200-400 psig) until stops bottom out.

11. Place the selector valve in “open” position, retract the pipe from facer, and turn off facer motor.

12. Set the selector valve in “close” position to relieve pressure.

13. Unlock facing unit and swing it clear.

14. Remove shavings from the pipe ends and the facer base. Faced ends must be kept clean and free of dust, water, oil, grease, or other contaminants. **Do not** touch faced surfaces.

15. Visually inspect the pipe ends. If they are not completely faced, repeat steps 2 through 14.

16. Set the selector valve in the "close" position, bring pipe ends together with a pressure of 100 to 200 pisg to check for alignment. There can be no misalignment (high / low) greater than 30 mils (1/32 inch or about the thickness of a credit card) or end gap greater than 5 mils.

17. Mark each pipe at shell and increase the pressure to 600 psig to check for shell slippage.

18. Verify heating tool temperature by using Tempil stick or pyrometer 500 °F ± 10 °F when using PE 2406 (yellow) or PE 3408 (black). Allow a minimum of 15 minutes warm-up time for temperature stabilization after a cold start.

19. Set the selector valve to "open" position, retract the shells, and place the heating tool between the pipe ends.

20. Set the selector valve to "close" position. When using PE 2406 (yellow) or PE 3408 (black), bring the pipe ends and heating tool together to an initial pressure of 500 psig to assure complete contact. Quickly release this pressure by moving the selector valve to "open" position, and leave it in this position.

21. Begin timing the heating cycle after a slight melt bead is visible completely around the circumference of both pipe ends.

22. At the end of the heating cycle, move the selector to the "open" position, retract the shells, and remove the heating tool.

23. Visually inspect both pipe ends quickly (no more than three seconds) to ensure 100 % melt pattern (no cold spot).

    CAUTION: Do not allow the heating tool to touch the melted pipe ends. If melted material is pulled off the pipe or if the melt is damaged, allow pipe ends to cool. Reface and repeat the fusion procedure.

24. When using PE 2406 (yellow) or PE 3408 (black), place the selector in the "close" position and bring the melted pipe ends together quickly, but **do not slam**. Apply only enough pressure to form a double rollback bead of proper size, and hold this pressure for the appropriate holding time by placing the selector valve midway between "open" and "close" position.

25. After holding time has elapsed, release pressure by placing the selector valve to the "open" position and allow join to cool before loosening shells.

PE Fusion Joint Inspection:

1. Visually inspect the joints for voids or discontinuities using the photographic example of proper joints provided by the manufacturer.

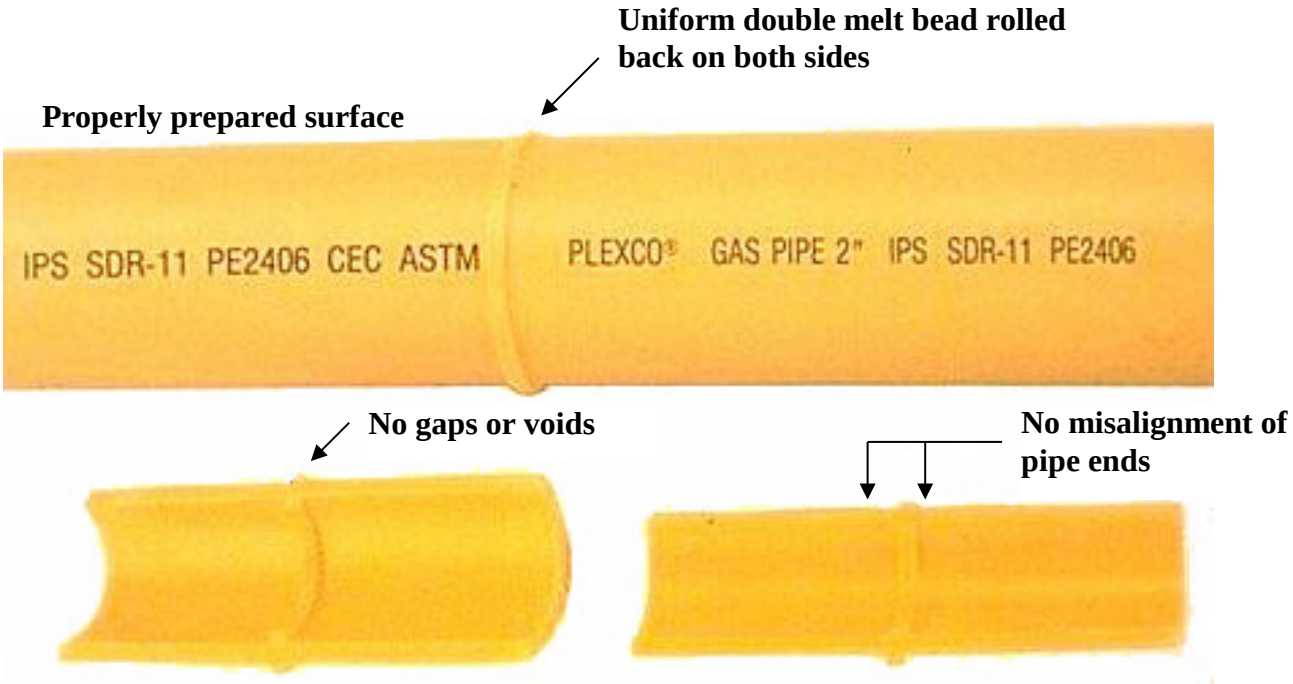
2. Examine the entire circumference of the joint for uniform and nonporous beads.

   Each fusion technique has specific inspection criteria. Always follow the manufacturer's recommendations and instructions (see Figure 1 example pictures).

3. For Butt Fusion:
   a. On both sides, the double bead should be rolled over to the surface and be uniformly rounded and consistent in size all around the joint.
   b. The double bead width should be 2 to 2-1/2 times its height above the surface.
   c. The v-groove depth between the beads should not be more than half the bead height.
   d. When butt fusing to molded fittings, the fitting side bead may have an irregular appearance. This is acceptable provided the pipe side bead is correct.
   e. It is not necessary for the internal bead to roll over to the inside surface of the pipe.

4. Complete inspection record in accordance with Company practice.

Figure 1: Example of Butt Fusion Joint Inspection Points



Reporting / Notification:
Document the details of the repair of Polyethylene pipe as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential ignition hazard. No open flames. No smoking. Remove all potential ignition sources.
- Static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Environmental Incident: uncontrolled spill/release of environmentally hazardous materials
- Atmospheric Changes in a Confined Space
- Damage to Facilities
- Component Failure
- Improper Fusion
- Fusion Equipment Malfunction

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 044
REVISION DATE 7/20/2021		B31Q COVERED TASK NO. 0771
Pipeline O&M Procedure	**Joining Plastic Pipe: Sidewall Heat**	PAGE NO. 1 of 4

SCOPE

This procedure outlines the general guidelines for joining plastic pipe using sidewall heat fusion.

OBJECTIVES

To join plastic pipe by sidewall heat fusion in a safe and efficient manner so as to minimize anticipated stresses upon the piping and associated fittings and eliminate leakage.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Pipe cutting tools
- Cleaning tools
- Fusion equipment
- Fittings
- Hand tools
- Non-petroleum marker

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Static electricity discharge can ignite a flammable gas or combustible dust atmosphere.

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used for joining plastic pipe by sidewall heat fusion.

This procedure must be qualified by subjecting a specimen joint made according to the procedure to one of the strength tests described in 192.283(a).

An individual not be qualified for this procedure until a specimen joint made by that person and according to the procedure is tested according to 192.283(a).

Approval:_____ Approval Date: _____ Next Review Date: _____

Joining of PE Pipe: Sidewall Heat Fusion

This purpose of this procedure is to describe the general steps required to join polyethylene pipe and associated fittings using sidewall heat. Personnel making and inspecting polyethylene pipe joints must be properly qualified. This is a general procedure. Always follow the manufacturer's instructions.

The principle of sidewall heat fusion is to heat the surfaces of the pipe to be joined to a certain temperature, then press them together, causing the pieces to become fused together.

CAUTION: Fire or Explosion Hazard: static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

General Procedure for Sidewall Heat Fusion:
All equipment shall be operated and maintained in accordance with the manufacturers' instructions.

1. Visually inspect the entire length of the pipeline section to ensure that there are no cuts, abrasions, scrapes, gouges, tears, cracks, punctures or other damages.

   Note: Damage should not exceed that of 10% of the minimum wall thickness required for the pipeline's operating pressure or the minimum wall thickness required to meet structural design requirements.

   Note: Any kink that happens to the pipe must be cut out.

2. All pipe and associated fittings must be thoroughly cleaned prior to being joined.

3. Clean pipe in area to be fused. Clean the pipe ends and inside and outside surfaces with a clean, dry, lint-free non-synthetic cloth such as cotton. If further cleaning is needed, wash the pipe with water and a clean cloth or paper towel. Use 90%+ isopropyl alcohol on a clean cloth to clean contaminants such as oil off the pipe.

4. Prepare the fusion area surfaces of the main and fitting base. Ensure that the prepared surface extends beyond the intended melt bead area.

5. Install the sidewall fusion machine on the main.

6. Align the fitting on the fusion area surface of the main and tighten.

7. Ensure proper alignment of the fitting to the main.

8. Retract the fitting from the main using the fusion machine handle and center the preheated, properly sized, and cleaned heater plate between the fitting base and the main.

9. Press the fitting and heater plate against the main using firm and continuous pressure until a continuous melt beads are observed around the fitting and the main.

10. Slightly release the heater plate pressure while continuing the heat soak cycle.

11. Remove the heater plate only after size of the melt beads around the fitting and the main are acceptable.

12. Bring the melted fitting and main together using continuous and progressively firm pressure until the final melt bead is achieved.

13. Maintain fusion pressure until the fitting and main have properly cooled.

14. Remove the fusion machine and visually inspect the finished fusion for three continuous melt beads around the fitting base.

15. All three fusion beads should be of uniform size completely round the fitting base.

16. Defective fusions should be cut out, the main repaired, and the fusion repeated.

PE Fusion Joint Inspection:

1. Visually inspect the joints for voids or discontinuities using the photographic example of proper joints provided by the manufacturer.

2. Examine the entire circumference of the joint for uniform and nonporous beads.

   Each fusion technique has specific inspection criteria. Always follow the manufacturer's recommendations and instructions.

3. Complete inspection record in accordance with Company practice.

Reporting / Notification:
Document the details of the inspecting of the PE fusion as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential ignition hazard. No open flames. No smoking. Remove all potential ignition sources.
- Static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Fusion Imperfections

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 045
REVISION DATE		B31Q COVERED TASK NO.
7/20/2021		0781
Pipeline O&M Procedure	**Joining of Plastic Pipe - Electrofusion**	PAGE NO. 1 of 4

SCOPE

This procedure outlines the general guidelines for joining PE pipe by electrofusion.

OBJECTIVES

To join PE pipe by electrofusion in a safe and efficient manner so as to minimize anticipated stresses upon the piping and associated fittings and eliminate leakage.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Fusion equipment
- Fittings
- Cleaning tools
- Hand tools
- Non-petroleum marker
- Electric power source
- Alignment Clamps

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Static electricity discharge can ignite a flammable gas or combustible dust atmosphere.

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used for joining Polyethylene pipe by electrofusion.

This procedure must be qualified by subjecting a specimen joint made according to the procedure to one of the strength tests described in 192.283(a).

An individual not be qualified for this procedure until a specimen joint made by that person and according to the procedure is tested according to 192.283(a).

Approval:_____ Approval Date: _____ Next Review Date: _____

Joining of PE Pipe-Electrofusion

This purpose of this procedure is to describe the general steps required to join polyethylene pipe and associated fittings using electrofusion. Personnel making and inspecting polyethylene pipe joints must be properly qualified. This is a general procedure. Always follow the manufacturer's instructions.

CAUTION: Fire or Explosion Hazard: static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

General Procedure:

1. Inspect pipe lengths and fittings for unacceptable cuts, gouges, deep scratches or other defects. Replace or cut out any damaged pipe. Damaged pipe should not be used.

2. Clean the pipe ends to be joined with water or + 90% isopropyl alcohol.

3. Ensure that the pipe ends are cut squarely. Remove any cuts, scratches or grooves.

4. Mark the appropriate stab depth on pipe ends using a non-petroleum marker.

5. Use a chamfer tool to roughen (surface) the pipe ends. Use a properly sized chamfer tool.

6. Insert pipe ends into the fittings. If the pipe ends do not come closely together or if a large section must be replaced, use a segment of pre-tested polyethylene plastic pipe with an electrofusion fitting on each end.

7. When fusing a tapping tee, prepare the fusion area surface of the main in accordance with manufacturer's instructions. Ensure that the prepared surface extends beyond the intended melt bead area.

8. Apply properly sized fitting clamps to maintain fitting and pipe alignment.

9. Attach electrofusion machine leads to the machine and fitting. Fitting adapters may be necessary when using a machine and fittings from different manufacturers. Follow the manufacturer's instructions.

Note: Electrofusion Machine may not be intrinsically safe and will need to be placed away from the electrofusion fitting as far as the leads will allow in case of component failure.

10. Turn on the electrofusion machine. Scan the barcode. The machine will read the fitting size and type and select the appropriate fusing temperature and time.

11. When prompted by the machine, press the fusion button. The machine readout will show the required fusion and cooling times.

    Do not rough handle or leak test the pipe section until fusion joint has properly cooled.

12. After observing the prescribed cooling time, remove the leads from the fitting and remove the alignment clamps.

13. Download the fusion machine memory to a computer, as needed, to create a record of the fusion including anomalies such as short stab and misalignment.

14. Cut out and replace all unsatisfactory fusion joints in accordance with appropriate Company procedures.

PE Fusion Joint Inspection:

1. Visually inspect the joints for voids or discontinuities using the photographic example of proper joints provided by the manufacturer.

2. Examine the entire circumference of the joint for uniform and nonporous beads.

   Each fusion technique has specific inspection criteria. Always follow the manufacturer's recommendations and instructions.

3. Complete inspection record in accordance with Company practice.

Static Electricity Precautions:

When a flammable atmosphere may be encountered and static charges may be present, (e.g. when repairing a leak, squeezing-off an open pipe, purging, making a connection, etc.) static electricity safety precautions are necessary.

Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

Polyethylene pipe does not readily conduct electricity. A static electricity charge can build up on the inside and outside surfaces of the pipe, and stay on the pipe surface until some grounding device such as a tool or a person comes close enough for the static electricity to discharge to the grounding device.

Steps that discharge the outer surface do not discharge the inner surface of the pipe. Squeeze-off, venting, cutting, etc. can still result in a static electricity discharge. Polyethylene pipe cannot be discharged by attaching grounding wires to the pipe. When appropriate, ground tools and remove all sources of ignition.

Reporting / Notification:
Document the details of electrofusion joints as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential ignition hazard. No open flames. No smoking. Remove all potential ignition sources.
- Static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure
- Fusion Equipment Malfunction
- Improper Fusion

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 047
REVISION DATE 7/20/2021		B31Q COVERED TASK NO. 0821
Pipeline O&M Procedure	**Tubing and Fitting Installation**	PAGE NO. 1 of 8

SCOPE

This procedure defines the steps in installing tubing and fittings for instrumentation, control, and sampling.

OBJECTIVES

Safely and effectively install tubing and fittings for instrumentation, control, and sampling.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Combustible gas detectors
- Probe rods, electronic line locators
- Tools required for installation
- Tubing and fittings required

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used to install:

- Gas sampling tubing
- Fittings

Approval:_____ Approval Date: _____ Next Review Date: _____

Installing Tubing and Fittings for Instrument Control and Sampling

Tubing, piping, and hoses are all used in a variety of ways on gas pipeline systems for the purposes of instrument control and sampling. This procedure contains general guidelines for identifying and selecting the correct materials to use, cutting and bending tubing or hoses, and installing associated fittings. Always select the type of tubing suited for the environment it will be installed in.

Per §192.203:

1) Materials and design-All materials must be designed to meet the particular conditions of service and the following:

   a) Each takeoff connection and attaching boss, fitting, or adapter must be made of suitable material, able to withstand the maximum pressure and temperature of the pipe or equipment it is attached to, and be designed to withstand any stresses without fatigue failure.

   b) Except for those takeoff lines that are isolated from sources of pressure through other valves, a shutoff valve must be in each takeoff line as near as possible to the point of insertion into the system. Blowdown valves must be installed where necessary.

   c) Brass or copper must never be used where metal temperatures are greater than 400^{o}F.

   d) Pipe or material containing liquids must be protected by heating or other methods from freezing.

   e) Pipe or material in which liquids can accumulate must have drains or drips.

   f) Pipe or components subject to clogging must have suitable connections for cleaning.

   g) The system of piping, components, and supports must provide safety under anticipated operating stresses.

   h) Each joint between sections of pipe, and between pipe and valves or fittings, must be able to withstand the anticipated pressure and temperature conditions. Slip type expansion joints are not acceptable. Expansion must be allowed for using flexibility as designed within the system itself.

   i) Each control line must be protected from possible and anticipated damage and must be designed and installed so as to prevent damage to any one control line from making both the over-pressure protective unit and the regulator inoperative.

Sizes and Types of Tubing

Tubing is generally sized according to its outside diameter (OD) and wall thickness, expressed in fractions and thousands of an inch, respectively (1/2", 0.035). Normally, the manufacturer will print or stamp this information on the side of the tubing. These values can be measured on an existing piece of tubing using a caliper or similar tool. Inside diameter (ID) can be found through the following formula: ID = OD – (2x wall thickness). Table 1, on the next page, shows tubing sizes.

Tubing is made from a variety of materials, with each having its own respective strengths and weaknesses. The following is a listing of the most common materials and their typical applications:

- Copper Tubing – One of the most widely used metals for tubing. Red-brown in color, resists rust and is usually used in systems where temperature and pressure variations are not extreme. Expensive when compared to other types of tubing.

- Steel Tubing – Identified by the black coating of iron oxide that forms after production, unless the steel tubing is galvanized (dipped in zinc to better resist corrosion, pipe appears silver in color). Steel tubing is very strong and is used in high pressure and high temperature conditions, but not corrosive environments. Steel tubing is used in systems that have a lot of vibration because it is less brittle than stainless steel.

- Stainless Steel Tubing – Stiffer and stronger than copper tubing. Performs well in high pressure and high-temperature applications. Extremely corrosion resistant but also relatively expensive tubing.

- Aluminum Tubing – Softer, lighter weight, and more flexible than other metal tubing. Aluminum is silver in color, resists corrosion, and is easy to cut and shape. Aluminum also breaks more easily and oxidizes at the fittings.

- Poly Tubing – A broad category of thermoplastic tubing that can be easily bent and re-shaped. Easier to install because it does not require bending, flaring or deburring. It is lightweight, pliable and resistant to most chemicals and moisture. Limited ability to withstand high pressures and temperatures. Poly tubing may be PVC, polyethylene (PE), or made with Teflon.

- Other types of Tubing:
  - Monel® Tubing
  - Inconel® Tubing
  - Hastelloy® Tubing

Table 1: Tubing Sizes

Tube	Tube OD (in.)	Wall Thickness (in.)	Tube ID (in.)	Tube	Tube OD (in.)	Tube Thickness (in.)	Tube ID (in.)
1/16	.062	.010	.042	5/8	.625	.049	.527
		.015	.032			.065	.495
		.020	.022			.083	.459
						.095	.435
1/8	.125	.028	.069	3/4	.750	.049	.652
		.035	.055			.065	.620
						.083	.584
						.095	.560
						.109	.532
3/16	.187	.028	.131	7/8	.875	.049	.777
		.035	.117			.065	.745
		.049	.089			.083	.709
						.095	.685
						.109	.557
1/4	.250	.028	.194	1	1.000	.065	.870
		.035	.180			.083	.834
		.049	.152			.095	.810
		.65	.120			.109	.782
						.120	.760
5/16	.312	.035	.242	1 ¼	1.250	.083	1.084
		.049	.214			.095	1.060
		.065	.182			.109	1.032
						.120	1.010
						.134	.982
						.156	.938
3/8	.375	.035	.305	1 ½	1.500	.095	1.310
		.049	.277			.109	1.282
		.065	.245			.120	1.260
						.134	1.232
						.156	1.188
						.188	1.124
1/2	.500	.035	.430	2	2.000	.109	1.782
		.049	.402			.120	1.760
		.065	.370			.134	1.732
		.083	.334			.156	1.688
						.188	1.624

Tubing Standards and Specifications

The American Society of Testing Materials (ASTM) is one of several organizations that publish standards for tubing, describing the characteristics, applications, and capabilities of different types and sizes of tubing. These standards are used for selecting and identifying the type and size of tubing for particular applications.

The following are typical ASTM identification codes used to specify particular types of tubing:

- Stainless Steel Tubing
  - ASTM – A213
  - ASTM – A249
  - ASTM – A269
  - ASTM – A450
  - ASTM – A632
- Carbon Steel Tubing
  - ASTM – A161
  - ASTM – A179
- Copper Tubing
  - ASTM – B68
  - ASTM – B75
  - ASTM – B88
  - ASTM – B251
- Aluminum Tubing
  - ASTM – B210
- Monel®
  - ASTM – B165
- Inconel®
  - ASTM – B167
- Hastelloy®
  - ASTM – B622

Storing and Handling Tubing

Proper storage and handling can have a dramatic effect on the performance of tubing.

- Use correctly sized tubing racks to evenly support tubing and prevent bending, sagging or scratching.
- Store tubing above floor level, where damage is less likely to occur.
- The ends of tubing should be sealed (capped, taped, or plugged) to prevent damage.
- Tubing should be stored indoors or in a covered location to prevent weather damage (steel tubing can rust; poly tubing will become brittle in prolonged sunlight).
- Never drag tubing over the floor or ground. This can cause scratches and gouges.

- Do not use a vise to hold tubing unless it is equipped with specialized jaws for protecting round tubing.
- Wear gloves when handling tubing to avoid scraping, gouging, or cutting yourself on rough or sharp edges of the tubing.
- Place straight lengths of tubing inside PVC piping during transport to prevent damage.
- Put flags on the ends of long lengths of tubing during handling and transporting so that you and others can easily see the tubing ends and thus avoid damage and/or accidents.
- Be aware of people, materials, and equipment around you when handling and transporting tubing so that you can avoid hitting anyone or anything with the tubing.

Cutting Tubing

Prior to the tubing being installed, it must be cut squarely and cleanly to proper length. Tubing is often cut with a tubing cutter, but in some cases, a hacksaw or band saw may also be used to cut tubing. For some types of soft plastic tubing, snips, pocketknife, or a special "V" shaped cutting tool can be used.

- Cutting Tubing with a Tube Cutter

  Always check the manufacturer's instructions before using any tubing cutter to make sure you know the proper and safe way to use the cutter. The manufacturer's instructions can contain information about the type and size of cutter and wheel needed for the specific cutting job. Mark the tubing at the exact place where the cut is to be made, prior to using a tubing cutter. Make the mark all the way around the tubing so that it is always visible while cutting.

- Cutting Poly Tubing with Snips

  Soft, flexible poly tubing and PVC tubing are easy to cut using specifically designed snips. Before using snips to cut plastic tubing, mark the tubing at the exact place where the cut is to be made. Make the mark all the way around the tubing so it is always visible while cutting.

- Deburring Tubing

  When metal tubing is cut with a tubing cutter, hacksaw, or band saw, there may be burrs on the ID, OD, or both, especially hacksaws. If not removed, burrs on the tubing can break loose, causing metal chips and slivers to enter the tubing system. A hand reamer is often used to remove the burr on the inside of the tubing. The reamer, which has blades on the outside of a cone-shaped end, is inserted into the cut end of the tubing. It is twisted clockwise to remove the ID burr. Reamers come in a range of types and sizes.

Tube Fittings

- Flared Fittings

  A flared fitting gets its name from the fact that the end of the tubing is enlarged, or flared, slightly to give a rim against which the sleeve and body of the fitting can seal. Flared fittings can be assembled repeatedly and provide a good strong connection. They come in a variety of types, sizes, and materials for specific applications. The fitting consists of three main parts: a body, a flare nut, and a flare sleeve. Not all flared fittings include a sleeve. Sleeves are used primarily in fittings or high-pressure applications.

- Compression Fittings

  Compression fittings are often used in instrument work because they are considered reliable and relatively easy to install. Compression fittings can usually be disconnected and retightened without damaging the tubing or the fitting. They come in a variety of designs, sizes, and materials to fit different tubing applications. When using compression fittings, the end of the tubing is not flared. The tubing is fitted with a compression ring or ferrule that pinches, or compresses, the tubing as the locknut is tightened on the body of the fitting. Compression fittings have either one or two ferrules for each joint. The ferrule of the fitting must be harder that the tubing.

Types of Tubing Fittings

Numerous types of fittings are used to change direction of tubing runs, provide branch connections, close ends of tubing, and connect tubing to tubing, tubing to piping, and tubing to instruments. The following are several of the most commonly used types of tubing fittings.

- Male/Female Connectors and Adapters
- Tee Fittings
- Elbow Fittings
- Union Fittings
- Cross Fittings
- Caps and Plugs
- Reducer Fittings
- Bulkhead Fittings
- Thermocouple Fittings

Pipe Joint Compounds

- Teflon® Tape
    - Teflon® tape is a special tape that is wrapped around threads to prevent metal-to-metal contact and to create a leak-proof joint. Follow these steps to use Teflon® tape:
    - Step 1: Remove all excess cutting oil from the threads to improve the grip of the tape on the threads.
    - Step 2: Start the tape from the end of the thread, leaving the first full thread bare to prevent the tape from bunching up at the beginning of the thread.
    - Step 3: Wrap the tape around the pipe in the direction that the joint is to be assembled.
    - Step 4: Continue to wrap the tape around the joint, overlapping the edges of each wrap until all remaining threads have been covered.
    - Step 5: Press the tape against the threads to seal it to the threads and prevent the tape from slipping off the threads once you start to make up the joint.

- Liquid Teflon®
- Pipe Dope

Reporting / Notification:

Document the details of tubing installation as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:

- Explosive release of pressurized gas.
- Presence of poisonous, flammable or explosive gases.

Abnormal Operating Conditions (AOCs):

- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure
- Gouged PE Pipe

Personal Protective Equipment (PPE):

Personnel working in trenches should wear appropriate PPE which may include:

- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 049
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7/20/2021		0861, 0901
Pipeline O&M Procedure	**Install Pipe in a Trench**	PAGE NO. 1 of 5

SCOPE

This procedure describes the steps required to install pipe by trenching.

OBJECTIVES

To safely and effectively install pipe with minimal damage to pipeline integrity.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- *Bedding and Backfill* Procedure
- *Excavating In-service Pipeline Using Heavy Equipment* Procedure
- *Install and Repair Tracer Wire* Procedure
- *Inspect Steel Pipeline When Exposed or After Maintenance* Procedure
- *Inspecting PE Fusion Joints* Procedure
- *Apply Pipe Coating in the Field (Hot Application)* Procedure
- *Apply Pipe Coating in the Field (Cold Application)* Procedure
- Pressure Testing Procedures

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Hand tools
- Mechanized equipment
- Shovel
- Tracer wire

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for the installation of new plastic or steel pipe in a trench.

Approval:_____ Approval Date: _____ Next Review Date: _____

Installing a Pipe by Trenching

This is the general procedure for installing a pipe by trenching. Separate procedures are listed for plastic and steel pipe. The installation of piping also includes: locating other underground pipelines and structures, surveying locating and excavating the location for the new line, joining pipe sections, adding cathodic protection test stations, and bedding and backfilling the trench. This procedure only addresses the installation of the pipe.

The pipe should be laid and continuously supported on undisturbed soil or approved backfill (preferably 6 inches of sand).

General Procedure for Plastic Pipe:
The length of plastic pipe expands and contracts at a higher rate than steel or cast iron. Special care should be taken to avoid pipe failure due to temperature changes. The crucial period for failure due to temperature effects is during installation, when rapid temperature changes may occur, and before adhesive, solvent-cemented or heat fused joints have been fully cured or have attained a high percentage of their final strength. Avoid installation of the plastic pipe under tension to minimize the effects of contraction from thermal changes.

1. Prepare the ditch for bedding and the subsequent pipe installation by removing rocks larger than 1-1/2 inches in diameter, adding approved backfill as needed, and compacting the trench bed to provide a relatively smooth trench bottom. See the procedure *Bedding and Backfill*.

2. Ensure the plastic piping is laid and continuously supported on undisturbed or well compacted soil.

3. If the plastic piping is joined above grade, allow sufficient time for the joint to set up before moving the pipe.

4. End connections should be made with fittings designed to provide equal or greater restraint than the strength of the plastic pipe and/or supplemented with additional restraint such as anchoring, bracing or strapping.

5. When using mechanized equipment, lift and lower the pipe using nylon sling, padded calipers, or other appropriate devices.

   Do not subject pipe to unnecessary stress. Do not twist or bend the pipe to a radius smaller than the minimum radius recommended by the manufacturer.

6. Ensure the plastic piping is continuously supported while being lowered into the ditch.

7. Lower the pipe into the ditch while being careful to protect the pipe from cuts, gouges, nicks, scratches and other damage during the installation process.

   Do not drag plastic piping over rough surfaces that could gouge or scratch the pipe.

8. Install tracer wire, as needed, following the Company procedure *Install and Repair Tracer Wire*.

9. Maintain a sufficient clearance between plastic piping and other underground structures not associated with the piping. If proper clearance cannot be attained, protect the piping from damage that might result from the proximity of other structures.

10. Inspect the plastic pipe for damage and visually inspect all joints as per the procedure *Inspecting PE Fusion Joints.*

11. Pressure test the plastic pipe following the appropriate Pressure Testing procedure.

12. Back fill the trench following the procedure *Bedding and Backfill*.

General Procedure for Steel Pipe:

1. Prepare the ditch for bedding and the subsequent pipe installation by removing rocks larger than 1-1/2 inches in diameter, adding approved backfill as needed, and compacting the trench bed to provide a relatively smooth trench bottom. See the procedure *Bedding and Backfill*.

2. Ensure that the trench bottom elevation conforms to the established pipeline profile and that it is padded with the approved backfill as described in the procedure *Bedding and Backfill.*

3. A sufficient clearance of 12 inches minimum between steel piping and other underground structures not associated with the piping must be maintained. If clearance cannot be attained, the piping must be protected from damage that might result from the proximity of other structures.

4. Lay out the pipe along the excavated trench. Ensure the piping is laid and continuously supported on undisturbed or well compacted soil.

5. Join the separate pipe sections together following Company approved welding procedures. This task should be completed only by qualified welders.

6. Inspect the welded joints following the appropriate procedure. Repair any defective welds.

7. Prime and coat the welded joints following the appropriate coating application procedure.

8. Locate the lifting devices at predetermined locations to reduce the possibility of overstressing the line. When using mechanized equipment, lift the pipe using nylon sling, padded calipers, or other appropriate devices.

9. Do not drag or roll the pipe across the ground or other surfaces where rocks and other sharp objects could cause damage to the pipe coating.

10. Ensure the pipe is adequately supported while being lowered into the ditch.

11. Move the pipeline in small increments to obtain the desired position. Perform holiday detection prior to lowering into ditch. Repair all holidays found and recheck.

12. When lifting, moving, and lowering pipe into the ditch, be careful to protect the pipe and pipe coating from dents, gouges, nicks, scratches and other damage.

13. Check the final position of the pipe to ensure that sufficient support exists for the bottom of the pipe. Block and support the pipe as needed, using care to not damage the pipe coating.

14. Visually inspect the entire length of the pipeline section to ensure that there are no wrinkles, gouges, or other apparent physical damage following the *Visually Inspect Pipe and Components* Procedure.

15. If coating damage or other pipeline damage is noted, take necessary steps to repair the coating.

16. Pressure test the pipeline following the appropriate Pressure Testing procedure.

17. Backfill the trench following the procedure *Bedding and Backfill*.

Reporting / Notification:
Document the details of the installation of plastic pipe as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Collapse of bell hole walls.
- Presence of poisonous, flammable or explosive gases in bottom of excavated area.
- Presence of oxygen deficient atmosphere in the bottom of excavated area.
- Traffic hazard, mechanized equipment hazard. Wear a reflective safety vest and use care when working near mechanized equipment and areas where moving vehicles are present.
- Drop / fall hazards.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure

Personal Protective Equipment:
- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 050
REVISION DATE 7/20/2021		B31Q COVERED TASK NO. 0871, 0911
Pipeline O&M Procedure	**Installing Pipe by Boring**	PAGE NO. 1 of 5

SCOPE

This procedure describes the steps required to install pipe by insertion after boring.

OBJECTIVES

To safely and effectively install pipe by insertion without damaging the pipe or pipe coating.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- *Bedding and Backfill* Procedure
- *Visually Inspect Pipe and Components* Procedure
- *Leak Test at Operating Pressure* Procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Hand tools
- Boring equipment
- Shovel
- O_2 meter (required for excavations deeper than four feet)
- Combustible gas detectors (optional, as-needed to check for explosive or poisonous atmosphere)
- Probe rods, electronic line locators
- Tracer wire (for plastic pipe)
- Mechanized equipment

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure is intended for the installation of new pipe.

Approval:_____ Approval Date: _____ Next Review Date: _____

Installing Pipe by Boring

This is the general procedure for installing a pipe by insertion after boring.

Horizontal Directional Drilling (boring) is used to create a horizontal hole of sufficient size to pull in the plastic or steel pipe. This procedure addresses the installation process.

Care should be taken to protect plastic pipe from damage when hauling, lifting, moving or handling.

Installation of a Steel Pipe by Boring:

1. Dig an entry trench or trail ditch long enough to lower the pipe to burial depth without causing excessive strain on the pipe as it is being pushed or pulled through the bore hole.

2. Seal the leading edge of the pipe.

3. Ensure that the trail ditch (entry and exit trench or pit) is relatively smooth, free of rocks and other debris that could damage pipe during pull-in or push-through.

4. When necessary, protect the pipe coating from damage before it enters the entry trench by placing padding underneath it.

5. Inspect the pipe and coating before pushing or pulling it through bore hole. Inspect the pipe for damage and visually inspect all joints as per the procedure *Visually Inspect Pipe and Components*.

6. Repair or replace any segment of pipe that contains unacceptable surface damage or defects.

7. Take precautions not to cause any damage to the pipe or coating during the installation process.

8. Ensure that pressure sensitive tape wrap is installed so that the exposed edge of the wrap is facing away from the entry of the borehole.

9. Pull or push pipe through borehole, taking care not to damage the pipe and coating. Use proper pipe handling devices.

10. If casing is used during the boring process, ensure the carrier pipe is properly supported within the casing.

11. Examine the pipe as it exits the borehole to look for indication of obvious damage.

12. Repair or replace any segment of pipe that contains unacceptable surface damage or defect.

13. Pressure test the pipe following the appropriate pressure testing procedure.

14. Dispose of any wastes and clean up.

15. Restore the site.

Installation of a Plastic Pipe by Boring:

1. Dig an entry trench or trail ditch long enough to lower the pipe to burial depth without causing excessive strain on the pipe as it is being pushed or pulled through the bore hole.

2. Seal the leading edge of the plastic pipe to be installed.

3. As needed, attach a weak link or breakaway device at the leading end of the plastic pipe to protect the pipe from damage if the pulling/pushing load gets too high.

4. Ensure that the trail ditch (entry and exit trench or pit) is relatively smooth, free of rocks and other debris that could damage pipe during pull in or push through.

5. When necessary, protect the plastic pipe from surface damage before it enters the entry trench by placing padding underneath it.

6. If the plastic piping is joined (using butt fusion or another method), allow sufficient time for the joint to set up before moving the pipe.

7. Inspect the plastic pipe before installing through the bore hole. Repair or replace any segment of pipe that contains unacceptable surface damage or defect.

8. If a pull back process is used to pull the pipe through the bore as the boring equipment is pulled out, attach the pipe to be installed to the anchor point of the boring equipment.

9. Attach the tracer wire to the boring equipment anchor point so that the wire is pulled into position with the plastic pipe.

10. Pull or push pipe through bore hole without twisting or turning the pipe, taking care not to put excessive strain on the pipe. Installing the pipe without twisting or turning the pipe ensures that the tracer wire does not get wrapped around the pipe.

11. If casing is used during the boring process, ensure the plastic (carrier) pipe is properly supported within the casing. Also, remove sharp edges from the end of the conduit to prevent damage to the inserted pipe.

12. Observe the pipe at the entry point as it is pulled/pushed-in. It should continue to move at a steady pace. If pipe movement stops or the pace is interrupted, pipe yielding may be indicated.

13. If a weak link is not used, monitor the tensile load and ensure that the tensile load does not exceed the pipe manufacturer's recommendations.

14. Examine pipe as it exits bore hole looking for indications of obvious damage.

15. Repair or replace any segment of pipe that contains unacceptable surface damage or defect.

16. Inspect the plastic pipe for damage and visually inspect all joints.

17. Pressure test the plastic pipe following the appropriate pressure testing procedure.

18. Dispose of wastes and clean up.

19. Restore the site.

Reporting / Notification:
Document the details of the installation as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Collapse of bell hole walls.
- Presence of poisonous, flammable, or explosive gases in bottom of excavated area.
- Presence of oxygen deficient atmosphere in bottom of excavated area.
- Traffic hazard, mechanized equipment hazard. Wear a reflective safety vest and use care when working near mechanized equipment and areas where moving vehicles and traffic are present.
- Drop / fall hazards.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Environmental Incident: uncontrolled spill/release of environmentally hazardous materials
- Damage to Facilities
- Component Failure

Personal Protective Equipment:
- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 051
REVISION DATE		B31Q COVERED TASK NO.
7/20/2021		0881, 0921
Pipeline O&M Procedure	**Installing Pipe by Plowing**	PAGE NO. 1 of 5

SCOPE

This procedure describes the steps required to install pipe by plowing/pull-in.

OBJECTIVES

To safely and effectively install pipe by insertion without damaging the pipe or pipe coating.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- *Bedding and Backfill* Procedure
- *Visually Inspect Pipe and Components* Procedure
- *Leak Test at Operating Pressure* Procedure
- *Install Tracer Wire* procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Hand tools
- Shovel
- Combustible gas detectors (optional, as needed to check for explosive or poisonous atmosphere)
- Probe rods, electronic line locators
- Tracer wire (for plastic pipe)
- Mechanized equipment as required

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure is intended for the installation of new pipe.

Approval:_____ Approval Date: _____ Next Review Date: _____

Installing a Pipe by Plowing/Pull-In

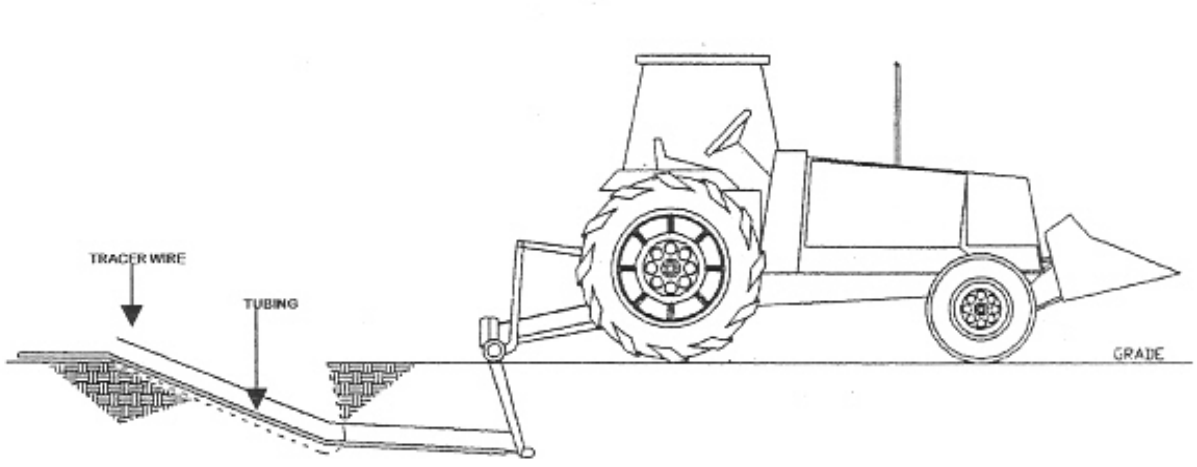
This is the general procedure for installing a pipe by plowing/pull-in.

Plowing techniques can be used for installing plastic mains and services. These techniques are best utilized in flat or gently rolling terrain, and in soil that is relatively compactable and free from large rocks and subsurface obstructions such as walks, driveways, culverts, trees or underground utilities. A pilot pass with the plow set shallower and without the pipe attached is sometimes feasible in marginal soil. Underground structures, such as other utilities, must be located to prevent damage while plowing.

The pull-in method is generally used for services or shorter strings of pipe. The plant-in method is less likely to damage the plastic pipe and allows continuous pipe placement with minimum chance of abrasion damage to the pipe walls.

Care should be taken to protect plastic pipe from damage when hauling, lifting, moving or handling.

Installation by Pulling:
During this technique, the plastic pipe is pulled or dragged through the ground in an oversized borehole created by a mole on a plow blade pulled by a tractor or winch. The connection at the mole head is often designed to break at a pull of not more than ½ of the apparent yield strength of the pipe that is being installed. This is called a weak link or breakaway device.



1. Inspect the area to determine the suitability of soil and terrain for plowing.

2. Expose all underground facilities in the path of the plowing operation to verify location and depth.

3. Dig an entry trench long enough to lower the pipe to burial depth without causing excessive strain on the pipe.

4. Seal the leading edge of the plastic pipe to be plowed in.

5. Attach a weak link or breakaway device at the leading end of the plastic pipe to protect the pipe from damage if the pulling load gets too high.

6. To create the weak link, fuse in a 12 inch length of the next smaller pipe size (e.g. when pulling in a 2 inch plastic pipe, fuse in a 12-inch length of a 1 inch plastic pipe immediately behind the pull head). The manufacturer's recommendations should be followed when creating or using a weak link.

7. Attach the pipe to be pulled to the mole or moling head section of the plow blade.

8. If a tracer wire is to be installed, attach the tracer wire to the mole or moling section of the plow blade so that the wire is pulled into position with the plastic pipe.

9. Take care to not put excessive or uneven strain on the pipe being pulled in. Once the pulling process has started, the pipe and pulling equipment should move at a steady pace.

10. Protect the pipe so it will not be scratched or gouged during the pull-in operation. Remove sharp edges from the end of the conduit to prevent damage to the inserted pipe.

11. Observe the pipe at the entry point as it is pulled-in. It should continue to move at a steady pace.

12. If pipe movement stops or the pace is interrupted, pipe yielding or the presence of underground obstructions may be indicated.

13. Observe the movement of the pulling equipment at the exit point. It should continue to move at a steady pace. Take precautions to prevent kinking or buckling of the pipe. Any section of pipe containing a kink or buckle must be cut out.

14. If a weak link is not used, monitor the tensile load and ensure that the tensile load does not exceed the pipe manufacturer's recommendations. Pull force and length of pull may not exceed the following:

Pipe Type	Maximum Force (lbs.)*	Maximum Length (ft.)
½" CTS MDPE	195	165
1" CTS MDPE	420	195
½" CTS HDPE	225	190
1" CTS HDPE	484	225
2" PE		500
4" PE		1000
6" PE		1000

15. Pull an additional length of pipe (3-5%) past the exit and leave an additional length of pipe (3-5%) at the entry point. This allows the pipe to shrink back to its original length during the relaxation period.

16. Allow a relaxation period of 8 to 24 hours to allow the pipe to recover from the temporary pull-in installation stress effects.

17. Check the tracer wire for continuity.

18. If the tracer wire has broken make the necessary repairs.

19. Blow the plastic pipe clear of dirt and debris using compressed air

20. Pressure test the plastic pipe following the appropriate pressure testing procedure.

Reporting / Notification:
Document the details of the installation as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Collapse of bell hole walls.
- Presence of poisonous, flammable or explosive gases in bottom of excavated area.
- Presence of oxygen deficient atmosphere in bottom of excavated area.
- Traffic hazard, mechanized equipment hazard. Wear a reflective safety vest and use care when working near mechanized equipment and areas where moving vehicles are present.
- Drop / fall hazards.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Environmental Incident: uncontrolled spill/release of environmentally hazardous materials
- Damage to Facilities
- Component Failure

Personal Protective Equipment:
- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 052
REVISION DATE 7/20/2021		B31Q COVERED TASK NO. 0891
Pipeline O&M Procedure	**Field Bending of Steel Pipe**	PAGE NO. 1 of 3

SCOPE

This procedure outlines the general guidelines for bending steel pipe in the field, as well as inspecting completed field bends.

OBJECTIVES

To be able to perform field bends of steel pipe in a safe and efficient manner so as to minimize anticipated stresses upon the piping and associated fittings and be able to inspect completed field bends.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Pipe bending tools
- Hand tools
- Tools to measure angles and lengths

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: When using tools during this procedure, it is important to keep appendages away from the hinge point and machinery. When using physical force, make sure to do so in a safe manner. Keep company safety procedures in mind.

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used for the bending of steel pipe while on-site.

Approval:_____ Approval Date: _____ Next Review Date: _____

Field Bending Steel Pipe

The purpose of this procedure is to describe the general steps in creating a bend in a steel pipeline. Personnel making and inspecting pipeline bends must be properly qualified. This is a general procedure. Always follow the manufacturer's instructions.

The principle of a field bend is to change the direction of a pipeline that may be required due to limits to factory made elbows or due to unknowns during construction.

CAUTION: Fire or Explosion Hazard: static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

General Procedure for Bending Steel Pipe:
Steel pipe bends, in the field, may require either hand bender or power bender tools. This is a very general guide for bending steel pipes, so consult the manufacturer's information about the specific product being used.

1. Identify when there is a need for the field bend, and the best position in the pipeline to make the bend.

2. Make a plan for what kind of angle is needed. Too sharp of an angle may impede the functionality of the pipeline.

3. Measure the angle desired beforehand. Be mindful that the bend must not impair the serviceability of the pipe.

4. If bending by hand, an anchor can be useful.

5. The bend has to have a smooth contour, free from buckling, cracks, crinkling, rippling, or any other mechanical damage.

6. Start bending the pipe with the most appropriate tool possible. This could be by hand, an improvised tool, a hand operated bender, or a power bender. Compensate for spring back, if necessary.

7. If using a tool that lacks degree markings or by hand, measure the degrees of bend or radius.

8. Inspect the resulting bend. Check for any sort of deformation or mechanical damage.

Reporting / Notification:
Document the details of the procedure as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential ignition hazard. No open flames. No smoking. Remove all potential ignition sources.
- Static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Environmental Incident: uncontrolled spill/release of environmentally hazardous materials
- Atmospheric Changes in a Confined Space
- Damage to Facilities
- Component Failure
- Improper Fusion
- Fusion Equipment Malfunction

Personal Protective Equipment:
- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 053
REVISION DATE		B31Q COVERED TASK NO.
7/20/2021		0941
Pipeline O&M Procedure	**Install and Repair Tracer Wire**	PAGE NO. 1 of 3

SCOPE

This procedure outlines the general guidelines to install and repair a tracer wire.

OBJECTIVES

To safely install and repair a tracer wire with minimal impact on operations and the environment.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- *Bedding and Backfill* Procedure
- *Installation of Pipe by Trenching* Procedure
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Twelve-gauge, solid copper locating wire (tracer wire)
- Location wire / Line marker boxes
- Line marking tape
- Connectors
- Hand tools

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used to install and replace tracer wire.

Approval:_____ Approval Date: _____ Next Review Date: _____

Install and Repair Tracer Wire

This purpose of this procedure is document the steps required to install an insulated tracer wire and/or pipeline tape marker during plastic pipe installation to serve as a means to accurately locate and trace the pipe when utilizing pipe locators.

General Procedure:

1. Use a tracer wire that is a coated (insulated) copper wire. The insulation should cover the copper wire over its entire buried length.

2. Visually inspect the tracer wire for damage to the insulation and for broken wire, during the installation.

3. Repair or replace any defects discovered during installation in accordance with manufacturer's instructions.

4. For installation of a tracer wire in a ditch, place the tracer wire in the ditch directly underneath the pipe.
   - Avoid spiral wrapping of the tracer wire around the pipe.
   - Do not tape the tracer wire to the pipe.

5. For installation of the tracer wire in a borehole, connect the tracer wire to the anchor point on the boring equipment along with the polyethylene pipe. This ensures the tracer wire is installed at the same time that the plastic pipe is installed.

6. For installation of the tracer wire using the plow-in method, connect the tracer wire to the plow head connection or install the tracer wire in its chute, as appropriate to ensure the tracer wire is installed as the pipe is being laid.

7. Ensure the tracer wire is not pulled taut or put under undue strain during installation.

8. Protect the tracer wire from damage by taking practicable precautions when hauling, lifting, moving or handling.

9. When it is necessary to connect lengths of tracer wire, or to tie into existing tracer wire(s), strip back insulation and use one of the following connection methods:
   - Twist wires and wrap with electrical tape;
   - Solder wires and wrap with electrical tape;
   - Split bolts; or
   - Electrical connector filled with silicon.

10. Install Location Wire / Line Marker boxes at the beginning and end of all new and renewed plastic main lines. Install additional boxes at 500' intervals.

11. The Location Wire / Line Marker box will be used to attach the tracer wire for direct hook-up to locate plastic main lines and as a ground level line marker.

12. To attach the tracer wire, feed the wire through the bottom of the box and attach it to the bottom of the lid using the hardware provided.

13. Check the tracer wire for continuity and make repairs if necessary.

Reporting / Notification:
Document the details of install and repair tracer wire as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Collapse of bell hole walls
- Presence of poisonous, flammable or explosive gases in bottom of excavated area.
- Presence of oxygen deficient atmosphere in bottom of excavated area.
- Drop / fall hazard

Abnormal Operating Conditions (AOCs):
- Component Failure

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 054
REVISION DATE		B31Q COVERED TASK NO.
7/20/2021		0951, 0961
Pipeline O&M Procedure General Maintenance	**Install and Maintain Above-Ground Pipe**	PAGE NO. 1 of 3

SCOPE

This procedure outlines the general guidelines installing and maintaining above-ground pipe.

OBJECTIVES

To install and maintain above-ground pipe in a safe and effective manner.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Any required coatings for pipe, as needed for repairs

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Supervisor guidance
- Field Operator guidance

Approval:_____ Approval Date: _____ Next Review Date: _____

Install and Maintain Above-Ground Pipe

This procedure describes the general steps required to install and maintain above-ground pipe. Only qualified personnel should install above-ground pipe.

Regular maintenance and inspection of above-ground pipe should be performed to ensure the system stays in proper and safe operating condition.

General Procedure for the Installation of Above-Ground Pipe
Designing and installing steel pipe should be done by qualified personnel. Factors such as sub-soil conditions and terrain must be considered when installing a pipeline. Supports for the pipe should be properly designed by a professional, as the pipe must be structurally supported at the proper intervals so as not to stress the pipe. Also, the expansion and contraction of steel pipe must be considered when designing and installing the pipeline.

Installation:

1. Follow design specifications. Only use pipe that is designed to withstand sunlight and other factors produced by aboveground installation. Most plastic pipe is not designed to be used aboveground. Steel pipe specifications are covered by API 5L and ASTM A53.

2. Unload and maneuver pipe without damaging the outside coating. If damaged, corrosion can occur in that area. Repair any coating damages using the proper procedure.

3. Line up piping to determine if the correct lengths and angles are present. If needed, shorten or bend the pipe according to procedure.

4. Make each joint in accordance with written procedures proven by experience and/or tests to produce strong, tight joints.

5. Welding must be performed in accordance with established written welding procedures, typically API 1104 standards. (See welding procedures for more information) Welders must be qualified.

6. Install pipe supports so that pipe joints are not under excessive stress. Ensure there is an insulating material that does not damage pipe coating between the support and pipe.

7. Electrically insulate dissimilar metals.

8. Obtain and follow manufacturer’s recommendations for each fitting used.

9. If the above-ground pipe is in a high use area where vehicles could damage the pipe, install bollards or other materials for protection.

10. Pressure test new pipe after installation.

11. Actual MAOP (Maximum Allowable Operating Pressure) of a new or replacement pipe is determined by a pressure test performed by the operator before being put into service.

Maintenance

1. Above-ground pipe should be inspected on a regular basis, but at least once every 3 years.

2. Coatings should be repaired as soon as possible to avoid corrosion. Any corrosion found should be measure to determine remaining pipe wall strength or replaced.

3. Ensure pipe supports are in contact with the ground and pipe and that insulating material is in good condition.

4. Repairs to pipe or fittings should be done by qualified personnel.

Reporting / Notification:

Document the details of repairs as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:

- Be careful when working with a pipeline under pressure. Be aware of unintended releases of gas.

Abnormal Operating Conditions (AOCs):

- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure

Personal Protective Equipment:

- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 055
REVISION DATE		B31Q COVERED TASK NO.
7/20/2021		0971
Pipeline O&M Procedure	**Install and Maintain Casing Spacers, Vents and Seals**	PAGE NO. 1 of 3

SCOPE

This procedure is to ensure that casing spacers, vents and seals are installed and maintained in a safe and efficient manner so as to minimize damage to the carrier piping and associated fittings. It describes practices required to comply with §§192.323, 192.467 (a) through (d), 192.479, 192.481, and 192.707.

OBJECTIVES

To ensure pipe inside casings maintains integrity.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- *Measure Pipe to Soil Electrolyte Potential* Procedure
- Operations and Maintenance Manual
- Annual CP survey records

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Casing spacers and end seals
- Voltmeter / Multi-meter *
- Copper-copper sulfate electrode
- Copper sulfate solution and water
- Hand tools

* Voltmeter or Multimeter- A voltmeter used for cathodic protection work needs to have an input impedance of at least 10 megaohms and a DC voltage scale.

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used to install and maintain casings and associated components.

Approval:_____ Approval Date: _____ Next Review Date: _____

Install and Maintain Casing Spacers, Vents, and Seals

Installation:

1. Properly sized casing spacers should be selected in order to fit the outside diameter of the carrier pipe and the inside diameter of the casing. The inside casing surface should be relatively smooth to facilitate spacer insertion.

2. Casing spacers should be constructed of a resilient insulating material such as plastic.

3. Install insulating casing spacers close enough together to prevent any possibility of carrier / casing contact due to sagging.

4. Follow the spacer manufacturer recommendations for installing insulating spacers and tightening spacer bolts or clamps. During the insertion process, maintain the correct alignment between the carrier pipe and the casing to prevent damage to spacers or cause spacers to slide on the pipe due to friction or snagging.

5. Pulling the carrier pipe through the casing is preferable to pushing the carrier pipe through the casing. Use of an internal compression bullhead and pulling cable is preferred. Insulating spacers can be applied prior to pulling or as the carrier pipe is being pulled.

6. Soil stabilization at both ends of the casing is necessary to eliminate electrical shorting between the carrier pipe and the casing due to long-term settling of the carrier pipe. The carrier pipe should be centered in the casing and self-supporting when soil stabilization is completed.

7. End seals are installed to prevent water, soil, and other debris from entering the casing/carrier facility. End seals should not be electrically conductive. Heat-shrink seals and tape seals are common and should be installed in select backfill to prevent damage. These soft seals commonly do not hold gas pressure. Ensure that properly-sized end seals are installed in accordance with manufacturer's recommendations.

8. It is preferable to install weld-on vent pipes before carrier pipe insertion to prevent damage to pipe coating and end seals due to sparks and heat. Vent tops must be designed to prevent water, debris, and insects from entering or plugging the vents. Vents are not required on both ends, but they make good visual markers, good leakage survey points, and good cathodic protection test points.

9. If vents are installed, install signage as applicable by code requirements.

Maintenance:

1. Casing end seals may fail over time causing infiltration of water and other debris.

2. Replacement of end seals should be performed according to installation procedures listed in step 7 above.

3. Casing spacers made of resilient insulating material such as plastic seldom fail; therefore, periodic maintenance is not required unless severe carrier or casing pipe movement or damage has occurred.

4. After installation of casing vents, periodic inspection for atmospheric corrosion must be performed according to applicable code requirements.

5. If line markers or other signage is used, maintenance of these facilities must be performed according to applicable code requirements.

Reporting / Notification:

Document the details of the short casing as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:

- Do not use a wet cell battery to conduct an internal resistance test. If a short exists between the carrier and the casing, large current flows may be generated by small voltages when conducting this test, resulting in a potential wet cell battery explosion.
- Some test lead stations are located in high grass or near swampy areas. Beware of snakes.
- Do not conduct the procedure during a lightning storm. Electricity from the lightning could travel onto the pipe and result in death or injury when electrical contact is made with the pipe during the rectifier inspection.

Abnormal Operating Conditions (AOCs):

- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities

Personal Protective Equipment:

- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 056
REVISION DATE		B31Q COVERED TASK NO.
7/20/2021		0981
Pipeline O&M Procedure	**Bedding and Backfilling**	PAGE NO.
		1 of 4

SCOPE

This procedure describes the steps required for bedding and backfilling an excavated site along a pipeline.

OBJECTIVES

To safely bed and backfill the excavated areas(s) without damaging the pipe or pipe coating. To complete the process with minimal environmental impact.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- Installation Standards for Gas Piping & Appliances on Customer's Premises Manual
- *Installing a Pipe by Trenching* Procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Shovel
- O_2 meter
- Combustible gas detectors (optional, as needed to check for explosive or poisonous atmosphere)
- Twelve-gauge, solid copper locating wire (Polyethylene pipe only)
- Line-marking tape
- Location wire / Line markers
- Mechanical tamper (when necessary)

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for the bedding and backfilling of steel and polyethylene pipe.

Approval:_____ Approval Date: _____ Next Review Date: _____

Bedding and Backfill

The following procedure details the manner in which steel and polyethylene pipe are to be bedded and backfilled providing continuous support around the entire circumference of the pipe so as not to cause damage. In situations where this procedure is impractical, all efforts should be made (i.e. ditch pads, rock shield) to minimize pipe stress and protect the pipe coating from damage.

General Requirements:

1. Bedding and initial fill material must be free of large rocks (larger than 1-1/2 inches), frozen earth, dirt clods, and decomposable debris such as wood. Under no circumstances shall granulated / pulverized limestone or other material be used that permanently hardens when in contact with water or other solvents.

2. Fill material should have a density similar to sand, fine-grained fill, or similar material with good compaction qualities (with a grain diameter of 1/2 inch or less).

Bedding and Backfilling:

1. Prepare the ditch for bedding and the subsequent pipe installation by removing rocks larger than 1-1/2 inches in diameter.

2. The ditch bed should be compacted, filling voids and waves by shoveling and tamping (by mechanical means, if necessary).

   Note: When rock, ledge, hardpan, or boulders are encountered, the trench bottoms should be padded with a minimum of six inches of sand. When necessary, successive layers should be applied uniformly to ensure smoothness.

3. The pipe should be laid and continuously supported on undisturbed soil or approved backfill (preferably 6 inches of sand).

4. Perform a visual inspection of the backfill material to identify any foreign objects that could cause damage to the pipeline system.

5. Take appropriate action to remove any foreign material or objects.

6. Determine if the backfill material is suitable for backfill around the pipeline:
   - Soft material should be used as bedding near the coating.
   - Excessive rocks may make replacement of backfill necessary.
   - Excessive roots, brush, and other material may make replacement of backfill necessary.

7. Use suitable materials to fill within 6 inches of the pipe or to the level stipulated by company specifications.

   Note: Use rock shields as needed to protect the pipeline coating.

8. Fill equally along both sides of the pipe until the pipe is covered. Use the excavator to backfill until the pipe is completely covered with two feet of soil.

9. When using heavy equipment for the placement of the initial backfill, special attention must be exercised to prevent pipe damage. There should be 24 inches of covering in place before the plowing of backfill material can occur.

10. Compact the soil under and around the pipe for proper pipe support using tamping tools, backhoes, and other tools and equipment as needed.

    Note: Extra compaction is required at road crossings and locations where heavy loads may cross the pipeline.

11. If a dozer or loader is used to finish backfilling, operate the heavy equipment in a position that is at a 90° angle to the pipe.

12. Cover the pipe to the cover depth required by specifications.

13. Compact the cover material.

14. Crown the backfill according to company specifications to allow for settlement.

    Unless otherwise authorized or required, each pipeline must be installed with a minimum cover as follows:

LOCATION	**NORMAL SOIL**	**CONSOLIDATED ROCK**
Class 1 Locations	30 Inches	18 Inches
Class 2, 3, & 4 Locations	36 Inches	24 Inches
Drainage ditches of public roads & Railroad crossings	36 Inches	24 Inches

Reporting / Notification:
Document the details of the excavation and backfill as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Component failure: Valve failure, weld / seam failure, flange, joint
- Corrosion Present
- Damaged Coating
- Fire / Explosion: Ignition of released gas
- Loss of Pressure in Pipeline
- Pipeline system damage: wrinkle, buckle, over-stress, gouge, dent
- Unexpected gas encountered
- Unexpected Pipeline Damage
- Unexpected Soil Movement

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Incorrect Backfill Material

Personal Protective Equipment (PPE):
Personnel working in trenches should wear appropriate PPE, which may include:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 057
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		0991
Pipeline O&M Procedure	**Apply and Repair Pipe Coating – Brushed or Rolled**	PAGE NO. 1 of 5

SCOPE

This procedure describes the steps required for proper surface preparation and application or repair of pipe coatings that are brushed or rolled on pipelines.

OBJECTIVES

To safely apply pipe coating in the field and to add corrosion protection and / or fill voids in damaged coatings.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- *Apply and Repair Pipe Coating – Sprayed or Wrapped* Procedure
- *Bedding and Backfill* Procedure
- Operation and Maintenance Manual

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Melt sticks (FBE226P Hot Melt Patch Compound stick, Polyethylene Melt Stick)
- Hand held propane torch
- Primer and coating
- Clean wire brush
- Abrasive paper
- Clean rags
- Approved cleaner (Acetone or Rubbing alcohol)
- Sharp knife
- Putty knife
- Small roller
- Fire extinguisher

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Heat applied coatings should not be used for leaking pipeline repair or in the presence of a flammable atmosphere.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for the application or repair of pipe coatings that are brushed or rolled on.

Approval:_____ Approval Date: _____ Next Review Date: _____

Apply and Repair Pipe Coating – Brushed or Rolled

This is the general procedure for the application and repair of pipe coatings that are brushed or rolled. All pipe coatings should be applied in accordance with the manufacturer's application instructions. Pipeline repair materials are used to add corrosion protection and / or fill voids in damaged coatings.

This procedure addresses the application of liquid coatings and primers on new or replaced pipe that are applied with a brush or roller, and repair of pipe coating using a melt stick. These materials provide the flexibility to make a variety of repairs to pipeline coatings ranging from minor coating damage to holidays and exposed steel.

Follow the Manufacturer's technical data sheet for the surface preparation and application of these materials.

Application of Liquid Pipe Coating:

1. Ensure coating materials are stored, handled, and transported in a manner that prevents damage or contamination.

2. Prepare the pipe surface.
   a. All metal surfaces should be cleaned of free rust, dirt, oil, grease, loose coating or other foreign material.

   b. Welded joints may need to be wire brushed with a power wire brush or other method that will remove slag or other loose particles.

   c. If feasible, the surface should be blasted to a commercial finish. If the surface is blasted in a mill or shop prior to being brought to the field, the surface should be wire brushed to remove any corrosion product before applying liquid coating.

3. Ensure that the pipe surface is free of moisture and remains free of moisture during the coating process. Coatings will not adhere properly to the pipe in the presence of moisture.

4. Apply coating evenly to pipe, fittings, and components using a hand brush or roller, ensuring adhesion and complete coverage.

5. The finished coat should not be disturbed until the coating has thoroughly dried – refer to manufacturer's specifications for drying time.

6. For pipelines extending from underground to aboveground, the coating shall extend a reasonable distance above ground level.

7. Inspect the final coating for verification that coating has been applied correctly.

Repair of Pipe Coating using Melt Stick

CAUTION: Heat applied coatings should not be used for leaking pipeline repair or in the presence of a flammable atmosphere.

1. Prepare surface for repair.
   a. Remove damaged coating with a sharp knife or hand grinder to prevent crack propagation in the coating.

   b. Clean exposed steel and adjacent coating with an approved cleaner **only if the area has been exposed to any type of oil, grease or other contaminants.** (Use Acetone or Rubbing alcohol)

   c. Remove adhering rust, coating chalk, and dirt.

   d. Roughen the coating in the repair zone using abrasive paper / cloth.

Melt Stick Application: Fusion Bond Epoxy (For damage up to 3/8 x 3/8 inch):

1. Heat the area of the pipe to be repaired being cautious not to scorch the surrounding pipe coating.

2. Continue heating the area until it is hot enough to melt the patch stick when the flame is removed.

3. Using a circular motion, apply the patch stick compound by rubbing the stick on the area to be repaired to achieve a smooth, neat patch, overlapping the existing coating.

4. The thickness of the patch should be at least 15 mils.

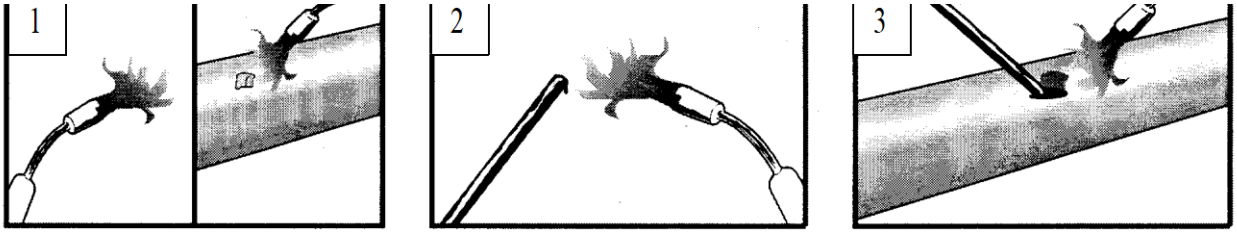
5. Allow the patch to cool before handling or backfilling.

Melt Stick Application: X-Tec II (For damage up to 3/8 x 3/8 inch):

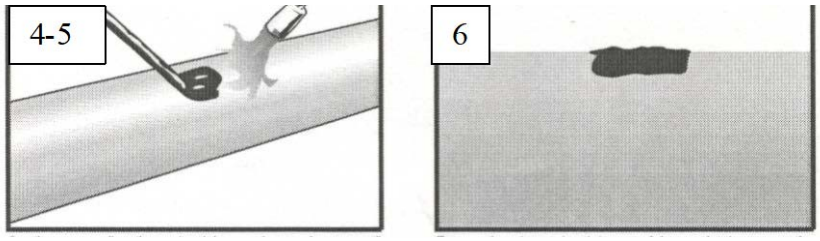
1. Using the hand held torch and a low intensity flame, pre-heat the repair zone with quick back and forth strokes to remove any moisture and to assist in adhesion.

2. Heat the melt stick until it becomes fluid.

3. Heat the melt stick and the repair zone simultaneously with the torch and spread the melt stick over the damaged area. **Keep the flame moving to prevent damage to the surrounding coating.** (Some ignition of the melt stick is acceptable.)



4. Continue spreading the melt stick over the repair zone until the entire area is covered.
5. After sufficient melt stick material is on the surface, apply additional heat to the area in quick back and forth motion to create a smooth surface.
6. Ensure that the melt stick material **completely covers** the repair zone. The melt stick material should be spread liberally so that the material is raised above the coating surface.



Final Inspection for all Repair Methods:

1. After application of a Melt stick, allow the repaired area to cool.
2. Inspect the repair area. Confirm that the melt stick material completely covers the repair zone.
3. Re-coat, repair or re-apply as necessary to fix any remaining applications.
4. Do not cover or backfill the excavated area until the coating has cooled.
5. Follow the *Bedding and Backfill* procedure to prevent damage to the repaired pipeline coating.

Reporting / Notification:
Document the details of coating repair as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Heat applied coatings should not be used for leaking pipeline repair or in the presence of a flammable atmosphere.
- Collapse of bell hole walls.
- Presence of poisonous, flammable or explosive gases in bottom of excavated area.
- Presence of oxygen deficient atmosphere in bottom of excavated area.
- Damage to or rupture of the pipeline if the line is not properly located or if proper care is not used during excavation.
- Drop / fall hazards

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Coating Imperfections

Personal Protective Equipment:
- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 060
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1041, 1051
Pipeline O&M Procedure	**Installation of Sleeves**	PAGE NO. 1 of 4

SCOPE

This procedure is to provide personnel, when installing repair clamps and sleeves, with safe and effective procedures to ensure the integrity of the piping system.

OBJECTIVES

To safely install repair clamps and sleeves.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- System maps and records

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Repair sleeve
- Appropriate fittings
- Hand tools
- Welding Equipment
- Fire Extinguisher

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Improper installation of a repair sleeve can cause serious personal injury or death.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Supervisor guidance
- Field Operator guidance

Approval:_____ Approval Date: _____ Next Review Date: _____

Installation of Sleeves

The purpose of this procedure is to document the installation of sleeves for repair purposes. This includes both bolted / mechanical type sleeves and welded sleeves.

Due to the variety of bolted / mechanical clamps and sleeves available, this procedure lists only general procedures for installing mechanical clamps and sleeves. All mechanical clamps and sleeves should be applied in accordance with the manufacturer's installation instructions.

All welded sleeves should be installed using qualified welding procedures and certified welders.

CAUTION: Use extreme care to not overheat the pipe or burn through the pipe when welding.

Installing Mechanical Sleeves:

1. Prior to installation, verify that the proper mechanical clamp or sleeve has been selected. When selecting a mechanical clamp or sleeve, consideration should be given to the following:
    - Pipe Size
    - Pipe Material
    - Operating Pressure
    - Type of repair
        - Permanent
        - Temporary

2. Visually examine the mechanical clamp or sleeve for possible defects or missing parts.

3. Prepare the pipe section for installation of mechanical clamp or sleeve. The pipe section should be free of dents, gouges, excessive scrapes, or other abnormalities (pipe out-of-round, etc.) that may prevent the proper installation of the mechanical clamp or sleeve and prevent a gastight joint.

    For steel pipe:

    Remove any coatings, dirt, rust or other debris for a reasonable distance on both sides where the mechanical clamp or sleeve is to be installed.

    For plastic pipe:

    Thoroughly clean the pipe with a clean rag to remove any dirt, dust, or other debris.

4. Install the mechanical clamp or sleeve in accordance with the manufacturer's installation instructions.

5. Leak test the mechanical clamp or sleeve to verify a gastight joint using a qualified leak test procedure.

6. If applicable, prepare and apply protective coatings as necessary.

Installation of Welded Sleeves

1. Clean the pipeline to remove any excess dirt using a nonflammable solvent.

2. Clean the bolt-weld fitting to remove any excess dirt using a nonflammable solvent.

3. All rust must be removed using hand or power brushing. Sandblasting, power sanding, and power grinding should be avoided. Care must be taken not to remove metal.

4. All existing coating material on the pipe must be removed beyond the area to be welded.

5. If severe corrosion is present, complete cylindrical pipe segment replacement should be considered.

6. Fit the weld type repair sleeve to the pipe with the longitudinal bevel surfaces in a horizontal position.

7. Ensure that the weld type repair sleeve makes complete contact with the pipe surface along each longitudinal bevel surfaces and the circumferential bevel surfaces.

8. External weld clamps may be used to ensure a tight fit to the pipe.

9. Weld the sleeve on following the appropriate welding procedure, ensuring the welding is performed and inspected by a qualified welder.

Reporting / Notification:
Complete documentation in accordance with Operation and Maintenance Manual.

Potential Hazards:
- Improper installation of sleeves can cause serious personal injury or death.
- Be careful when working with a pipeline under pressure. When sleeves are installed on pressurized lines, additional safety precautions must be observed.
- Be careful when welding to not overheat or burn through the pipe. This could result in the release and/or ignition of gas. Never weld a fitting on a tank or pipeline in an area where vapors may exist.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure

Personal Protective Equipment (for Field Operators):
- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 062
REVISION DATE 7/21/2021		B31Q COVERED TASK NO. 1071
Pipeline O&M Procedure	**Repair of Steel Pipe by Grinding**	PAGE NO. 1 of 3

SCOPE

The purpose of this procedure is to describe the process of repairing steel pipe via grinding.

OBJECTIVES

To safely and correctly repair steel pipes by grinding.

49 CFR 192.309

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Grinding Tools
- Coating Equipment

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Ensure ignition sources are not present; a spark could ignite any flammable vapor present in the piping. Do not use spray-applied primers or coatings in the presence of open flames or other ignition hazards

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable Company practice.

COMMENTS

This procedure may be used to repair steel pipe by grinding.

Approval: _____ Approval Date: _____ Next Review Date: _____

Repair of Steel Pipe by Grinding

This is the general procedure for repairing steel pipe using a grinding method. Personnel repairing pipes must be properly qualified.

General Procedure:

1) When grinding to repair steel pipe, the remaining wall thickness must be equal to, or greater than, either:
   a) The minimum wall thickness required by the tolerances in the specification to which the pipe was manufactured.
   b) The nominal wall thickness required for the design pressure of the pipeline.

2) Dents must be removed from steel pipe at a pressure that produces a hoop stress of 20%, or more, of SMYS.
   a) A dent that contains a stress concentrator such as a scratch, gouge, groove, or arc burn.
   b) A dent that affects the longitudinal weld or a circumferential weld.
   c) In pipe to be operated at a pressure that produces a hoop stress of 40% or more of SMYS, a dent that has a depth of:
      i) More than 1/4inch (6.4mm) in pipe 12 ¾ inches (324mm) or less in outer diameter.
      ii) More than 2% of the nominal pipe diameter in pipe over 12 ¾ inches (324mm) in outer diameter.

3) Each arc burn on steel pipe to be operated at a pressure that produces a hoop stress of 40%, or more, of SMYS must be repaired or removed. The arc burn must be completely removed and comply with the wall thickness requirement.

4) Prior to working on the pipe to be repaired, the specifications on the pipe and the pipeline must be noted for wall thickness requirements.

5) Inspect the pipe to be repaired and determine what can be effectively ground for repairing.

6) Using an appropriate grinding tool and carefully applying proper pressure, grind the damaged areas smooth, in accordance with the required wall thickness.

7) After grinding the pipe, inspect the pipe to make sure that the repairs are sufficient and within compliance.

8) When the appropriate repairs have been made, recoat the piping and replace the pipe into the pipeline.

9) Perform a pressure test on the pipeline to make sure that the repairs and replacement were sufficient.

10) Record and report all damages, repairs and any difficulties encountered.

Reporting / Notification:
Document the details of the repairs as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Grinding the steel pipe can create a hazardous environment; ensure all personnel in the vicinity have proper safety equipment before beginning the procedure.
- Ensure ignition sources are not present; a spark could ignite any flammable vapor present in the piping.
- Do not use spray-applied primers or coatings in the presence of open flames or other ignition hazards. The propellant used for the spray application is a combustible gas and may cause an ignition.
- Inhalation of harmful fumes from primer, paint or other coating.

Abnormal Operating Conditions (AOCs):
- Fire or explosion
- Unexpected presence of hazardous gas
- Damage to Facilities
- Coating Imperfection

Personal Protective Equipment:
- Gloves
- Safety Glasses/Safety Goggles
- Steel-toed boots
- Company Approved Fire Retardant Clothing
- Ear Plugs

REVISION NO.		PROCEDURE NO.
		MP 063
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1081, 1091, 1101
Pipeline O&M Procedure	**Tapping a Pipeline**	PAGE NO. 1 of 7

SCOPE

The purpose of this procedure is to document the hot tapping process.

OBJECTIVES

To safely operate a hot tap with minimal environmental impact.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Hot Tapping Machine Owner's Manual

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Hot tapping machine
- Appropriate fittings
- Hand tools
- Welding Equipment
- Fire Extinguisher

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Improper use of hot tap machines can cause serious personal injury or death. When hot taps are performed on pressurized lines, additional safety precautions must be observed.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Supervisor guidance
- Field Operator guidance

Approval:_____ Approval Date: _____ Next Review Date: _____

Tapping a Pipeline

The purpose of this procedure is to document the hot tapping process. This procedure includes the general steps for:

- Installing a welded T-fitting at the location to be tapped,
- Installing a tapping valve on the T-fitting,
- Pressure testing the T-fitting and valve,
- Installing the tapping machine, and
- Operating the tapping machine.

Each tap made on a pipeline under pressure must be performed by a crew qualified to make hot taps. This is a general procedure. Follow the tapping machine manufacturer's instructions.

CAUTION: Improper use of hot tap machines can cause serious personal injury or death.

CAUTION: Use extreme care to not overheat the pipe or burn through the pipe when welding.

Installing Split Tee Fittings:

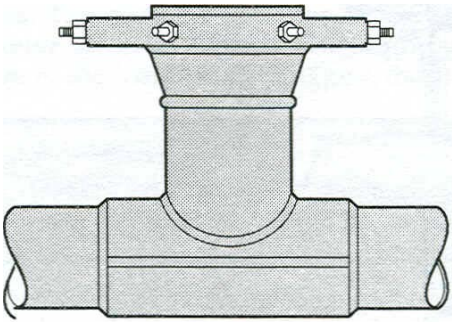
1. Ensure that the pipe has been ultrasonically tested for proper thickness in the area to be welded following the appropriate procedure. Do not weld unless the pipe thickness is adequate.

2. Determine the temperature, pressure, and product in the pipe.

3. Obtain all necessary permits.

4. Place the split tee fitting on the pipeline and weld to Company specifications, following the appropriate Welding procedure.

Figure 1: Split Tee Fitting



5. Install the tapping valve.

6. Install appropriate equipment to pressure test the tapping valve.

7. Pressure test the tapping valve following Company practice.

8. If the fitting and valve fail the pressure test, repair the fitting following the appropriate Welding procedure and retest.

9. The welds may be subject to non-destructive testing. Follow the appropriate welding procedures.

Installing Bolt-Welded Fittings:

1. Clean the pipeline to remove any excess dirt using a nonflammable solvent.

2. Clean the bolt-weld fitting to remove any excess dirt using a nonflammable solvent.

3. Place the seal on the pipeline.

4. Place the top half of the fitting on top of the seal.

5. Place the bottom half of the fitting under the pipeline.

6. Tighten the socket head cap screws to hold the bottom half in place.

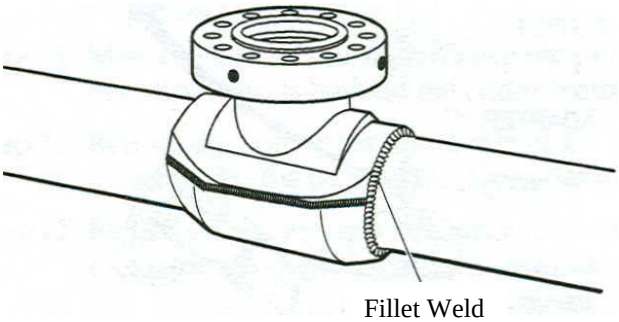
7. Fillet weld the top and bottom halves together, following the appropriate Welding procedure. Weld to Company specifications.

8. Install appropriate equipment to pressure test the tapping valve.

9. Pressure test the tapping valve following Company practice.

10. If the fitting and valve fail the pressure test, repair the fitting following the appropriate Welding procedure and retest.

Figure 2: Bolt-Welded Fitting



Hot Tap Preparation

CAUTION: Each tap made on a pipeline under pressure must be performed by a crew qualified to make hot taps. When hot taps are performed on pressurized lines, additional safety precautions must be observed.

1. Clean the tapping valve bore and check the nipple for alignment, wall thickness, and proper inside diameter.

2. Check the flange assembly for bolts and gaskets.

3. Ensure the tapping valve opens, closes, and seals properly.

4. Measure the tapping valve bore to ensure adequate clearance for the cutter or completion plug; record the dimension.

5. Measure the closed tapping valve to ensure there is enough space to house the cutter and pilot drill when the valve is closed; record the dimension.

6. Ensure the boring bar drive is tight and in good repair.

7. Bottom out the boring bar packing nut and back off one quarter turn to adjust it.

8. Check the retainer rod packing nut for adjustment:
   a. Tighten the packing nut as much as possible, while still allowing the retainer rod to be easily turned with the measuring rod.
   b. Ensure the packing nut does not extend out into the taper of the boring bar.
   c. Check the drive ring for cracks and ensure cap screws are tight.

9. Install the measuring rod and cutter holder on the boring bar:
   a. Tighten the retainer rod firmly; and
   b. Install a locking pin with cotter pins on either end.

10. Check the teeth and measure the outside diameter (OD) of the cutter; record the dimension.

11. Install the cutter onto the cutter holder.

12. Check the pilot drill and its components:
   a. Ensure that the pilot drill is straight and in good condition;
   b. Ensure that the pilot drill brushing is new before installation;
   c. Ensure that the pilot drill matches the cutter; and
   d. Ensure that U rods (keepers) swing freely.

13. Install the pilot drill in the cutter holder and tighten.

14. Align the tapping machine adapter with the cutter and tighten the adapter bolts:
    a. For alignment, measure from the OD of the cutter to the OD of the raised flange face; and
    b. Ensure the tapping machine adapter is square to the cutter.

15. Measure and record the distance the pilot drill tip extends beyond the cutter teeth.

16. Retract the boring bar and cutter as far as possible into the tapping machine adapter.

17. Read the fully retracted distance from the measuring rod and record this reading.

18. Measure the distance from the pilot drill tip to the face of the tapping machine adapter flange.

19. Measure the distance from the top of the tapping valve to the top of the pipe.

20. Calculate the total distance the pilot drill must travel to contact the top of the pipe, adding 1/8 inch for a gasket.

21. Refer to the manufacturer's specifications for the approximate distance the pilot and cutter must travel to complete the tap after the pilot contacts the pipe.

Tapping Machine Installation:

1. Open the tapping valve.

2. Clean flange faces.

3. Install a gasket.

4. Install the tapping machine on the tapping valve:
    - Align the bolt holes of the flanges;
    - Install bolts (studs and nuts) and tighten evenly.

5. Install the bleeder valve and pressure gauge on the tapping machine; leave the valve open to relieve pressure.

6. Install and tap an equalization fitting and pressurize the assembly to check for leaks.

7. Connect power unit hydraulic hoses to the tapping machine.

8. Using the hand crank with the measuring rod as a guide, extend the boring bar until the pilot drill contacts the pipe.

9. Mark the tapping distance on the measuring rod.

10. Retract the boring bar slightly, remove the hand crank, and engage the clutch.

Tapping:

1. Complete the steps for preparing and installing the tapping machine.

2. Start the power unit.

3. Open the rotation control valve on the tapping machine and begin tapping.

4. Close the bleeder valve when the pilot drill has penetrated the pipe and all air is purged from the valve and adapter.

5. Close the rotation control valve and disengage the clutch.

6. Stop the power unit.

7. Extend the boring bar and cutter manually two or three turns to ensure the tap is complete. The tap is complete when the machine runs smoothly and the measuring rod reads the full tapping distance.

8. Retract the boring bar and cutter manually until the measuring rod is fully extended.

9. Remove the measuring rod.

10. Close the tapping valve.

11. Open the bleeder valve to relieve pressure.

12. Remove the bleeder valve, hydraulic hoses, and bypass piping, if used.

13. Unbolt and remove the tapping machine from the tapping valve.

14. Remove the cutter assembly, locking pin, pilot drill, and cutter holder.

15. Retract the boring bar and remove the tapping machine adapter.

16. Clean and inspect the equipment.

17. Repackage equipment properly and securely.

Note: When performing a hot tap, you must always remove and save the pipe coupon (if applicable) so that it can be inspected. Do not allow the coupon to be lost inside the pipeline.

Reporting / Notification:
Complete documentation in accordance with Operation and Maintenance Manual.

Potential Hazards:
- Improper use of hot tap machines can cause serious personal injury or death. Only trained personnel should use a hot tap machine.
- Be careful when working with a pipeline under pressure. When hot taps are performed on pressurized lines, additional safety precautions must be observed. Secure the hot tap machine as recommended by the manufacturer.
- Be careful when welding to not overheat or burn through the pipe. This could result in the release and/or ignition of gas. Never weld a fitting on a tank or pipeline in an area where vapors may exist.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure

Personal Protective Equipment (for Field Operators):
- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 064
REVISION DATE. 7/21/2021		B31Q COVERED TASK NO. 1111
Pipeline O&M Procedure	**Tapping Cast Iron Pipe**	PAGE NO. 1 of 4

SCOPE

This procedure outlines the general guidelines for the Installation of a Clock Spring Sleeve as a composite sleeve for pipe repair.

OBJECTIVES

To safely install a Clock Spring Sleeve as a composite reinforcement system designed to restore the pressure carrying capacity of pipelines to original pipe conditions.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- Pipeline map
- *Leak Test at Operating Pressure* Procedure
- Operation and Maintenance Manual
- Manufacturer Specifications for installation of the composite sleeve materials.

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Select the appropriate material and equipment per manufacturer specification.
- Select proper installation tools.
- Select proper inspection tools.

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used for the installation of a clock spring composite sleeve for the repair of external and internal corrosion, welds, leaks, dents, and other similar defects of a pipeline.

Approval:_____ Approval Date: _____ Next Review Date: _____

Installation of a Clock Spring Composite Sleeve.

This procedure outlines the process for the installation of a clock spring composite sleeve per manufacturer's specification for various defects on a pipeline.

General Procedure for installation of a clock spring composite sleeve:

1. Locate and identify the pipeline defect.

2. Obtain the appropriate equipment as per the manufacturer specifications.

3. Clean and prepare pipe surface as specified by the manufacturer.
    a. The pipe surface must be clean and free of rust
    b. The surface must have the proper profile

4. Ensure correct working clearance around the pipe.

5. Mix and prepare filler and adhesive.

6. Apply filler to the defect and the edge of the starter pad per manufacture specification.

7. Apply adhesive to the pipe.

8. Place leading edge of Clock Spring on to the starter pad and start to apply adhesive.

9. Start to coil Clock Spring around the pipe applying adhesive to each layer per manufacture specification.
    a. Ensure sufficient surface adhesiveness
    b. Ensure correct overlap, if applicable
    c. Ensure no sagging or wrinkles are present
    d. Ensure no dry spots are present
    e. Ensure composite material is thoroughly coated as applicable

10. Attach cinch bar to the finished coil and cinch tight to extrude all excess adhesive and filler.

11. Seal edges with adhesive and leave to cure, then apply corrosion coating per manufacture specification.

12. Visually inspect, as per manufacturer for
    a. Curing
    b. Dry spots

13. Document as required.

Reporting / Notification:
Document the details of the leak test as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:

- Potential release of flammable gas through leaking joint or fitting. Eliminate all ignition sources prior to beginning work. No smoking. No open flames. Use only intrinsically safe communications equipment and non-sparking tools.

Abnormal Operating Conditions (AOCs):

- Damage to Facilities or Pipe
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition

Personal Protective Equipment:

- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 064
REVISION DATE. 7/21/2021		B31Q COVERED TASK NO. 1111
Pipeline O&M Procedure	**Tapping Cast Iron Pipe**	PAGE NO. 4 of 4

REVISION NO.		PROCEDURE NO.
		MP 066
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1131
Pipeline O&M Procedure	**Install a Stopple**	PAGE NO. 1 of 3

SCOPE

This procedure is to provide personnel with safe and effective activities to ensure the integrity of the piping system for pipeline stopping.

OBJECTIVES

To safely and properly install a stopple.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- System maps and records

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Stopping Machine with Attachments
- Rubber Lubricant
- Hand Tools

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

Every reasonable precaution shall be taken to protect employees and the general public.

COMMENTS

This procedure may be used for the insertion and removal of stopples.

Approval:_____ Approval Date: _____ Next Review Date: _____

Installing a Stopple

The purpose of this procedure is to provide personnel with the means to ensure the integrity of the piping system for pipeline stopping. This includes both insertion and removal of a stopple.

This procedure lists only general procedures for installing a stopple; all equipment shall be operated and maintained in accordance with the manufacturer's instructions.

General Procedure:

1. Prior to installation, verify that the proper fitting and isolation valve has been installed onto the pipe.

2. Advance the inserting bar of stopping machine until fully extended. Attach stopper to the inserting bar and apply rubber lubricant. Withdraw inserting bar to the rearmost position.

3. Securely tighten stopping machine onto isolation valve.

4. If appropriate, equalize pressure across the isolation valve.

5. Fully open isolation valve.

6. Stopple pipe by advancing inserting bar with attached stopper into fitting. Continue to advance until stopper contacts bottom of fitting. Set stopper to stop off line.

   CAUTION: Whenever two stopping machines are being utilized for the installation of a by-pass line to maintain service around a section of pipe to be isolated on a single-fed line, pay close attention to the manufacturer's instructions for sequencing.

7. Verify pressure and monitor during performance of work.

8. Relieve pressure: At this point, stopper tightness can be determined.

   CAUTION: When using one stopping machine, once the stopper has been set, pressure can be relieved through the blow down connection.
   CAUTION: When using two stopping machines, once the stoppers have been set, relieve pressure between the stopped off section of pipe.

9. Once performance of desired work has been completed, retract stopper(s) from fitting.

10. Close the isolation valve.

11. Remove stopping machine from the isolation valve.

Reporting / Notification:
Complete documentation in accordance with Operation and Maintenance Manual.

Potential Hazards:
- Extreme care should be used when working near a blowing gas situation.
- Non-intrinsically safe electrical equipment must not be used in a gaseous atmosphere; any sparking action could cause ignition of the gas.
- Do not use extension levers, hydraulic hand tools, or cheater bars on mechanical units; this will overstress the pipe.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure

Personal Protective Equipment (for Field Operators):
- Gloves
- Safety Glasses/Safety Goggles
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 067
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1141, 1151
Pipeline O&M Procedure	**Squeeze Off Pipe**	PAGE NO. 1 of 7

SCOPE

This procedure outlines general guidelines for squeezing-off polyethylene or steel piping to control the flow of gas.

OBJECTIVES

Safely control the flow of gas by squeezing-off pipe with minimal environmental impact.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Joining of Polyethylene Pipe Procedures
- ASTM F1041, *Standard guide for Squeeze-Off of Polyethylene Gas Pressure Pipe or Tubing*

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Squeeze-off tool
- Grounding rods (a minimum 5/8-inch tool steel)
- #8 insulated wire or bonding cable
- 10-inch wide (minimum) burlap or absorbent rags
- Soap solution (a mixture of 3 parts water to a minimum 1 part liquid detergent solution; where ambient temperatures below 32ºF are encountered, an antifreeze solution may be added to the water to prevent freezing)
- Fire extinguisher (minimum of one 20# dry chemical)
- Combustible Gas Indicator (CGI), e.g. Gascope
- Non-sparking tools
- Intrinsically safe communication equipment (e.g. radio)

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Extreme care should be used when working near a blowing gas situation.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for squeezing off polyethylene or steel pipe.

Approval:_____ Approval Date: _____ Next Review Date: _____

Squeeze-off Pipe

This procedure outlines general guidelines for the squeeze-off of polyethylene and steel gas piping and tubing. Squeeze-off is a technique used to control the flow of gas through pipe by compressing the pipe between two parallel bars until the inside surfaces make contact. Squeeze-off is accomplished by the use of a mechanical or hydraulic device (Squeeze-off Tool).

The squeeze-off technique can be useful for making installation tie-ins as well as for emergency repairs. Squeeze-off is not suitable for repeated flow control at the same location or to throttle or partially restrict gas flow.

Polyethylene pipe is a relatively low conductor of electricity. As a result, it builds up a static charge when it is in gas service due to the gas flow on the inside surface of the pipe. Squeezing off polyethylene pipe increases the amount of static charge build-up. Be careful, the buildup of a static charge represents an explosion hazard.

CAUTION: Extreme care should be used when working near a blowing gas situation.

Tool Inspection:
Select the proper sized squeeze-off tool and squeeze bars to fit the pipe being squeezed. Inspect the squeeze-off tool to ensure it is in good working order and that it has the following features:

1. The squeeze bar configuration must be either circular, flat with rounded edges, or consist of two circular bars side by side.

2. The force mechanism must be capable of providing sufficient force to accomplish squeeze-off. Mechanical or hydraulically operated squeeze-off tools may be used.

3. Over squeeze protection must be built into the squeeze-off tool by means of mechanical stops. Confirm the presence of the mechanical stops.

4. Premature release protection must be built into hydraulic squeeze-off tools to prevent unintentional release in the squeeze mode.

   Test the squeeze-off tool release protection. With hydraulic tools, an unintentional release of gas could occur in the event of hydraulic system failure.

5. A grounding nut must be located on the polyethylene pipe squeeze tool.

CAUTION: Do NOT use a squeeze-off tool unless it meets Company standards, has the appropriate safety devices, and all parts are in good working order.

General Squeeze-off Procedure for Polyethylene Pipe:

1. Ensure that the squeeze tool is grounded.
   a. Drive the grounding rod firmly into the ground near the pipe.
   b. Connect a #8 insulated wire or bonding cable to the grounding rod, then connect the other end of the grounding wire to the grounding nut on the squeeze-off tool.

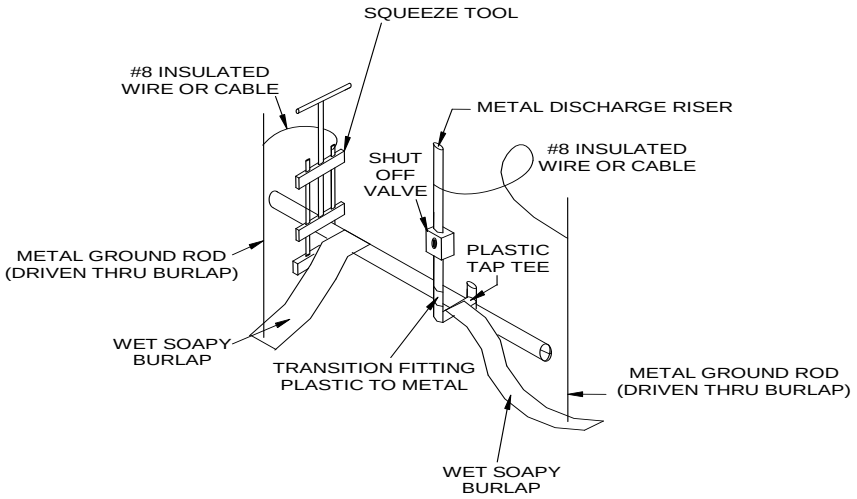
2. Ground the polyethylene pipe by wrapping burlap or absorbent rags wetted with soapy solution down stream of the squeeze-off tool.

3. Ground the wet, soapy burlap or absorbent rags shall also be grounded by driving a metal grounding rod through it and into the ground.

4. Ground the polyethylene pipe at the gas discharge point by wrapping burlap or absorbent rags around the pipe. See Figure 1 for the proper configuration.

   CAUTION: The grounded riser/ purge point must remain grounded until the pipe is cut off and capped.

Figure 1: Squeeze-off tool configuration



5. Place at least one 20# dry-chemical fire extinguisher in close proximity to the gas discharge location.

6. Follow all applicable safety standards prior to and during the squeeze-off procedure.

7. Inspect the pipe for cuts, scrapes, gouges or anomalies before placing the squeeze-off tool. If possible, do not place the squeeze-off tool on or near any anomalies.

8. Place the squeeze-off tool at least (no less than) 3 pipe diameters or 1 foot (whichever is greater) away from the nearest fitting, butt fusion, socket fusion, Electrofusion, or saddle fusion. Failure to do so may result in damage to the fitting or joints.

9. Place the squeeze-off tool on the pipe so that the pipe is centered and squared in the squeeze tool.

10. Operate the squeeze tool to bring the squeeze bars together. Compress the pipe at a slow rate to allow stress relaxation in the pipe. ASTM F1041 recommends a maximum compression rate of 2 inches per minute (i.e., it should take at least 2.25 minutes to fully compress 4 inch IPS pipe (O.D. = 4.5 inches).

11. The amount of squeeze-off must not exceed the amount required to control the flow of gas. In sizes 3-inch iron pipe size (IPS) and larger, gas flow may not be completely shut off. A slight seepage may be detectable in these sizes. Any additional force exerted by the squeeze-off tool in an attempt to completely shut the gas off may damage the pipe. Company squeeze-off tools are equipped with built-in stops to prevent over squeezing of the pipe.

12. When nearing completion of the squeeze-off procedure, proceed very slowly and apply only enough force to achieve shutoff of the gas flow.

13. In larger-diameter pipes (3 inches and larger), pauses during the squeeze-off will allow the pipe to relax and will help the pipe form a seal.

    CAUTION: Do not use extension levers, hydraulic hand tools, or cheater bars on mechanical units; this will overstress the pipe.

    CAUTION: Non-intrinsically safe electrical equipment must not be used in a gaseous atmosphere; any sparking action could cause ignition of the gas.

    Note: In cold weather, it will be necessary to take extra time to perform the squeeze-off.

14. Squeeze-off polyethylene pipe only once in the same place. It is possible for scale or other metal particles contained within the gas flow to become trapped in the pipe at the squeeze point, whereby a second squeeze-off in this area may force these particles to penetrate the pipe.

After squeeze-off is complete:

1. Relax the squeeze tool to permit the gas to flow. Release the squeeze very slowly. ASTM F1041 recommends a maximum release rate of 0.5 inches per minute (i.e., it should take at least 9 minutes to fully release 4 inch IPS pipe (O.D. = 4.5 inches).

2. When the squeeze tool is removed, inspect the squeezed section for any signs of damage.

3. Mark the squeeze-off spot with tape so that the same area will not be squeezed off twice.

4. When squeezing off DuPont Aldyl "A" (pink) **Pre-1973** plastic pipe, reinforcement is recommended at the squeeze-off to extend the life of the pipe. Full-encirclement, stainless steel band clamps in pipe sizes 2 inches through 8 inches are recommended. The band clamp should be long enough to extend at least 2.5 inches beyond each side of the squeeze-off area. The pipe should be clean and rounded prior to the installation of the band clamp.

   Note: DuPont pipe has indent printing, thus making it possible to identify the date.

General Squeeze-off Procedure for Steel Pipe:

1. Verify the correct pipeline segment and proper location for the squeeze off. Determine whether the line has one-way or two-way feed. If possible, the squeeze tool should be located a reasonable distance away from fittings.

2. Use squeeze tool to shut off gas flow to pipeline segment.
   i. Select the proper size squeeze tool for the pipe to be squeezed. The correct squeeze bars for the various size pipe must be used.

   ii. Position squeeze tool onto pipe. The squeeze tool should be upright, centered and square on the pipe. If possible, the longitudinal seam of the pipe should be facing directly under the upper jaw or directly above the lower jaw of the squeeze tool.

   iii. Compress pipe by operating the closing mechanism. Flatten the pipe between the upper and lower jaws shutting off gas flow.
      - If available, engage the accidental release prevention mechanism. Some squeeze tools require installation of saddle clamps; others automatically lock.

3. Close valve in the system nearest squeeze point or attach and close isolation valve.

4. Verify system pressure and monitor during performance of work.

5. Release closing mechanism and remove squeeze tool from pipe.
   i. If available, disengage the accidental release prevention mechanism or remove clamps.

6. Perform necessary work.

7. Once the project is complete, open valve allowing pressure to equalize in the system and purge air from line.

Blowing Gas Situation:

1. Locate the squeeze-off tool at least 2 feet back from the break if possible.

2. Use the grounding techniques for plastic pipe as described above and as specified in Figure 1.

3. Employees entering the excavation must be equipped with Flame Resistant (FR) clothing and flash hood, a self-contained breathing apparatus, and leather gauntlet gloves.

4. Only attempt squeeze-off with adequate personnel to assist the crew as determined by the Supervisor.

5. When practical, perform squeeze tool operation using above ground squeeze-off equipment.

Reporting / Notification:

Document the details of the squeeze-off as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:

- Polyethylene pipe is a relatively low conductor of electricity. As a result, it builds up a static charge when it is in gas service due to the gas flow on the inside surface of the pipe. Squeeze-off increases the amount of static charge build-up. The build up of a static charge represents an explosion hazard.
- Extreme care should be used when working near a blowing gas situation.
- Non-intrinsically safe electrical equipment must not be used in a gaseous atmosphere; any sparking action could cause ignition of the gas.
- Do not use extension levers, hydraulic hand tools, or cheater bars on mechanical units; this will overstress the pipe.
- The grounded riser/ purge point must remain grounded until the pipe is cut off and capped.

Abnormal Operating Conditions (AOCs):

- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities

- Component Failure
- Static Electricity Control

Personal Protective Equipment:

- Gloves
- Safety Glasses/Safety Goggles
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 068
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1161, 1171
Pipeline O&M Procedure	**Install and Maintain Customer Meters, Regulators, and Relief Devices**	PAGE NO. 1 of 6

SCOPE

This procedure outlines the general guidelines for installing and maintaining residential, commercial, and industrial meters, regulators, and relief devices. To ensure meters are properly sized to accommodate load capacity for customers ranging from residential to large commercial and industrial customers.

OBJECTIVES

To install meters, regulators and relief valves in a safe manner, with minimal environmental impact. To ensure the new devices are located and installed in such a way as to protect the public from gas that might be vented from regulator service valves and relief valves.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Operations and Maintenance Manual
- *Temporary Isolation of Service Lines & Disconnect Customer Meter* procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Hand tools
- Intrinsically safe lighting
- Kuhlman gauge
- Meter and accessories
- Associated piping and fittings, various attachments
- Fire extinguisher
- Combustible Gas Indicator (CGI), as needed

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Care should be taken when installing relief valves and vent valves to ensure they are vented safely away from the public and ignition sources.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for installing and maintaining meters, regulators and associated relief valves

Approval:_____ Approval Date: _____ Next Review Date: _____

Installing and Maintaining Customer Meters, Regulators, and Relief Valves

This procedure outlines general guidelines for installing and maintain customer meters, regulators and associated relief valves. All meters and regulators must be installed and operated in accordance with the manufacturer's installation and operating instructions.

CAUTION: Care should be taken when installing relief valves and vent valves to ensure the safety of the public.

Service regulator vents and relief vents should terminate outdoors at a location that allows vent gas to escape freely into the atmosphere away from any opening into nearby buildings.

The meter and regulator selected should provide the customer/premise with the proper delivery pressure and volume.

Meter / Regulator Location:

1. Install the meter / regulator in a readily accessible location, preferably adjacent to the building being served.

2. Verify that the chosen location provides protection from potential damage such as:
   - Vehicles
   - Construction equipment
   - Falling objects
   - Flooding
   - Snow / ice buildup.

3. Verify that the chosen location allows access to the meter / regulator for:
   - Operation of the gas shut-off valve
   - Obtaining readings
   - Inspections and testing
   - Maintenance and repairs

4. Verify that the service regulator vents and relief vents terminate outdoors at a place where vented gas can escape freely into the atmosphere away from any opening into nearby buildings. Ensure the vents are rain and insect resistant and protected from damage caused by being submerged during flooding.

5. The meter or regulator must **NOT** be installed:
   - In contact with the soil or other potentially corrosive materials;
   - Under windows or other openings that may be used as an emergency exit;
   - In front of building crawl spaces;
   - Near building air intakes; and
   - In such a manner as to create stresses upon the connecting piping and the meter.

Installation:

1. Isolate the service line.
   - Ensure the curb valve is closed.
   - Double check with curb / gate key to achieve complete shutdown.

2. Attach a Kuhlman gauge to the service line.

3. Slowly open the curb valve and observe the pressure reading on the Kuhlman gauge.

4. Verify the line pressure and close the curb valve.

5. Ensure that the piping is free of foreign materials, construction debris and obstructions. Clean the pipe and fittings thoroughly inside and out. Remove any surface rust or dirt from the threaded surfaces.

6. Visually examine the meter set (meter, regulator and relief valve), piping, and connections for possible defects or missing parts. Verify that the proper meter set, regulator, relief valve and connections have been selected.

7. Install the approved meter set (meter, regulator and relief valve). The combination of piping and fittings will vary from one meter set to another depending on a variety of factors. Some likely factors include the height of service riser and the location of service riser in relation to customer piping and diameter of piping.

8. Install the regulator ensuring that the gas flow through the regulator is in the proper direction. Most regulators have a marking to denote the inlet and outlet of the regulator.
   - The regulator should be installed so that the regulator vent is facing downward or other configurations that will allow the regulator relief valve to function properly.
   - In areas where severe water or freezing conditions may exist, consideration should be given to the installation of additional special fittings that will prevent the blocking of the regulator vent.

CAUTION: Ensure the relief valve and any vent valves are located and positioned so that any vent gas can escape freely into the atmosphere away from any opening into nearby buildings.

9. Use pipe joint material only on the male threads of the pipe being connected.

10. Tighten each fitting sufficiently to provide a gas-tight seal.

11. Ensure the meter is adequately supported and that the meter set presents a neat appearance.

12. In some commercial and industrial applications, it may be necessary to install multiple meters on a meter header. Install the meter header in a manner that provides adequate support of the meters.

13. Test the meter set and associated connections for leaks following the applicable Leak Test procedure. Repair any leaks.

14. Set the regulator pressure before connecting to customer piping.
    a. Verify the set-point of the regulator (outlet pressure setting) is correct for the application:
        i. Open the outlet shut-off, if equipped, or install a fitting that will permit gas flow through the regulator.
        ii. Install the proper pressure gauge.
        iii. Remove the regulator seal cap and gasket (the cap that covers the adjustment button, screw, knob)
    b. Turn the gas on slowly.
    c. Verify that the reading on the pressure gauge is the correct delivery pressure – adjust as per manufacturer's instructions.
    d. Turn the gas off slowly.

15. Test the relief device in accordance with the appropriate Inspect, Test, and Maintain Pressure Regulating, Limiting, and Relief Device procedure.

16. Clean up the work site. The right-of-way and surrounding property must be restored as closely as possible to its original state and to the satisfaction of the property owner and any regulatory agency.

Turn on Customer Meters (Residential)

This procedure describes the steps required to properly turn on a customer's gas service. When service is to be restored to a building or dwelling after being off, the Company representative is required to make certain tests and safety checks during the process of turning on the meter.

CAUTION: If the service line, house line or appliance has a leak, a combustible atmosphere may exist or be created when the service line is tested, when the house line is tested, and when appliances are tested. Observe all Company safety precautions and practices.

General procedure:

1. Inform the customer of the work to be performed.

   If the customer is not at home, check with neighbors on each side and across the street of the residence to attempt to find out the status of the homeowner, unless otherwise advised by the dispatcher. Inform dispatch of any findings. Leave a door card if the customer is not at home.

2. Verify the meter number with the work order.

3. Make sure the curb stop valve is open. If the curb stop valve is found in the closed position, test the service line in accordance with the proper leak test procedure.

4. Test the house line in accordance with the proper leak test procedure. Observe all safety precautions.

5. Check all gas appliances during light up for:
   a. Proper gas/ air mixture;
   b. Spillage at draft hood;
   c. Proper venting and ventilation;
   d. Combustible air availability;
   e. Faulty controls;
   f. Proper installation; and
   g. Proper operation.

   Note: In the event that the homeowner insists that they want to restore their gas appliances, the Company representative must still perform a house line test and conduct a visual inspection of the gas appliances for any unsafe conditions or code violations. The Company representative must be able to light one appliance before leaving. If no appliances are available due to red tags then meter must be pin locked.

6. If unsafe appliances exist, shut off at the valve, red tag the appliance, and inform the customer for reason for applying the red tag.

7. Fill out the necessary work forms.

8. Inform the Supervisor if you cannot complete the service restoration for any reason.

Reporting / Notification:
Document the details of setting of meters, regulators and relief valves as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential flammable atmosphere when gas is vented during meter set installation. Remove all potential ignition sources. No open flames. No smoking.
- Do not conduct this procedure during a lightning storm.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Excessive Pressure: exceeding the operating limits
- Inadequate Pressure: falls below the normal operating requirements
- Damage to Facilities
- Component Failure
- Broken Valve

Personal Protective Equipment:
- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 069
REVISION DATE 7/21/2021		B31Q COVERED TASK NO. 1191
Pipeline O&M Procedure	**Maintenance of Service Valves Upstream of Customer Meter**	PAGE NO. 1 of 4

SCOPE

This procedure outlines the general guidelines for the maintenance of service valves upstream of customer meter.

OBJECTIVES

To safely inspect and maintain valves with minimal impact on operations and the environment. To ensure the proper operation of emergency valves and valves required for the safe operation of the pipeline. This may include the operation of valves on pipelines under pressure.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable
- *Inspect and Maintain Valves* Procedure
- *Purging / Blowdown* Procedure
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Tool for disassembly and/ or assembly of valves
- Appropriate fittings, gaskets and packing
- Appropriate lubricant
- Valve lubrication tool / gun
- Hand tools
- Combustible Gas Indicator (CGI), e.g. Gascope
- Appropriate Maintenance Equipment

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Ensure ignition sources are not present; a spark could ignite any flammable vapor present in the piping.

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable Company practice.

COMMENTS

This procedure may be used for maintenance of service valves upstream of customer meters.

Approval:_____ Approval Date: _____ Next Review Date: _____

Maintenance of Service Valves Upstream of Customer Meter

This procedure outlines the process maintaining service valves upstream of customer meter. Valve maintenance is typically limited to cleaning, lubricating and operating the valve. This is a general procedure and you should always follow the manufacturer's instructions.

CAUTION: Do not operate valves that are in the closed position or are equipped with a locking device without proper authorization. Check with a supervisor, Operations or Gas Control before attempting to operate the valve.

General Procedure:

1. Prior to performing maintenance of the service valves, follow the procedures for properly inspecting the valves.

2. If the valve requires lubricant as a primary sealing mechanism, lubricate the necessary ports with an approved lubricant in accordance with the manufacturer's recommendations.

3. Prior to operating any valve, request authorization from a supervisor. Proceed with valve operation only after receiving authorization, and notification of any personnel participating in the operation of the valve you may proceed.

4. Upon receiving authorization, unlock the valve as needed to operate the valve.

5. Verify that there is an operating position indicator.

6. If there is no visible indication of the valve's position, note the position of the valve before moving the valve to insure that the valve can be returned to its original position.

7. Slowly open or close manual valves as follows to ensure that there are no sudden increases or decreases in gas flow or pressure. Ensure the pressure does not exceed the designated MAOP of the pipeline, does not actuate an overpressure protection device, or cause leakage. Also, ensure the pressure does not fall below the minimum pressure specified for the pipeline section. Valves shall not be fully operated without the direct permission of a supervisor:
   a. Gate valves and gear operated butterfly valves must be operated two complete turns.
   b. One quarter turn plug and ball valves must be operated at least until the plug or ball initially "breaks away" from seat.

8. Verify that the operating position indicator works properly.

9. Slowly return the valve to its original position to ensure that there are no sudden increases or decreases in gas flow or pressure.

10. Re-lock the valve, as needed, in the proper position.

11. Notify a supervisor and others concerned that the valve is back in the normal operating position.

12. Report any valve that fails to operate, leaks, is damaged, or vandalized to Management.

13. Document the results on the valve inspection form.

Reporting / Notification:
Document the details of the repair or replacement of the valves as required by Company practice and DOT regulation. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Beware of lightning and thunder. Do not perform valve maintenance if lightning is present.
- Upon approaching a valve or valve enclosed in a valve box, check the atmosphere around the valve or valve box for the presence of a gas leak.
- If purging procedure is not completed properly, gas may be released when the valve is removed. Ensure ignition sources are not present. A spark could ignite any flammable vapor present in the piping.
- Changing the position of a valve quickly may result in pressure variations. This may result in shutting down the pipeline.
- Valves in service on an operating pipeline may be under pressure. Sudden operation of valves used infrequently may result in a leak. Care should be taken when operating older valves.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Activation of a safety device
- Damage to Facilities
- Component Failure
- Unintended Valve Closure
- Unintended Shutdown of a Pipeline System
- Operation of an Alarm or Shutdown Device
- Valve Inoperable

REVISION NO.		PROCEDURE NO.
		MP 069
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1191
Pipeline O&M Procedure	**Maintenance of Service Valves Upstream of Customer Meter**	PAGE NO. 4 of 4

Personal Protective Equipment:

- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 070
REVISION DATE 7/21/2021		B31Q COVERED TASK NO. 1201
Pipeline O&M Procedure	**Temporary Isolation of Service Lines & Disconnect Customer Meter**	PAGE NO. 1 of 4

SCOPE

This procedure outlines the general guidelines for temporary isolation of service lines and disconnecting service for a customer meter.

OBJECTIVES

To safely disconnect service with minimal environmental impact.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- *Squeeze-off Pipe* Procedure
- Operations and Maintenance Manual

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Pin lock, or approved locking device
- Curb box repair lid (if required)
- Leak-detection solution
- Curb key and cleanout tool
- Curb box locator
- Hand tools
- Pin lock key

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for service disconnection of:

- A single-meter installation
- A multiple-meter installation

Approval:_____ Approval Date: _____ Next Review Date: _____

Temporary Isolation of Service Lines & Disconnect Customer Meter

Temporary isolation means that service to a customer will be discontinued for a short period to allow maintenance or other activity to be performed on the service line and/or meter set assembly -- service to the customer will be restored when the work is completed.

This procedure describes the steps required to temporary isolate a service line and properly turn off a customer's gas service.

Service disconnection may be accomplished by closing the valve at the meter stop and installing a pin lock in the lock wing of the meter. If the meter stop cannot be locked because of a broken lock stop or because it is not accessible, other Company approved methods of lockout should be used to prevent an unauthorized turn on.

Temporarily Isolating a Service Line:

1. Stop the flow of gas. For work downstream of the meter valve, close the meter valve. If for any reason you must leave the worksite, lock the meter valve closed.

2. For work between the main and the meter valve:
   a. If there is a curb valve on the service, close the curb valve. If there is no curb valve, excavate to expose the service line connection to the main.

      Note: Any buried piping that is exposed must be inspected following *Visually Inspect Pipe and Components* procedure.

   b. If there is a gas control fitting, e.g., a self-tapping tee, remove the cap, insert the proper tool and turn it clockwise. Seat the tapping bit firmly inside the tap hole to stop gas flow.

   c. For pipe with no curb valve or gas control fitting, gas flow may be stopped using the *Squeeze Off Pipe* procedure.

3. Purge gas from the service line. This is only required if work is being done between the main and the meter valve. Refer to the *Purging a Pipeline* procedure.

4. Complete work and reconnect service line or meter assembly.

5. If the service line was purged of gas, purge the air from the line using gas:
    a. Close the meter valve.

    b. Disconnect the piping from the outlet of the meter valve.

    c. Re-open whatever method was used to isolate the service from the main.

    d. Follow purging safety precautions, open the meter valve, fully open if there is not an excess flow valve (EFV) installed on the service, less than fully open so as not to trip the EFV if one is installed.

    e. Close the meter valve when 100% gas is detected.

    f. Reconnect the meter assembly

Disconnect Service for Customer Meter Installation:

1. Inform the customer of the work to be performed, when applicable.

2. Verify the Company meter number.

3. Close the valve at the meter stop.

4. Install a lock on the meter stop, or use another approved locking device.

5. Replace broken meter-stop, when possible.

6. Verify that gas flow has stopped using a gauge.

7. Record the final meter reading and meter number.

8. Notify Operations that service has been disconnected.

9. Before leaving the site, ensure an accurate final meter reading has been recorded

Reporting / Notification:
Complete the appropriate paper work and / or electronic documentation as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential ignition hazard. No open flames. No smoking. Remove all potential ignition sources.
- Static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 071
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1211
Pipeline O&M Procedure	**Monitor Natural Gas Odorization Levels**	PAGE NO. 1 of 6

SCOPE

This procedure outlines the general guidelines for monitoring odorization levels.

OBJECTIVES

To safely monitor odorization levels to ensure that any gas leak is detectable by a person with a normal sense of smell well before the gas concentration reaches the Lower Explosive Limit (LEL).

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- *Operating an Odorizer* Procedure
- Operation and Maintenance Manual
- Odorometer manufacturer's User Manual

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Odorization sampling equipment
- Leak detector equipment (Odorometer)
- Writing utensils

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used to monitor odorization levels.

Approval:_____ Approval Date: _____ Next Review Date: _____

Monitor Natural Gas Odorization Levels

This procedure outlines the process to monitor odorization levels. DOT regulations require the odorant to be readily detectable in natural gas concentrations of 1/5th the lower explosive limit (LEL).

Personnel conducting odorization sampling must have their sense of smell tested by a company approved method for a normal sense of smell, which can be able to detect the odorant at or below normal odorization levels.

Odorometers are designed to mix gas and air and move them to a sniffing chamber. The air is drawn in through the unit, and mixed with gas. The technician or observer smells the gas and air mixture, gradually raising the level of gas in the mixture until he or she detects an odor of gas.

Know the lower explosive limit of the natural gas in your pipeline. If it is different than 5%, you may need to adjust the odorometer to ensure that the gas is detectable at 1/5th of the LEL.

Threshold Odor Determination:
Prior to testing odorization levels (sniff test) for the first time, each technician or observer should determine their odor threshold, by smelling known concentrations of natural gas and odorant.

1. Have the observer(s) sniff an unodorized air stream.

2. Adjust the gas flow rate to the estimated threshold value and let the observers sniff again to see if they can smell any foreign odor.

3. Adjust the gas concentration upward or downward, as indicated by the above test, and have the observer(s) sniff again.

4. Repeat these steps until the threshold value is obtained. It is best to take several readings on both sides of the threshold and to run an occasional blank using air with no added gas.

5. Calculate the average threshold value of each observer.

6. The odor level rating should be based on the first sniff only, because fatigue is very rapid in this concentration range.

Odor Characteristics at Standard Concentration:
Prior to conducting a sniff test for the first time, each technician or observer should also determine how the normal concentration of odorant smells to them.

1. Have the observer(s) sniff the unodorized air stream.

2. Adjust the gas rate to the desired concentration.

3. Have the observer(s) sniff the effluent air stream, rating the odor intensity as: (1) absent, (2) barely detectable, (3) readily detectable, (4) strong, (5) very strong (obnoxious).

4. If desired, a description of the character of the odor, such as onion, garbage, refinery, etc., can also be obtained.

5. Repeat the test after a short time to check the first determination.

General Procedure:
The following procedure outlines the general steps required to monitor odorization levels. See the manufacturer's instructions for more information.

1. Inspect and smell the odorization sampling equipment (odorometer, hoses, regulators and other accessories) before sampling. Replace any smelly hoses. Clean any smelly regulators to remove the smell. Clean or replace any other accessories that smell.

2. Verify that the odorometer is in good working order.

3. Ensure the odorometer batteries are in place. Take extra batteries with you.

4. Calibrate the odorometer according to the manufacturer's recommendations.

5. Perform odorization sampling tests in an odor and draft free environment, when possible.

   Note: Do not smoke, eat, or drink 30 minutes prior to taking an odorization sampling tests.

   Note: Do not take odorization sampling tests after exposure to high levels of odorant (e.g. after removing a regulator that smells, after filling odorant tanks, etc.).

6. Connect the odorometer to the gas supply using aluminum or plastic tubing. Do not exceed the manufacturer's maximum recommended inlet supply pressure.

   Do not use copper or rubber tubing, as these tend to remove odorant compounds.

7. The observer must be careful to hold his nose close to the sniffing funnel to avoid dilution with the surrounding air.

8. Odor level rating must be based on the first sniff or two because the olfactory senses fatigue rapidly with continued exposure to an odor.

9. Between sniffs the observer should breathe deeply but slowly through his nose to "regenerate" his perception.

10. If the odorant is not readily detectable at $1/5^{th}$ LEL, adjust proper odorization level in accordance with company practice.

11. Record the result on the Odorization Monitor Form (see the attached sample form).

Reporting / Notification:
Document the details of odorization levels as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Most odorants are flammable liquids. Odorant vapor is a flammable gas. Vapor may cause a flash fire. No open flames and No smoking.
- Most odorants are hazardous materials when in concentrated form.
- Most odorants will penetrate vinyl gloves. Wear Company approved nonpermeable gloves, such as PVC or nitrile rubber when working with or around the odorant.
- Clothing may absorb odorant. Leather and metal (coins, belt buckles, etc.) may absorb the odorant. Change clothes before leaving the work area.
- Do not get odorant in eyes. Wear goggles when working with odorant. If odorant splashes in eyes, flush with plenty of water for at least 15 minutes. See the odorant MSDS for appropriate response.
- Empty odorant containers may contain flammable, hazardous residues. Do not cut or grind the container. Dispose of empty containers properly.

Abnormal Operating Conditions (AOCs):
- Improper Odorization: excessive or inadequate odorization
- Environmental Incident: uncontrolled spill/release of environmentally hazardous materials
- Damage to Facilities
- Component Failure
- Loss of Olfactory Senses

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 071
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1211
Pipeline O&M Procedure	**Monitor Natural Gas Odorization Levels**	PAGE NO. 6 of 6

Odorization Monitor Form

"Odorization Sampling" and/or "Sniff Test"

Annual Period _____

COMPANY: _____

Location: _____
Date: _____
Odor Level: _____ **Nil**
_____ **Barely Detectable**
_____ **Readily Detectable**
_____ **Strong**

List other odors present: _____
_____
Remarks: (Odorometer Reading) _____
Observed By: _____

Location: _____
Date: _____
Odor Level: _____ **Nil**
_____ **Barely Detectable**
_____ **Readily Detectable**
_____ **Strong**

List other odors present: _____
_____
Remarks: (Odorometer Reading) _____
Observed By: _____

Location: _____
Date: _____
Odor Level: _____ **Nil**
_____ **Barely Detectable**
_____ **Readily Detectable**
_____ **Strong**

List other odors present: _____
_____
Remarks: (Odorometer Reading) _____
Observed By: _____

REVISION NO.		PROCEDURE NO. MP 072
REVISION DATE 7/21/2021		B31Q COVERED TASK NO. 1221
Pipeline O&M Procedure	**Inspect, Test, and Maintain an Odorizer**	PAGE NO. 1 of 10

SCOPE

This procedure outlines the general guidelines for inspecting, testing and maintaining an odorizer.

OBJECTIVES

To safely inspect and test an odorizer with minimal impact on operations and the environment.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet for the odorant used
- *Monitor Natural Gas Odorization Levels* Procedure
- Operation and Maintenance Manual
- Record of previous inspection
- Odorizer manufacturer's User's Manual

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Odorization sampling equipment (Odorometer)
- Leak detector equipment
- Odor control masking agent
- Pipe fittings and hose connections (1/2 to 2 inch)
- Pipe dope and Teflon tape
- Tools
- Goggles and gloves
- Fire extinguisher

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Most odorants are extremely flammable liquids. Vapor from odorants is also flammable. Vapor may cause a flash fire.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Inspecting an odorizer
- Handling odorant
- Handling an odorant spill

Approval:_____ Approval Date: _____ Next Review Date: _____

Inspecting an Odorizer

This procedure outlines the general guidelines for inspecting an odorizer. The purpose of the odorizer system is to keep the proper and consistent level of odorant in the pipeline. See Figures 1, 2, and 3 for examples of typical odorization systems. Odorization equipment should be operated and maintained in accordance with the manufacturer's recommendations.

CAUTION: Most odorants are extremely flammable liquids. Odorant vapor is a flammable gas.

CAUTION: Static discharge may ignite odorant vapors. Ignition of odorant vapor may cause a flash fire.

Handling Odorants:
Odorants can be delivered in either gas or liquid form. The following precautions are general guidelines for handling odorants. See the odorant manufacturer's SDS sheet for specific guidance.

- Keep away from heat, sparks and flame.
- Keep away from oxidizers, such as bleach.
- Use or handle only with adequate ventilation.
- Ground metallic containers/cylinders prior to transfer of odorant.
- Avoid breathing odorant vapor.
- Avoid contact with eyes, skin and clothing.
- Dispose of empty odorant containers properly.

Handling an Odorant Spill:
1. Evacuate the area.

2. Shut off the source, minimize vapor release and contain any liquid spill.

3. Protect from ignition.

4. Keep out of water sources and sewers. Dike the spill as needed using absorbent material.

5. Personnel should stay upwind and wear air-supplied masks or self-contained breathing apparatus.

6. Recover as much bulk liquid as possible; connect to a sump and transfer into a closed container.

7. If absorbent, such as sand or soil, is used, promptly place in sealed containers to control odors.

8. Spill residues and contaminated soil may be deodorized using dilute (5%) aqueous solutions of bleach or a Bacterial Deodorizor. A masking agent may also be used during deodorizing.

   CAUTION: Do not use concentrated or dry bleach – may cause possible ignition. Do not use bleach solutions on large spills as the liquids will drive the odorant deeper into the soil and increase the contaminated area. Reaction between a large quantity of bleach with a large odorant spill may also cause the spilled odorant to heat up sufficiently to start a fire or injure personnel responding to the spill.

9. Dispose of material in an approved and controlled manner.

Inspect Odorizer:

1. Measure and record the total volume of gas, in million cubic foot (MMCF), that passed through the odorization facility since the previous inspection.

2. Obtain and record the odorant storage tank level from the previous inspection, and the amount of odorant added since the previous inspection.

3. Check the odorant storage tank for adequate supply. Add odorant if necessary, following the section “Filling the Odorant Tank” below. Record the odorant tank level.

4. Verify the odorant rate using the Monthly Odorization Report Form (see the sample form on the final page of this document).

5. Inspect all odorizer components and piping for gas and/or odorant leaks. Typical odorization systems are shown in Figures 1, 2, 3 of this document.

6. Make repairs if leaks are found.

7. Inspect odorizer for proper operation following manufacturer’s instructions.

8. Conduct an odor test to verify that odorant can be readily detected in the gas leaving the odorization facility. See the procedure *Monitor Natural Gas Odorization Levels.*

9. Make adjustments as needed. If adjustments are necessary, record odorizer settings when complete.

10. Record all maintenance and repairs performed.

Filling the Odorant Tank:
General guidelines for unloading an odorant cylinder are listed below. See the instructions provided by the manufacturer or supplier for more information.

1. Attach ground clamps before connecting any hoses or piping.

2. Ensure that the receiving or storage vessel has been depressurized.

3. Ensure that gas pressure to the cylinder is regulated to a pressure below 100 psig. It is recommended that a pressure safety valve be installed in the gas line supplying the cylinder.

4. Remove the plugs in both cylinder valves.

5. Attach piping (hoses, tubing, etc.) from the liquid valve on the cylinder to the liquid line on the receiving odorant tank.

6. Attach the gas line to the gas/vapor valve on the cylinder. Use nitrogen or natural gas to pressurize the cylinder.

7. Slowly open the gas supply valve and the gas valve on the cylinder until the pressure in the cylinder is greater than the pressure in the receiving odorant tank.

8. Slowly open the liquid valves on the cylinder and the receiving vessel.

9. Liquid should move from the cylinder into the receiving vessel.

10. Monitor the receiving vessel pressure and vent as necessary to keep the receiving tank pressure below the cylinder pressure.

11. When all liquid has been transferred, allow gas to flow through the piping for a short time to remove any liquid from the piping.

12. Close the gas supply valve and allow the cylinder and piping to vent through the receiving vessel.

13. Close the liquid valve on the receiving vessel.

14. Close the liquid valve on the cylinder.

15. Close the gas valve on the cylinder.

16. Slowly loosen the piping connections due to the possibility of residual gas pressure.

CAUTION: Any remaining odorant vapor or mixed gas / odorant vapor may leak when the piping connections are loosened and disconnected.

17. Slowly and carefully disconnect the supply line when it has been safely depressurized.

18. Replace the plugs in both cylinder valves using Teflon tape before shipment.

The cylinder must be empty for return shipment to the supplier. The supplier may require the cylinder to be at low pressure (30 psig or less).

Reporting / Notification:
Document the details of odorization inspection as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Most odorants are flammable liquids. Odorant vapor is a flammable gas. Vapor may cause a flash fire. No open flames and No smoking.
- Most odorants are hazardous materials when in concentrated form.
- Most odorants will penetrate vinyl gloves. Wear Company approved nonpermeable gloves, such as PVC or nitrile rubber when working with or around the odorant.
- Clothing may absorb odorant. Leather and metal (coins, belt buckles, etc.) may absorb the odorant. Change clothes before leaving the work area.
- Do not get odorant in eyes. Wear goggles. If odorant splashes in eyes, flush with plenty of water for at least 15 minutes. See the odorant SDS sheet for appropriate response.
- Empty odorant containers may contain flammable, hazardous residues. Do not cut or grind the container. Dispose of empty containers properly.

Abnormal Operating Conditions (AOCs):
- Improper Odorization: excessive or inadequate odorization
- Environmental Incident: uncontrolled spill/release of environmentally hazardous materials
- Damage to Facilities
- Component Failure
- Odorizer Malfunction

Personal Protective Equipment:
- Gloves
- Safety Glasses/Safety Goggles
- Steel-toed boots
- Company Approved Fire Retardant Clothing

Figure 1. Typical Injection / Pump Odorization System

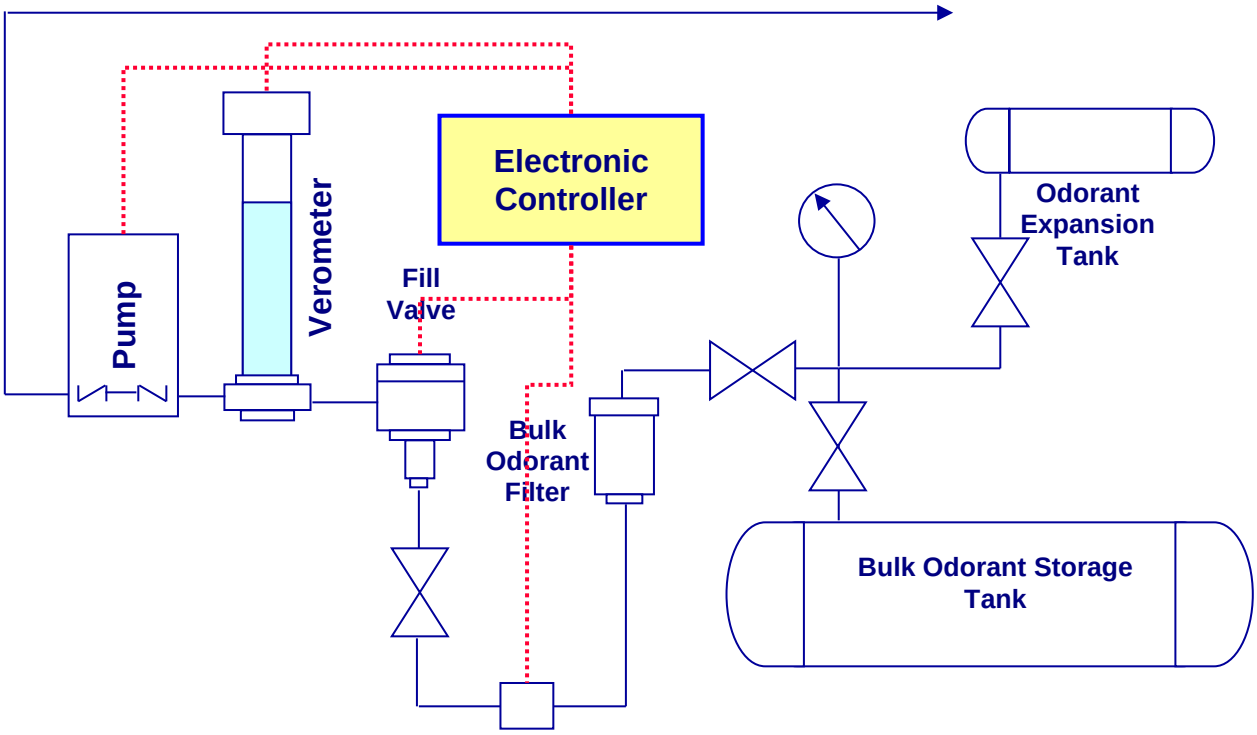


Figure 2. Typical Bypass Odorization System

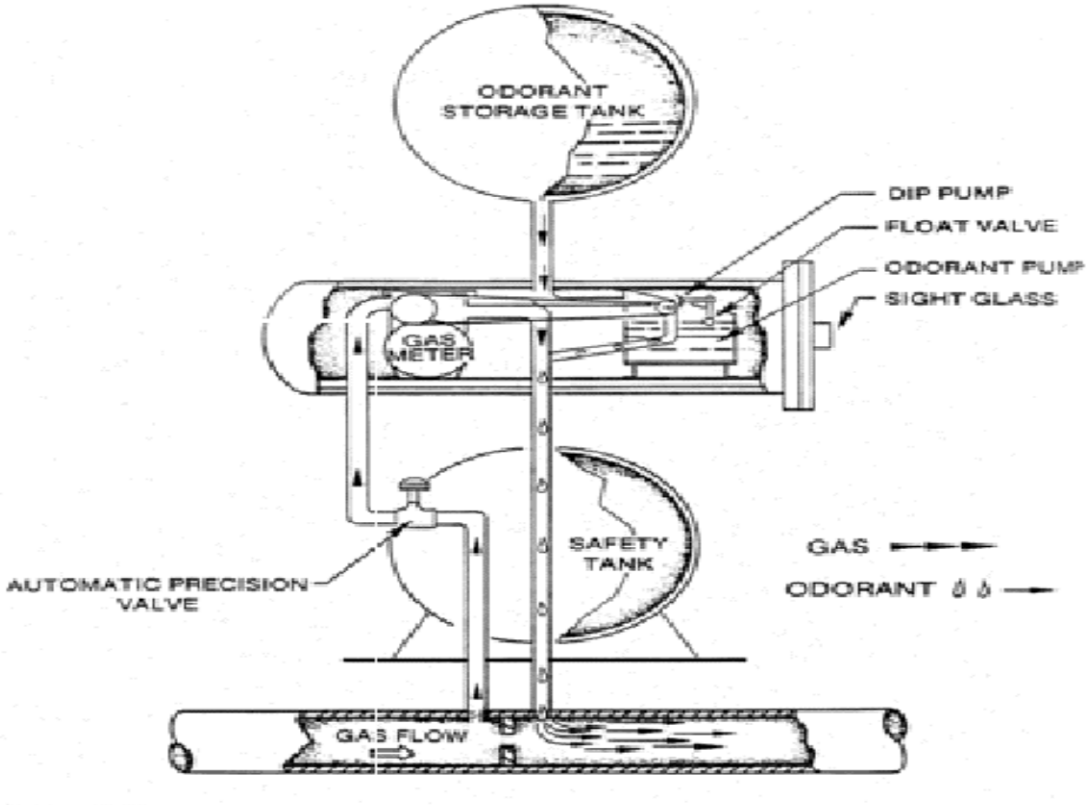
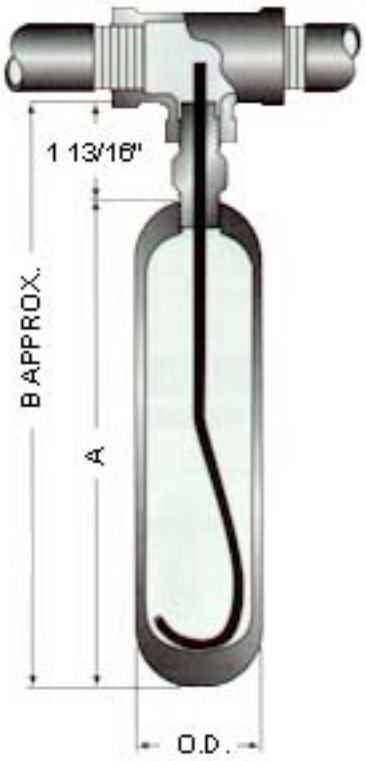


Figure 3. Typical Wick Style Odorization System



REVISION NO.		PROCEDURE NO. MP 072
REVISION DATE 7/21/2021		B31Q COVERED TASK NO. 1221
Pipeline O&M Procedure	**Inspect, Test, and Maintain an Odorizer**	PAGE NO. 10 of 10

Monthly Odorization Report Form

COMPANY: _____

Odorizer Location: _____

Month of: _____ **Period:** _____ **to** _____

Odorizer Information

Check Type:

Wick: ____ **Bypass:** ____ **Injection / Pump:** ____

If Injection / Pump: Make: _____ **Type:** _____

Tank Capacity: _____ **oz., gal. or lb.**

Brand Name of Odorant Used: _____

Odorant Usage:

1. **Odorant in tank at First of the Month:** _____
2. **Odorant Added During this Month:** _____
3. **Total Odorant to Account for (Items 1 + 2):** _____
4. **Odorant in Tank at End of the Month:** _____
5. **Odorant Used During this Month (Items 3 – 4):** _____
6. **Gas Delivery this Month:** _____ **MMCF**
7. **Rate of Odorization in oz., lbs. or gal./MMCF:**

$$\frac{\text{Odorant Used in oz., lbs./gal (Item 5)}}{\text{Gas Delivery in MMCF (Item 6)}} = \text{\_\_\_\_\_ oz., lbs. or gals./MMCF}$$

[Note: MMCF = million cubic foot]

Superintendent/Inspector: _____

Signature: _____ **Date:** _____

REVISION NO.		PROCEDURE NO.
		MP 073
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1231, 1241
Pipeline O&M Procedure	**Investigate Gas Leak**	PAGE NO. 1 of 10

SCOPE

This procedure provides general guidelines for investigating an indoor or outdoor gas leak.

OBJECTIVES

To provide a prompt and effective response to a gas leak report. To safely investigate and quickly determine the situation and to respond in the most appropriate way to save lives, and minimize or avert damage to property.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Operation and Maintenance Manual
- Emergency Plan
- Pipeline maps

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Combustible gas indicator (CGI)
- Carbon monoxide testing equipment
- Probing bar
- Non-sparking hand tools, including various wrenches
- Intrinsically safe communication equipment
- Intrinsically safe flash lights

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Fire or Explosion Hazard. Eliminate all potential ignition sources. Observe static electricity precautions. Protect lives first, property second. Take responsibility for your own safety as well.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure provides guidelines for emergency response to the report of gas detected inside or near a building. This procedure may also be used for conducting a leak investigation inside and outside of buildings and structures.

Approval:_____ Approval Date: _____ Next Review Date: _____

Investigating Gas Leak Reports

This procedure outlines the general guidelines for responding to a report of gas detected outdoors, inside, or near a building. It is the investigator's responsibility to find all leaks and fumes. Although the initial leak may be apparent, the investigation must continue until the entire leak perimeter is established. When a positive source of the gas or fumes is found, it must be assumed that there may be others. Check all potential sources.

Note: Notify the supervisor and other necessary personnel immediately of any gas-related situation where an injury, fatality, or property damage has occurred, or when other agencies are involved, such as the police, fire departments, paramedics, etc.

Protect lives first, property second. Take responsibility for your own safety as well.

Personnel Safety:

- The first person to respond to a report of gas detected inside a building shall take every necessary action to ***protect life and property***.
- No open flames.
- No smoking
- Ensure that cell phones, pagers, and radios are either intrinsically safe or left outside.
- Turn on all necessary equipment before entering premise (Flashlights, Combustible Gas Indicators (CGI), etc.) – "Zero" CGI in clean air before taking readings.
- ***Knock*** on the door – ***DO NOT*** ring the doorbell.
- DO NOT use the telephone in the area of a suspected gas leak.
- Establish a safety perimeter to prevent bystanders and unauthorized personnel from entering the area.
- Use the required safety equipment.

Each instrument used for leak detection and evaluation shall be operated in accordance with the manufacturer's recommended operating instructions. Each leak detection instrument must be calibrated in accordance with the manufacturer's recommend calibration instructions.

This procedure is not intended to be followed in all situations, but on a case by case basis. The emergency responder should draw on his or her training and experience and determine whether the steps set forth should be followed in a different order, based on the circumstances. Do not use this procedure as the only method, but as a general guideline.

Whenever Gas is Detected:

1. Evaluate the conditions.

2. Note the location and concentration.

3. Institute any action necessary to protect lives and property. Remember, Safety First!

4. Classify the leak according to leak classification criteria (see the procedure *Conduct Gas Leak Survey*), notify Dispatch, and submit the data to your immediate Supervisor.

5. When third party damage to gas pipeline facilities occurs, and the source of leakage is known, determine whether the gas has entered any adjacent buildings.

Outside Gas Leak Investigation General Procedure:

Upon initial investigation it is necessary to evaluate the magnitude of the leakage, extent of migration, proximity to buildings and field conditions which may influence where the gas is escaping.

- If possible, locate all gas lines (Company owned and foreign) in the vicinity of the leak investigation. Particular attention should be paid to the location of valves, fittings, tees, stubs, and connections.
- Personnel should look for evidence of recent construction activities that may have contributed to the leakage.
- Gas may also migrate and vent along a trench or bore-hole provided for other facilities. Leaks could occur at the intersection of the foreign facility and the gas pipeline; particular attention should be given to those intersections.

CAUTION: Fire or Explosion Hazard. Eliminate all potential ignition sources. Observe static electricity precautions.

1. Ensure that the CGI is activated, calibrated, cleared, and prepared for use prior to beginning investigation.

2. Upon arrival, look for obvious signs of a gas leak in the area (use sight, smell, and hearing), including, but not limited to:
    - Dead or dying grass, shrubs, or trees
    - Absence of growth in paving cracks
    - Cracked or crusted soil, or mildewed soil
    - Absence of grass overhang on curbing or walkways
    - Odor of gas or sound of escaping gas

3. Meet with the person who reported the leak. If the leak was reported by a customer, try to contact the customer. Discuss the leak complaint with the person and determine whether that person perceives the leak to be inside or outside a building in order to determine the most appropriate next step.

   If the leak is reported to be inside a building, see the section "Indoor Investigation" in this procedure and continue to investigate.

4. Check any aboveground facilities for leaks, such as, but not limited to, meter sets and regulator stations.

5. Observe the general terrain in the area. Remember, natural gas generally travels uphill.

6. Check around the perimeter of any structure in which gas could likely migrate along the edge of the foundation for the presence of a gas leak, if applicable. See the "Indoor Investigation" section of this procedure if there is indication there is gas inside a building.

7. Test for gas at building walls, meter risers, over gas service lines, other utility entrances, sanitary and storm sewer entrances, water valve boxes, splice boxes (electric/cable), and telephone / electric manholes within the premises.

8. Perform underground leak investigations of any underground mains and services in the area. If a service line is found to be leaking, shut off the gas supply and retest the area to determine that the gas has dissipated.

9. When gas is detected, establish a perimeter of the leak area by monitoring with the CGI until zero readings are obtained in all directions. Call for assistance if necessary. **Remember, gas can travel long distances underground through sewers.**

10. Verify that gas is not migrating close to any buildings or other structures where gas could likely accumulate.

11. Begin probing ("bar-holing") around the perimeter of any structure in which the gas could likely migrate along the edge of the foundation and obtain readings using a CGI. Bar holes should be evenly spaced over the suspected lines and of equal depth and diameter. Grade any leaks found in accordance with Company policy.

    Note: Only those instruments designed to register the % of gas-in-air may be used for grading leaks. Instruments that give audible or visual alarms for gas leaks but do not provide % of gas-in-air may not be used for grading leaks.

CAUTION: Use extra care when bar holing. Probe rods can cause damage to pipeline facilities.

12. If a check of the outside of a building or other structure indicates the presence of gas near or under a building or other structure or along the edge of the foundation:
    a. Notify in accordance with Operations and Maintenance Manual or Emergency Plan;

    b. Begin taking action as described in the "Indoor Investigation" section of this procedure;

    c. If possible, expose the area around the service riser, open water meter boxes and other available openings to allow the gas to escape to the atmosphere. Care must be taken to make these openings safe for the public and to **AVOID IGNITION**.

13. Consideration should also be given to probing ("bar-holing") along nearby neighboring structures especially if the leak investigation is revealing no presence of a gas leak at the present location.

14. Unusual situations may complicate investigation techniques on some occasions such as, but not limited to:
    - Multiple leaks
    - Foreign gases
    - Gas detected in storm-drain or sewer systems
    - Gas detected in telephone or other duct runs

    These indications should be considered migrating gas leakage until proven otherwise by test or analysis.

Class I Leak Outside a Building:

1. Conduct a continuous investigation, including regular monitoring of the leak until the leak is repaired.

2. Notify the appropriate Supervisor of the condition.

3. Take steps to ensure public safety until help arrives.

4. The on-site first responder will communicate with police, fire, and/or 911 officials to enlist help with evacuations when multiple buildings are involved until the Supervisor arrives and takes charge.

5. Upon arrival of the Supervisor, establish immediate communication with all investigating personnel onsite. The first responder, and the Supervisor are each responsible to ensure that the first responder has informed the Supervisor of relevant facts relating to the investigation.

6. The Supervisor is responsible for:

- Deciding if a gas vent is necessary, and for installing a gas vent to vent leakage.
- Confirming that an emergency one call is made if excavation with power equipment is required.
- Obtaining necessary gate sketches and maps for the locations of emergency valves, and emergency flow valves (EFVs).
- Assigning personnel to stand by at emergency valve locations for quick access and operation as appropriate.
- Confirming the accuracy of any leak pattern perimeter and attempting to locate the leak source.
- Confirming the accuracy of the Leak Classification.
- Ensuring continuous monitoring of the site with a CGI until zero readings are obtained in all directions.

Notes - About a Class I Leak:

- A Class I Leak requires immediate repair and/or continuous action until the situation is no longer hazardous.

- A Class I Leak cannot be re-classified until corrective action has been taken, leak clamps are installed, and service lines are renewed or until other leak repairs have been made.

- The Class I Leak can then be re-classified if this corrective action warrants a change to a Class II or III category, as specified in the leak classification criteria.

- A Class I Leak cannot be re-classified by venting only.

- Prior to leaving a property involved in a Class I Leak investigation all property conditions must be returned to their normal operating state. An example of an unacceptable property condition is for personnel to leave foreign materials such as a cloth rag, duct tape seal etc. at a work site that would temporarily block the release of natural gas.

- The onsite Supervisor will determine when buildings are safe for occupancy.

The Supervisor will inform emergency response personnel onsite of the safe occupancy determination.

Indoor Gas Leak Investigation General Procedure:
Areas of the building to be tested with a combustible gas indicator are at the discretion of the investigator and his or her Supervisor, depending on the nature of the complaint.

1. Ensure that the CGI is activated, calibrated, cleared, and prepared for use prior to entering the building. Turn on a flashlight prior to entering a building.

2. While approaching the building, observe the area for obvious signs of a gas leak in the area (use sight, smell, and hearing), including, but not limited to:
   - Dead or dying grass, shrubs, or trees
   - Absence of growth in paving cracks
   - Cracked or crusted soil, or mildewed soil
   - Absence of grass overhang on curbing or walkways
   - Odor of gas or sound of escaping gas

3. Attempt to communicate with the customer or person who reported the leak.

   Knock on the door to get the attention of the occupants. Do not use the doorbell.

4. Ask the occupants about the location of the gas odor. Caution occupants about open flames, smoking, electrical switches, telephones and other possible ignition sources.

5. If the customer/leak reporter is **not** present:

   a. Using an instrument capable of alerting the user to the presence of a gas leak, check around the entrance door and any other available openings such as, but not limited to, crawl space vents, windows, etc. for an indication of a gas leak.

   b. Probe around the outside perimeter of the building next to the building foundation and obtain CGI readings checking for the presence of gas in the ground outside the building.

   c. If there is an indication of gas inside the building:
      i. Shut off the gas to the building if possible.

      ii. If, in the judgment of the personnel at the scene, the indication of gas presents a hazard to life or property, immediately notify:
         - System Management
         - Fire Department
         - Police Department

iii. Establish a safety perimeter and prevent unauthorized personnel from entering the building – DO NOT allow entry into the building until it has been checked and deemed safe for entry.

iv. Conduct a check of adjacent structures for the presence of a gas leak.

v. If necessary, implement Emergency Plan.

6. Using the CGI, test around the entry door for gas indications.

7. As you enter the premise, sample the air in rooms, concentrating on the location(s) where the occupants believe they detected the odor, if given, for the presence of a gas leak. Ensure the CGI is set to the LEL scale.

   CAUTION: Do not operate exhaust fans, attic fans, window fans, electric garage doors, or any other possible ignition sources.

8. If there is an indication of gas inside the building, obtain a reading with a CGI. If the reading indicates the presence of a dangerous concentration of gas (20% of the Lower Explosive Limit (L.E.L.) or 1% on the percent gas (%) scale, or greater, or in the judgment of the personnel at the scene the indication of gas presents a hazard to life or property:

   You have encountered a leak that constitutes a potentially hazardous condition to persons or property and requires immediate action, repair, and continuous monitoring until the condition is no longer hazardous.

   - Evacuate the building immediately. Direct people to a safe area.
   - DO NOT operate/use any electrical switches;
   - Ventilate the building if safe to do so, while exiting the building.
   - Use reasonable means (warning signs, caution tape, etc.) to prevent entry into the evacuated building until it has been determined that it is safe for occupancy.
   - Shut off and lock gas meter, if one exists;
   - Notify immediate Supervisor
   - Establish a safety perimeter and prevent unauthorized personnel from entering the building – DO NOT allow entry into the building until it has been checked and deemed safe for entry.
   - Probe around the outside perimeter of the building next to the building foundation and obtain CGI readings checking for the presence of gas in the ground outside the building.
   - Check water meter boxes and other available openings. Check other structures in close proximity.
   - If necessary, implement Emergency Plan.

Once the building is safe for re-entry:

a. Search for and locate leak.
b. Repair leak or inform the customer to correct the situation – if the repair is the customer's responsibility, ensure meter is off and locked – advise the customer to call back to have the gas turned back on once the repair is made.

9. If there is an indication of gas inside the building and it DOES NOT present a hazard to life or property (see #8 above), and a shut-off valve is located before the leak:

a. Shut off the valve at the appliance/leak to isolate the leak and tag the appliance; or,
b. Repair leak; or
c. Turn off service valve at the meter, install lock in the service valve, and advise the customer to repair.

10. If no sustained reading is obtained in the open atmosphere of the building, test the atmosphere with CGI while entering various areas of the building.

a. Take readings in all available openings such as basement walls, crawl spaces, floor cracks, sewer drains and traps, and the top of foundation walls.
b. Take readings over all utility entrances.
c. Take readings around all appliance fittings. If a leak is detected on appliances, repair the leak if possible.

11. When it is not possible to gain entry to buildings, make every attempt to determine the inside condition. Test around doors, windows, exhaust fans, vents, sleeves, keyholes, or any available openings with a CGI or carbon monoxide indicator.

a. If no gas / fumes are indicated, shut off gas at the meter or curb stop. In buildings where multiple meters are in place, contact your Supervisor for further discussion and instructions to determine if shutting off service at the curb valve is required.

b. If testing outside the building indicates that gas or fumes are inside the building, shut off the gas at the meter or curb stop and seek help from the building manager, neighbors, police, or fire department if necessary to gain entrance.

12. At commercial and industrial establishments where it is impracticable to shut the gas supply off, the building lines may be tested with a gas detector that reads in parts per million (PPM), providing that the majority of the gas piping is accessible.

13. When no gas is detected on the LEL scale with a CGI inside the building, see the section "Outdoor Investigation" in this procedure and continue the investigation.

Reporting / Notification:
Document the details of the emergency response as required by Company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential ignition hazard. No open flames. No smoking. Remove all potential ignition sources.
- Static electricity discharge can ignite a flammable gas atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.
- Potential oxygen deficiency in confined spaces. Potential deadly carbon monoxide levels in confined spaces. Use self-contained breathing apparatuses in confined spaces. Only personnel trained and qualified to use SCBA and confined space access should attempt entry into confined spaces or areas with unsafe breathing environments.
- Use extra caution when bar holing in the area of polyethylene pipe. Contact with the pipe may create a worse situation.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure
- Leak Detection Equipment Malfunction

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 074
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1261
Pipeline O&M Procedure	**Conduct Gas Leak Survey**	PAGE NO. 1 of 5

SCOPE

The purpose of this procedure is to describe the steps required to perform a gas leakage survey and pipeline patrol

OBJECTIVES

To safely conduct gas leakage survey and inspect the pipeline right-of-way to visually identify right-of-way conditions, signs of leaks, encroachments, or any other signs of potential impact to the safety of pipeline operations.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Operations and Maintenance Manual
- Pipeline map

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Pipeline maps
- Communication devices
- Writing utensils
- Gas Leakage Survey form
- Combustible gas indicator (CGI)
- Gas detector
- Probe rod

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for Field Operator guidance.

Approval:_____ Approval Date: _____ Next Review Date: _____

Gas Leak Survey

This procedure outlines the general guidelines to conduct a leakage survey and inspect any portion of a pipeline system to detect, classify, and report leakage locations that are venting to the atmosphere. See the Operation and Maintenance Manual to determine the frequency of pipeline leakage survey and patrol.

Gas Leakage Survey:

1. Map/plan out the portion of system to be surveyed.

2. Calibrate each instrument used for leak detection in accordance with manufacturer's instructions.

3. Identify all foreign facilities in the area of the survey if possible.

4. Take continuous samples of the atmosphere over the most logical venting locations of the pipeline being surveyed.

5. Give consideration to the location of the pipeline:
   a. For aboveground piping, take a sample of the atmosphere adjacent to the piping as close to the pipe as possible.
   b. For underground piping, take a sample of the atmosphere along the route of the pipeline to be inspected as close to the ground as possible.
   c. For piping under pavement, walk on both sides of the street checking at all street openings and sample at the following locations:
      - Curb lines;
      - Manholes;
      - Catch basins;
      - Sewer, power, and telephone duct openings;
      - Fire and traffic signal boxes;
      - Cracks in pavement of sidewalks;
      - Foundation walls; and
      - Other points where venting is likely to occur.

   Note: Adverse conditions such as moisture, frost, ice & snow cover, and high or gusting wind that may affect the venting of subsurface gas leaks. Avoid conducting the survey under adverse conditions, if possible.

6. Take a sample at and / or around valves, fittings, tees, stubs, and connections using a gas detector or CGI.

7. If a leak is detected requiring immediate action, notify management and request additional personnel as needed.

8. Evaluate the location and magnitude of a leak in accordance with Leakage Grading Criteria section of this procedure.

9. Monitor or repair all leaks in accordance with the appropriate Company procedures.

10. Complete the Gas Leakage Survey form in accordance with Company practices (see Figure 1 for example form).

Leakage Grading Criteria

GRADE 1 LEAK - A gas leak which, due to its location and/or relative magnitude, constitutes a potentially hazardous condition to persons or property and requires immediate repair or continuous action until the condition is no longer hazardous. Grade 1 leaks include, but are not limited to:

- Damage by outside sources resulting in leakage.
- Any indication on a combustible gas indicator (CGI) of gas entering a building.
- Any reading within three feet of a building wall.
- Any reading of 4% or more gas-in-air (80% LEL or more) within manholes, vaults, or catch basins.
- Escaping gas that has ignited.
- Any leak which, in the judgement of operating personnel at the scene, requires immediate action to eliminate a hazardous condition.

GRADE 2 LEAK - A leak that does not present an immediately hazardous condition, but justifies scheduled repair based upon its potential for future hazard. Grade 2 leaks include, but are not limited to:

- Any reading in a paved or unpaved area which is more than 3 feet from, but within 30 feet of a building.
- Any reading less than 4% gas-in-air (80% LEL) in manholes, vaults, or catch basins; the reading to be taken with the structure in its normal condition as nearly as is physically possible.
- Any leak, which in the judgement of the operating personnel at the scene, requires scheduled repair.

GRADE 3 LEAK - A leak that is not hazardous at the time of detection and can be reasonably expected to remain that way. Any leak on the Company's underground facilities, which is not classified as Grade 1 or Grade 2, shall be designated as Grade 3.

Reporting / Notification:
Reports of patrols should be made on a “Pipeline Patrol” Form and “Gas Leakage Survey” Form should be filed with the applicable operating unit. See the Operations and Maintenance Manual for more information.

Potential Hazards:
- Poisonous snakes or other dangerous wildlife may be encountered along the right-of-way.
- Beware traffic hazards. Wear a reflective safety vest and use care when patrolling near roadways and in other areas where moving vehicles are present.
- Do not conduct leakage surveys if lightning is present.
- Potential ignition of escaping gas. No open flames. No smoking.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Damage to Facilities
- Leak Detection Equipment Malfunction
- Corrosion
- ROW Issues
- Facility Damage
- Loss of Cover
- Line Marker Issues

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 074
REVISION DATE 7/21/2021		B31Q COVERED TASK NO. 1261
Pipeline O&M Procedure	**Conduct Gas Leak Survey**	PAGE NO. 5 of 5

Gas Leakage Survey Form

Period Covered: Began _____ **Ended** _____

Areas Covered: _____

_____

_____

Map References: _____

_____

_____

Leakage Indications Discovered (describe locations and indications, such as a condition of vegetation):

_____

_____

Describe any unusual conditions at highway and railroad crossings: _____

_____

_____

Other Factors noted which could affect present or future safety or operations of the gas system:

_____

_____

_____

Follow-up (repairs, maintenance or test resulting from this inspection): _____

_____

_____

_____

Comments: _____

_____

Number of Persons in Survey Party: _____

Signature of Person in Charge of Survey Party: _____

Date: _____

REVISION NO.		PROCEDURE NO. MP 075
REVISION DATE 7/21/2021		B31Q COVERED TASK NO. 1271
Pipeline O&M Procedure	**Mobile Gas Leak Survey**	PAGE NO. 1 of 7

SCOPE

The purpose of this procedure is to describe the steps required to perform a mobile gas leakage survey.

OBJECTIVES

To safely conduct a mobile gas leakage survey using Flame Ionization Detectors and Optical Methane Detectors and inspect the pipeline right-of-way to visually identify right-of-way conditions, signs of leaks, encroachments, or any other signs of potential impact to the safety of pipeline operations.
Ref: 49 CFR 192.723

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- SDS Sheet(s) if applicable

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Pipeline maps
- Communication devices
- Writing utensils
- Gas Leakage Survey form
- Combustible gas indicator (CGI)
- Gas detector
- Probe rod

SAFETY, HEALTH AND ENVIRONMENTAL

Caution: Explosive gas mixtures can cause serious injury or death. Inhalation of vapors can cause health problems.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for Field Operator guidance.

Approval:_____ Approval Date: _____ Next Review Date: _____

Mobile Gas Leakage Survey

This procedure outlines the general guidelines to conduct a mobile leakage survey and patrol a pipeline to inspect any portion of a pipeline system to detect, classify, and report leakage locations that are venting to the atmosphere. See the Operation and Maintenance Manual to determine the frequency of pipeline leakage survey and patrol.

Flame ionization is very sensitive and has a very low chance for false alarms, but it is slow and has a limited range of effect. Optical detection is able to scan a large area for methane or other gasses very quickly, but it is susceptible to false alarms and is not very sensitive, so lower concentrations of gas can be overlooked.

Mobile Gas Leakage Survey:

1. Calibrate each instrument used for leak detection in accordance with manufacturer's instructions.

2. Identify all facilities in the area of the survey, if possible.

3. For either method, inspect the vehicle and be sure that the equipment is properly installed.

4. Depending on the method and specific equipment used, there may be slight differences in how the survey needs to be conducted. Consult the manufacturer's instructions for details.

5. Generally, flame ionization requires the sensor to be very close. For surveys, make sure to get the sensors to pass right over the areas in which there would be leaks, like on the surface above buried pipelines.

6. For optical methane detectors, there is generally no need to get so close. However, make sure to know the optimal range and what its radius of effect is (check with the manual). These detectors are not as accurate, so multiple sweeps may or may not be necessary (check with the company supervisors or Company practices).


7. Take continuous samples of the atmosphere over the most logical venting locations of the pipeline being surveyed. Give consideration to the location of the pipeline:
   a. For aboveground piping, take a sample of the atmosphere adjacent to the piping as close to the pipe as possible.
   b. For underground piping, take a sample of the atmosphere along the route of the pipeline to be inspected as close to the ground as possible.
   c. For piping under pavement, check at all street openings and sample at the following locations:
      - Curb lines;
      - Manholes;
      - Catch basins;
      - Sewer, power, and telephone duct openings;
      - Fire and traffic signal boxes;
      - Cracks in pavement of sidewalks;
      - Foundation walls; and
      - Other points where venting is likely to occur.
   d. At and / or around valves, fittings, tees, stubs, and connections using a gas detector or CGI.

   Note: Adverse conditions such as moisture, frost, ice & snow cover, and high or gusting wind that may affect the venting of subsurface gas leaks. Avoid conducting the survey under adverse conditions, if possible.

8. If a leak is detected requiring immediate action, notify management and request additional personnel as needed.

9. Evaluate the location and magnitude of a leak in accordance with Leakage Grading Criteria section of this procedure.

10. Monitor or repair all leaks in accordance with the appropriate Company procedures.

11. Complete the Gas Leakage Survey form in accordance with Company practices (see Figure 1 for example form).

Patrol Pipeline:

1. Observe and report potential hazards which could affect pipeline safety and operation such as, but not limited to:
   - Indications of leaks,
   - Construction activities,
   - Encroachments (construction, new buildings, etc.),
   - Evidence of recent unmonitored excavations,
   - Exposed pipe,
   - Sinkage / slip areas,
   - Washouts or areas lacking adequate pipe support,
   - Missing or damaged line markers,
   - Areas requiring right-of-way maintenance, etc.

2. Report any indications of these activities on a Pipeline Patrol Form.

3. If conditions are observed that could affect pipeline safety or operation, immediately notify the Operations Supervisor. The Supervisor, in consultation with Engineering, will determine the appropriate course of action.

4. Report newly identified sites that may impact pipeline integrity. The following types of facilities should be noted on the patrol form and a copy of the form should be forwarded to a supervisor to determine if the facility will impact the Integrity Management Program:
   - Outside areas or open structures such as playgrounds, recreational facilities camping grounds, outdoor theatres, stadiums, recreational areas near a body of water, or areas outside a rural building such as a religious facility.
   - Buildings used for commercial or recreational purposes such religious facilities, office buildings, community centers, general stores, 4-H facilities, roller skating rinks, etc.
   - Facilities occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate. Examples include, but are not limited to hospitals, prisons, schools, day-care facilities, retirement facilities or assisted-living facilities.

5. Only newly discovered identified sites or existing sites where the usage has changed need be recorded and forwarded to the supervisor.

Leakage Grading Criteria

GRADE 1 LEAK - A gas leak which, due to its location and/or relative magnitude, constitutes a potentially hazardous condition to persons or property and requires immediate repair or continuous action until the condition is no longer hazardous. Grade 1 leaks include, but are not limited to:

- Damage by outside sources resulting in leakage.
- Any indication on a combustible gas indicator (CGI) of gas entering a building.
- Any reading within three feet of a building wall.
- Any reading of 4% or more gas-in-air (80% LEL or more) within manholes, vaults, or catch basins.
- Escaping gas that has ignited.
- Any leak which, in the judgement of operating personnel at the scene, requires immediate action to eliminate a hazardous condition.

GRADE 2 LEAK - A leak that does not present an immediately hazardous condition, but justifies scheduled repair based upon its potential for future hazard. Grade 2 leaks include, but are not limited to:

- Any reading in a paved or unpaved area which is more than 3 feet from, but within 30 feet of a building.
- Any reading less than 4% gas-in-air (80% LEL) in manholes, vaults, or catch basins; the reading to be taken with the structure in its normal condition as nearly as is physically possible.
- Any leak, which in the judgement of the operating personnel at the scene, requires scheduled repair.

GRADE 3 LEAK - A leak that is not hazardous at the time of detection and can be reasonably expected to remain that way. Any leak on the Company's underground facilities, which is not classified as Grade 1 or Grade 2, shall be designated as Grade 3.

Reporting / Notification:
Reports of patrols should be made on a "Pipeline Patrol" Form and "Gas Leakage Survey" Form should be filed with the applicable operating unit. See the Operations and Maintenance Manual for more information.

Potential Hazards:
- Poisonous snakes or other dangerous wildlife may be encountered along the right-of-way.
- Beware traffic hazards. Wear a reflective safety vest and use care when patrolling near roadways and in other areas where moving vehicles are present.
- Do not conduct leakage surveys if lightning is present.
- Potential ignition of escaping gas. No open flames. No smoking.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Damage to Facilities
- Leak Detection Equipment Malfunction
- Corrosion
- ROW Issues
- Facility Damage
- Loss of Cover
- Line Marker Issues

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO. MP 075
REVISION DATE 7/21/2021		B31Q COVERED TASK NO. 1271
Pipeline O&M Procedure	**Mobile Gas Leak Survey**	PAGE NO. 7 of 7

Gas Leakage Survey Form

Period Covered: Began _____ **Ended** _____

Areas Covered: _____

_____

_____

Map References: _____

_____

_____

Leakage Indications Discovered (describe locations and indications, such as a condition of vegetation):

_____

_____

Describe any unusual conditions at highway and railroad crossings: _____

_____

_____

Other Factors noted which could affect present or future safety or operations of the gas system:

_____

_____

_____

Follow-up (repairs, maintenance or test resulting from this inspection): _____

_____

_____

_____

Comments: _____

_____

Number of Persons in Survey Party: _____

Signature of Person in Charge of Survey Party: _____

Date: _____

REVISION NO.		PROCEDURE NO.
		MP 076
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1291
Pipeline O&M Procedure	**Locate & Temporarily Mark Pipelines**	PAGE NO. 1 of 4

SCOPE

This procedure describes the steps required to locate and temporarily mark underground pipelines and facilities.

OBJECTIVES

To locate and temporarily mark pipelines and facilities to ensure safe, incident free excavation activities.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- One Call System User's Guides

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Electronic locating equipment
- Hand tools
- Yellow, and white marking paint, flags stakes and / or approved line markers
- Tape measure
- Company maps, drawings & applicable computerized data measurements
- Service line measurements, if applicable

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for:

- Locating and temporarily marking underground pipelines and facilities.
- Completing a One Call locate request

Approval:_____ Approval Date: _____ Next Review Date: _____

Locating & Temporarily Mark Pipelines

This procedure describes the steps required to locate and temporarily mark underground pipelines and facilities in accordance with state and federal regulations.

It is the responsibility of the locator to locate, mark, and stake all underground facilities at the site within the tolerance zone so as to enable the excavator to employ prudent techniques, which may include hand-dug test holes to determine the precise location of the underground facility.

Temporary markings should be placed in the area of excavation activity before the activity begins, as far as practical.

Locating Facilities– General Procedure:

1. Review the ticket location information, scope of intended work, and type of excavation activity.

2. Check the batteries in both the transmitter and the receiver. If the batteries are low, replace them with new ones according to the manufacturer's recommendations.

3. Go to the location indicated by the locate ticket. If the proposed area of excavation is not clearly identified with white paint, or is not accurately described on the locate ticket, attempt to contact excavator for clarification.

4. Read and interpret maps, drawings and service line information, if applicable, to determine the layout of company buried facilities and any lateral connections in the vicinity of the proposed excavation. At the proposed excavation site, look for indications of underground lines such as: curb and wire boxes, CP test stations, valves, meters, and other structures.

5. Attach the pipe lead to the pipe, test station, or any appurtenance that provides a good electrical contact with the structure to be located. Make sure that there is no rust or paint to interfere with the connection.

6. If there is no place to hook directly to the pipe, test station, or other pipeline component, position the transmitter as nearly as possible directly over the pipeline. Follow the manufacturer's instructions for the locating instrument to prevent being too close to the transmitter with the receiver (typically 30 - 75 feet from the transmitter).

7. Attach the ground wire to a suitable ground or ground stake that is located as far from the structure to be located as possible.

8. Turn the transmitter on and make any adjustments necessary to ensure proper operation. Use the lowest frequency at the lowest power output possible to minimize the “bleed over” of the signal to adjacent buried pipelines or other underground facilities.

9. Turn the receiver on and adjust the power setting on the receiver to a workable level.

10. Follow the instructions for the line-locating instrument to locate the buried piping. On residential private property, the company shall attempt to locate the service line (curb to meter) and / or the underground house line if it is within the proposed excavation site. Commercial and industrial customers will be handled on an individual basis.

11. Mark the location of Company pipelines. Markings may include one or any combination of the following: paint, flags, or stakes.
    - Paint markings should be at 4” to 12” in length and at least 1” in width.
    - All elbows, tees and other changes of direction should be marked.
    - Straight pipe sections should be marked at least every 5 to 10 feet (closer if the terrain makes it difficult to see the next marking at that distance).
    - The diameter of the pipe should be indicated.
    - When known, termination points, dead ends and stub outs should be marked.
    - When there is a strong likelihood that marks may be destroyed, offsets should be used. Offsets are indicated on a permanent surface and are placed parallel to the running line of the facility. The offset should indicate the distance from the offset to the facility and should identify the facility owner and if necessary size of the facility.
    - Continue to mark lines 20 to 30 feet beyond the indicated area of excavation.

12. If the actual pipeline layout is different than shown in the company records, sketch the actual pipeline layout to assist in updating the records.

13. Whenever electronic locating equipment cannot be used, there is a questionable locate, or the excavator will be within the tolerance zone, request the excavator to use soft excavation procedures. (Hand dig or vacuum excavation).

14. If there is a disagreement involving using soft excavation procedures, notify a supervisor. Document supervisory contact by completing applicable section on the line locating form (see the sample line locating form attached to this procedure)

15. In the event of a true emergency situation, where digging is to begin immediately:
    a. If there is a questionable locate or the electronic locator cannot be used, remain at the proposed excavation site for a reasonable period of time (up to one hour unless he or she receives another call and is the only one on duty to respond), to observe the initial excavating.

b. If you get pulled off the site due to another call, return as soon as possible. If you cannot return, arrange for a "follow-up" inspection as required.

16. When excavation includes trenchless construction such as augering, boring, directional drilling, tunneling, etc., the facility location must be visually verified before or during trenchless installation by way of a spot hole or full excavation at each point where the installation path crosses the pipeline facility.

17. **TOLERANCE ZONE:** Any excavation within the tolerance zone should be performed with hand tools until the marked facility is exposed. Unless otherwise specified by state law or code, the tolerance zone includes the width of the facility and (18") measured horizontally from each side of the facility.

18. It is the responsibility of the excavating contractor to immediately report to the facility owner any break on its lines. This includes: any dents, gouges, grooves, or other damage to such lines, or to their coating or cathodic protection, made or discovered in the course of the excavation or demolition activity.

Reporting / Notification:
Document locate results as required by company policy.

Potential Hazards:
- Traffic Hazard: Wear a reflective safety vest and use care when locating lines under or near roadways and in other areas where moving vehicles are present.
- Venomous snakes or other dangerous wildlife may be encountered along the right-of-way.

Abnormal Operating Conditions (AOCs):
- Locating Equipment Malfunction
- Broken Tracer Wire

Personal Protective Equipment:
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 077
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1301, 1311
Pipeline O&M Procedure	**Patrol Right-of-Way and Install Pipeline Markers**	PAGE NO. 1 of 4

SCOPE

The purpose of this procedure is to describe the steps required to perform a right-of-way or easement patrol, and to install and maintain pipeline markers as needed.

OBJECTIVES

To safely inspect the pipeline right-of-way to visually identify right-of-way conditions, signs of leaks, encroachments, or any other signs of potential impact to the safety of pipeline operations. To safely install and repair pipeline location markers.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Operations and Maintenance Manual
- *Locate and Temporarily Mark Pipeline* Procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Pipeline maps
- Communication devices
- Writing utensils
- Pipeline Patrol Report form
- Electronic pipeline locator
- Marker driver and cap, if applicable
- Marker with proper warning information label

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for inspecting pipeline right-of-ways and installing or replacing pipeline markers.

Approval:_____ Approval Date: _____ Next Review Date: _____

Patrol Right-of-Way or Easement

This is the procedure to inspect pipeline right-of-way or easement.

General Procedure:

1. Methods of patrolling include walking, driving, flying or other appropriate means of traversing the right-of-way.

2. The purpose of the patrol is to observe and report potential hazards which could affect pipeline safety and operation such as, but not limited to:
   - Indications of leaks;
   - Construction activity;
   - Encroachments (construction, new buildings, etc);
   - Evidence of recent unmonitored excavations;
   - Exposed pipe;
   - Sinkage/slip areas;
   - Washouts, areas lacking adequate pipe support;
   - Missing or damaged line markers;
   - Areas requiring right-of-way maintenance, etc.

3. Indications of these activities should be noted on a Pipeline Patrol Form.

4. If conditions are observed that could affect pipeline safety or operation, immediately notify the operations supervisor. The supervisor will determine the appropriate course of action.

5. Report newly identified sites that may impact pipeline integrity. The following types of facilities should be noted on the patrol form and a copy of the form should be forwarded to a Supervisor in charge of the Integrity Management Program to determine if the facility will impact the program:

   - Outside areas or open structures such as playgrounds, recreational facilities camping grounds, outdoor theatres, stadiums, recreational areas near a body of water, or areas outside a rural building such as a religious facility.
   - Buildings used for commercial or recreational purposes such religious facilities, office buildings, community centers, general stores, 4-H facilities, roller skating rinks, etc.
   - Facilities occupied by persons who are confined, are of impaired mobility, or would be difficult to evacuate. Examples include, but are not limited to hospitals, prisons, schools, day-care facilities, retirement facilities or assisted-living facilities.

6. Only newly discovered identified sites or existing sites where the usage has changed need be recorded and forwarded to a Supervisor.

Install & Maintain Line Markers

This is the general procedure for installing and maintaining line markers. Line markers are used to provide a visual, aboveground indicator for an underground pipeline.

All signs must have the information needed to identify the product in the line including company name and phone numbers where responsible parties can be reached at all times.

Line markers are required at each buried pipeline crossing of a public road and railroad unless impractical in class 3 or 4 locations.

Line markers/labels are required along each section of aboveground pipeline in areas accessible to the public.

Line markers are to be placed with each corrosion test station.

Install Line Markers:

1. At the desired field location, determine the exact position of the pipeline using an electronic pipeline locator.

2. Mark the ground as close as practical over the exact location of the pipeline.

3. Place the marker into the marker driver.

4. Place the marker's pointed end onto the spot that was marked in the step # 2 above. The face or back of the marker should be facing you.

5. With the marker upright inside of the marker driver, drive the marker into the ground to the desired depth. Do not drive the marker to such a depth that it could damage the coating of the pipeline.

6. Remove the marker driver from the marker, and remove the decal protector from the marker, if necessary.

7. If desired, the marker may be photographed, numbered, and/or located with a GPS positioning device at this time, and such information recorded.

8. While standing at this location, look upstream and downstream to verify that markers are plainly visible in both directions. If not, place additional markers following the procedure listed above.

Maintain Line Markers:

1. Identify the section of the pipeline to be inspected.

2. Locate the most recent pipeline maps (records or alignment drawings), and use them to accurately locate the section of pipeline to be inspected.

3. Determine the access requirements for the section to be inspected. Some right-of-ways are restricted.

4. Inspect the line markers and replace any that are missing or damaged or contain incorrect information.

5. Ensure that there are enough signs and that they have been placed in the correct places.

6. Document information according to company practice.

Reporting / Notification:

Reports of these patrols should be made on a "Pipeline Patrol" Form and should be filed with the applicable operating unit. See Operations and Maintenance Manual for more information.

Potential Hazards:

- Venomous snakes or other dangerous wildlife may be encountered along the right-of-way.
- Beware traffic hazards. Wear a reflective safety vest and use care when patrolling near roadways and in other areas where moving vehicles are present.

Abnormal Operating Conditions (AOCs):

- Escaping Gas: unplanned or uncontrolled
- Damage to Facilities
- Fire or Explosion: uncontrolled ignition
- Abnormal Facility Conditions

Personal Protective Equipment:

- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 078
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1321, 1331, 1341
Pipeline O&M Procedure	**Inspect Excavation Activities**	PAGE NO. 1 of 5

SCOPE

This procedure describes the general steps for inspecting excavation activities and for inspecting the pipeline for damage after excavation.

OBJECTIVES

Prevent and minimize pipeline damage caused by excavation activities.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- *Locate and Temporarily Mark Pipelines* Procedure
- *Visually Inspect Pipe and Components* Procedure
- *Bedding and Backfill* Procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Combustible gas detectors
- Probe rods, electronic line locators
- Holiday detector
- Pit gauge

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

Ensure rescue equipment is readily available during work performed in excavated trenches.

COMMENTS

This procedure may be used for:

- Inspection of excavation activities
- Monitoring third party excavation activities
- Assuring performance of Damage Prevention activities

Approval:_____ Approval Date: _____ Next Review Date: _____

Inspect Excavation Activities

The purpose of this procedure is to describe the steps required to inspect excavation activities and ensure the performance of damage prevention activities during excavation. This includes inspecting the pipeline for damage at a maintenance job.

Excavation activities include excavation, anchoring, blasting, boring, tunneling, drilling, driving-in, backfilling, the removal of aboveground structures by either explosive or mechanical means, and other earth-moving operations.

Physical site inspections must be done as frequently as necessary during and after the excavation activities to verify the integrity of the pipeline system when the actual location has not been verified with electronic locating equipment or when excavation near a transmission line meets the criteria below.

If the scope of the project involves excavating within 25 feet of a main, the qualified person will develop a schedule to monitor the excavation site once a day while excavation activities are taking place.

If the scope of the project involves excavating within 5 feet of a main, the qualified person must continuously monitor the excavation in the area of the pipeline while excavation activities are taking place.

CAUTION: When excavation includes blasting, a survey with gas detection equipment must be conducted prior to and after the blasting activity.

Extended periods of blasting will require periodic surveys and continuous monitoring.

General Procedure:

1. Upon arrival at the excavation site, locate the person in charge and identify yourself as a representative of your Company. Tell them that there are underground pipelines in the area and you are there to observe and assist them to locate and work safely around the pipelines.

2. Check that the one-call center has been notified and that all underground utilities have been properly marked. For proper marking refer to the requirements of the procedure *Locating and Marking Pipelines*.

3. Take care to preserve the paint, flags, stakes, or other designations for underground facilities until no longer needed for proper and safe excavation.

4. Ensure the pipeline is remarked as necessary; such as if any facility marking is removed or is no longer visible.

5. Encourage the excavator to hand dig near the markings to locate the buried pipeline. If excavation activities are within the tolerance zone, instruct the excavator to use prudent digging techniques.

6. If the excavation includes trenchless construction such as auguring, boring, directional drilling, tunneling, etc., visually verify the pipe line location before or during installation. Pothole to locate the marked facilities at the point where the bore is to cross the marked facilities.

7. If an underground line or cable is encountered during an excavation, power excavating should stop and the line or cable should be exposed using hand tools.

8. Ensure the excavator provides proper support for exposed pipe, both those owned by the Gas Department and facilities owned by other utilities. Support should be provided to avoid excessive sagging. All supports should be free from sharp edges.

9. Ensure that care is exercised when digging or working around the company's pipeline facilities. Care should be taken when heavy equipment is used near exposed facilities.

10. If the excavation is near vehicular surfaces (streets, roadways, parking lots, etc.) ensure that suitable barricades are set up to protect against vehicular intrusion.

11. Nothing should be hung from or slung over exposed pipelines, cables and other exposed facilities.

12. Do not climb on, strike or attempt to move pipeline facilities.

13. Where possible, the soil excavated from the trench should be placed at least 2 feet from the edge of the trench to reduce the chance of cave-ins.

14. Shoring or other trench stabilization methods are required under the following circumstances:
    - when the trench depth is 5 feet or more
    - when the soil is loose and granular
    - when the soil is very wet or saturated
    - when a Competent Person determines that any combination of the above warrants shoring

15. When employees are required to be in trenches 4 feet deep or more, OSHA Standards should be followed. An adequate means of exit, such as an approved ladder or steps, should be provided and located so as to require no more than 25 feet of lateral travel. Ladders should extend at least 3 feet above the top of the trench and be secured.

16. Ensure that the backfill material, even if it is the original soil, is free from old paving, rocks, debris, large clods or any material that might damage the pipeline or coating.

17. If the pipeline has been supported during excavation, do not remove the supports until the soil under the piping has been compacted and it can support the pipeline adequately.

18. Ensure the excavation is filled evenly from both sides and is compacted in lifts so that the compaction is even and resembles original soil. See the *Bedding and Backfill* procedure for more information.

19. Encourage the excavator to not compact excessively on pipeline facilities that can be damaged by soil movement.

20. Ensure the site is cleaned up according to company expectations.

Reporting / Notification:
Document the details of the inspection as required by company practice. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Collapse of bell hole walls.
- Presence of poisonous, flammable or explosive gases in bottom of excavated area.
- Presence of oxygen deficient atmosphere in bottom of excavated area.
- Drop / fall hazards. Maintain a safe distance from construction equipment and the edge of the excavation.
- In the event the gas line is ruptured evacuate all personnel to a location upwind of the leak and implement the Emergency Response procedures.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Pipeline system damage
- Component Failure
- Corrosion Present
- Coating Damage
- Unexpected Soil Movement

REVISION NO.		PROCEDURE NO.
		MP 078
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1321, 1331, 1341
Pipeline O&M Procedure	**Inspect Excavation Activities**	PAGE NO. 5 of 5

Personal Protective Equipment (PPE):

Personnel working in trenches should wear appropriate PPE which may include:

- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 084
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1651
Pipeline O&M Procedure	**Purging / Blowdown**	PAGE NO. 1 of 29

SCOPE

This procedure outlines the general guidelines to purge and blow-down a pipeline.

OBJECTIVES

To safely purge and blow-down a pipeline with minimal environmental impact.

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- Operation and Maintenance Manual
- *Squeeze off Pipe* Procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Combustible Gas Indicator (CGI), e.g. Gascope
- Carbon Monoxide (CO) test equipment
- Non-sparking hand tools
- Pressure gauges
- Steel vent stacks and vent stack valves
- Fully equipped nitrogen truck / trailer, and / or Nitrogen tanks
- Bonding cables
- Burlap or absorbent rags & soapy water solution
- Fire extinguisher
- Propane gas / approved cylinder
- Leak detection fluid
- Igniter, matches, etc.
- Valve, stop, nipple, etc. at the point of purging
- 2 temporary hoses or welders hoses with quick disconnects
- Flame purge torch assembly
- Intrinsically safe communication device (e.g. cell phone, radio)

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Eliminate all known sources of ignition in the vicinity of the work area including open flames, electrical sparks and arcing, and liquid combustibles. Fire extinguishers are to be located at each purge/blow-down point and at all open main line excavations.

See the procedure for potential hazards and Personal Protective Equipment (PPE).

Ensure a fire watch is standing by during all purging and blow down activities.

COMMENTS

This procedure may be used to purge and blow-down a pipeline.

Approval:_____ Approval Date: _____ Next Review Date: _____

Purging / Blowdown

This procedure outlines the general guidelines for purging and blow-down of all natural gas service, distribution, transmission, gathering and storage pipelines. It is recommended that inert gas be utilized for the purge process for all steel and plastic pipelines 12 inches in diameter or larger and greater than 1500 feet in length.

CAUTION: Eliminate all known sources of ignition in the vicinity of the work area including open flames, electrical sparks and arcing, and liquid combustibles. Fire extinguishers are to be located at each purge / blow-down point and at all open main line excavations.

Safety Precaution:

- Eliminate all potential ignition sources prior to the beginning purging operation.
- Eliminate all liquid combustibles.
- Notify local public officials and / or the public in the vicinity prior to the purging operation, as needed.
- A fire extinguisher must be present at the purging site at a suitable location.
- The purge stack must be metal and an electrical ground applied so that the potential for static electricity is minimized.
- Steel vent stacks must be long enough to carry the gases a minimum of 5 feet above the top of the excavation.
- When purging through a plastic punch tee or fitting, the vent must transition to steel pipe before the valve.
- The purge stack diameter should not be larger than one-half the diameter of the pipeline being purged.
- Chose the suitable purging location to reduce the risk to life, property, and the environment.
- Avoid purging directly under or into power lines.

Inert Gas Slug Method:

1. Determine the volume of the slug of inert gas (nitrogen) required for the size of pipeline to be purged from Table 1. Divide this volume by 200 to obtain number of cylinders of nitrogen required.

2. Install bonding and / or grounding devices on the pipeline to be blown-down.

3. Establish communication between operating personnel involved in the blow-down.

4. Ensure that a calibrated combustible gas indicator (CGI) is located at purge site / discharge riser.

5. Install an inlet (injection) manifold and blow-off piping according to Figure 1.

6. Hook-up the nitrogen cylinders (or Tube Trailer) to the inlet manifold.

7. Use Table 2 to determine the inert gas injection pressure on injection manifold, approximate length of time of injection and approximate purge time.

8. Carefully assign the manpower to this type of purge since accurate timing and pressure control are essential.

9. When all personnel are at their stations, fully open Valves V-2 and V-3. The mainline valve, nitrogen cylinder valve(s) and V-4 remain closed. Refer to Figure 1.

10. At start (Time=0) the nitrogen cylinder outlet valve(s) and Valve V-1 are opened to produce and maintain the appropriate psig pressure on the nitrogen injection manifold pressure gauge. The inert gas is injected for the time noted in Table 2.
    a. In order to maintain the utmost accuracy, it is imperative that this gauge be positioned on the pipeline to be purged, a minimum of 10 pipe diameters from the inlet mainline valve, bag, or stopper.
    b. If it is not feasible that the gauge be placed at least 10 pipe diameters from the inlet mainline valve, bag, or stopper, refer to Table 2 for correct manifold pressures.

11. When the nitrogen injection time is completed, close the nitrogen cylinder valve(s), then close Valve V-1 and open either V-4 (air injection valve, if purging out of service) or the upstream mainline valve (if purging into service).

12. The termination of the nitrogen injection and start of the air or natural gas injection must be accomplished within 30 seconds in order to retain the required length and separation of slug. A delay of 3 minutes or greater requires the purge procedure to be restarted, which will result in possible premature endpoint readings.

13. Valve V-4 or the upstream mainline valve must be manually operated at the specified pressure until the endpoints are confirmed.

14. Sample at the downstream blowoff stack to confirm end points.
    - Purging into service
      Minimum 96% natural gas and Maximum 4% inert

    - Purging out of service
      Minimum 96% inert and Maximum 4% natural gas

15. Purge is complete when the appropriate end points are confirmed.

16. Place the line into service.

Steel pipelines

a. Close the blow-off valve on the vent stack.
b. Open the downstream valve or isolation device (bag, stopple, etc.).

Plastic pipelines

a. Close the blow-off valve on the vent stack.
b. Close the punch tee.
c. Open the blow-off valve on the vent stack to ensure punch tee is not leaking through.
d. Open the downstream valve or isolation device (squeeze tool, etc.).

TABLE 1
Pipe Displacement at Atmospheric Conditions

O.D.	Pipe Size – Inches		Displacement	
	Wall Thickness	I.D.	Cu. Ft./Lin. Ft.	MCF/Mile
4.500”	0.188 0.237	4.125 4.026	0.0928 0.0884	0.490 0.467
6.625”	0.219 0.280	6.1875 6.065	0.2088 0.2006	1.102 1.059
8.625”	0.250 0.322	8.125 7.981	0.3601 0.3474	1.901 1.834
10.750”	0.250 0.365	10.250 10.020	0.5730 0.5473	3.025 2.891
12.750”	0.312 0.375 0.500	12.250 12.000 11.750	0.8185 0.7854 0.7530	4.322 4.147 3.976
16”	0.312 0.375 0.500	15.375 15.250 15.000	1.2893 1.2688 1.2272	6.808 6.699 6.480
20”	0.312 0.375 0.500	19.375 19.250 19.000	2.0474 2.0211 1.9690	10.820 10.671 10.396
24”	0.312 0.375 0.500	23.375 23.250 23.000	2.9801 2.483 2.8853	15.735 15.567 15.234
30”	0.344 0.375 0.500	29.312 29.250 29.000	4.6863 4.6663 4.5869	24.744 24.638 24.219
36”	0.375 0.500 0.625	35.250 35.000 34.750	6.7771 6.6813 6.5862	35.780 35.280 34.780

TABLE 2
Quantity of Nitrogen Required to Purge a Pipeline Using Inert Gas Slug Method

Pressure on N2 injection manifold (PSIG)	N2 Injection Rate (CFM)	Minimum slug velocity (ft/min)	**Quantity of Nitrogen, Cubic Feet – quantity needed is underlined number in tables below**						
LENGTH OF PIPELINE (ft)			500’	1,000’	2,000’	5,000’	10,000’	20,000’	50,000’
4” Diameter Pipe, Nitrogen Injection hose 50’ - ¾” diameter									
3 psig	11 CFM	125 ft/min	**19 ft^3**	**23 ft^3**	**29 ft^3**	**40 ft^3**	**53 ft^3**	**71 ft^3**	**107 ft^3**
TOTAL PIPE VOLUME (Cu.ft)			45	90	180	450	900	1800	4500
Est. N2 Injection Time (min:sec)			1:45	2:05	2:40	3:40	4:50	6:30	9:45
Est. Total Purge Time (min:sec),			2:00	2:30	3:30	5:30	11:00	25:00	80:00
6” Diameter Pipe, Nitrogen Injection hose 50’ – ¾” diameter									
8 psig	30 CFM	130 ft/min	**46 ft^3**	**56 ft^3**	**70 ft^3**	**98 ft^3**	**129 ft^3**	**173 ft^3**	**261 ft^3**
TOTAL PIPE VOLUME (Cu.ft)			110	220	440	1100	2200	4400	11000
Est. N2 Injection Time (min:sec)			1:30	1:50	2:20	3:20	4:20	5:45	8:40
Est. Total Purge Time (min:sec)			2:00	2:00	3:00	5:00	9:30	21:00	70:00
8” Diameter Pipe, Nitrogen Injection hose 50’ – ¾” diameter									
18 psig	60 CFM	150 ft/sec	**77 ft^3**	**94 ft^3**	**117 ft^3**	**164 ft^3**	**217 ft^3**	**291 ft^3**	**439 ft^3**
TOTAL PIPE VOLUME (Cu.ft)			185	370	740	1850	3700	7400	18500
Est. N2 Injection Time (min:sec)			1:20	1:40	2:00	2:50	3:40	4:50	7:20
Est. Total Purge Time (min:sec)			2:00	2:00	2:30	4:00	7:30	15:00	55:00
Approximate Length of Slug			210’	260’	350’	475’	600’	850’	1,250

TABLE 2 (Continued)
Quantity of Nitrogen Required to Purge a Pipeline Using Inert Gas Slug Method

Pressure on N2 injection manifold (PSIG)	N2 Injection Rate (CFM)	Minimum Slug Velocity (ft/min)	**Quantity of Nitrogen, Cubic Feet – quantity needed is underlined number in tables below**						
LENGTH OF PIPELINE (ft)			500	1,000	2,000	5,000	10,000	20,000	50,000
10.75" Diameter Pipe, Nitrogen Injection hose 50' – ¾" diameter									
35 psig	100 cfm	165 ft/sec	**121 ft^3**	**147 ft^3**	**184 ft^3**	**257 ft^3**	**340 ft^3**	**457 ft^3**	**688 ft^3**
TOTAL PIPE VOLUME (Cu.ft)			290	580	1160	2900	5800	11600	29000
Est. N2 Injection Time (min:sec)			1:15	1:30	1:50	2:35	3:30	4:35	6:50
Est. Total Purge Time (min:sec)			2:00	2:00	2:30	3:30	7:00	15:00	50:00
12.75" Diameter Pipe, Nitrogen Injection hose 50' – 1 ¼" diameter									
11	150	180	**173 ft^3**	**211 ft^3**	**263 ft^3**	**368 ft^3**	**486 ft^3**	**653 ft^3**	**985 ft^3**
TOTAL PIPE VOLUME (Cu.ft)			415	830	1660	4150	8300	16600	41500
Est. N2 Injection Time (min:sec)			1:10	1:25	1:45	2:30	3:15	4:20	6:30
Est. Total Purge Time (min:sec)			2:00	2:00	2:30	3:30	7:00	14:00	40:00
16" Diameter Pipe, Nitrogen Injection hose 50' – 1 ¼" diameter									
27	275	210	**280 ft^3**	**342 ft^3**	**430 ft^3**	**605 ft^3**	**802 ft^3**	**1080 ft^3**	**1632 ft^3**
TOTAL PIPE VOLUME (Cu.ft)			655	1310	2620	6550	13100	26200	65500
Est. N2 Injection Time (min:sec)			1:00	1:15	1:35	2:15	3:00	4:00	6:00
Est. Total Purge Time (min:sec)			2:00	2:00	2:15	3:30	6:00	12:00	38:00
Approximate Length of Slug			210'	260'	350'	475'	600'	850'	1,250

TABLE 2 (Continued)
Quantity of Nitrogen Required to Purge a Pipeline Using Inert Gas Slug Method

Pressure on N2 injection manifold (PSIG)	N2 Injection Rate (CFM)	Minimum Slug Velocity (ft/min)	**Quantity of Nitrogen, Cubic Feet – quantity needed is underlined number in tables below**						
LENGTH OF PIPELINE (ft)			500	1,000	2,000	5,000	10,000	20,000	50,000
20” Diameter Pipe, Nitrogen Injection hose 50’ – 2” diameter									
11	**490**	**235**	**448 ft^3**	**548 ft^3**	**689 ft^3**	**968 ft^3**	**1283 ft^3**	**1728 ft^3**	**2611 ft^3**
TOTAL PIPE VOLUME (Cu.ft)			1040	2080	4160	10400	20800	41600	104000
Est. N2 Injection Time (min:sec)			1:00	1:15	1:25	2:00	2:40	3:35	5:20
Est. Total Purge Time (min:sec)			2:00	2:00	2:30	3:00	5:00	10:00	28:00
24” Diameter Pipe, Nitrogen Injection hose 50’ – 2” diameter									
24	775	255	**Complete Fill**	**788 ft^3**	**990 ft^3**	**1391 ft^3**	**1845 ft^3**	**2484 ft^3**	**3752 ft^3**
TOTAL PIPE VOLUME (Cu.ft)			1495	2990	5980	14950	29900	59800	149500
Est. N2 Injection Time (min:sec)			2:00	1:05	1:20	1:50	2:30	3:15	4:50
Est. Total Purge Time (min:sec)			2:00	2:00	2:30	3:00	5:00	9:00	25:00
30” Diameter Pipe, Nitrogen Injection hose 50’ – 2” diameter									
45	1350	285	**Complete Fill**	**1230 ft^3**	**1546 ft^3**	**2173 ft^3**	**2880 ft^3**	**3880 ft^3**	**5863 ft^3**
TOTAL PIPE VOLUME (Cu.ft)			2335	4670	9340	23350	46700	93400	233500
Est. N2 Injection Time (min:sec)			1:45	1:00	1:35	1:40	2:10	2:55	4:20
Est. Total Purge Time (min:sec)			1:45	2:00	2:30	3:00	5:00	7:00	25:00
Approximate Length of Slug			210’	260’	350’	475’	600’	850’	1,250

TABLE 2 (Continued)
Quantity of Nitrogen Required to Purge a Pipeline Using Inert Gas Slug Method

NOTES

1. Higher pressures will result in faster injection of the inert gas, the values represented Correspond to the minimum pressure necessary on the nitrogen manifold and the resultant approximate injection flow and time.

2. Inert gas injection times are approximations only, the total quantity of nitrogen, as identified, must be injected. All required quantities of nitrogen should be injected within the injection time estimate.

3. Purge times are provided for reference only, the actual success of the purge is determined when endpoint values are maintained. Purge times are estimated from the start of nitrogen injection at the inlet to receiving endpoint values at the outlet. Purge times assume natural gas is injected at 5 PSIG at a pressure gauge located near the inlet on the pipe being purged.

4. Purge times shall be multiplied by the following factors to determine time approximations if purging at pressures greater than 5 PSIG. Purge times will shorten at higher pressures by these respective factors.

   10 PSIG - 0.6598
   15 PSIG - 0.5069
   20 PSIG - 0.4157

TABLE 3
Recommended Blowoff Sizes for Various Pipe Sizes

Pipe Size (Nominal)	Distribution Riser/Blowoff Pipe Size	Transmission Riser/Blowoff Pipe Size	Recommended Reduced Pipe Riser/Blowoff Size (Nominal)(Liquids Present)
2”	1”	1”	1/4”
3”	1”	1”	1/2”
4”	1”	1-1/2”	3/4”
6”	1-1/2”	2”	1”
8”	2”	3”	1-1/2”
10”	3”	3”	1-1/2”
12”	3”	4”	2”
16”	4”	6”	2”
20	6”	8”	3”
24”	6”	8”	4”
30”	8”	10”	4”
36”	10”	12”	6”

Complete Fill Method:

1. Determine the total volume of the pipeline to be purged using the Pipe Displacement Table 1. Select pipeline size and multiply the length required to be purged by the appropriate displacement value (Cu Ft / Lin Ft column) and then multiply by 1.5 for a safety factor. Divide this volume by 200 to obtain number of cylinders of nitrogen required.

2. Install bonding and / or grounding devices on the pipeline to be purged.

3. Ensure that a calibrated CGI is located at the purge site / discharge riser.

4. Establish communication between operating personnel involved in the purge.

5. Install an inlet (injection) manifold and blow-off piping according to Figure 1.

6. Hook-up the nitrogen cylinders (or Tube Trailer) to inlet manifold.

7. Fully open Blow-off Valve V-3 and Inlet Manifold Valve V-2. Refer to Figure 1.

8. Open the nitrogen cylinder valve(s) and Valve V-1 to inject nitrogen into the system at a rate over 5 feet per second during filling.

9. Monitor the nitrogen manifold injection pressure to ensure it meets or exceeds the minimum pressure listed in Table 2.

10. Monitor the pipeline pressure to ensure the purge segment is not over-pressurized.

11. Sample the venting mixture with a CGI at the blow-off stack to make sure the line has been completely filled with inert gas.

12. The nitrogen injection is terminated upon injecting all of the calculated nitrogen requirements, while simultaneously venting until following endpoints are reached:
    Pipelines being purged out of service:
    - Pipeline pressure decreases to 0 psig and the following endpoints are reached:
      Minimum 96% Inerts or Air and Maximum 4% Natural Gas

    Pipelines being purged into service:
    - Pipeline pressure is adjusted to a positive pressure slightly above atmospheric pressure and the following end points are reached:
      Minimum 96% Natural Gas and Maximum 4% Inerts or Air

13. Purge is complete when the appropriate end points are confirmed.

14. Place the line into service.
    Steel pipelines:
    a. Close the blow-off valve on the vent stack, and
    b. Open the downstream valve or isolation device (bag, stopple, etc.).

    Plastic pipelines
    a. Close the blow-off valve on the vent stack,
    b. Close the punch tee,
    c. Open the blow-off valve on the vent stack to ensure punch tee is not leaking through, and
    d. Open the downstream valve or isolation device (squeeze tool, etc.).

Direct Displacement Method

Blow-down of Pipeline Procedure:

1. Install vent stack(s), vent valve(s) and pressure gauge(s).

2. Install bonding and / or grounding devices on pipeline to be blown-down.

3. Establish communication between operating personnel involved in the blow-down.

4. Isolate the section of pipeline to be blown-down by appropriate method (valves, stopples, etc.).

5. Slowly open and secure the downstream blow-off valve in the wide-open position.

6. Continue blow-down until the pipeline pressure goes to 0 psig.

   Note: The approximate blow-down time found in Table 4, is to be used only as a guideline.

7. Periodically check the pressure on the blown-down line for any buildup of pressure. If pressure buildup is excessive consider:
   a. Setting a vent stack between the shutoff valve or shutoff device and operations and the maintenance work area;
   b. Installing a vent sealant at the shut off valve to prevent bleed through; and
   c. Readjusting the valve stops on the aboveground valves.

8. Perform operations and maintenance work as required. Welding is not to be performed unless proper pipeline purging or siphoning operations are performed (see *Jet Welding* Procedure).

Table 4 – Blow-down Time

Blowdown Time in Minutes per 100 Linear Feet with a One Inch Valve Pressure (psig)

Line Pipe Diameter	0.43 (12" W.C.)	1 psig	5 psig	25 psig	50 psig	100 psig	200 psig	400 psig	600 psig	800 psig	1000 psig
2"	0.005	0.007	0.011	0.020	0.025	0.031	0.039	0.049	0.056	0.062	0.067
3"	0.012	0.015	0.026	0.045	0.056	0.071	0.089	0.113	0.129	0.142	0.153
4"	0.020	0.027	0.046	0.078	0.098	0.124	0.156	0.196	0.225	0.247	0.266
6"	0.045	0.060	0.102	0.175	0.221	0.278	0.350	0.441	0.505	0.556	0.599
8"	0.078	0.103	0.177	0.302	0.381	0.480	0.604	0.761	0.872	0.959	1.033
10"	0.124	0.164	0.281	0.481	0.606	0.763	0.962	1.212	1.387	1.527	1.645
12"	0.177	0.235	0.402	0.687	0.865	1.090	1.374	1.731	1.981	2.181	2.349
16"	0.279	0.370	0.633	1.082	1.363	1.717	2.164	2.727	3.121	3.435	3.701
20"	0.443	0.587	1.005	1.718	2.165	2.727	3.436	4.330	4.956	5.455	5.877
24"	0.645	0.855	1.462	2.500	3.150	3.969	5.001	6.302	7.214	7.940	8.553
30"	1.010	1.339	2.289	3.915	4.933	6.215	7.831	9.867	11.295	12.432	13.392
36"	1.467	1.944	3.325	5.686	7.164	9.026	11.373	14.330	16.404	18.055	19.450

Blowdown Time in Minutes per 100 Linear Feet with a One and One Half Inch Valve Pressure (psig)

Line Pipe Diameter	0.43 (12" W.C.)	1 psig	5 psig	25 psig	50 psig	100 psig	200 psig	400 psig	600 psig	800 psig	1000 psig
2"	0.002	0.003	0.005	0.008	0.010	0.013	0.017	0.021	0.024	0.026	0.028
3"	0.005	0.006	0.011	0.019	0.024	0.30	0.038	0.048	0.055	0.060	0.065
4"	0.009	0.011	0.019	0.033	0.042	0.052	0.066	0.083	0.095	0.105	0.113
6"	0.019	0.025	0.043	0.074	0.094	0.118	0.149	0.187	0.215	0.236	0.254
8"	0.033	0.044	0.075	0.128	0.162	0.204	0.257	0.323	0.370	0.407	0.439
10"	0.053	0.070	0.119	0.204	0.257	0.324	0.408	0.514	0.589	0.648	0.698
12"	0.075	0.100	0.170	0.291	0.367	0.463	0.583	0.735	0.841	0.926	0.997
16"	0.119	0.157	0.269	0.459	0.579	0.729	0.919	1.157	1.325	1.458	1.571
20"	0.188	0.249	0.426	0.729	0.919	1.158	1.459	1.838	2.104	2.316	2.495
24"	0.274	0.363	0.621	1.061	1.337	1.685	2.123	2.675	3.062	3.371	3.631
30"	0.429	0.568	0.972	1.662	2.094	2.638	3.324	4.189	4.795	5.278	5.685
36"	0.623	0.825	1.411	2.414	3.041	3.832	4.828	6.083	6.964	7.665	8.257

TABLE 4 – Blow-down Time (Continued)

Blowdown Time in Minutes per 100 Linear Feet with a Two Inch Valve
Pressure (psig)

Line Pipe Diameter	0.43 (12" W.C.)	1 psig	5 psig	25 psig	50 psig	100 psig	200 psig	400 psig	600 psig	800 psig	1000 psig
2"	0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.012	0.014	0.015	0.016
3"	0.003	0.004	0.007	0.011	0.014	0.018	0.023	0.028	0.032	0.034	0.036
4"	0.005	0.007	0.012	0.020	0.025	0.032	0.040	0.049	0.055	0.060	0.063
6"	0.012	0.015	0.026	0.046	0.057	0.071	0.089	0.110	0.124	0.134	0.142
8"	0.020	0.026	0.046	0.077	0.098	0.123	0.153	0.190	0.214	0.232	0.246
10"	0.032	0.042	0.072	0.124	0.155	0.195	0.244	0.302	0.340	0.369	0.391
12"	0.046	0.062	0.104	0.176	0.222	0.279	0.349	0.432	0.487	0.527	0.558
16"	0.072	0.095	0.163	0.278	0.349	0.438	0.549	0.680	0.766	0.829	0.878
20"	0.114	0.151	0.259	0.441	0.555	0.697	0.872	1.080	1.220	1.320	1.400
24"	0.166	0.220	0.377	0.642	0.808	1.010	1.270	1.570	1.770	1.920	2.030
30"	0.260	0.345	0.590	1.010	1.260	1.590	1.990	2.460	2.780	3.000	3.180
36"	0.380	0.500	0.860	1.470	1.840	2.310	2.880	3.580	4.030	4.360	4.620

Blowdown Time in Minutes per 100 Linear Feet with a Three Inch Valve
Pressure (psig)

Line Pipe Diameter	0.43 (12" W.C.)	1 psig	5 psig	25 psig	50 psig	100 psig	200 psig	400 psig	600 psig	800 psig	1000 psig
3"	0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.012	0.014	0.015	0.016
4"	0.002	0.003	0.005	0.009	0.011	0.014	0.017	0.021	0.024	0.026	0.028
6"	0.005	0.007	0.012	0.020	0.025	0.031	0.039	0.048	0.054	0.059	0.062
8"	0.009	0.011	0.020	0.034	0.043	0.054	0.067	0.083	0.094	0.101	0.107
10"	0.014	0.018	0.032	0.054	0.068	0.085	0.106	0.132	0.149	0.161	0.171
12"	0.020	0.026	0.045	0.077	0.097	0.122	0.152	0.189	0.213	0.231	0.244
16"	0.031	0.042	0.071	0.121	0.153	0.192	0.240	0.297	0.335	0.363	0.384
20"	0.050	0.066	0.113	0.193	0.243	0.305	0.382	0.473	0.533	0.577	0.611
24"	0.073	0.096	0.165	0.281	0.354	0.444	0.555	0.688	0.775	0.839	0.889
30"	0.114	0.151	0.258	0.440	0.554	0.695	0.869	1.078	1.214	1.314	1.392
36"	0.165	0.219	0.395	0.640	0.804	1.010	1.263	1.566	1.763	1.909	2.022

TABLE 4 – Blow-down Time (Continued)

Blowdown Time in Minutes per 100 Linear Feet with a Four Inch Valve
Pressure (psig)

Line Pipe Diameter	0.43 (12" W.C.)	1 psig	5 psig	25 psig	50 psig	100 psig	200 psig	400 psig	600 psig	800 psig	1000 psig
4"	0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.012	0.014	0.015	0.016
6"	0.003	0.004	0.007	0.011	0.014	0.018	0.022	0.028	0.031	0.034	0.036
8"	0.005	0.007	0.011	0.019	0.024	0.031	0.038	0.048	0.054	0.058	0.062
10"	0.008	0.011	0.018	0.031	0.039	0.049	0.061	0.076	0.086	0.093	0.098
12"	0.011	0.015	0.026	0.044	0.056	0.070	0.087	0.108	0.122	0.132	0.104
16"	0.018	0.024	0.041	0.070	0.088	0.110	0.138	0.171	0.192	0.208	0.220
20"	0.029	0.038	0.065	0.111	0.139	0.174	0.219	0.271	0.306	0.331	0.351
24"	0.042	0.055	0.095	0.161	0.203	0.253	0.319	0.395	0.445	0.481	0.510
30"	0.065	0.087	0.148	0.252	0.317	0.397	0.499	0.618	0.696	0.754	0.799
36"	0.094	0.126	0.215	0.367	0.460	0.577	0.724	0.898	1.010	1.095	1.161

Blowdown Time in Minutes per 100 Linear Feet with a Six Inch Valve
Pressure (psig)

Line Pipe Diameter	0.43 (12" W.C.)	1 psig	5 psig	25 psig	50 psig	100 psig	200 psig	400 psig	600 psig	800 psig	1000 psig
6"	0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.013	0.014	0.015	0.016
8"	0.002	0.003	0.005	0.009	0.011	0.014	0.017	0.021	0.024	0.026	0.027
10"	0.004	0.005	0.008	0.014	0.017	0.022	0.027	0.034	0.038	0.041	0.044
12"	0.005	0.007	0.012	0.020	0.025	0.031	0.039	0.048	0.054	0.059	0.062
16"	0.008	0.011	0.018	0.031	0.039	0.049	0.061	0.076	0.085	0.092	0.098
20"	0.013	0.017	0.029	0.049	0.062	0.078	0.097	0.121	0.136	0.147	0.158
24"	0.019	0.025	0.042	0.072	0.090	0.113	0.142	0.175	0.198	0.214	0.227
30"	0.029	0.038	0.066	0.112	0.141	0.177	0.222	0.275	0.309	0.335	0.355
36"	0.050	0.056	0.096	0.163	0.205	0.257	0.322	0.399	0.450	0.487	0.516

TABLE 4 – Blow-down Time (Continued)

Blowdown Time in Minutes per 100 Linear Feet with a Eight Inch Valve
Pressure (psig)

Line Pipe Diameter	0.43 (12" W.C.)	1 psig	5 psig	25 psig	50 psig	100 psig	200 psig	400 psig	600 psig	800 psig	1000 psig
8"	0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.012	0.014	0.015	0.016
10"	0.002	0.003	0.005	0.008	0.010	0.013	0.016	0.020	0.022	0.024	0.025
12"	0.003	0.004	0.007	0.011	0.014	0.018	0.023	0.028	0.031	0.034	0.036
16"	0.005	0.006	0.011	0.018	0.023	0.028	0.035	0.044	0.050	0.054	0.58
20"	0.007	0.010	0.017	0.029	0.036	0.045	0.056	0.070	0.079	0.085	0.090
24"	0.011	0.014	0.024	0.042	0.052	0.066	0.082	0.102	0.115	0.124	0.131
30"	0.017	0.022	0.038	0.065	0.082	0.103	0.129	0.159	0.179	0.194	0.206
36"	0.025	0.032	0.056	0.094	0.119	0.149	0.186	0.231	0.261	0.282	0.299

Blowdown Time in Minutes per 100 Linear Feet with a Ten Inch Valve
Pressure (psig)

Line Pipe Diameter	0.43 (12" W.C.)	1	5	25	50	100	200	400	600	800	1000
10"	0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.012	0.014	0.015	0.016
12"	0.002	0.003	0.005	0.008	0.010	0.013	0.016	0.020	0.022	0.024	0.025
16"	0.003	0.004	0.007	0.011	0.014	0.018	0.023	0.028	0.031	0.034	0.036
20"	0.005	0.006	0.011	0.018	0.023	0.028	0.035	0.044	0.050	0.054	0.058
24"	0.007	0.009	0.015	0.026	0.033	0.041	0.052	0.064	0.072	0.078	0.083
30"	0.011	0.014	0.024	0.041	0.051	0.065	0.081	0.100	0.113	0.122	0.129
36"	0.015	0.020	0.035	0.060	0.075	0.093	0.117	0.145	0.164	0.178	0.187

Blowdown Time in Minutes per 100 Linear Feet with a Twelve Inch Valve
Pressure (psig)

Line Pipe Diameter	0.43 (12" W.C.)	1	5	25	50	100	200	400	600	800	1000
12"	0.001	0.002	0.003	0.005	0.006	0.008	0.010	0.012	0.014	0.015	0.016
16"	0.002	0.003	0.005	0.008	0.010	0.012	0.016	0.019	0.022	0.024	0.025
20"	0.003	0.004	0.007	0.013	0.016	0.020	0.029	0.031	0.035	0.038	0.040
24"	0.005	0.006	0.011	0.018	0.023	0.029	0.036	0.045	0.050	0.055	0.058
30"	0.007	0.010	0.017	0.029	0.036	0.045	0.057	0.070	0.079	0.085	0.091
36"	0.011	0.014	0.025	0.041	0.052	0.066	0.082	0.102	0.114	0.124	0.132

Inlet Control Purge:

1. Install vent stack(s), vent valve(s) and pressure gauge(s), if applicable.

2. Install bonding and / or grounding devices on pipeline to be purged.

3. Ensure a calibrated CGI is located at the purge site / discharge riser.

4. Establish communication between the operating personnel involved in the purge.

5. Open and secure the blow-off valve in the wide-open position.

6. Open the main line valve and quickly establish the required purge pressure indicated in the Table 5. Maintain the pressure for the time established in Table 5.

7. Continue the purge until the end point conditions are confirmed with the use of a CGI at the blow-off stack.

   Note: Purge time determined from Table 5 is approximate and is to be used only as a guideline.

8. End point for pipelines being purged into service:
   - Minimum 96% Natural Gas and Maximum 4% Inerts or Air

9. Once the end points have been confirmed, continue to purge a minimum additional time as shown in the table below, not to exceed 30 minutes:

Length of Line	Additional Purge Time
0 to 1000’	2 minutes
1000’ to 2000’	4 minutes
2000’ to 3000’	6 minutes
3000’ to 4000’	8 minutes
4000’ to 5000’	10 minutes
> 1 mile	10 minutes/ per mile up to 30 minutes

10. Place the line into service.

    Steel pipelines:
    a. Close the blow-off valve on the vent stack, and
    b. Open the downstream valve.

Plastic pipelines:

a. Close the blow-off valve on the vent stack.
b. Close the punch tee.
c. Open the blow-off valve on the vent stack to ensure the punch tee is not leaking through.
d. Open the downstream valve.

TABLE 5- Inlet Control Purge

Minimum Inlet PSIG – Note: for lines less than 1 mile establish inlet pressure shown for 1 mile

Length of Pipeline (miles)	2 or 3-inch Blowoff Valve Inlet Pressure PSIG Main Line Size (in)		4-inch Blowoff Valve Inlet Pressure PSIG Main Line Size (in)				6-inch Blowoff Valve Inlet Pressure PSIG Main Line Size (in)				
	4”	6”	6”	8”	10”	12”	12”	16”	18”	20”	24”
≤1	14 psig	22 psig	8 psig	8 psig	11 psig	18 psig	6 psig	11 psig	14 psig	21 psig	36 psig
2	20 psig	25 psig	12 psig	11 psig	13 psig	20 psig	8 psig	12 psig	15 psig	22 psig	36 psig
3	25 psig	28 psig	16 psig	13 psig	15 psig	21 psig	10 psig	13 psig	16 psig	23 psig	36 psig
4	29 psig	30 psig	19 psig	16 psig	17 psig	22 psig	11 psig	14 psig	17 psig	23 psig	37 psig
5	33 psig	32 psig	22 psig	18 psig	18 psig	23 psig	13 psig	15 psig	18 psig	24 psig	37 psig
6	37 psig	35 psig	24 psig	20 psig	20 psig	24 psig	14 psig	16 psig	19 psig	25 psig	37 psig
7	40 psig	37 psig	27 psig	22 psig	21 psig	25 psig	16 psig	17 psig	20 psig	25 psig	38 psig
8	43 psig	39 psig	29 psig	24 psig	23 psig	26 psig	17 psig	18 psig	20 psig	26 psig	38 psig
9	46 psig	41 psig	32 psig	26 psig	24 psig	27 psig	18 psig	19 psig	21 psig	26 psig	39 psig
10	49 psig	43 psig	34 psig	28 psig	25 psig	28 psig	20 psig	20 psig	22 psig	27 psig	39 psig
11	52 psig	44 psig	36 psig	29 psig	26 psig	29 psig	21 psig	21 psig	23 psig	28 psig	39 psig
12	55 psig	46 psig	38 psig	31 psig	28 psig	30 psig	22 psig	22 psig	23 psig	28 psig	40 psig
13	57 psig	48 psig	40 psig	32 psig	29 psig	31 psig	23 psig	23 psig	24 psig	29 psig	40 psig
14	60 psig	50 psig	41 psig	34 psig	30 psig	32 psig	24 psig	24 psig	25 psig	29 psig	40 psig
15	62 psig	51 psig	43 psig	35 psig	31 psig	33 psig	25 psig	24 psig	25 psig	30 psig	41 psig

Length of Pipeline(Miles)	8-Inch Blowoff Valve Inlet Pressure PSIG Line Main Line Size (in)		10-Inch Blowoff Valve Inlet Pressure PSIG Line Main Line Size (in)		12-Inch Blowoff Valve Inlet Pressure PSIG Line Main Line Size (in)
	20”	24”	24”	30”	36”
≤1	9 psig	16 psig	8 psig	15 psig	13 psig
2	10 psig	17 psig	9 psig	15 psig	13 psig
3	11 psig	18 psig	10 psig	16 psig	14 psig
4	12 psig	18 psig	11 psig	16 psig	14 psig
5	13 psig	19 psig	12 psig	17 psig	15 psig
6	13 psig	19 psig	12 psig	17 psig	15 psig
7	14 psig	20 psig	13 psig	18 psig	15 psig
8	15 psig	21 psig	14 psig	18 psig	16 psig
9	16 psig	21 psig	15 psig	19 psig	16 psig
10	17 psig	22 psig	15 psig	19 psig	17 psig
11	17 psig	22 psig	16 psig	20 psig	17 psig
12	18 psig	23 psig	17 psig	20 psig	18 psig
13	19 psig	23 psig	17 psig	20 psig	18 psig
14	20 psig	24 psig	18 psig	21 psig	18 psig
15	20 psig	24 psig	19 psig	21 psig	19 psig

TABLE 5- Inlet Control Purge (Continued)

Approximate Purge Time – Based on purge time of 2 min/mile after establishing pressure in table above

Length (ft)	Time	Length (mile)	Time	Length (mile)	Time
500’	0 min 12 sec	1 mile	2 min	11 mile	22 min
1000’	0 min 23 sec	2 mile	4 min	12 mile	24 min
1500’	0 min 35 sec	3 mile	6 min	13 mile	26 min
2000’	0 min 46 sec	4 mile	8 min	14 mile	28 min
2500’	0 min 58 sec	5 mile	10 min	15 mile	30 min
3000’	1 min 9 sec	6 mile	12 min		
3500’	1 min 21sec	7 mile	14 min		
4000’	1 min 32 sec	8 mile	16 min		
4500’	1 min 44 sec	9 mile	18 min		
5000’	1 min 55 sec	10 mile	20 min		

TABLE 6-Pipe Displacement at Atmospheric Conditions

O.D.	Pipe Size – Inches		Displacement	
	Wall Thickness	I.D.	Cu. Ft./Lin. Ft.	MCF/Mile
4.500”	0.188 0.237	4.125 4.026	0.0928 0.0884	0.490 0.467
6.625”	0.219 0.280	6.1875 6.065	0.2088 0.2006	1.102 1.059
8.625”	0.250 0.322	8.125 7.981	0.3601 0.3474	1.901 1.834
10.750”	0.250 0.365	10.250 10.020	0.5730 0.5473	3.025 2.891
12.750”	0.312 0.375 0.500	12.250 12.000 11.750	0.8185 0.7854 0.7530	4.322 4.147 3.976
16”	0.312 0.375 0.500	15.375 15.250 15.000	1.2893 1.2688 1.2272	6.808 6.699 6.480
20”	0.312 0.375 0.500	19.375 19.250 19.000	2.0474 2.0211 1.9690	10.820 10.671 10.396
24”	0.312 0.375 0.500	23.375 23.250 23.000	2.9801 2.483 2.8853	15.735 15.567 15.234
30”	0.344 0.375 0.500	29.312 29.250 29.000	4.6863 4.6663 4.5869	24.744 24.638 24.219
36”	0.375 0.500 0.625	35.250 35.000 34.750	6.7771 6.6813 6.5862	35.780 35.280 34.780

Blow-off Control Purge:

1. Install vent stack(s), vent valve(s) and pressure gauge(s), if applicable.
2. Install bonding and / or grounding devices on the pipeline to be purged.
3. Ensure a calibrated CGI is located at the purge site / discharge riser.
4. Establish communication between the operating personnel involved in the purge.
5. Open and secure the blow-off valve in the wide-open position.
6. Maintain the valve in the full open position while controlling the pressure through communications with the personnel at the main line inlet valve. Maintain the pressure at less than 20 psig at the blow-off.
7. Open the main line inlet valve to start the flow of gas into the segment. Open the valve in a controlled manner. Control the valve as necessary to establish and maintain a blow-off control pressure between 5 and 15 psig.
8. Read the pressure at the gauge on the inlet to the blow-off valve. The pressure should never exceed 20 psig or the MAOP of the system being purged.
9. Continue the purge until the end point conditions are confirmed with the use of a CGI at the blow-off stack.

   Note: Purge time determined from Table 7 is approximate and is to be used only as a guideline.

10. End point conditions for Pipelines being purged into service:
    - Minimum 96% Natural Gas and Maximum 4% Inerts or Air
11. Once the end points have been confirmed, continue to purge a minimum additional time as shown in the table below, not to exceed 30 minutes:

Length of Line	Additional Purge Time
0 to 1000’	2 minutes
1000’ to 2000’	4 minutes
2000’ to 3000’	6 minutes
3000’ to 4000’	8 minutes
4000’ to 5000’	10 minutes
> 1 mile	10 minutes/ per mile up to 30 minutes

12. Place the line into service.
    Steel pipelines
    a. Close the blow-off valve on the vent stack.
    b. Open the downstream valve.

Plastic pipelines:

a. Close the blow-off valve on the vent stack.
b. Close the punch tee.
c. Open the blow-off valve on the vent stack to ensure punch tee is not leaking through.
d. Open the downstream valve.

TABLE 7 – Blow-off Control Method

Time (Minutes) for Pressure at Two Inch Blow-off[(1,2)] – Blow-off Control Method

Pipe Volume	Pressure (PSIG)						
(MCF)	0.5	1	3	5	10	15	20
0.250	0.50	0.50	0.50	0.50	0.50	0.25	0.25
0.500	1.0	1.0	1.0	0.75	0.75	0.50	0.50
1.0	2	2	2	2	2	1	1
2.0	4	4	4	3	3	2	2
4.0	8	7	7	6	5	4	3
5.0	10	9	8	7	6	5	4
10.0	20	18	16	14	11	9	8
15.0	32	28	25	22	18	15	13
20.0	40	35	31	28	23	19	16
25.0	50	44	39	35	28	23	20
50.0	100	88	78	70	56	46	40
75.0	150	132	117	105	83	69	59
100	200	176	156	140	111	92	79
150	300	264	233	209	166	138	118
200	400	351	312	279	222	184	157

TABLE 7 – Blow-off Control Method (Continued)

Time (Minutes) for Pressure at Three Inch Blow-off[(1,2)] – Blow-off Control Method

Pipe Volume	Pressure (PSIG)						
(MCF)	0.5	1	3	5	10	15	20
0.250	0.25	0.25	0.25	0.25	0.25	0.25	0.25
0.500	0.50	0.50	0.50	0.50	0.25	0.25	0.25
1.0	1.0	1.0	0.75	0.75	0.50	0.50	0.50
2.0	2.0	2.0	2.0	2.0	1.0	1.0	0.75
4.0	4	4	3	3	2	2	2
5.0	5	4	4	4	3	2	2
10.0	9	8	7	7	5	5	4
15.0	14	13	11	10	8	7	6
20.0	18	16	15	13	11	9	8
25.0	22	20	18	16	13	11	9

50.0	43	40	36	32	26	21	19
75.0	65	60	54	48	39	32	28
100	86	81	71	64	51	42	37
150	130	120	107	96	77	63	55
200	173	160	142	128	102	84	73

Time (Minutes) for Pressure at Four Inch Blow-off[(1,2)] – Blow-off Control Method

Pipe Volume	**Pressure (PSIG)**						
(MCF)	**0.5**	**1**	**3**	**5**	**10**	**15**	**20**
0.250	0.25	0.25	0.25	0.25	0.25	0.25	0.25
0.500	0.50	0.25	0.25	0.25	0.25	0.25	0.25
1.0	0.75	0.50	0.50	0.50	0.50	0.25	0.25
2.0	2.0	1.0	1.0	0.75	0.75	0.50	0.50
4.0	3	2	2	2	2	1	1
5.0	4	3	3	2	2	2	1
10.0	7	5	5	4	3	3	3
15.0	11	8	7	6	5	4	4
20.0	14	10	9	8	6	5	5
25.0	18	12	11	10	8	7	6
50.0	35	24	21	19	16	13	11
75.0	52	36	32	29	23	19	17
100	70	48	43	38	31	25	22
150	104	72	64	57	46	38	33
200	139	96	85	76	61	50	44

TABLE 7 – Blow-off Control Method (Continued)

Time (Minutes) for Pressure at Six Inch Blow-off[(1,2)] – Blow-off Control Method

Pipe Volume	**Pressure (PSIG)**						
(MCF)	**0.5**	**1**	**3**	**5**	**10**	**15**	**20**
0.250	0.25	0.25	0.25	0.25	0.25	0.25	0.25
0.500	0.25	0.25	0.25	0.25	0.25	0.25	0.25
1.0	0.50	0.25	0.25	0.25	0.25	0.25	0.25
2.0	0.75	0.50	0.50	0.50	0.50	0.25	0.25
4.0	2.0	1.0	1.0	1.0	0.75	0.50	0.50
5.0	2.0	2.0	2.0	1.0	1.0	0.75	0.75
10.0	4	3	3	2	2	2	2
15.0	5	4	4	4	3	3	2
20.0	7	6	5	5	4	3	3
25.0	8	7	6	6	5	4	3
50.0	16	13	12	11	9	7	6
75.0	24	20	18	16	13	11	9

100	32	27	23	21	17	14	12
150	47	40	35	31	25	21	18
200	63	53	47	42	34	28	24

Note: (1)Times represented are for plug valves and are to be used for approximation only. Full port style valves will result in slightly less purge duration.

(2)The success of the purge is determined upon obtaining and attaining the end point values as determined in Blow-off Control Purge Procedure.

TABLE 8-Recommended Blow-off Sizes for Various Pipe Sizes

Pipe Size (Nominal)	Distribution Riser/Blow-off Pipe Size	Transmission Riser/Blow-off Pipe Size	Recommended Reduced Pipe Riser/Blow-off Size (Nominal)(Liquids Present)
2”	1”	1”	1/4”
3”	1”	1”	1/2”
4”	1”	1-1/2”	3/4”
6”	1-1/2”	2”	1”
8”	2”	3”	1-1/2”
10”	3”	3”	1-1/2”
12”	3”	4”	2”
16”	4”	6”	2”
20	6”	8”	3”
24”	6”	8”	4”
30”	8”	10”	4”
36”	10”	12”	6”

Purging Inside Buildings and Other Confined Spaces Procedure:

This procedure outlines the general guidelines for purging inside of buildings and other confined spaces. This procedure should be considered when traditional purging methods cannot be achieved. When it is necessary to disconnect a meter from the piping system, the house line, meter, and meter set assembly must be purged. When the air and gas mixture cannot be safely purged into the atmosphere, the flame purge torch will be used (see Figure 3).

Using the flame purge method will reduce the chances of personal injury and discharging of gas odor throughout the building. It will prevent air pockets in the piping system that can cause improper operation of gas-burning equipment.

CAUTION: Do not release products of combustion into a confined, unventilated part of the building.

Note: Verify house line pressure. If it is greater than 1 psig, then a service regulator must be installed at the point of the flame purger connection.

Safety Precaution:

- Never leave flame-purging equipment unattended during purging operation.
- Keep the flame away from flammable and combustible sources.
- Use the flame purge method in a ventilated area only.
- Check the purging equipment for leakage prior to use.
- Have a fire extinguisher available at the job site.
- Check the atmosphere for Carbon Monoxide (CO) and combustible gas prior to, during, and after purging operations to ensure a safe atmosphere.

Note: Incomplete combustion leads to the production of carbon monoxide (CO). If purging is done in a confined location, the use of calibrated CO test equipment is essential during the flame purge.

Flame Purge Torch Assembly Method:
Purging House Lines, Meter, and Meter Set Piping:

1. Check the open atmosphere with a CGI prior to, during and after purging.
2. Check the atmosphere with CO testing equipment to obtain background CO prior to, during and after purging.
3. Test the house line in accordance with appropriate Company procedure.
4. Close the meter stop.
5. Attach the flame purge torch to the end of the main house line run, downstream of a valve.
6. The branch house lines may require purging in the same manner.
7. Open the propane cylinder and check for leakage on pilot line and connections.
8. Open meter stop and check purge hose and connections for leakage.
9. Open pilot valve and light pilot.
10. Open purge hose valve and continue to purge.

11. When purging is completed, shut off fuel supplies, disconnect flame purge torch, and secure the house line.

12. Check all applicable pipe and fittings for leakage.

Purging Meter and Meter Set Piping Only:

1. Check the open atmosphere with a CGI prior to, during and after purging.

2. Check the atmosphere with CO test equipment to obtain background CO, prior to, during and after purging.

3. When the meter set is operating on a bypass (inlet and outlet valves on meter closed), close the control valve and remove the necessary fittings to attach flame purge torch.

4. Attach the flame purge torch.

5. Open propane cylinder and check for leakage on the pilot line and connections.

6. Open the control valve that is attached to the purge hose and check connections for leakage.

7. Open the pilot valve and light the pilot.

8. Open the purge hose valve and continue to purge until all air has been exhausted.

9. When purging has been completed, close the meter inlet and outlet valves (to trap gas in meter set assembly).
10. Disconnect the flame purge torch, close control valve and cap.

11. Return meter set to normal operation.

12. Check meter set piping and all fittings for leakage.

Purge to Outside Atmosphere Method:

1. Perform the necessary testing of the house line, service line, or main line using the applicable Company work procedure.

2. Prior to setting up the purging equipment, ensure the curb valve is closed.

3. Attach the hose to the terminal valve, connect sufficient lengths to deliver the gas to outdoor air and attach a control valve at the end of the hose. The natural gas must be discharged to an area free of ignition sources and outside the building.

4. Ensure the area of discharge is free of any ignition sources.

5. Once the discharge hose is assembled and the discharge end is outside the building, slowly open the terminal valve, then slowly open the control valve to discharge the natural gas.

6. Have a fire extinguisher available at the purge point.

7. Monitor the gas concentrations at the outlet of the hose utilizing a CGI and continue purging until 100 % gas concentration is achieved.

8. Shut off the terminal valve, disconnect the hose, and secure the piping.

9. Check for leakage.

Reporting / Notification:
Document the details of purging and blow-down as required by Company practice. Use the attached Vented Gas to Atmosphere Data Sheet as applicable. See the Operation and Maintenance Manual for more information.

Potential Hazards:
- Potential ignition hazard. No open flames other than those described in this procedure. No smoking. Remove potential ignition sources, including liquid combustibles.
- Presence of an oxygen deficient atmosphere.
- Static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Pipeline system damage
- Abnormal facility conditions
- Component Failure

Personal Protective Equipment:
- Gloves
- Safety Glasses/Safety Goggles
- Steel-toed boots
- Company Approved Fire Retardant Clothing

Figure 1: Purging with Inert Gas

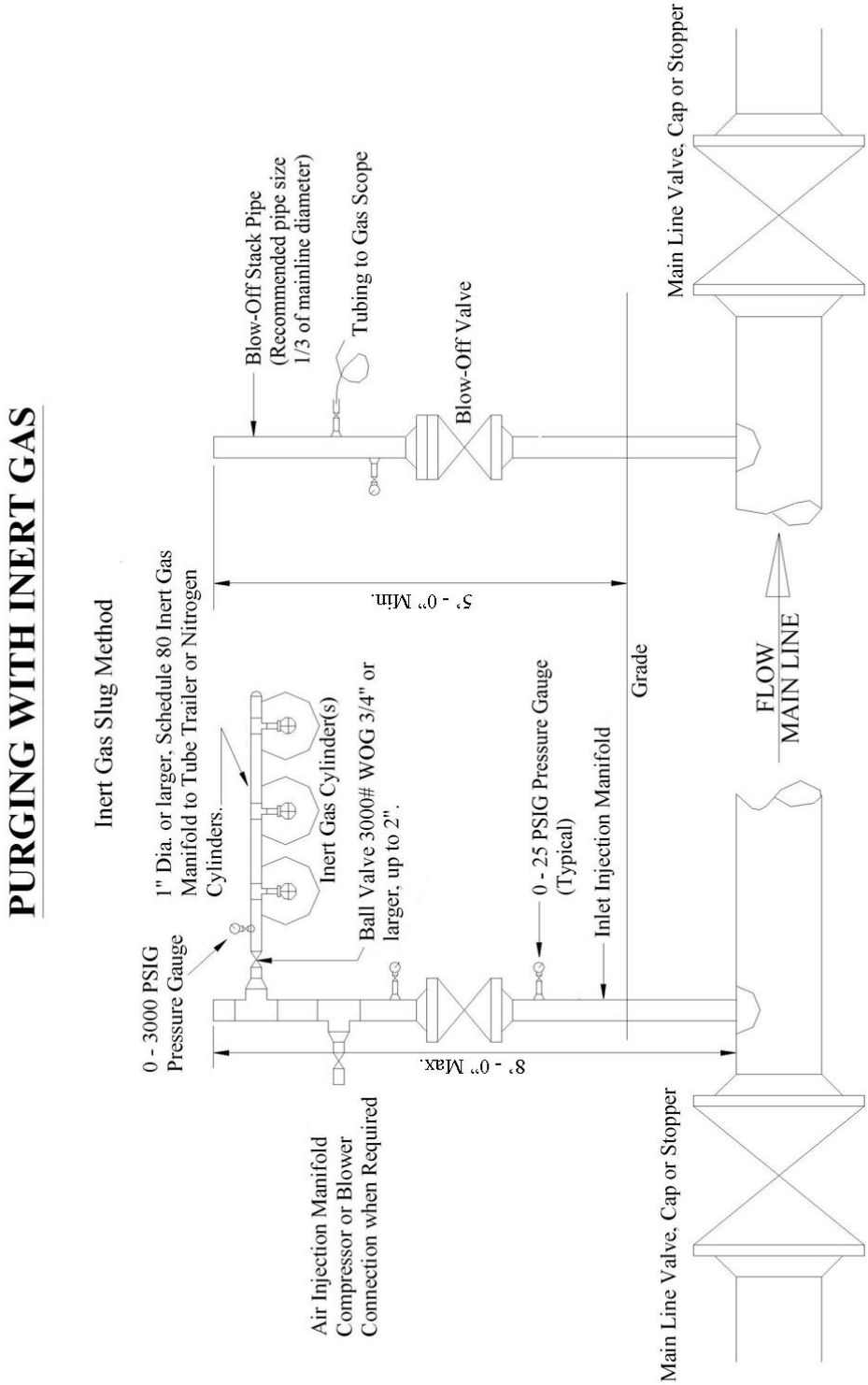


Figure 2: Purging W/O Inert Gas

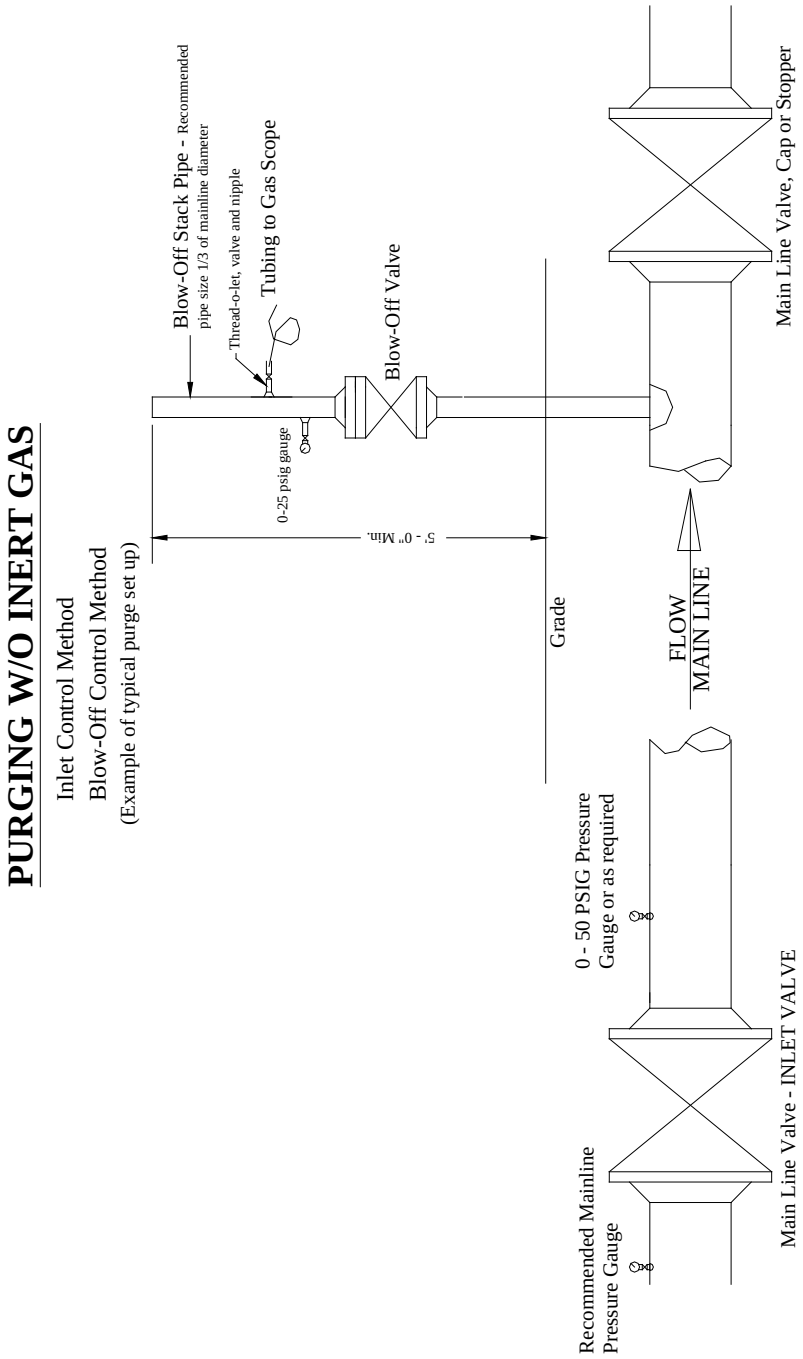
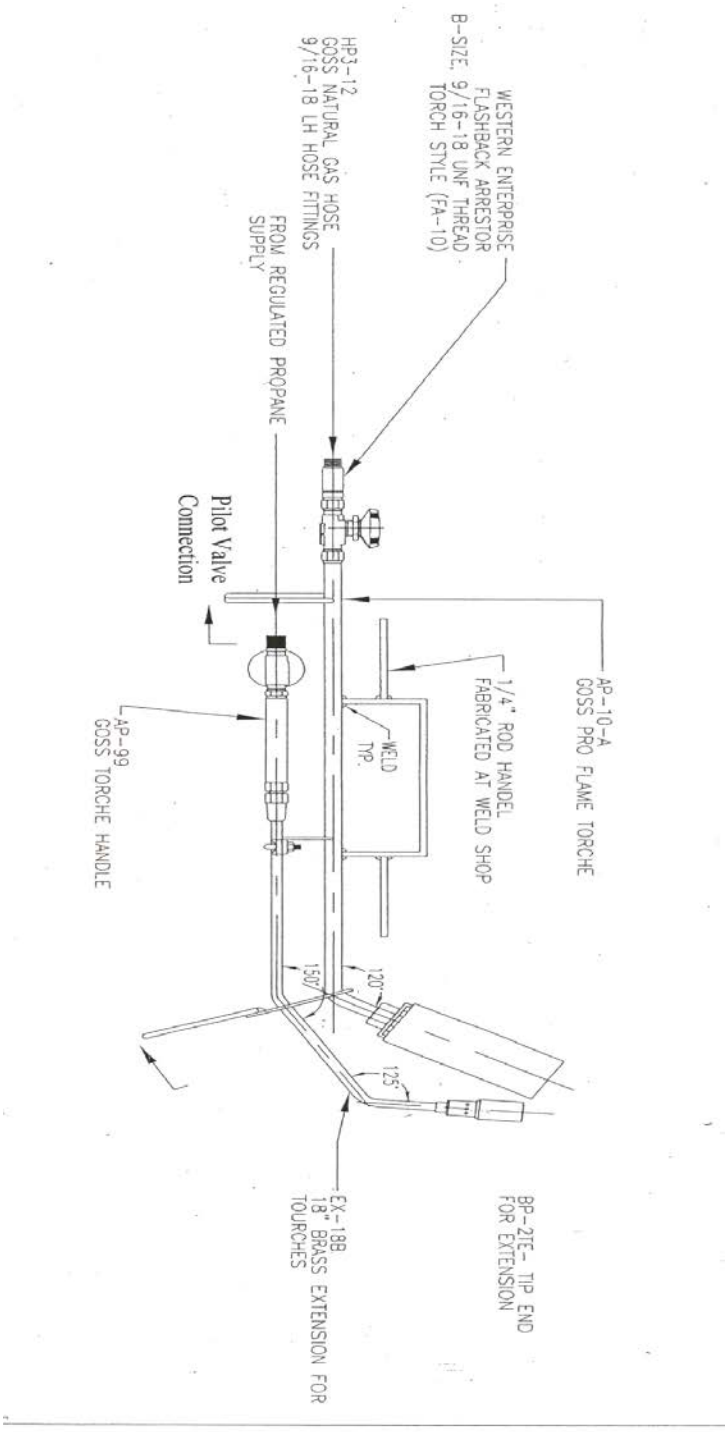


Figure 3: Flame Purge Torch Assembly



Vented Gas to Atmosphere Data Sheet

Section 1:

General Information:_____ Line No._____
Date_____ Blowdown/Purge Location_____
Company_____
Division_____ City, Township, Borough_____
Prepared by_____ County_____ State_____

Section 2:

Method Used:

_____ Complete Fill _____ Blow-off Control
_____ Inert Gas Slug _____ Double Pressure
_____ Inlet Control _____ Other*

If method used differed from *"Pipeline Blowdown and Purging,"*
provide details on reverse. Vented gas other than listed, describe on reverse.

Section 3:

To be completed when blowing down/purging pipelines.

Line Number (if applicable)_____
Size(s)_____
Length(s)_____
Sta_____ to Sta_____ or From_____ to_____
Line operating pressure prior to blowdown/purge_____

1. What is the calculated time for the blowdown/purge?_____
2. What size blow off was used?_____
3. What kind of blow off valve (manufacturer and type) was used?_____
4. Time Start Blowdown _____
5. Time End Blowdown _____
6. Was the blow off valve:_____ 25% open _____ 50% open
   _____ 75 % open _____ 100% open

7. Time Start Purge _____
8. Time Acquired Suitable End Purge Conditions_____
9. Percent gas at the end of purge _____ %
10. Was a CGI used to verify end purge conditions Yes No (circle answer)
11. Time End Purge _____
12. Was the blow off valve:_____ 25% open_____ 50% open
    _____ 75% open_____ 100% open

13. What was the pressure at the blow off? _____
    When the blow off valve was closed?_____
    Fifteen minutes after the blow off valve was closed? _____
    When the line was ready to be placed back in service?_____

Vented Gas to Atmosphere Data Sheet (Continued)

Section 4:

To be completed when blowing down/purging compressor stations, regulator stations, etc.
Type (compressor, regulator station, etc.)_____
Volume (if known)_____
Equipment operating pressure prior to Blowdown/Purge_____

1. What kind of valve (manufacturer and type) and size was used to blowdown/purge?_____

2. Was the valve:_____25% open _____75 % open
_____50% open _____100% open

3. How much time elapsed from the beginning of the blowdown/purge until the valve was closed?
_____

4. What was the pressure at the valve:
   When the valve was closed?_____
   Fifteen minutes after the valve was closed?_____
   When the equipment was ready to be placed back in service?_____

Comments:_____

REVISION NO.		PROCEDURE NO.
		MP 085
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		1701
Pipeline O&M Procedure	**Pipeline Abandonment**	PAGE NO. 1 of 5

SCOPE

The purpose of this procedure is to document the process of abandoning or deactivating a pipeline or pipeline section.

OBJECTIVES

To safely abandon pipeline with minimal down time and impact to the environment. 49 CFR 192.727

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- MSDS Sheet(s) if applicable
- *Purge a Pipeline* Procedure

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Tools for removing and attaching fittings
- Combustible Gas Indicator (CGI)
- O_2 meter
- Fire fighting equipment

SAFETY, HEALTH AND ENVIRONMENTAL

See the procedure for potential hazards and Personal Protective Equipment (PPE).

COMMENTS

This procedure may be used for the abandonment or deactivation of mains or service lines.

Approval:_____ Approval Date: _____ Next Review Date: _____

Pipeline Abandonment

This is the procedure for the abandonment or deactivation of a pipeline section.

Personnel Safety

- Personnel shall ensure that safety conditions exist. Anytime components are disconnected from the gas distribution system, there is a chance that gas will escape and cause a hazard.
- Ignition and potential ignition sources should be eliminated.
- A fire extinguisher must be present at the site placed at a suitable location.
- Establish a safety perimeter to prevent bystanders and unauthorized personnel from entering the area of activity.
- Welding activities may not be performed on piping containing a natural gas and air mixture.
- Personnel shall consult the manufacturer's installation and operating instructions for complete information on the uses of different types and styles of isolation and stoppering devices, equipment and tools.

Disconnection Procedure:

1. Review the pipeline abandonment plan. The plan should include a description of the section to be abandoned, the disconnection method to be used, the clean out methods to be employed, and the closure methods to be used.

2. Complete the lockout / tagout procedure.

3. Isolate the pipeline in which the section to be disconnected is located; by closing the appropriate valves, utilize stopper fittings, end caps, blind flanges, or other appropriate devices to isolate the pipeline or facility.

4. If active service lines are connected to the pipeline section being shut down, the following steps should be taken:

    a. All service valves should be secured by locking the valve in the closed position until service is reestablished to the customer's premises.
    b. Customers should be contacted and advised of the service interruption.
    c. Bypass the section to be abandoned.
    d. Re-establish service to affected customers as per company policy and procedure.

5. If a service line is to be abandoned, the following steps should be taken:

   a. Remove and reclaim the Company meter(s), as appropriate.
   b. Shutoff inactive service lines from the main line by a curb cock, ball valve, or other reliable means outside of the building.
   c. Install a lock in the lock on the meter stop or install another locking device as appropriate to prevent the opening of the valves by persons other than those authorized by the operator.

6. Purge the isolated pipeline segment following the procedure *Purge a Pipeline*.

7. If the line is to be disconnected from other active pipelines (abandoned in place), the piping being shut down must be thoroughly purged. However, the pipeline need not be purged when the volume of gas is so small that there is no potential hazard.

8. Use a combustible gas indicator to verify that the piping does not contain natural gas.

9. Vent the gas being expelled into the atmosphere only at a place or area where it will be discharged safely, as per the procedure *Purge a Pipeline*.

10. Verify that all pressure has been relieved.

11. Shut down the cathodic protection rectifier (if applicable).

12. Bond the section to be disconnected.

13. Support the pipe using a method that will not damage the pipe coating. Cables and clamps may be used as necessary.

14. Cut or disconnect the pipe using the appropriate method:
    - Cold cut,
    - Torch cut, or
    - Unbolt

15. Remove the section of pipe to a safe area.

16. Disconnect the cables and remove the clamps, as necessary.

17. Ensure that the section(s) of the pipe that will remain in service are cathodically protected.

18. Cap the ends of pipe sections with proper caps (threaded, flanged, welded or fused). See the Sealing Procedure below.

19. For a service line, one of the following must be done to prevent the flow of gas to the customer:
    - Lock or otherwise secure the valve controlling gas to the service;
    - Install a mechanical device or fitting in the service line or meter set; or
    - Disconnect the customer's piping from the gas supply.

20. Coat all pipe ends left in service.

21. Remove any above ground facilities.

22. Complete the required documentation.

23. Report any Abnormal Condition to Operations immediately.

Sealing Procedure:

To keep the pipe from becoming a conduit for water, which could cause erosion, or from leaking any residual product into the nearby soil and groundwater, abandoned pipeline segments must be sealed.

1. Measure the atmosphere within the pipe for explosive vapors.

2. If there is a flange on the ends, install a blind flange on each end of the pipe.

3. If there is no flange, weld a cap or plate on the ends of the pipe.

4. Pressurize the sealed pipeline with nitrogen.

5. Leave a small amount of pressure on the nitrogen remaining in the line being disconnected and sealed to help preserve the interior surface of the pipe and to remove any residual vapors.

6. Complete the appropriate documentation.

Reporting / Notification:
Document the results as required by DOT regulation and company practice. DOT regulations require that documentation for permanently abandoned transmission pipelines should be provided to the NPMS. See the Operations and Maintenance Manual for more information.

Potential Hazards:
- Do not stand near pipe being cut. This prevents being struck by pre-sprung pipe when the cut is completed.
- Presence of poisonous, flammable or explosive gases in the bottom of excavated area.
- Presence of oxygen deficient atmosphere in the bottom of excavated area.
- Drop / fall hazards.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Damage to Facilities
- Component Failure
- Improper Purging

Personal Protective Equipment:
- Gloves
- Steel-toed boots
- Company Approved Fire Retardant Clothing

REVISION NO.		PROCEDURE NO.
		MP 086
REVISION DATE		B31Q COVERED TASK NO.
7/21/2021		
Pipeline O&M Procedure	**Uprate Pipeline to Higher MAOP**	PAGE NO. 1 of 5

SCOPE

This procedure outlines the general guidelines for uprating the MAOP of a pipeline, following the regulations at 192 Subpart K.

OBJECTIVES

To make necessary modifications to a pipeline in order to increase the Maximum Allowable Operating Pressure (MAOP).

RELEVANT DOCUMENTS

Documents related to the use of this procedure:

- Title 49 Code of Federal Regulations, Part 192, Subpart K
- Relevant pipeline historical information
- Written plan detailing pipeline segment uprating

MATERIALS AND EQUIPMENT

Material / Equipment typically needed to perform this procedure:

- Replacement materials
- Pipeline repair equipment
- Pressure measurement equipment

SAFETY, HEALTH AND ENVIRONMENTAL

CAUTION: Static electricity discharge can ignite a flammable gas or combustible dust atmosphere.

See the procedure for potential hazards and Personal Protective Equipment (PPE). Ensure that the work area is setup to protect the public from danger following applicable company practice.

COMMENTS

This procedure may be used for the modification and inspection of a pipeline for the uprating of its MAOP.

Approval:_____ Approval Date: _____ Next Review Date: _____

Uprate Pipeline to Higher MAOP

This purpose of this procedure is to describe the general steps required to uprate pipelines to operate at higher MAOP following the regulations in 49 CFR Part 192, Subpart K. Personnel modifying and inspecting the pipeline must be properly qualified.

General Requirements:

1. Inspect the sections of the pipeline to decide which segment should be upgraded. Review the design, operating and maintenance history, and previous testing of the segment to determine whether the proposed increase is safe. Perform a leakage survey and make any repairs, replacements and alterations necessary for safe operation at the increased pressure.

2. Pressure is to be increased in increments, and increased gradually at a controllable rate. After each incremental increase, the pressure must be held constant while the affected segment of pipeline is inspected for leaks. Each discovered leak must be repaired before continuing.

3. All records associated with the uprating of a segment of pipe (each investigation required, all work performed, all pressure tests conducted and the repairs made) must be kept for the life of the segment.

4. Except for steel pipelines constructed prior to September 12, 1970, the new MAOP should not exceed the maximum that would be allowed for a new segment of pipeline constructed in the same are with the same materials, according to Title 49 §192.619 or §192.621.

Uprating Steel Pipe to a Pressure Greater Than 30% or More of SMYS:

1. For pipelines constructed before September 12, 1970, the pressure can be increased to the highest pressure allowed by §192.619, with the highest pressure the segment was previously subjected to as the test pressure.

2. For pipelines constructed after September 12, 1970, the previously established MAOP can be increased if either of the following requirements is met:

    a. The segment of pipeline is tested in accordance with the previous requirements for a new line of the same material in the same location.

    b. If the segment of pipeline is in a class 1 location and it has not been previously pressure tested the established MAOP may be increased if:

i. It is impractical to test in accordance with the previous requirements;
ii. The new MAOP is less than 80% of that allowed for a new line of the same design at the same location;
iii. The operator determines that the new MAOP is consistent with the condition of the segment of pipeline and the design requirements.

3. Increments of increasing pressure must be either 10% of the pressure prior to uprating or 25% of the total pressure increase, whichever produces fewer increments.

Uprating Steel Pipe to a Pressure Less Than 30% of SMYS and Uprating Plastic, Cast Iron, or Ductile Iron Pipelines:

1. Perform a leak survey (if it has been more than 1 year since the last survey) and repair any leaks that are found, except that a leak determined not to be potentially hazardous need not be repaired if it is monitored during the pressure increase and it does not become potentially hazardous.

2. Make any repairs, replacements, or alterations in the segment of pipeline that are necessary for safe operation at the increased pressure.

3. Reinforce or anchor offsets, bends and dead ends in pipe joined by compression couplings or bell and spigot joints to prevent failure of the pipe joint, if the offset, bend, or dead end is exposed in an excavation.

4. Isolate the segment to have increased pressure from lower pressure segments.

5. If the pressure in mains or service lines is higher than the pressure being delivered to the customer, the installation of a regulator for each service line is necessary. Test each regulator to determine functionality. Pressure may be increased as necessary to test each regulator, after a regulator has been installed on each pipeline subject to the increased pressure.

6. Increments of increasing pressure should be either equal to 10 p.s.i. or 25% of the total pressure increase, whichever produce fewer increments. Whenever a pressure regulator must be installed due to MAOP uprating, there must be at least two approximately equal incremental increases.

7. For cast iron / ductile iron facilities, if the records are not enough to determine the stresses applied to the segment, the following must be satisfied:

a. If original laying conditions are unknown, assume that cast iron pipe was supported on blocks with tamped backfill, and that ductile iron was laid without blocks with tamped backfill in order to estimate stress.

b. Unless the actual maximum cover depth is known, measure the actual cover in at least three places where the cover is most likely to be greatest and use the greatest cover measured.

c. Unless the actual nominal wall thickness is known, determine the wall thickness by cutting and measuring coupons from at least three separate pipe lengths. The coupons must be cut from pipe lengths in areas where the cover depth is most likely to be the greatest. The average of all measurements taken must be increased by the allowance indicated in the following table:

	Allowance Inches (Millimeters)		
	Cast Iron Pipe		
Pipe Size Inches (Millimeters)	**Pit Cast Pipe**	**Centrifugally Cast Pipe**	**Ductile Iron Pipe**
3 to 8 (76 to 203)	0.075 (1.91)	0.065 (1.65)	0.065 (1.65)
10 to 12 (254 to 305)	0.08 (2.03)	0.07 (1.78)	0.07 (1.78)
14 to 24 (356 to 610)	0.08 (2.03)	0.08 (2.03)	0.075 (1.91)
30 to 42 (762 to 1067)	0.09 (2.29)	0.09 (2.29)	0.075 (1.91)
48 (1219)	0.09 (2.29)	0.09 (2.29)	0.08 (2.03)
54 to 60 (1372 to 1524)	0.09 (2.29)		

d. For cast iron pipe, unless the pipe manufacturing process is known, assume that the pipe is pit cast pipe with a bursting tensile strength of 11,000 p.s.i. (76 MPa) gage and a modulus of rupture of 31,000 p.s.i. (214 MPa) gage.

Reporting / Notification:
Document the details of the any pipeline uprating in a written plan. The plan should include a record of each investigation required by 192 Subpart K, of all work performed, and of each pressure test conducted, in connection with the uprating. Retain the written plan for the life of the pipeline segment.

Potential Hazards:
- Potential ignition hazard. No open flames. No smoking. Remove all potential ignition sources.
- Static electricity discharge can ignite a flammable gas or combustible dust atmosphere. Observe all Company procedures for static electricity safety and control, including procedures for discharging static electricity and requirements for personal protection.

Abnormal Operating Conditions (AOCs):
- Escaping Gas: unplanned or uncontrolled
- Fire or Explosion: uncontrolled ignition
- Environmental Incident: uncontrolled spill/release of environmentally hazardous materials
- Atmospheric Changes in a Confined Space
- Damage to Facilities
- Component Failure

Personal Protective Equipment:
- Hard Hat
- Safety Goggles
- Appropriate Gloves
- Long Sleeve Shirt
- Company Approved Foot Protection