Distribution List Issued To

All Forexco personnel. For the purposes of the certificate transfer process, the following persons will have the following titles. Upon completion of the certificate transfer and the closing of the transaction, this list of personnel will be updated as Forexco hires New York personnel and/or contractors to perform specific functions.

<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Company</th>
</tr>
</thead>
<tbody>
<tr>
<td>Field Foreman</td>
<td>Tom Mehegan</td>
<td>GFS</td>
</tr>
<tr>
<td>Maintenance Foreman</td>
<td>Tom Mehegan</td>
<td>GFS</td>
</tr>
<tr>
<td>Pipeline Superintendent</td>
<td>John Hargraves</td>
<td>GFS</td>
</tr>
<tr>
<td>Facility &amp; Construction Superintendent</td>
<td>Tom Mehegan</td>
<td>GFS</td>
</tr>
<tr>
<td>Operational Engineering Team Lead</td>
<td>John Hargrove</td>
<td>GFS</td>
</tr>
<tr>
<td>Area Manager</td>
<td>Vernon Smith</td>
<td>Forexco</td>
</tr>
<tr>
<td>Pipeline Ops Engineer</td>
<td>Tom Mehegan</td>
<td>GFS</td>
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<tr>
<td>Pipeline Coordinator</td>
<td>Vernon Smith</td>
<td>Forexco</td>
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<tr>
<td>Operations Coordinator</td>
<td>Vernon Smith</td>
<td>Forexco</td>
</tr>
<tr>
<td>TBR/Commissioning Foreman</td>
<td>John Hargraves</td>
<td>GFS</td>
</tr>
<tr>
<td>Operational Integrity Engineer</td>
<td>John Hargraves</td>
<td>GFS</td>
</tr>
</tbody>
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NY Office File Room/Pipeline
Review and Revisions Index

This Operations and Maintenance Manual (O&M Manual) will be reviewed at least once each calendar year, but not exceeding 15-month intervals. Appropriate changes will be made as necessary to ensure that the O&M Manual remains compliant and effective. A log of all changes will be maintained as part of this O&M Manual.
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GENERAL

1.0 Scope (16 NYCRR 255.601)

1.1.1 This operations and maintenance manual (O&M Manual) has been prepared to address the requirements of Title 16 of the New York Codes, Rules and Regulations, Part 255 – “Transmission and Distribution of Gas” (Part 255). Part 255 prescribes minimum safety requirements for the design, fabrication, installation, inspection, testing and operation and maintenance of gas transmission and distribution systems, including gas gathering lines, gas pipelines, gas compressor stations, and gas metering stations not covered by Title 49 CFR 192 – Transportation of Natural and Other Gas by Pipeline: Minimum Federal safety standards (49 CFR 192). Part 255 is based on and includes many of the requirements set forth in 49 CFR 192. This O&M Manual also addresses applicable requirements of Title 49 CFR 191 – Transportation of Natural and Other Gas by Pipeline: Annual Reports, Incident Reports and Safety Related Reports (49 CFR 191).

1.1.2 This O&M Manual does not apply to pipeline facilities in any state other than New York, to interstate gas pipeline facilities subject to the jurisdiction of the Federal Energy Regulatory Commission, or to hazardous liquid pipeline facilities.

1.2 Purpose

1.2.1 The intent of this document is to provide detailed instructions and written procedures to be followed by operation and maintenance personnel performing operations, maintenance, and repair tasks on Forexco, Inc. (Forexco) natural gas pipeline facilities owned and operated in the state of New York.

1.2.2 This document includes procedures for welding, joining, corrosion control, operations, maintenance, and responding to accidents and leaks.

1.2.3 This document also includes a description of critical and non-critical task procedures related to processes and operations.

1.3 Implementation

1.3.1 It is the responsibility of Forexco staff or contract personnel involved in the operations and maintenance of the pipeline facilities to adhere to the following guidelines:

- Operate and maintain the pipelines in accordance with this O&M Manual;
- Provide and maintain complete records where applicable and required by this O&M Manual;
- Provide input when experience and changing technology or conditions dictate revisions of this O&M Manual to ensure continued safe and
efficient operation of Forexco's pipelines.

- Follow Forexco critical and non-critical task procedures where appropriate.

1.3.2 All personnel directly involved with operating and maintaining Forexco's systems shall become familiar with the contents of this O&M Manual. An electronic version of the latest revision of the O&M Manual shall be kept on a cloud-based drive and copies will be provided to key operations, maintenance and management personnel. The master copy of the O&M Manual shall be maintained in electronic form by the Pipeline Coordinator.

1.4 Review

1.4.1 The general operating and maintenance responsibilities outlined in this O&M Manual will be modified from time to time as experience dictates and as changes in operating conditions require.

1.4.2 The periodic review of procedures is an integral part of the review process of the complete O&M Manual conducted by Forexco at intervals not exceeding fifteen months, but at least once each calendar year. This procedure has been developed to specifically address the requirements of 16 NYCRR Part 255, Section 255.605(o).

1.4.3 Annually, or more frequently as appropriate, a review of the pipeline-related work performed by Forexco operations and maintenance personnel shall be conducted by senior field staff, coordinators and/or managers to evaluate the adequacy and effectiveness of the procedures used in normal pipeline operation and maintenance. This review shall include actual observation of the work performed in the field where applicable.

1.4.4 All observed deficiencies and recommended modifications arising from the review of procedures shall be documented using the form entitled Review of Operation and Maintenance Procedures. These recommendations shall be fully reviewed and approved or disapproved following Forexco's established management of change (MOC) procedure and forms. Disapproval of a procedure revision should only occur when a more appropriate remedy for a deficiency is identified, such as insufficient training of personnel. When approved through MOC, procedures shall be modified to address the identified deficiencies.

1.4.5 Upon approval, revised procedures shall be substituted for the deficient procedures in the O&M Manual. New procedures shall be added to the O&M Manual. The Pipeline Coordinator shall be responsible for updating the O&M Manual including the Revisions page.
1.4.6 All changes to existing procedures and new procedures shall be communicated to all affected employees prior to the effective dates of such changes. Any supplemental training shall be conducted for affected employees prior to the effective dates of such changes. Copies of all changed or new procedure documents shall be inserted into and become a part of the O&M Manual. All procedures that have been revised or added shall be made available at locations where operations and maintenance activities are performed.

1.5 Mapping

1.5.1 The New York Master Data Spreadsheet (Master Spreadsheet) lists specific attribute data for all pipelines operated by Forexco in New York as described in Section 1.5.2. The Master Spreadsheet shall be updated by the Pipeline and Facilities Engineer as required.

1.5.2 The Forexco Master Spreadsheet will contain records for the following:

- List of pipeline segments,
- Pipe attributes (material of construction, length type of pipe),
- Operating pressures,
- Maximum Allowable Operating Pressure (MAOP), and
- Class locations

1.5.3 Safe and efficient operation of the pipeline system depends upon the availability of up-to-date systems maps and drawings. All current maps and drawings shall be housed and maintained in the GIS mapping system and shall be accessible at all times in the event of an emergency. All information on pipelines or compressor station modification shall be forwarded to the GIS group as soon as possible after completion of the construction or repair, so that system maps and compressor station drawings can be updated. Paper copies of maps and drawings shall be printed from the electronic files as required. All changes to maps and drawings will be approved and communicated through the MOC procedures of Forexco.

1.6 Record keeping

1.6.1 The Pipeline Coordinator is responsible for providing guidance on pipeline system records management and documentation. Operating and maintenance records and operating history are either maintained electronically in the Forexco's Bluetick data management system or in files located at Forexco’s office in Elmira, New York, File Room (File Room) and are available to personnel as needed to ensure safe operation of the pipeline. Forexco will utilize the Bluetick Remote Monitoring and Control (Bluetick) software system to safely and efficiently monitor and operate its pipeline systems.
1.6.2 Required recordkeeping includes records of pipeline construction, corrosion control, pressure testing, operations, maintenance and operator qualification, which are discussed in the applicable sections of this O&M Manual. This information includes forms to use, retention period, required intervals for performing activities, and required data.

1.6.3 All original referenced records pertaining to the pressure testing of any pipeline designed to operate at 125 PSIG or more will be kept in files reserved for that pipeline only and retained for as long as the line remains in service.

1.6.4 All records, or copies thereof, will be retained on file in the State of New York and accessible to the staff of the New York State Department of Public Service. The minimum period of retention shall be three years.

1.7 Notifications and Reports

1.7.1 Unless otherwise indicated, submission of any notification, program, plan, letter of intent, procedure, written or telephonic report for NY operations will be made to the Albany office of the Gas and Water Division of the Department of Public Service, 3 Empire State Plaza, Albany, NY 12223-1350, 518-474-5453.

1.7.2 Contact names and phone numbers for the State of New York Public Service Commission are located in Appendix 8.2 of this O&M Manual.

1.7.3 An annual report (DOT Form RSPA 7100.2-1 will be sent to the Office of Pipeline Safety, United States Department of Transportation, no later than March 15 for the preceding calendar year. Copies of Annual Reports are available electronically.

1.8 Additional Information

Part 255
Documents incorporated by reference specified in Section 255.7 of Part 255 and listed fully title at Title 16 New York Codes, Rules and Regulations, Chapter 1, Subchapter A, part 10, Section 10.3.
2.1 Scope (16 NYCRR 255.451)

Corrosion mitigation is required for all pipelines that are subject to corrosion. This section provides an overview of the tactics used to control any corrosion activity in Forexco's systems.

2.2 General (16 NYCRR 255.453)

Corrosion assessment, monitoring and mitigation programs are developed by the Operational Integrity Engineer, with input and review by Operations, Maintenance and Engineering. The Pipeline Ops Engineer ensures these programs are implemented when any new pipeline becomes operational. The nature of the corrosion monitoring and mitigation program can be determined by numerous factors including, but not limited to the following:

- Pipeline product,
- Environmental sensitivity and population density of surrounding area,
- Pipeline operating history and age,
- Operating pressure and operating conditions, and
Pipeline specifications.

All operating pipelines must have a corrosion monitoring program in place that is appropriate for their operation. Monitoring pipelines is a combined effort as detailed below.

2.3 External Corrosion Control (16 NYCRR 255.455)

Factors that cause external corrosion include environmental conditions, flaws in a pipeline’s external coating, inadequate cathodic protection, and physical contact that alters the pipeline or pipeline surface. External corrosion mitigation includes using a suitable external coating to protect the pipe, repairing coating that’s damaged or has become disbonded, and ensuring a cathodic protection system is implemented, properly connected, and functioning for steel pipelines.

All piping both above and below grade is protected from the effects of corrosion within one year after the completion of construction. To achieve this protection a system is utilized all of the following:

- Coating all bare steel,
- Insulating buried steel electrically from other conductors,
- Cathodically protecting the buried steel,
- Providing for a means to test the performance of the system, and
- Performing periodic tests and analysis.

Installation of the coating and type shall be noted on the Pipeline Construction Handover/Commissioning Checklist form.

2.3.1 Stress Corrosion Cracking

Stress corrosion cracking (SCC) is caused by the simultaneous presence of tensile stress, a specific corrosion medium, and a susceptible material. SCC is a form of environmental attack on metal that causes cracks to form and grow.

Pipelines that are potentially more susceptible to SCC have the following characteristics:

- operating stress > 60% SMYS,
- operating temperature > 100°F,
- distance from compressor station is 20 miles or less,
- age greater than or equal to 10 years, and/or
- corrosion coating systems other than fusion-bonded epoxy (FBE).
ASME Appendix A3.3 also states that if an incident or hydrostatic test break or leak has been caused by SCC in the past, that segment should be evaluated for SCC regardless of the above criteria being met.

If an excavated pipeline displays signs of external corrosion, Operations, Maintenance and Operational Integrity determine whether the line is susceptible to SCC. Operation and Maintenance personnel shall consult with Operational Integrity about measurement procedures, pipeline operation, and pipeline repairs. SCC examinations are conducted in accordance with industry standards NACE SP024-2008 for Stress Corrosion Cracking Direct Assessment, or CEPA RP (2007) on Stress Corrosion Cracking.

2.3.2 Examination of Buried Pipeline When Exposed (16 NYCRR 255.459)

External corrosion mitigation is generally limited to using a suitable external coating to protect the pipe, repairing coating that’s damaged or has become disbanded, and ensuring a cathodic protection system is implemented, properly connected, and functioning for steel pipelines.

Damage to the coating can occur during a ground disturbance and disbanded coating is usually the result of high operating temperatures, improper coating types, or improper installation of coating. The coating will be inspected and repaired whenever a section of pipe is exposed. Findings will be recorded on the Backfill Inspection and Foreign Crossing Record form included in Appendix 8.10.

For investigation of SCC on excavated buried pipelines, see section 2.3.1.

2.3.3 Protective Coating (16 NYCRR 255.461)

All above grade pipe and appurtenances are painted to mitigate surface corrosion. Suitable high quality paint is applied over the manufacturer’s recommended primer and on a properly prepared surface. The coating is inspected and results recorded annually on the Valve Inspection form. Any defect in the coating is repaired prior to the next annual survey.

All below grade piping is coated to create an integral, continuous bond to the steel. Pipe is purchased with a suitable mill applied coating and all steel joints are coated using liquid epoxy coating systems or equivalent coating system.

Installation of sacrificial anode beds will be considered when connecting cathodic protection to a line operated by a third-party is not an option. In this case, magnesium anodes are strategically attached along the length of the pipeline to sacrificially protect the steel pipeline.
2.3.4 Monitoring (16 NYCRR 255.465)

External corrosion is monitored by reviewing rectifier readings taken six times each calendar year, but at intervals not to exceed two and one-half months, for impressed current systems. Cathodic protection is required on all operating, inactive pipelines, made of steel. Testing on buried pipeline is to be performed at each test station using criteria of a negative pipe to soil potential of at least -0.85 volts as measured between the structure and a copper-copper sulfate reference cell contacting the electrolyte. External corrosion circumstances may be monitored using in-line inspections and digs to visually inspect the pipe as needed. Special coating surveys may also be conducted as needed. Operations and Maintenance shall consult with Operational Integrity to determine what type of inspection is required.

- These surveys and analysis of results may be accomplished either by qualified Forexco personnel or contracted out to others.
- In an attempt to minimize any adverse effects on existing adjacent underground foreign facilities, Forexco will coordinate with the foreign facility’s corrosion personnel during the design and construction of the pipeline as needed. Once the pipeline is operating, both operators individually monitor the crossing on an annual basis. Any conflicts, which arise, are jointly resolved in such a way as to not adversely affect either facility.
- In the event that cathodic protection monitoring identifies an area that is not sufficiently protected to the level as defined above, remedial action shall be initiated promptly to correct the condition and restore the level of protection.
- Rectifier readings are recorded using the Rectifier Inspection form every two months, but not to exceed an interval of two and one-half months and are maintained in the File Room.
- Annual Cathodic Protection Survey reports are filed in the File Room.

2.3.5 Electrical Isolation (16 NYCRR 255.467)

Buried steel pipeline facilities will be isolated electrically from other conductors using insulating flange gaskets, riser isolation kits, resistance bonds or other techniques as deemed necessary. A typical insulating flange assembly is shown in Appendix 8.4.

2.3.6 Test Stations (16 NYCRR 255.469)

Test stations are placed at each end of the pipeline, at each road and railroad crossing, at each foreign pipeline crossing, and elsewhere as required along the pipeline. At foreign pipeline crossings the wire attachments, anodes, bonds, etc. are installed after reviewing the foreign facility’s crossing specifications and
consulting with the foreign facility’s corrosion personnel. A typical test station installation is shown in Appendix 8.4.

2.3.7 Test Leads (16 NYCRR 255.471)

Test leads will be installed to ensure that test wires are mechanically secure and electrically conductive and that stress concentration on the pipe is minimized. At the point of connection to the pipeline, each bared test lead wire and metallic area will be coated with a compatible electrical insulating material. Typical test lead installations are shown in Appendix 8.4.

2.3.8 Interference Currents (16 NYCRR 255.473)

During the annual Cathodic Protection survey, the pipelines will be examined for interference currents and appropriate remedial measures taken as required.

2.4 Internal Corrosion Control (16 NYCRR 255.475)

2.4.1 Internal corrosion is caused when either the dew point of the pipeline product exceeds the minimum operating temperature of the pipeline system, or when the product contains fluids with free water, bacteria, oxygen, H2S, carbon dioxide, or suspended or dissolved solids that either alone or combined become corrosive. Internal corrosion mitigation can include some or all of the following:

- Installing separation facilities to remove free water, or dehydration facilities that dry gas so its dew point is below the minimum operating temperature of the pipeline,
- Adding chemical treatment in batch form (with pig placement), in slug form (without pig placement), and/or in continuous injection form,
- Minimizing oxygen entering the system via vapor recovery units, chemical injections, routine pigging and using inhibited methanol,
- Running inline cup-type pigs to remove solids and water,
- Removing dissolved gasses, such as oxygen,
- Installing an internal coating, such as full-contact polymeric liners or free-standing non-corrosive liners,
- Using inert pipeline materials such as plastic or fiberglass, and
- Treating bacteria that can cause pitting using biocide programs.

2.4.2 Monitoring (16 NYCRR 255.477)

Internal corrosion is monitored to assess the corrosive nature of fluid in the pipeline, the condition of the pipe, and to ensure corrosion mitigation efforts are working. If the pipeline product is non corrosive, it must be regularly monitored to ensure it does not become so. The type and number of monitoring techniques depends on the nature and service of the pipeline.
New, operating, and discontinued metallic pipelines must be evaluated at least annually to determine the necessity and suitability of internal corrosion mitigation efforts. Production records, operating history, monitoring data, and inspection details can be discussed at corrosion review meetings and the results documented. The frequency of these meetings depends on the pipeline’s operating conditions.

Monitoring techniques for internal corrosion can include the following:

- Inspecting corrosion coupons,
- Analyzing water for iron (Fe), manganese (Mn), or chemical residuals,
- Analyzing solids samples,
- Non-destructive testing methods, such as pipeline x-rays, ultrasonic thickness measurements or other appropriate methods,
- Inspecting pipeline cutouts. See Pipeline Cutout Evaluation Checklist or Pipeline Failure Cutout Analysis Checklist in Appendix 8.10,
- Reviewing production fluid characteristics including water cut, flow rate, acid gas content, operating pressure, and fluid chemistry, and/or
- Completing inline inspections (smart pigging).

Documentation of periodic corrosion reviews is filed in the Forexco File Room.

2.5 Atmospheric Corrosion Control and Monitoring (16 NYCRR 255.479 & 255.481)

See sections 2.3.3 and 2.3.4.

2.6 Remedial Measures (16 NYCRR 255.483 & 485)

See section 2.3.

2.7 Corrosion Control Records (16 NYCRR 255.491)

The following records will be maintained for as long as the pipeline remains in service:

- Records or maps showing the location of cathodically protected piping, cathodic protection facilities (other than unrecorded galvanic anodes installed before August 1, 1971), and the neighboring structures bonded to the cathodic protection system are maintained by Pipeline Coordinator; and

- Records relating to 16 NYCRR sections 255.465(a) [external corrosion monitoring: pipe-to-soil electrical potential tests]; 255.465(e) [evaluate unprotected pipe via electrical survey and cathodically protect where active corrosion found]; and 255.475(b) [inspect internal surface of removed pipe for internal corrosion].
Records of each test, survey, or inspection required for corrosion control will be kept for at least five years and in sufficient detail to demonstrate the adequacy of corrosion control measures or that a corrosive condition does not exist.

3 OPERATIONS

3.1 Operator Qualification Program and Company Training (16 NYCRR 255.604)

3.1.2 The Operator Qualification Program is maintained as a separate document entitled: Forexco Operator Qualification Program. Veriforce, or another qualified third party service provider, will be contracted by Forexco to administer this written program. The third party contractor works directly with Forexco's management personnel to implement and oversee all components of this operator qualification program. The operator qualification program is updated as needed, but at least annually. The program documents are maintained electronically by the third party contractor and are accessible by Forexco personnel.

3.1.3 Training and evaluation is provided in conjunction with Veriforce. Records are maintained electronically by Veriforce using VeriSource, an internet-based database that allows Forexco to review qualification status of individual employees by task or by individual name.

3.1.4 Covered Tasks

Forexco has identified all activities performed by operations and maintenance personnel on pipeline facilities that potentially affect the operation or integrity of the pipeline and are required by federal or state regulations. These activities have been designated as covered tasks under the Operator Qualification Program. Employees required to perform covered tasks must be qualified by training, testing and evaluation to do so. Until such time as individuals becomes qualified, they may still perform a covered task if, while doing so, their actions are directed and observed by a qualified individual.

All contractors used by Forexco to perform covered tasks must qualify their employees who perform these covered tasks to the same standards as Forexco employees. Documentation of qualifications must be provided by contractors before their employees can begin work on Forexco facilities.
3.1.5 Operators

- Training is provided to both new and experienced Field Operators. New Field Operators complete an initial one to three month progression, during which their progress is monitored and recorded by an assigned mentor. The mentor may be a Lead Operator or Foreman for the area or other qualified individual.
- Training tasks are operations-based (sending and receiving pigs, handling chemicals, gauging tanks, changing orifice plates, etc.) with a specific focus on safety and loss control.
- Depending on equipment in the production area, operations tasks cover not only pipelines, but also wells and production facilities. Processes are established at each field office to periodically review and assess specific operating procedures.
- Industry and site specific training, along with competency reviews, are tools used to train new Field Operators. Task Observation Reports and test results are filed in the employee’s training file by the administrator.
- Monthly safety meetings are also a forum for learning where safety topics and pipeline incidents can be discussed.

3.1.6 Third-Party Companies and Contractors

When third-party companies and contractors are hired to provide pipeline services or materials, the contract itself and the local Supply Chain Management personnel ensure the third party company personnel are both qualified and able to do the work; however, field offices will further ensure pipeline integrity is upheld by appointing a Forexco representative with stop-work authority to supervise third party work, ensuring a Safe Work Permit is completed, and ensuring that the person performing the work has completed the Safety orientation. Some contractors providing services, such as welders, must have an approved Quality Assurance/Quality Control manual.
3.2 Startup and Shutdown Procedures (16 NYCRR 255.605)

3.2.1 Forexco pipeline start up and shut down procedures are considered critical tasks and can be found in Appendix 8.6.

3.2.3 All appropriate precautions must be taken to ensure maximum operating temperatures and pressures are not exceeded for even a short period of time.

3.2.4 Other considerations include ensuring that valves are in the correct position and are opened or closed in the proper sequence, pumps or compressors are started and shut down safely, and safety shut downs are properly calibrated and function tested according to the required maintenance schedule.

3.3 Compressor Operation, Startup and Shutdown (16 NYCRR 255.605)

3.3.1 Internal Forexco procedures are found in Appendix 8.7.

3.4 Class Location Review (16 NYCRR 255.609)

3.4.1 The class location is determined by the number of buildings intended for human occupancy in the class location unit. The class location unit is an area that extends 220 yards on either side of the centerline of any continuous 1-mile length of pipeline. For the purposes of this section, each separate dwelling unit in a multiple dwelling building is counted as a separate building intended for human occupancy. Class locations shall be reviewed in accordance with Section 3.4.

3.4.2 A Class 1 location is any class location unit that has 10 or fewer buildings intended for human occupancy.

3.4.3 A Class 2 location is any class location unit that has more than 10 but fewer than 46 buildings intended for human occupancy.

3.4.4 A Class 3 location is:

- Any class location unit that has more than 46 buildings intended for human occupancy; or

- An area where the pipeline lies within 100 yards of either a building or a small, well-defined outside area that is occupied by 20 or more persons during normal use (such as a playground, recreation area, outdoor theater, or other place of public assembly).

3.4.5 A Class 4 location is:

- Any class location unit that has 100 or more buildings intended for human occupancy and where wall to wall pavement is prevalent; or
• Any class location unit where buildings with four or more stories above ground is prevalent.

3.4.6 The boundaries of the class location unit determined in accordance with paragraphs 3.4.1 through 3.4.5 of this section may be extended according to the following:

• When a cluster of buildings intended for human occupancy otherwise requires a Class 2, 3, or 4 location, the class location unit ends 220 yards from the nearest building in the cluster.

• When the number of buildings with four or more stories requires a Class 4 location, the class location unit ends 220 yards from the nearest building with four or more stories.

3.4.7 At least once each five years, or more frequently if information from annual leak surveys, patrols or surveillance indicates a change in population density or operating conditions for any portion of the system, Forexco shall proceed to determine if a class location should be revised. This review shall include the following steps:

• Determine the new class location of the segment,
• Investigate the original design, construction, and testing procedures of the segment to determine if it will meet the requirements of the new class location,
• Review the physical condition of the segment involved from available records,
• Review the operation and maintenance history of the segment,
• Calculate the MAOP and corresponding hoop stress for this segment, and
• Determine the actual area affected by the population density increase, noting any physical barriers or other factors which may limit further expansion in the area.

Data and observations supporting the need for a class location review are recorded on the Pipeline Right-of-Way Inspection Check List forms. These documents are filed with the annual leak survey reports in the File Room and uploaded to Bluetick.
3.5 Change in Class Location Confirmation or Revision of Maximum Allowable Operating Pressure (16 NYCRR 255.611)

3.5.3 If the study based on class location review reveals that the hoop stress corresponding to the established MAOP is not acceptable for the new class location, either the MAOP must be lowered or other action taken.

3.5.4 If no changes in class location are warranted, Forexco shall document in writing that the design, testing and operation of the affected pipeline segments conform to the then current class locations.

3.6 Continuing Surveillance (16 NYCRR 255.613)

3.6.1 A right-of-way (ROW) is a piece of land that a pipeline runs on or under. A land owner signs an easement giving Field Operations rights to access the land to patrol, inspect, and maintain a pipeline. Typical inspection tasks include monitoring for soil erosion and pipeline leaks, and noting recent or current third-party activity. Crossings are locations where pipelines cross roads, highways, rail lines, other pipelines, or water bodies.

3.6.2 The field office can increase inspection frequency based on the following local and high-risk conditions:

<table>
<thead>
<tr>
<th>Local conditions</th>
<th>High-risk conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water or ice induced erosion.</td>
<td>Highly-populated areas.</td>
</tr>
<tr>
<td>Slope instability.</td>
<td>Water crossings such as rivers, streams, or</td>
</tr>
<tr>
<td>Development encroachment on the ROW.</td>
<td>creeks.</td>
</tr>
<tr>
<td>Pipeline operating pressure.</td>
<td>Railways or roads.</td>
</tr>
<tr>
<td>Pipeline product.</td>
<td>Major utilities.</td>
</tr>
<tr>
<td>Pipeline length and diameter.</td>
<td>Adjacent pipelines.</td>
</tr>
<tr>
<td></td>
<td>Terrain subject to erosion or slumping.</td>
</tr>
</tbody>
</table>
3.6.3 Forexco shall patrol the pipeline and ROW to determine and take appropriate action concerning the following:

- Actual or potential excavation, construction activity, or other encroachment upon the ROW (see above),
- The safety of a pipeline where it runs on or under a land owner’s property,
- Construction or development which may lead to a change in class location,
- Failures,
- Leakage (dead vegetation),
- Corrosion,
- Substantial changes in cathodic protection requirements,
- Other unusual operating or maintenance conditions,
- Erosion, wash outs, slope slumping or general instability,
- General condition of the ROW,
- Line markers and test stations, and/or
- Vandalism or other activity at above ground valve sets

3.6.3 Pipeline ROW inspections can incorporate the following tasks:

- Class Location review (see Section 3.4),
- Annual right-of-way patrol (see Section 4.1),
- Leak detection survey (see Section 4.2),
- Verification of signage (see Section 4.3),
- Testing valve function (see Sections 4.8 and 4.9), and/or
- Other pipeline maintenance.

ROW inspection data is recorded on the Pipeline Right-of-Way Inspection Check List on file with the annual leak survey notebooks in the Forexco File Room.

3.7 Damage Prevention Program (16 NYCRR 255.614)

3.7.1 Forexco shall make the following efforts in an attempt to minimize the possibility of damage to the pipeline by third party excavation. “Excavation” includes any operation for the purpose of movement or removal of earth, rock or other materials in or on the ground by use of mechanized equipment or by blasting. This includes digging, augering, backfilling, drilling, grading, plowing in, pulling in, trenching and tunneling.

- Participate in Dig Safely New York (UFPO), the NY one-call underground damage prevention program, 811 or 1-800-962-7962.
- Require all Forexco personnel responsible for excavation to be familiar with and adhere to NYCRR Part 753 – Protection of Underground Facilities.
- Deliver to residents in close proximity of the pipeline a written brochure describing among other things the importance (and requirement) of calling
Dig Safely New York and reminding them of the encroachment rules regarding the pipeline ROW.

- Have a Forexco representative on site during any known excavation within fifteen feet (15') of Forexco pipeline facilities.
- Patrol the ROW for excavations unknown to Forexco.
- Take action to prevent and remove encroachments on the ROW.
- Follow the Forexco Ground Disturbance Procedures shown in Appendix 8.6. The Forexco Ground Disturbance Permit is used to prompt and document all required actions and considerations when excavation work is performed. A copy of this form is included in Appendix 8.10.

Each of the above mentioned procedures and programs is detailed below:

### 3.7.2 Forexco Participation:
Forexco will follow established procedures for Dig Safely New York inquiries including:

- Document all incoming requests. Each request to Forexco for facilities location and marking from Dig Safely New York is routed simultaneously to the Pipeline Coordinator, qualified Pipeline Technicians and maintenance administrative staff. Each request is entered into Bluetick by the maintenance administrative staff and a work order is issued. Upon completion of all activities necessary to provide an accurate response, a confirming e-mail, documenting the identifying number of the request, the requesting party contact and phone number, the response, the timing and the name of the responding Forexco representative, is transmitted back to the maintenance administrative staff. Records of all requests and responses are maintained in binders in the File Room.

- Check facilities’ maps and records. If the area to be excavated is within 15 feet of Forexco's pipeline, the lines shall be marked.

- Respond to the excavator. If the area is clear of facilities, tell the excavator. If not, tell the excavator how the line has been marked out. Document the response given to the excavator and the date and time of the response.

- A yellow flag, stake with yellow paint on it, or yellow paint mark shall be used to mark out the location of the pipeline

- When the planned excavation affects Forexco's Pipeline, a temporary marking is to be provided by the commencement date on the locate ticket. If Forexco cannot complete the mark out by the commencement date, the operator must promptly contact the excavator stating as such and make alternative arrangements to complete the mark out no later than 2 days after the commencement date, or other date that is mutually agreed upon.

- In an emergency or unusual situation, the marking should be provided sooner. All efforts shall be made to respond promptly so that the facilities may be marked before excavation begins.

- Forexco will make every effort to provide Dig Safely New York with updated pipeline location information within 3 months of the installation
of a new underground facility, if that facility is located in an area not already included as an alert area.

3.7.3 Excavation by Forexco: At all times when Forexco is to make an excavation, Forexco shall call Dig Safely New York at least 2 full working days in advance of the commencement of work. Each employee who may have a responsibility for performing or supervising an excavation shall have access to a copy of NYCRR Part 753 and shall be required to adhere to its applicable provisions. Some of the major points of NY Part 753 are as follows:

- Forexco cannot proceed with an excavation on the stated date of commencement if, prior thereto it has not received notification from each and every operator that such operator has either (1) no facilities located in or within 15 feet of the proposed excavation or (2) that facility has been marked.
- Once a foreign facility has been marked, it is the responsibility of the excavator to maintain those marks for the duration of the excavation work in that area.
- Where a foreign gas or liquid petroleum facility has been marked, the Forexco excavator shall expose the underground facility by means of hand dug test holes. Powered or mechanized equipment may be used for removal of pavement or masonry but only to the depth of such pavement or masonry.
- When foreign facilities other than gas or liquid petroleum facilities have been marked, verification shall be accomplished either by hand dug test holes or by other means mutually agreed to by the excavator and operator.
- Forexco relies on its Ground Disturbance Procedure (see Appendix 8.8) in conjunction with its Safe Work Permit procedure (see Appendix 8.6) to ensure that personnel are protected from unsafe working conditions associated with trenches and other excavations. The presence of site observers, monitoring for unsafe accumulations of gas, and providing rescue equipment as needed are examples of the safety precautions enforced by Forexco through these procedures.
- Where center line stakes or marks do not indicate the size of the underground facility, such facility shall be assumed to lie within a strip of land four feet in width centered on the centerline of such strip of land at the stakes or marks.

3.7.3 Company Representatives on site:

Forexco will have a representative on site during any excavation within fifteen feet (15’) of Forexco facilities on the ROW. The representative will remain on site during backfilling to ensure that the excavator follows the applicable portions of the Forexco Ground Disturbance Procedure (see Appendix 8.8).
3.7.4 Patrolling the ROW for excavations unknown to Forexco:

When Forexco performs any type of survey of the pipeline, or an employee is traveling in the area of the pipeline for any reason, that person should make a conscious effort to observe activity or signs of activity related to excavation in close proximity to the pipeline ROW.

3.7.5 Company action regarding actual or impending encroachment:

If an employee observes any excavation activity which is believed to be encroaching upon the ROW, or has the potential to execute upon the ROW, the employee shall advise the excavator to stop the observed activity immediately. The employee should then inform them of the pipeline’s existence and ask them to call Dig Safely New York. The situation should be documented on the ROW Inspection Checklist and reported to the Forexco supervisor. Notes concerning these incidents will be uploaded to Bluetick.

3.8 Blasting (16 NYCRR 255.614)

3.8.1 Prior to any blasting associated with excavation within 1,000 feet of a pipeline, Operations and Maintenance personnel shall secure an engineering opinion of the potential stresses imposed upon the pipeline through consultation with Integrity Engineering.

3.8.2 Inspections of the pipeline shall be performed prior to and after blasting activities to verify the integrity of the pipeline. Each inspection shall include a leakage survey.

3.9 Emergency Plan (16 NYCRR 255.615)

3.9.1 Forexco maintains an Emergency Response Program (ERP) to minimize hazards arising from or associated with gas pipeline emergencies. While this plan is a part of the corporate ERP it provides guidance for corporate and local Forexco employees, in conjunction with local emergency response agencies and public officials, to effectively respond to potential and actual emergencies. The ERP establishes a program by which Forexco receives notification of emergencies involving its pipeline system; efficiently accomplishes required communication of the occurrence; has immediate access to established written procedures for responding to reasonably foreseeable emergencies; coordinates with local fire and police agencies before, during and after the occurrence of an emergency event; and pursues appropriate follow up activities after an emergency event. The ERP enables Forexco to respond promptly and effectively to different types of emergencies, including:

1. gas detected inside or near a building;
2. fires located near or directly involving a pipeline facility;
3. explosions occurring near or directly involving a pipeline facility;
and natural disasters.

3.9.2 The ERP has a number of components which include a Field Emergency Response Guide (FERG) that establishes roles and action plans for individual field employees. A copy of the FERG is provided to each field employee who may participate in an actual emergency event after they successfully complete the internal FERG training session. The overall ERP, including its component parts, is updated as needed and reviewed at least annually.

3.9.3 Copies of the ERP are maintained in the Emergency Operations Center (EOC) of Forexco at its New York office. Field employees maintain their individual copies of the FERG following completion of required emergency response training.

3.10 Public Awareness Program (16 NYCRR 255.616)

3.10.1 Forexco has developed and implemented a written continuing public education program that follows the guidance provided in the American Petroleum Institute's (API) Recommended Practice (RP) 1162.

3.10.2 The goal of the Public Awareness Program is to promote public awareness, which improves public safety, asset protection, and environmental protection (see the current Public Awareness Pamphlet in Appendix 8.9).

3.10.3 Forexco implements a written New York Operations Public Awareness Program, managed by the Public Awareness Program Administrator and Administration Team.

3.10.4 This program is designed to provide full compliance with 16 NYCRR 255.616 of the New York State regulations and consistency with API’s RP 1162, as incorporated by reference.

3.11 Maximum Allowable Operating Pressure and Over Pressure Protection (16 NYCRR 255.619)

The MAOP of Forexco's pipelines is based on a test pressure of at least 1.5 times this pressure and all fittings, valves, and other appurtenances, which exceeds the requirements of NYCRR 255.619. In circumstances where a lower test pressure is appropriate, Forexco may apply a different test pressure, in accordance with the requirements in NYCRR 255.619.

3.11.1 The capacity of all pressure limiting devices shall be checked at least once each calendar year, but not to exceed an interval of fifteen months, to assure their ability to limit the maximum allowable operating pressure of the pipeline. See section 6.10 Valves and Pressure Limiting Devices for further information.
3.11.2 As allowed in CFR 192.619 4c and 16 NYCRR 255.619 (d), the originally established MAOP may be maintained for cathodically protected steel pipelines provided that, when the pressure is increased above the highest pressure to which the pipeline has been subjected during the last five years, the pipeline is leakage surveyed and all leaks found are repaired in accordance with this part. If the pressure is not increased, a leakage survey is not required.

3.11.3 If required, records of highest operating pressure for a given pipeline will be maintained in files reserved for that pipeline as detailed in Section 1.6.2.

3.11.4 Consideration should be given to the history of the pipeline that may compromise the MAOP. Actual operating pressure, cathodic protection history, any internal or external corrosion known or suspected, any known damage, and the leak history should all be considered.

3.12 Testing: Pressure over 125 psig. (16 NYCRR 255.505)

Pressure Testing Pipelines

3.12.1 Pipelines must be tested for strength and leaks by replicating the same conditions under which the pipeline will operate. For example, if buried when operational, the line must be buried during testing. Strength tests ensure the structural integrity of the pipeline and help determine its MAOP. Leak tests ensure all connections are tight. New pipelines are tested before commissioning. Existing pipelines may be tested either following repair activity, before reactivation, or as requested by regulatory agencies. A copy of the Hydrostatic Test Procedure for Fabricated Assemblies is shown in Appendix 8.7.
3.12.2 General requirements:
No person may operate a new segment of pipeline, or return to service a segment of pipeline that has been reconstructed, relocated, replaced, or reactivated until it has been tested in accordance with this part to substantiate the proposed maximum allowable operating pressure and each leak has been located and eliminated.

3.12.3 Any leak that is located must be corrected prior to placing the pipeline in service.

3.12.4 All pipeline pressure tests shall be hydrostatic. When using fresh water for tests, consider the water quality in regards to internal corrosion. In particular, depending on the water source, bacteria and oxygen may be present and O2 scavenger and biocide treatments may be required. The test pressure shall at a minimum be equal to the lesser of 90% specified minimum yield strength (SMYS) or 1.5 times the desired MAOP. The strength test shall be conducted at or above test pressure for a minimum of 12 hours. Pneumatic pressure tests shall not be permitted unless special conditions warrant and a detailed risk assessment is performed in conjunction with an MOC. Project specific testing procedures shall be developed prior to any pneumatic pressure test.

3.12.5 The test must be documented by a calibrated pressure chart recorder (paper or electronic) with increments no less than 50 psig (paper). The chart recorder must be calibrated against a deadweight tester (weights or electronic) at least hourly for the first and last two hours of the test.

3.12.6 For a short length of pipeline that where throughout its entire length the entire circumference can be examined for the detection of leakage, the test duration may be 4 hours.

3.12.7 If a component other than pipe is the only item being replaced or added to a pipeline, a strength test after installation is not required, provided that the manufacturer of the component certifies that (1) the component was either tested to a pressure at least that of the MAOP of the pipeline, or (2) manufactured under a QA program that assures that each item manufactured is at least equal in strength to a prototype and that the prototype was tested to at least the MAOP of the pipeline to which it is being added.

3.12.8 At least 5 business days in advance of the test start date, Forexco should make notification to the NYPSC to coordinate the presence of an inspector. All pressure tests must be certified by an inspector of the Gas and Water Division of the NYPSC to be valid.

3.12.9 A weld used to tie in a test segment of pipe is excepted from a hydrostatic test.

3.12.10 Charting Pressure Test Results:
Pressure test results are retained in the pipeline license file for the life of the pipeline. Pressure test documentation is completed for the duration of the pressure test and includes the following information:

- Time and date of test.
- Pipe specifications.
- Elevation profile and location of the test section and testing points.
- Pressure test medium.
- Test pressure at lowest elevation.
- Test duration.
- Pressure and temperature charts (if applicable).
- Pressure volume chart (if applicable).
- Location of any leaks or failures and description of repair action.
- Pressure reading before test failed.
- Clearly identified test start and end points on each chart.
- Range of the recording instrument.
- Desired maximum operating pressure.
- NYPSC certification

3.12.11 The following information is required on the face of the pressure chart (not on the back or on an attached sheet):

- Forexco's name.
- To and from location of the tested pipeline.
- Pipeline license number and line number.
- Test date.
- Test medium.
- Range of the recorder.

3.12.13 If an electronic recorder is used, a permanent paper copy of the test data must be retained in either a paper-based or an electronic filing system. Calibration records for the chart recorder must also be kept on file.

3.13 Environmental Protection and Safety During Pressure Test (16 NYCRR 255.515)

3.13.1 Due consideration and respect for the pressures involved while testing at elevated pressures is required. All equipment including hoses, fittings, pumps, etc. must be rated for the pressures required at test and they must be in good condition. Non-code fittings, hoses without known pressure ratings, and poor workmanship must not be tolerated. An attempt should be made to completely fill the pipeline with water to remove all air. The volume of the pipeline being tested should be calculated and a reasonable measure or calculation of the quantity of water introduced into the pipeline is desired. The use of a foam pig pushed with the test water can help assure that a minimum amount of air remains in the pipeline during test. Workers and others not associated with the test should be made aware that elevated pressures are on the pipeline and those persons without a
reason for being near the pipeline or test set up should be asked to move away. Safety equipment such as hard hats, eye protection, and gloves may be appropriate.

3.13.2 Hydrostatic test water should be disposed of in a manner sensitive to the environment. If large quantities of iron (rust) are expected it may be prudent to drain the water into sediment sump or other suitable filter arrangement. Large volumes of water even at low pressure can erode soils, especially those that have recently been disturbed, therefore the use of diffusers should be considered.

3.14 Abnormal Operating Conditions (16 NYCRR 255.605(r))

3.14.1 The purpose of this section is to provide guidance on when an abnormal operating condition (AOC) exists and to identify to Operations and Maintenance personnel the appropriate steps to take in responding to, investigating and correcting the AOC in order to return the pipeline to normal operating conditions.

3.14.2 Conditions that develop that are not intended or expected, and are not immediately identifiable, sometimes result in AOCs if left unchecked. In some instances, these conditions can be the early stage of an impending emergency. Examples of conditions that, under the right circumstances, can cause operating design limits to be exceeded, become a hazard to personnel safety or result in negative impacts to the environment and thus be classified as AOCs, include, but are not limited to:

- Unintended or inexplicable valve movement, closure or opening,
- Unintended or inexplicable pump, compressor or facility shutdown,
- Unintended or inexplicable pump, compressor or facility startup,
- Unscheduled increase or decrease in pressure(s),
- Unscheduled increase or decrease in flow rate(s),
- Unscheduled increase or decrease in temperature(s),
- Loss of critical communications,
- Unintended, inexplicable or improper operation of a safety device (including pressure limiting or shutdown devices), and
- Other inexplicable malfunctions of components, deviations from established operating limits or personnel error that could become a hazard to personnel safety or result in negative impacts to the environment if allowed to continue.

3.14.3 Most AOCs will be identified by Forexco Operations and Maintenance personnel by direct observation or after notification through the monitoring/call out systems. Operations and Maintenance personnel will take immediate steps to identify the cause of the AOC and to correct the cause as soon as possible.
3.14.4 After the AOC has been corrected and the affected pipeline, pipeline segment or associated equipment has returned to normal operations and stabilized, Operations and Maintenance personnel will monitor the affected part(s) of the pipeline at sufficient critical locations along the pipeline to ensure continued integrity and safe operation.

3.14.5 Monitoring activities may include, but are not limited to:

- monitoring essential operating conditions;
- at critical locations, checking for variance from normal operating pressure, flow rate, temperature, etc. that may have reasonably been a contributing cause of the AOC or may have reasonably been a result of the AOC;
- inspecting by walking, driving and/or flying the affected pipeline, or pipeline rights-of-way, to check for indications of damage or encroachments that may have reasonably been a contributing cause of the AOC or may have reasonably been a result of the AOC;
- inspecting by walking, driving and/or flying the affected pipeline, or pipeline rights-of-way, to check for indications of leakage that may have reasonably been a contributing cause of the AOC or may have reasonably been a result of the AOC; and
- inspecting by walking, driving and/or flying the affected pipeline, or pipeline rights-of-way, to check for indications of tampering, vandalism or security related concerns that may have reasonably been a contributing cause of the AOC.

3.14.6 If the cause of the AOC is corrected by Operations and Maintenance personnel, the Operations and Maintenance personnel will document the occurrence, investigation, response procedures and follow up activities of the AOC in a report which will also include recommendations to eliminate the cause of the AOC. If no release occurred as a result of the AOC, documentation of the event will follow the procedures and using the forms of the Near Miss reporting protocol. If a release occurred arising from the AOC, documentation of the event will follow the procedures and an incident report will be made, distributed and filed in the File Room. Operations and Maintenance supervisors will review the report, critique response procedures for effectiveness and implement any corrective actions.

3.14.7 The effectiveness of this procedure will be periodically reviewed according to Section 3.7 of this manual.

4 MAINTENANCE

The safest and most cost-effective form of maintenance is preventative maintenance. An effective corrosion control program and a well-coordinated inspection routine are necessary to minimize repairs and ideally eliminate hazardous conditions. Preventative Maintenance Programs have been developed to assist the Operations and Maintenance staff in maintaining Forexco's system. Forexco's Operations and Maintenance personnel
are required to know the location and surface access to installations such as valves, vents, and cathodic protection rectifiers for pipelines and other system equipment.

4.1 Patrolling (16 NYCRR 255.705)

The pipelines will be patrolled per the schedule shown below. The patrol will consist of looking for washouts and other hazardous conditions, including a check for area population development change, construction activity, pipeline marker condition (at a minimum assure markers are standing and are visible from one marker to the next and that Forexco information is legible), test station markers, ROW encroachments and other factors affecting safety and operation. All exposed piping will be inspected for coating deficiencies and/or other damage.

The frequency of patrols will be as shown in the following table:

<table>
<thead>
<tr>
<th>Pipeline Class Location</th>
<th>Highway &amp; Railroad Crossings</th>
<th>At all other locations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 2</td>
<td>7 ½ months; but at least twice each calendar year.</td>
<td>15 months; but at least Once each calendar year.</td>
</tr>
<tr>
<td>3</td>
<td>4 ½ months; but at least four times each calendar year.</td>
<td>7 ½ months; but at least twice each calendar year.</td>
</tr>
<tr>
<td>4</td>
<td>4 ½ months; but at least four times each calendar year.</td>
<td>4 ½ months; but at least four times each calendar year.</td>
</tr>
</tbody>
</table>

4.2 Annual Leakage Survey (16 NYCRR 255.706)

4.2.1 A leakage survey of all pipelines will be performed once each calendar year but not to exceed 15 months. This survey will be done in conjunction with one of the patrols described in section 4.1 above. The survey will be performed using a combustible gas indicator, flame ionization leak detector, or infra-red unit. The survey will be performed by either walking or driving and the indicator or detector will be set on the appropriate sensitivity scale. A driving survey is acceptable provided there is reasonable access to the pipeline. The manufacturer’s recommendations for proper instrument use, calibration, speed of travel over ground, location of sampler, etc. will be followed.

4.2.2 After completion of the procedure the results will be recorded and reported as required. Leak survey records can be found in the Forexco File Room.

4.2.3 All leaks will be repaired in accordance with Section 4.4.
4.3 Pipeline Markers (16 NYCRR 255.707)

Erecting and Maintaining Signage

4.3.1 Pipeline warning signs are required where pipelines cross highways, roads, railways, or water courses. Pipeline warning signs must be placed in areas adjacent to all pipeline installations including meter stations, valve sites, risers, and line heaters. A large facility identification sign is required at the entrance of any licensed gas compressor station.

4.3.2 Pipeline markers complying with the following will be installed at each crossing of a public road, railroad, navigable waterway, and wherever else it is necessary to identify the location of the pipeline to reduce the possibility of damage or interference. They will be considered where a pipeline is in close proximity to public and private facilities or environmentally sensitive areas. Markers will be installed as close as practical directly over the buried pipeline. In areas used for commercial farm purposes in at least two of the last five years, pipeline markers will be installed at points that adequately identify the location and direction of the pipeline. These location points will be determined in consultation with the farmland operator.

- The following will be written legibly on a background of sharply contrasting color on each line marker:
  The word “Warning”, “Caution”, or “Danger” followed by the words “Gas Pipeline” or “Natural Gas Pipeline”, all of which must be in letters at least one inch high with one quarter inch stroke; and:

    Forexco, Inc.
    TBD Upon Transfer

- Whichever format is chosen above, it must be consistent for the entire pipeline.
• For facilities, the sign must include the facility name, legal location, licensee, emergency telephone number, and the appropriate warning symbol.

• Within 60 days following the transfer the certificates from Repsol Oil & Gas USA, LLC to Forexco, all markers will be relabeled with Forexco labels. During the 60 day period, Forexco will contract with Repsol for transition services relative to the maintenance of the existing telephone number and immediate notification to Forexco personnel.

4.3.3 Pipeline markers installed over pipelines in a rural ROW should be, whenever possible, visible from one pipeline marker to another. Pipeline markers should be installed perpendicular to the pipeline. For pipelines located parallel to rural roads the markers should be installed facing oncoming traffic. At road crossings, the markers should be installed perpendicular to the pipeline. Pipeline markers will be placed at locations where buried facilities come above ground.

4.3.4 Operations and Maintenance personnel erect and maintain signs. When a pipeline or portion of a pipeline is removed, Operations and Maintenance personnel remove related signs.

4.4 Gathering and Transmission Lines: Permanent Field Repair of Imperfections, Damages, and Leaks (16 NYCRR 255.711, 713, 715 and 717)

Repairing Pipelines

4.4.1 About Pipeline Repair

After verifying the correct pipeline segment is shut in and depressurized, Operations and Maintenance personnel will proceed to expose the pipe. Once exposed, the extent and type of damage can be assessed and the appropriate repair done. Ensure procedures outlined in section 3.7 above are followed when exposing the pipe. If coating or pipeline repair is needed, complete the Pipeline Dig and Repair Report (see Appendix 8.10).
4.4.2 Verifying Pipeline Identity, Contents, and State

Operations and Maintenance personnel must ensure they are dealing with the correct pipeline, identify the pipeline’s contents, and that the line is shut in and depressurized before any repair work commences. If line locators are used to identify and map a pipeline, care must be taken not to follow the wrong pipeline where multiple pipelines cross. Temperature, vibration, and the sound of flow can help determine whether a line is shut in and depressurized. When verifying pipeline contents, drills, hammers, and punches are discouraged for safety reasons unless they’re included in the site specific procedures and the pipeline contents and pressure are known.

4.4.3 Repair Methods

After all of the above is verified, mechanical cold cutting is the preferred method. Setup sufficient drip pans to catch any escaping product before cutting the pipeline and ensure pipeline support legs are on site in case the pipe on either side of the cut needs to be braced. The line should be electrically bonded. If there is any doubt about the pipeline identity, contents, or shut in state, cold tapping, which doesn’t rely on welding, is the preferred method. With cold tapping, a sleeve that includes a valve and a lubricator device that provides an access point for the cutting device is bolted onto the pipe.

The type of repair depends on the defect or failure. Forexco replaces only the offending portion of the pipeline and the replacement pipe must be either at least of the same or better grade, type, diameter, and wall thickness as the remaining pipe.

Portions of sour service pipeline with internal corrosion defects that require repair must be cut out and replaced.

When repairing a pipeline, rather than pressure testing the entire line, a piece of pre-pressure-tested pipe can be used. When pre-pressure-tested pipe is used for the repair, the welds joining the pipe to the line must be 100% x-rayed. If pre-tested pipe is used, documentation that includes Pressure Test results, material specification reports, material composition and grade, and whether the pipe is of sour service specification must be retained. Where only a portion of one joint of pre-tested pipe is used, the above documentation must be tracked for both the current use and any subsequent uses for the remaining pre tested pipe.

Pre tested pipe must be stored in a manner that protects the pipe and especially its external coating from the elements.
4.5 Gathering and Transmission Lines: Testing of Repairs (16 NYCRR 255.719)

All replacement pipe segments must be pressure tested after installation unless pre-tested pipe is used. For pre-tested pipe, sour service pipelines, or pipelines that are part of a crossing, all welds must be 100% x-rayed. For non-sour service pipelines, x-ray inspection is not required if the line is pressure tested following repair. For details, see section 3.12. Pipe coatings damaged as a result of repair activities must be fixed or replaced before the pipeline is buried.

4.5.1 Each permanent field repair of a pipeline shall be pre-tested to insure that the repaired section has a strength equal to or greater than the pressure required for a new line installed in the same location.

4.5.2 If the repair was accomplished by cutting out a cylindrical piece of pipe and replacing it with pipe of similar or greater design strength, the pipe shall have been tested to 1.5 times the MAOP per Forexco guidelines. If the pipe has been pre-tested, appropriate records must be available to prove the viability of the test.

4.5.3 Forexco's welding procedures are shown in Appendix 8.5. Forexco provides proof of welder’s certification, ticket verification, and test results for specific welding repairs upon request.

4.5.4 All welds including those necessary to install a full encirclement welded split sleeve or the tie-in welds for a replaced cylindrical piece of pipe shall be non-destructively tested.

4.6 Abandonment or Inactivation of Facilities (16 NYCRR 255.727)

4.6.1 The Pipeline and Facilities Engineer will update the Master Spreadsheet when a pipeline’s status changes and review the spreadsheet annually. The terms inactive and abandoned are recognized by state and federal agencies.

4.6.2 Taking Pipelines Out of Normal Operation

A pipeline is considered out of normal operation (inactive) when it is no longer shipping fluid and this condition is not expected to change soon. A pipeline that is inactive because a well is down for maintenance is still in normal operation. If a line will be out of normal operation for longer than 12 months, Operational Integrity review, timely steps, depending on the nature of the pipeline product, will be taken to protect pipeline integrity. Within 12 months, Operational Integrity shall be consulted to determine the appropriate methods and timing.

An inactive pipeline is an asset that can be used for the same or another function in the future. To maintain pipeline integrity and avoid stagnant fluid traps, the line will be pigged clean then purged with air, water, or an inert gas such as nitrogen. All purging will be carried out in accordance with Forexco purging
procedures. A batch chemical inhibitor treatment may be run. To maintain ongoing integrity, the line will be physically isolated or disconnected at both ends, cathodic protection left connected, and annual cathodic protection surveys continued. Pipeline crossing signs will be maintained and the discontinued line included in ROW inspections. The pipeline is left in a safe condition such that if its integrity is breached, no environmental issues or safety concerns to workers or the public will arise.

4.6.3 Abandoning Pipelines

Abandoning is defined as permanently shutting down all or part of a pipeline because it is either not required or unable to function. An abandoned pipeline is not an asset and should not be put back in service.

Pipelines may be abandoned in place or removed from the ground. Forexco may elect to abandon pipelines in place unless the lines are exposed, there are land owner requirements, there is current or impending site development, or they are located near a water crossing or environmentally sensitive area.

The following steps will be taken when abandoning pipelines:

- Leave in place in safe condition,
- Disconnect all sources of gas,
- Cut and cap below ground level, except when within a facility that will continue to operate, in which case just disconnect and cap,
- Remove cathodic protection,
- Remove surface equipment such as line heaters, pig traps, and risers, unless located within an operating facility, and
- Leave no stagnant fluid traps. Remove underground T connections replace them with straight pipe. Pipelines abandoned before the current regulations took affect and are subsequently exposed to reveal traps such as connection points, fittings, or dead legs where stagnant fluid may collect will have these removed and ensure no combustible mixtures are left in the line. Pipelines that are either permanently accessible for regular inspections or for which internal fluid is tested and found non-corrosive and documented as such are exempted from this practice.

4.7 Compressor Station Maintenance (16 NYCRR 255.729 to 736)

4.7.1 Procedures (16 NYCRR 255.729)

See starting, operating, and shutdown procedures in Appendix 8.7.

4.7.2 Inspection and Testing of Relief Devices (16 NYCRR 255.731)
Excluding rupture discs, pressure relieving devices are operated periodically and inspected and tested per section 4.8. Defective or inadequate equipment is promptly repaired or replaced. Remote control shutdown devices are inspected and tested at intervals not exceeding 15 months but at least once per calendar year. Pressure devices are function tested at intervals not exceeding 15 months but at least once per calendar year. Test data is recorded in the valve inspection contractor’s annual reports maintained in the Forexco File Room. Each pressure device needs to be inspected for the following:

- Capacity,
- Proper set pressure,
- Visible damage,
- Mechanical condition,
- Protection from dirt, liquids, or freezing, and
- Proper installation and any condition that could cause the device to malfunction.

Rupture disks are not tested but are identified and included in scheduled inspections along with other pressure shut down valves in each system or facility.

### 4.7.3 Additional Inspections (16 NYCRR 255.732)

Sensors monitor compressors for excessive vibration and provide an immediate signal to the local control panel when set limits are exceeded. If field personnel are not present at the compressor location at that time, a field operator call out is immediately generated. The field operator will determine and correct the cause of excess vibration with the assistance of maintenance and/or mechanic staff as needed. Frequent visual inspections are made at the compressor locations. Inspection results are entered into the site log. Unit readings are entered in individual unit logs. Work orders for repair are requested by Forexco personnel. Documentation is maintained and available in the File Room and at the compressor locations.

Sensors monitor compressor area buildings for levels of combustible gas present and provide an immediate alarm and signal to the local control panel when the lower explosive limit (LEL) set limit is exceeded. If field personnel are not present at the compressor location at that time, a field operator call out is immediately generated. The field operator will determine and correct the cause of the alarm with the immediate assistance of maintenance and/or mechanic staff called out as needed. Frequent visual inspections are made at the compressor locations. Results and LEL readings are entered into the site log. Work orders for repair are requested by Forexco personnel. Documentation is maintained in the File Room and at the compressor locations.

Compressors are equipped with automatic shut-off valve systems. Sensors monitor these systems and provide an immediate signal to the local control panel.
when the shut-off valves deviate from expected normal operations. If field personnel are not present at the compressor location at that time, a field operator call out is immediately generated. The field operator will determine and correct the cause of the shut-off valve system deviation with the immediate assistance of maintenance and/or mechanic staff as needed. Frequent visual inspections are made at the compressor stations. Results and readings are entered into the site log. Work orders for repair are requested. Documentation is maintained in the File Room and at the compressor locations.

4.7.4 Equipment Isolation for Maintenance or Alterations (16 NYCRR 255.733)

Forexco's compressor maintenance procedures, including equipment isolation and purging, are found in Appendix 8.7.

4.7.5 Storage of Combustible Materials (16 NYCRR 255.735)

Any flammable or combustible material beyond everyday usage requirements is stored at least 75 feet from any ignition source.

4.7.6 Gas Detection (16 NYCRR 255.736)

Each compressor station has a fixed gas detection and alarm system unless:

- It has at least 50 percent of its upright side area permanently open, or
- Is located in an unattended field compressor station and has 1,000 HP or less.

If required, the alarm system continuously monitors the concentration of gas in air and alarms when that concentration exceeds 20 percent of the lower explosive limit.

4.8 Valves and Pressure Limiting Devices (16 NYCRR 255.739, 741, and 743)

Maintaining Valves and Pressure Devices
4.8.1 Pressure control and overpressure protection devices ensure the pipeline operates below its MAOP.

Pressure devices are grouped into the following types:
- Process Control Devices - adjust to compensate for either high or low pressure and keep pipeline pressure within a predefined range.
- Pressure Limiting Devices - shut down some or all of the system when a predefined pressure is met or exceeded.
- Pressure Relieving Devices - bleed off pressure when a predefined pressure is met or exceeded. This O&M Manual only documents processes performed on pressure relieving devices that are connected to pipelines.

4.8.2 Testing

Pressure devices are function tested at intervals not exceeding 15 months but at least once per calendar year. Test data is recorded in the valve inspection contractor’s annual reports maintained in the Forexco. Pressure devices need to be inspected for the following:

- Capacity,
- Proper set pressure,
- Visible damage,
- Mechanical condition,
- Protection from dirt, liquids, or freezing, and
- Proper installation and any condition that could cause the device to malfunction.

The inspection form should include at least the following information:

- Date the work was completed and name of operator(s) who completed the work,
- Producing area and/or pipeline license location number,
- Component type and location,
- Inspection tasks and maintenance work details,
- Results of inspection and work performed, and
- Further actions required.

4.8.3 If it is determined that a change in capacity is required, the change shall be completed promptly in accordance with Forexco MOC process. The results of the check and all changes shall be recorded.
4.8.4 Updating Pressure Device Records

Pressure device records are updated in conjunction with construction activity such as when a new pipeline is tied into an existing pipeline. Pressure devices are documented using a table that lists each device and its geographic location. Information for valves at compressor stations and meter sites is also included.

4.9 Valve Maintenance (16 NYCRR 255.745)

4.9.1 All pipeline isolation block valves that may be used in an emergency situation are inspected at least once each calendar year, at intervals not exceeding 15 months. Test data is recorded on the Valve Inspection form maintained in the File Room. During the annual valve inspection the following actions are performed and documented on the Valve Inspection forms that are maintained in the File Room:

- Confirm the presence and relative position of the valve on the system map,
- Confirm the presence and condition of the line marker, if required, and the legibility of the writing, especially the emergency telephone number,
- Visually inspect the valve and piping for corrosion and any indication of acts of vandalism,
- Inspect the valve and piping for external leakage using either a CGI or a soap solution,
- Function test and partially operate the valve to assure that the stem has not seized up, and
- For remotely controlled valves, although the device can be triggered from an offsite location, an observer must be onsite to record that the valve physically moves.

4.9.2 Any Critical Valve that is not operational will be either repaired or replaced promptly after the defect discovery.

4.9.3 Valves referred to in this section are those that might be required in an emergency. They include emergency pipeline isolation and block valves and any other isolating valves. These valves are typically located where a pipeline descends into or emerges from the ground.

4.9.4 Update the valve records in conjunction with construction activity; for example, when a new pipeline is tied into an existing pipeline. Documentation for valves includes a table that lists the device and its geographic location.

4.10 Prevention of Accidental Ignition (16 NYCRR 255.751)

Forexco utilizes the Safe Work Permit document (see Appendix 8.10) to identify, communicate, eliminate or mitigate hazards associated work performed on Forexco sites and requires contractors to utilize job safety analysis (JSA) and/or their company procedures to identify, eliminate or control hazards associated with the work they will
perform.

Prior to commencing work in an area where the potential exists for conditions that would support combustion or where flammable materials could be ignited a Hot Work Permit (see Appendix 8.6) will be completed.

These documents work together to ensure identified hazards that could be encountered during the job are eliminated or reduced.

The following steps are used to minimize the danger of accidental ignition of gas in any structure or area where the presence of gas constitutes a hazard of fire or explosion:

- Determine if the work may be moved out of the hazardous location, eliminating it as “Hot Work,”
- Ensure proper isolation of all potential sources of energy or combustible substances,
- Utilize portable gas detection capable of detecting at minimum 02 and LEL. Check thoroughly to determine the presence of a combustible gas mixture prior to welding in or around a structure or area containing gas facilities. Do not use gas or electric welding or cutting on pipe or on pipe components that contain a combustible mixture of gas and air in the area of work. Begin welding only when safe conditions are validated and continuously monitor during activities for presence of combustible gases,
- Provide a fire extinguisher and/or Fire Watch,
- Maintain site control of the area limiting access; Post warning signs where appropriate,
- When flashlights, hand lanterns or other electrical equipment is needed for a task intrinsically safe (Class I) devices should be used, and
- Install a metallic bond at the location of a cut in a pipe that is made by other means than with a cutting torch.

5 ACCIDENTS AND LEAKS

Responding to Hits, Leaks, and Ruptures

- Pressure decrease, product volume imbalance, or report from public? 
  - No → Complete scheduled inspection
  - Yes → Shut-in offending pipeline segment and notify regulator immediately

- Leak or rupture? 
  - Yes → Complete internal and external pipeline failure reports
  - No → Yes
5.1 **Report of Accidents (49 CFR 191.15; 16 NYCRR 255.801)**

5.1.1 All incidents involving Forexco's gas facilities that result in injury or death to any person, damage to property, concern due to coverage by news media, or that involve carbon monoxide (CO) will be immediately reported by telephone to the New York State Public Service Commission as identified in the Emergency Response Plan.

5.1.2 Within 30 days a written account will be submitted for each incident that involves gas facilities and:
- A death or personal injury necessitating in-patient hospitalization; or
- Estimated property damage, including cost of gas lost, for Forexco, or others, or both, of $50,000 or more.
- The Forexco Incident Report forms for incident reporting and PHMSA form 7100.2 (see section 5.7.1) will be completed and filed with the New York State Public Service Commission and maintained in the File Room. Both forms are included in Appendix 8.10.

5.1.3 This report will set forth a chronological sequence of events including a detailed description of the:
- Accident (incident);
- Response, action and investigation by the operator; and
- Results and findings of the investigations.

5.1.4 Such written account for a CO incident will be made only when it resulted in either an injury or fatality.

5.1.5 Where applicable, a copy of the report will be sent to the Office of Pipeline Safety, United States Department of Transportation.

5.2 **Leaks: General (16 NYCRR 255.805)**

5.2.1 Leaks can be small openings, cracks, or holes in the pipeline that cause a slow release of pipeline product. They may be seen or smelled during ROW inspections, or they may be indicated by slight variations in pressure meters or product volume imbalances.

5.2.2 Ruptures are instantaneous tears or breaks that release an immediate and large volume of pipeline product. They can be detected quickly because of the significant reduction in operating pressure and product volume imbalance.

5.2.3 A pipeline leak or rupture is considered a pipeline failure.

5.2.4 A pipeline hit can be caused by contact from a backhoe, shovel, hydro-vac unit, or other third party event. Pipeline hits can be avoided by following the steps outlined in section 3.7.
5.3 Leaks: Records (16 NYCRR 255.807)

Records depicting the entire history of a leak from discovery through repair to follow up inspection will be maintained in the File Room and each leak identified by number. The name of the responsible individual will appear on the records. Notes concerning the leak will be uploaded to Bluetick.

The gas leak record will contain an adequate number of readings from the sample points tested during the leakage investigation to determine the extent of hazardous gas migration expressed in percent gas-in-air or percent LEL found at the time of classification, re-classification if applicable, surveillance investigations, during leak repair activities, after completion of repairs, and at any follow-up inspections.

5.4 Leaks: Instrument Calibration (16 NYCRR 255.809)

Each instrument utilized for leakage surveys and investigations must be tested against a known sample or in accordance with the manufacturer’s recommended instructions as follows:

(a) after any repair or replacement of parts other than normal maintenance;
(b) once every three months for CGI's and solid-state leak detection instruments and yearly for hydrogen flame ionization (HFI) instruments; and
(c) any time it is suspected that the calibration has changed.

5.5 Leaks: Response (16 NYCRR 255.811, 813, 815, 817)

5.5.1 The ERP will be invoked by Field Operations when necessary.

5.5.2 All leaks found on the pipeline system will be treated and handled as expeditiously as possible regardless of actual classification. If necessary, production will be stopped. When discovered, the nearest valve on each side of the leak will be closed to block in and isolate the pipeline segment involved. This blocked pipe segment will be depressured and the leak excavated. The leak will be repaired and the pipeline placed back in service.

5.5.3 Operations and Maintenance personnel may be notified of a pipeline leak by members of the public, they may notice volume imbalances or low pressure readings on meters, or they may discover them during the course of routine inspections when they smell product, see liquid on the ground (water or hydrocarbon), or hear the hiss of gas escaping from the pipeline. Gas detectors can also be used during routine inspections to locate leaks.
5.5.4 Where normal operating factors cannot account for a pressure or flow reduction, Operations and Maintenance personnel will consider shutting in the system and investigating on site immediately.

5.5.5 Pipeline segments with hits or leaks will be immediately isolated and the regulatory agency notified. The nearest valve on each side of the leak will be closed to block in and isolate the pipeline segment involved. This blocked pipe segment will be depressured and the leak excavated.

5.6 Follow-up Investigation (16 NYCRR 255.827)

See Section 1.4.

5.7 Reporting of Incidents and Safety Related Conditions (49 CFR 192.605(b)(4); 49 CFR 191.15; 49 CFR 191.23; 49 CFR 191.25)

5.7.1 Incident Report (49 CFR 191.3; 49 CFR 191.15)

The report which must be filed when an incident occurs is DOT Form PHMSA F7100.2, Incident Report – Gas Transmission and Gathering Systems. A copy of this form is in Appendix 8.10 and copies of all completed forms are on file in the HSE files. For purposes of completing and submitting this report, an incident means any of the following events:

(1) An event that involves a release of gas from a pipeline AND results in one or more of the following consequences:
   (i) A death or personal injury necessitating in-patient hospitalization;
   (ii) Estimated property damage of $50,000 or more, including loss to Forexco, others or both, but excluding cost of gas loss;
(iii) Estimated unintentional gas loss of three million cubic feet or more.

(2) An event that is significant in the judgment of Forexco, even though the loss did not meet the criteria of paragraph (1) above.

This form must be prepared and submitted as soon as practicable, but not more than 30 days after detection of an incident meeting the above criteria. The report is to be electronically submitted to PHMSA unless arrangements have been made to use an alternative reporting method.

5.7.2 Safety Related Condition Report (49 CFR 191.23; 49 CFR 191.25)

The report which must be filed to document the occurrence of a safety related condition associated with a gas pipeline must be headed “Safety Related Condition Report” and provide the following information:

(1) Name and principal address of Forexco,
(2) Date of the report,
(3) Name, job title and business telephone number of the person submitting the report,
(4) Name, job title and business telephone number of the person who determined the condition exists,
(5) The date the condition was discovered and the date the condition was first determined to exist,
(6) Location of the condition with reference to the State (and town, city or county), and as appropriate, the nearest street address, landmark or name of the pipeline,
(7) Description of the condition, including circumstances leading to its discovery, any significant effects of the condition on safety, and the name of the commodity transported, and
(8) The corrective action taken (including the reduction of pressure or shutdown) before the report was submitted and the planned follow-up or future corrective action, including the anticipated schedule for starting and concluding such action

For purposes of preparing and submitting this report, a safety related condition shall be associated with a pipeline in service and shall include any of the following:

(1) For a pipeline operating at a hoop stress at or above 20% SMYS, (a) general corrosion that reduces the wall thickness to less than that required for the MAOP, or (b) corrosion pitting that might result in leakage;
(2) Unintended movement or abnormal loading from natural causes, such as earthquakes, flooding or landslides, which impairs the serviceability of a pipeline transporting gas;
(3) Material defects or physical damage that impairs the serviceability of a
pipeline operating at a hoop stress at or above 20% of SMYS;

4) Any malfunction or operating error that causes the pressure of a pipeline transporting gas to rise above its MAOP;

5) Any malfunction or operating error that causes the pressure of a pipeline transporting gas to rise above its MAOP;

6) A leak in a pipeline transporting gas that constitutes an emergency; and

7) Any condition that could lead to an imminent hazard and causes Forexco to (a) reduce the operating pressure by 20% or more, or (b) shut down operation of a pipeline transporting gas.

A safety related condition report is NOT required for a safety related condition on a pipeline located 220 yards or more from any building intended for human occupancy or outdoor place of assembly, except where that pipeline is located within the right-of-way of an active railroad, paved road, street or highway. A safety related condition report MAY NOT be required if the condition is corrected by repair or replacement in accordance with applicable safety standards before the deadline for submitting the report.

Each report of a safety related condition must be filed with both PHMSA and the New York PSC in writing within five business days after the day a representative of Forexco first determines that the safety related condition exists, but not later than ten working days after the day a representative of Forexco first discovers the condition. Separate conditions may be described in a single report if they are closely related.

5.7.3 Forexco follows Global Performance Indicator Reporting requirements for incidents meeting the reporting criteria. Incidents, near misses and unsatisfactory conditions are tracked in a database. This system tracks and ensures actions are completed. Lessons learned are shared across Forexco in the form of Alerts. This system would be used for a safety related condition only if such condition meets the criteria for an incident.
APPENDICES

8.1 Compliance Cross-Reference
8.2 Contact Lists – Forexco / PSC
8.3 State of New York Systems Map
8.4 Cathodic Protection Installation Procedures
8.5 Welding Procedures
8.6 Critical Task Procedures
8.7 Non-Critical Task Procedures
8.8 Ground Disturbance Procedure
8.9 Public Awareness Pamphlet
8.10 Reports and Forms
8.11 Gathering and Transmission Pipelines
8.1 Compliance Cross-Reference
<table>
<thead>
<tr>
<th>CITATION 16 NYCRR</th>
<th>REQUIREMENT</th>
<th>APPLICABLE (YES/NO)</th>
<th>PROGRAM REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>255.605</td>
<td>Each operator shall include, as a minimum, the following in its operating and maintenance plan as applicable:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>255.605(a)</td>
<td>Detailed instructions for employees covering operating and maintenance procedures during normal operations and repairs;</td>
<td>YES</td>
<td>Appendices 8.4 through 8.8</td>
</tr>
<tr>
<td>255.605(b)</td>
<td>Procedures required to be included by the provisions of the welding, joining, corrosion control, upgrading, operations, maintenance, and accidents and leaks sections of this Part;</td>
<td>YES</td>
<td>Appendices 8.4 through 8.8</td>
</tr>
</tbody>
</table>
| 255.605(c)       | Specific programs relating to facilities presenting the greatest hazard to public safety either in an emergency or because of extraordinary construction or maintenance requirements; | YES | Section 3.9  
Section 3.13  
Section 3.14 |
| 255.605(d)       | Provision for periodic inspections to ensure that operating pressures are appropriate for the class location; | YES | Section 3.4  
Section 3.5 |
| 255.605(e)       | Precautions to be taken when excavation is performed in the vicinity of any underground gas facility; | YES | Section 3.7.2  
Section 3.7.3  
Section 3.7.4 |
| 255.605(f)       | Procedures to correct, within specified timeframes, deficiencies found during any inspections, evaluations, reviews, etc. required by this Part; | YES | Section 2.3.3  
Section 4.2  
Section 4.4  
Section 4.9 |
| 255.605(g)       | Criteria employed to determine business districts for the purpose of compliance with section 255.723(b)(1) of this Part; | NO | Forexco does not operate distribution lines. |
| 255.605(h)       | Criteria employed to identify those conditions at leak hazard locations which necessitate that the interval between surveillances be shortened; | YES | Section 3.6.2 |
| 255.605(i)       | Details of how an operator plans to comply with any requirement of this Part that is written in nonspecific language. For example, section 255.805(b) of this Part states that "Each operator shall establish a means by which it determines the appropriate surveillance interval at leak locations under frost conditions." The details required by this subdivision would necessitate the operator to specify the established means; | YES | Section 4.2  
Section 4.4  
Section 4.9 |
| 255.605(j)       | Instructions enabling personnel who perform operation and maintenance activities to recognize conditions that may be safety-related conditions that are subject to the reporting requirements of section 255.831 of this Part; | YES | Section 5.7  
Section 3.14  
Appendix 8.10 |
| 255.605(k)       | Procedures for making construction records, maps, and operating history available to appropriate personnel; | YES | Section 1.5 |
| 255.605(l)       | Procedures for start up and shut down of any section of pipeline in a manner designed to assure operation within the maximum allowable operating pressure limits prescribed by this Part, plus the build-up allowed for operation of pressure limiting and control devices; | YES | Section 3.2  
Appendix 8.6 |
| 255.605(m)       | Procedures for maintaining compressor stations, including provisions for isolating units or sections of pipe and for purging before returning to service; | YES | Section 4.7  
Appendix 8.7 |
| 255.605(n)       | Procedures for starting, operating, and shutting down gas compressor units; | YES | Section 3.3  
Appendix 8.7 |
<table>
<thead>
<tr>
<th>CITATION 16 NYCRR</th>
<th>REQUIREMENT</th>
<th>APPLICABLE (YES/NO)</th>
<th>PROGRAM REFERENCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>255.605(o)</td>
<td>Procedures for periodic review of the work done by operator personnel to determine the effectiveness and adequacy of the procedures used in normal operation and maintenance and modifying the procedures when deficiencies are found;</td>
<td>YES</td>
<td>Section 1.4</td>
</tr>
<tr>
<td>255.605(p)</td>
<td>Procedures for adequate precautions in excavated trenches to protect personnel from the hazards of unsafe accumulations of vapor or gas, and making available when needed at the excavation, emergency rescue equipment including a breathing apparatus and a rescue harness and line;</td>
<td>YES</td>
<td>Section 3.7</td>
</tr>
<tr>
<td>255.605(q)</td>
<td>Responding promptly to a report of a gas odor inside or near a building, unless the operator's emergency procedures under section 255.615(a)(3) of this Part specifically apply to these reports; and</td>
<td>YES</td>
<td>Section 3.9 Emergency Response Plan</td>
</tr>
<tr>
<td>255.605(r)</td>
<td>For transmission lines, other than those operated in connection with the operator's distribution system, procedures for the following to provide safety when operating design limits have been exceeded: (1) ... (4) ...</td>
<td>YES</td>
<td>Section 3.14</td>
</tr>
<tr>
<td>255.605(s)</td>
<td>Implementing the applicable control room management procedures required by section 255.631 of this Part.</td>
<td>NO</td>
<td>Forexco does not use a controller working in a control room who monitors and controls all or part of a pipeline facility through a SCADA system.</td>
</tr>
</tbody>
</table>
8.2 Contact Lists – Forexco / PSC
NEW YORK STATE DEPARTMENT OF PUBLIC SERVICE

EMERGENCY NOTIFICATION CALL LIST

During business hours (8:30 a.m. – 4:45 p.m., Monday – Friday) the telephone report is to be made to the Department of Public Service, Office of Gas & Water, Safety Section, in Albany at (518) 474-5453. It is expected that contact be made with staff personnel as soon as possible after the incident occurs.

During non-business hours (4:45 p.m. – 8:30 a.m., State holidays and weekends) contact one of the staff personnel in the following order:

<table>
<thead>
<tr>
<th>Contact Names</th>
<th>Phone Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jeremy Kemak</td>
<td>(607) 692-4464</td>
</tr>
<tr>
<td>Kris Harsh</td>
<td>(607) 723-8785</td>
</tr>
<tr>
<td>Mike McCutcheon</td>
<td>(607) 758-9833</td>
</tr>
<tr>
<td>Kimberly Guzzo</td>
<td>(315) 252-6258</td>
</tr>
<tr>
<td>Brett Mahan</td>
<td>(315) 655-4281</td>
</tr>
<tr>
<td>Jeffrey Kline</td>
<td>(518) 729-2525</td>
</tr>
<tr>
<td>Chris Stolicky</td>
<td>(518) 703-1456</td>
</tr>
<tr>
<td>Kevin Speicher</td>
<td>(315) 391-3794</td>
</tr>
</tbody>
</table>

Department of Public Service
Office of Gas and Water, Safety Section
Three Empire State Plaza
Albany, New York 12223-1350

NOTE: For additional Emergency Notification contacts and information, see the Forexco Emergency Response Manual.
8.3 State of New York Systems Map
8.4 Cathodic Protection Installation Procedures

1. Exothermic Welding Procedure
2. Insulating Flange Assembly
3. Royston “Handy Cap” over Exothermic Weld Connections
4. Magnesium Anode Cable Splice
5. Test Station with Multiple Magnesium Anode Groundbed and Permanent Reference Electrode
6. “Zap Guard” Fink Test Station for Use in Areas Where Induced AC Voltage is Present
7. Damaged Test Station Removal and Wire Termination Burial
REMOVE PIPELINE COATING - FILE PIPE TO BRIGHT METAL AND DRY ANY MOISTURE WITH A TOWEL.

STEP 1

3" TO 4"

STRIP INSULATION FROM WIRE

STEP 2

HOLD WELDER FIRMLY IN PLACE WHILE MAKING CONNECTION

APPLY SPARK GUN AWAY FROM OPERATOR

STEP 3

COAT CONNECTION WITH BITUMINOUS COMPOUND OR PLASTIC WELD CAP (SEE DRAWING A1-32406-C FOR WELD CAP INSTALLATION)

STEP 4

HOLD GRAPHITE MOLD IN PLACE

STARTING POWDER TO GUN

WELD METAL

METAL DISK

COPPER WIRE

PIPE SURFACE

STEP 5

**WHEN NO. 14 TO NO. 10 AWG SOLID WIRE IS USED, IT WILL BE NECESSARY TO INSTALL A COPPER SLEEVE (CA-133-1-H) OVER THE BARE SECTION OF WIRE BEFORE THE CONNECTION IS ATTEMPTED. WIRE SHOULD PROTRUDE 1/8" BEYOND END OF SLEEVE.**

FOREXCO, INC.
PROCEDURE FOR MAKING EXOTHERMIC WELD CONNECTIONS TO STEEL PIPE

CORRPRO COMPANIES, INC.
1055 West Smith Road
Medina, Ohio 44256
(330) 723-5082
EXOTHERMIC WELDING PROCEDURE
FOR STEEL PIPE

1. WHEN USING No. 14 TO No. 10 AWG SOLID WIRE, IT WILL BE
   NECESSARY TO INSTALL A COPPER SLEEVE (CAB-1 33-1H)
   OVER THE BARE END OF THE WIRE AND CRIMP IN PLACE BEFORE
   ATTEMPTING TO MAKE THE CONNECTION. FOR No. 10 AWG
   STRANDED WIRE, USE CAB-1 33-1K. THE WIRE SHOULD
   PROTRUDE AT LEAST, 1/8" FROM THE END OF THE SLEEVE.

2. INSERT THE CONDUCTOR INTO MOLD NOTING ANY SPECIAL
   INFORMATION UNDER "POSITIONING" FOR APPLICATION TYPE
   IN THE MANUFACTURER'S INSTRUCTIONS PACKAGED WITH THE
   WELDER.

3. INSERT STEEL DISK IN BOTTOM OF CAVITY INSIDE MOLD. DUMP
   THE WELD METAL INTO MOLD BEING CAREFUL NOT TO UPSET
   THE STEEL DISK. TAP THE BOTTOM OF THE TUBE TO LOOSEN
   ALL THE STARTING POWDER AND SPREAD IT EVENLY OVER THE
   WELD METAL. PLACE A SMALL AMOUNT OF STARTING POWDER
   ON THE TOP EDGE OF MOLD UNDER COVER OPENING FOR EASY
   IGNITION.

4. CLOSE COVER AND IGNITE WITH THE FLINT GUN. MOVE FLINT GUN
   AWAY QUICKLY TO PREVENT FOULING. IF FLINT GUN SHOULD
   BECOME FOULED, SOAK IT IN HOUSEHOLD AMMONIA.

5. AFTER IGNITION, HOLD THE WELDER IN PLACE FOR A MOMENT
   TO ALLOW THE WELD TO SOLIDIFY. AFTER THE WELD HAS COOLED,
   REMOVE THE SLAG WITH A CHIPPING HAMMER OR WIRE BRUSH.

6. COAT THE CONNECTION AND THE ENTIRE PREPARED SURFACE
   WITH BITUMASTIC COMPOUND (KOPPERS No. 50 OR EQUAL) OR
   PLASTIC WELD CAPS.

7. REMOVE ALL SLAG FROM THE WELDER BEFORE MAKING THE NEXT
   WELD. CLEAN THE COVER EVERY 6 TO 10 WELDS.

8. WET OR DAMP MOLDS WILL PRODUCE POROUS WELDS. MOLDS
   MUST BE DRIED OUT BEFORE ATTEMPTING TO WELD.

9. CONNECTIONS ARE TO BE PLACED A MINIMUM OF 3 INCHES
   APART. UNSUCCESSFUL WELDS ARE TO BE ABANDONED AND
   MOVED TO ANOTHER PREPARED SURFACE NOT LESS THAN
   3 INCHES AWAY.

THIS DRAWING MAY NOT BE DUPLICATED IN
ANY WAY EXCEPT BY WRITTEN AGREEMENT
WITH CORRPRO COMPANIES, INC.

FOREXCO, INC.
PROCEDURE FOR MAKING
EXOTHERMIC WELD CONNECTIONS
TO STEEL PIPE
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FLANGE NUT

STUD

INSULATING WASHER (TYP.)

INSULATING GASKET

INSULATING SLEEVE

FLANGE NUT

PIPELINE

FLANGE

CORPRO COMPANIES, INC.

1055 West Smith Road
Medina, Ohio 44256

(330) 723-5082
{This page intentionally left blank}
1. Weld lead to pipeline as shown on drawing A1-32403-C

2. Wire brush weld connection to remove slag deposits.

3. Prime the area of exposed metal and weld connection with No. 747 ROYSTON PRIMER. Allow primer to dry completely before proceeding to Step 5.

4. Remove protective cover from "HANDY CAP" and place over welded connection and lead wire.

5. Before placing the "HANDY CAP", align the lead wire tunnel over the wire.

6. Leave some slack in the lead wire before backfilling.

7. Tape ends of "HANDY CAP" with electrical tape to hold it in place during backfilling.

NOTE: Electrical tape may be deleted if surface is clean and dry.

---

CORRPRO COMPANIES, INC.
1055 West Smith Road
Medina, Ohio 44256
(330) 723-5082

FOREXCO, INC.
Steps for Applying ROYSTON "HANDY CAP" over Exothermic Weld Connection

DRAWN BY: J.W.P.
DESIGNED BY: J.P.D.
DATE: 9-26-05
SCALE: NONE
SHEET: 1 of 1
DRAW No.: A1-32406-C

This drawing may not be duplicated in any way except by written agreement with CORRPRO COMPANIES, INC.
(This page intentionally left blank)
**NOTE:**

1. **THIS SPlice IS NOT TO BE USED ON IMPRESSED CURRENT SYSTEMS**

2. **ENTIRE SPlice TO BE COATED WITH SCOTCHKOTE ELECTRICAL COATING OR EQUAL, AND ALLOWED TO DRY COMPLETELY BEFORE BACKFILLING**
5-THREADED POSTS WITH TWO ASA BINDING NUTS PER POST
FINK 5-POLE TEST STATION
COVER NOT SHOWN

FINK TEST STATION WITH COVER - SEE DETAIL

3" DIA. PLASTIC CONDUIT WITH ANCHOR

GRADE

2" MIN.

SOIL ANCHOR

JUNCTION BOX

COPPER CONNECTING STRAP

PERMANENT REFERENCE ELECTRODE

LEAD - (No. 14
HMWP - BLACK)

PIPE LEAD WIRES

ANODE HEADER CABLE

THEMATIC ELECTRODE (OPTIONAL)

12" TYP.

PIPELINE

12" TYP.

MAGNESIUM ANODE

ANODE SPACING PER JOB SPECIFICATIONS

NOTES:
1) WIRES A & B ARE No. 12 AWG - TW SOD COPPER - SINGLE
   CONDUCTOR, (WHITE)
2) WIRE C IS No. 8 AWG - HMW-7 STRAND COPPER - SINGLE CONDUCTOR, (BLACK)
3) LEAD WIRES CONNECTED TO PIPE BY EXOTHERMIC WELD, AND COATED
   - SEE DRAWINGS A1-32403-C AND A1-32406-C.

FOREXCO, INC.
TYPICAL TEST STATION WITH MULTIPLE MAGNESIUM ANODE GROUNDBED
AND PERMANENT REFERENCE ELECTRODE
8.5  Welding Procedures

1. Butt                        F-01-03
2. Butt                        F-08-03
3. Butt                        F-09-03
4. Butt                        F-10-03
5. Butt                        F-11-03
6. Fillet Weld                 F-06-03
7. Fillet Weld                 F-07-03
8. Fixed Butt Welding          F-02-03
9. Fixed Butt Welding          F-04-03
10. Repair Procedure           F-12-03
11. Rolled Butt Welding        F-03-03
12. Rolled Butt Welding        F-05-03
13. Shielded Metal Arc Branch Weld FPL-2
14. Welding Procedure Numbering System
Forexco, Inc.
Welding

Welding Procedure Specification No. F-01-03
Reference Procedure Qualification Record No. F-01-03

1. Scope
2. Process
3. Material
4. Diameter
5. Wall Thickness
6. Joint Design
7. Filler Material
8. Electrical Char.
9. Number of Welders
10. Position

Butt
SMAW
API 5L X 82
2 3/8" to 6 5/8" O.D.
.188" to .750"
V-Bevel, 60-70 degree, included
E8010-E7010
DCER
1 Minimum
Fixed

11. Direction of Welding:
12. Number of Passes
13. Time Lapse between
14. Type of Line-up Clamp
15. Removal of Line-up Clamp
16. Cleaning
17. Preheating
18. Shielding Gas & Flow Rate
19. Shielding Flux
20.

Downhill
Minimum of 2 passes
Note 5
External
50% of Root Pass
Power Tool, or Hand Tools
Note 6
N/A
Costed

OTES:
1. Root Pass, Hot Pass, and remaining passes: electrode size 3/32" through 8/32" selection depends on pipe diameter. For 0.40 to .0750 (inclusive) wall pipe, electrode size up to and including 3/16" diameter is allowed for the filler and cap pass.
2. For every .125" of wall thickness less than that of the test pipe, one complete filler pass will be eliminated.
3. For every .125" of wall thickness greater than that of the test pipe, one complete filler pass will be added.
4. Add stripper passes if needed from 2-5 o'clock to complete a uniform cap pass.
5. Not to exceed 5 minutes between Root and Hot Pass. Remaining passes as soon as possible.
6. Preheating: As required by company and prevailing weather conditions. If the base metal temperature is below 50°F, preheat the base metal to at least 150°F to 250°F maximum and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.
7. (X52 pipe) E-6010,E7010 for root pass, remaining passes E-7010.

<table>
<thead>
<tr>
<th>Welding Data</th>
<th>Bead Number</th>
<th>Electrode Size</th>
<th>Voltage</th>
<th>Amperage</th>
<th>Speed of Travel</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Root Pass</td>
<td>3/32&quot;-1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>5&quot;-12&quot;</td>
<td></td>
</tr>
<tr>
<td>2. Hot Pass</td>
<td>3/32&quot;-1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>5&quot;-12&quot;</td>
<td></td>
</tr>
<tr>
<td>3. Filler &amp; Cover Pass</td>
<td>1/8&quot;-5/32&quot;-3/16&quot;</td>
<td>20-40</td>
<td>90-190</td>
<td>4&quot;-10&quot;</td>
<td></td>
</tr>
</tbody>
</table>
FOREXCO, INC.
WELDING PROCEDURE SPECIFICATION

Welding Process: Manual Shielded Metal-Arc
Pipe/Fitting: Grade API 5L X46-X60
Diameter Group: 2 3/8" - 12 3/4"
Wall Thickness Group: 3/16" - 3/4"

TEST MATERIAL DATA
Diameter: 12-3/4" Wall Thickness: 3/32" Grade: API 5L X60 Mfg.: N/A

WELDING PARAMETERS

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/8&quot;</td>
<td>6010</td>
<td>E</td>
<td>90</td>
<td>Lincoln</td>
<td>10 - 130</td>
<td>20 - 30</td>
<td>6 - 15</td>
<td>7.20 (39.00)</td>
<td>23.10</td>
</tr>
<tr>
<td>2-Rem.</td>
<td>5/32&quot;</td>
<td>7010</td>
<td>E</td>
<td>130</td>
<td>Lincoln</td>
<td>170 - 170</td>
<td>20 - 30</td>
<td>6 - 12</td>
<td>9 (13.00)</td>
<td>51.00</td>
</tr>
</tbody>
</table>

Additional passes, if required due to wall thickness variations, shall be made in accordance with the parameters of the last pass.

Visual Inspection Results: Satisfactory
Radiographic Examination Results: N/A

TENSILE STRENGTH TEST DATA

<table>
<thead>
<tr>
<th>Specimen Number</th>
<th>Fracture Location</th>
<th>Width</th>
<th>Thickness</th>
<th>Area</th>
<th>Load (Lbs.)</th>
<th>Ultimate Tensile Strength (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>X</td>
<td>0.96</td>
<td>0.37</td>
<td>0.355</td>
<td>29,635</td>
<td>84,042</td>
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<tr>
<td>T-2</td>
<td>X</td>
<td>0.968</td>
<td>0.376</td>
<td>0.364</td>
<td>30,540</td>
<td>85,000</td>
</tr>
</tbody>
</table>

BEND and NICK BREAK TEST DATA

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Root or Side Bend</th>
<th>Face or Side Bend</th>
<th>Nick Break Specimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB-1</td>
<td>yes</td>
<td>FB-1</td>
<td>yes</td>
</tr>
<tr>
<td>RB-2</td>
<td>yes</td>
<td>FB-2</td>
<td>yes</td>
</tr>
<tr>
<td>RB-3</td>
<td>N/A</td>
<td>FB-3</td>
<td>N/A</td>
</tr>
<tr>
<td>RB-4</td>
<td>N/A</td>
<td>FB-4</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Destructive Test Results: To Be Welded and Tested

WELDING CONDITIONS

No. of Welders: Minimum 1 Remaining Passes 1 Minimum
Welder Names: Marshall Sparks
Test Welding Temp. and Conditions: In FE Shop
Welding Machines: Stringer/Weave
Cleaning: Power Brushing / Grinding
Welding Direction: Vertical Down
Pipe Position: Horiz. - Fixed (5G)
Clamp Type/Removal: External - After 50% of Root Pass Completed
Current/Polarity: DCRP
Time Between Passes: 5 Minutes between Root/Hot Pass. Remaining Passes within 72 Hrs.
Temp. Control: Infrared Pyrometer or Temp Stick
Preheat shall be applied at all temperatures below 50 degrees F. and when C.E. is greater than 0.40%. Pipe to be dry.

Weld Joint Design
- Voltage was measured across arc for procedure development.
- Allow for a one to four volt increase when measuring at the machine terminals due to voltage loss.
- A change from the above electrode size to one nominal size smaller or larger is permissible. See Below Parameters.

<table>
<thead>
<tr>
<th>Electrode Dia.</th>
<th>Amps</th>
<th>Volts</th>
<th>Travel Speed (IPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32&quot;</td>
<td>60-90</td>
<td>20-24</td>
<td>8-15</td>
</tr>
<tr>
<td>3/16&quot;</td>
<td>160-200</td>
<td>25-30</td>
<td>9-18</td>
</tr>
</tbody>
</table>

This procedure was prepared in accordance with the Twentieth Edition of API 1104 and DOT Parts 192 and 195.
Forexco, Inc.

Welding

WELDING PROCEDURE NO. F-08-03
(Ref Procedure Qualification Record No. F-08-03)

1. Scope  Butt
2. Process  SMAW
3. Material  API 5L X42
4. Diameter  <= 2 3/8"
5. Wall Thickness  <= .188"
6. Joint Design  V-Bevel 60° - 70° inclusive
7. Filler Material  E6010
8. Electrical Char.  DCEP
9. Number of Welders  1 Minimum
10. Position  Fixed

11. Direction of Welding:  downhill
12. Number of Passes  Minimum of 2 passes
13. Time Lapse between  See Note 5
14. Type of Line-up Clamp  External when needed
15. Removal of Line-up Clamp  After Tacking
16. Cleaning  Power Tools or Hand Tools
17. Preheating  See Note 6
18. Shielding Gas & Flow Rate  N/A
19. Shielding Flux  Coated
20.

NOTES:
1. Root Pass, Hot Pass, and remaining passes; electrode size 3/32" through 1/8", selection depends on pipe diameter.
2. For every .125" of wall thickness less than that of the test pipe, one complete filler pass will be eliminated.
3. For every .125" of wall thickness greater than that of the test pipe, one complete filler pass will be added.
4. Add stripper passes if needed from 2-5 o'clock to complete a uniform cap pass.
5. Not to exceed 5 minutes between Root and Hot Pass. Remaining passes as soon as possible.
6. Preheating: As required by company and prevailing weather conditions; if the base metal temperature is below 50°F, preheat the base metal to at least 150°F to 250°F maximum and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.
7. (X42 pipe) E6010 5p+ for root pass, remaining passes E6010.

<table>
<thead>
<tr>
<th>Bead Number</th>
<th>Electrode Size and Type</th>
<th>Voltage</th>
<th>Amperage and Polarity</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Pass</td>
<td>3/32&quot; - 1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>5&quot; - 12&quot; ipm</td>
</tr>
<tr>
<td>Hot Pass</td>
<td>3/32&quot; - 1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>5&quot; - 12&quot; ipm</td>
</tr>
<tr>
<td>Filler Pass &amp; Cover Pass</td>
<td>1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>4&quot; - 10&quot; ipm</td>
</tr>
</tbody>
</table>
FOREXCO, INC.

WELDING PROCEDURE SPECIFICATION

Welding Process: Manual Shielded Metal Arc
Pipe/Fitting: Grade API 5L X42 and Below
Diameter Group: Less than 2 3/8".
Wall Thickness Group: Less Than 0.188"

TEST MATERIAL DATA
Diameter: 1.900"  Wall Thickness: 0.145"
Grade: API 5L X42  Mfg.: N/A

WELDING PARAMETERS

<table>
<thead>
<tr>
<th>Pass</th>
<th>Electrode Number</th>
<th>Size</th>
<th>AWS Class No.</th>
<th>Mfg.</th>
<th>Ampacity Range</th>
<th>Voltage Range</th>
<th>Travel Speed (IPM)</th>
<th>Heat Input - Kilocalories</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>3/32&quot;</td>
<td>EB010 Lincoln</td>
<td>60</td>
<td>90</td>
<td>MIN - 20 MAX - 23</td>
<td>6 12</td>
<td>9</td>
<td>6.00</td>
</tr>
<tr>
<td>2-Rem.</td>
<td>1/8&quot;</td>
<td>EB010 Lincoln</td>
<td>90</td>
<td>120</td>
<td>MIN - 22 MAX - 28</td>
<td>6 12</td>
<td>9</td>
<td>9.00</td>
</tr>
</tbody>
</table>

Additional passes, if required due to wall thickness variations, shall be made in accordance with the parameters of the last pass.

Visual Inspection Results: Satisfactory
Radiographic Examination Results: N/A

TENSILE STRENGTH TEST DATA

<table>
<thead>
<tr>
<th>Specimen Number</th>
<th>Fracture Location</th>
<th>Specimen Width</th>
<th>Specimen Thickness</th>
<th>Area Sq. in.</th>
<th>Load (Lbs.)</th>
<th>Ultimate Tensile Strength (ksi)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>T-2</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-3</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-4</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BEND and NICK BREAK TEST DATA

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Results</th>
<th>Specimen No.</th>
<th>Results</th>
<th>Specimen No.</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB-1</td>
<td>ok</td>
<td>FB-1</td>
<td>N/A</td>
<td>NS-1</td>
<td>ok</td>
</tr>
<tr>
<td>RB-2</td>
<td>ok</td>
<td>FB-2</td>
<td>N/A</td>
<td>NS-2</td>
<td>ok</td>
</tr>
<tr>
<td>RB-3</td>
<td>N/A</td>
<td>FB-3</td>
<td>N/A</td>
<td>NS-3</td>
<td>N/A</td>
</tr>
<tr>
<td>RB-4</td>
<td>N/A</td>
<td>FB-4</td>
<td>N/A</td>
<td>NS-4</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Destructive Test Results: To Be Welded and Tested

WELDING CONDITIONS

No. of Welders Minimum Root Pass Remaining Passes Welder Names: To Be Determined Test Welding Temp. and Conditions: In FE Shop
1 1 Minimum

Welding Machine: "Welding Technique: Stringer/Weave"
Cleaning: "Power Brushing/ Grinding"
Welding Direction: Vert. Down
Pipe Position: Horizontal - Fixed (6G)
Clamp Type/Removal: N/A
Current/Polarity: DCRP
Time Between Passes: All Passes completed without delay.
Temp. Control: Infrared Pyrometer
Preheat shall be applied at all temperatures below 50 degrees F. and when C.E. is greater than 0.40%. Pipe to be dry.

Weld Joint Design: "Additional Information:"
Voltage was measured across are for procedure development
Allow for a one to four volt increase when measuring at the machine terminals due to voltage loss.
A change from the above electrode size to one nominal size smaller or larger is permissible. See Below Parameters.

<table>
<thead>
<tr>
<th>Electrode Dia.</th>
<th>Amps</th>
<th>Volts</th>
<th>Travel Speed (IPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32&quot;</td>
<td>60-90</td>
<td>20-24</td>
<td>6-12</td>
</tr>
<tr>
<td>1/8&quot;</td>
<td>90-120</td>
<td>20-30</td>
<td>9-18</td>
</tr>
</tbody>
</table>

This procedure was prepared in accordance with the Nineteenth Edition of API 1104 and DOT Parts 192 and 193.
Forexco, Inc.

Welding

WELDING PROCEDURE NO. F-09-03
(Ref Procedure Qualification Record No. F-09-03)

1. Scope  Butt  11. Direction of Welding:  Downhill
2. Process  SMAW  12. Number of Passes  Minimum of 2 passes
3. Material  API 5LX42  13. Time Lapse between  See Note 5
4. Diameter  ≤2 3/8"  14. Type of Line-up Clamp  External when needed
5. Wall Thickness  ≤ .188"  15. Removal of Line-up Clamp  After-Tracking
7. Filler Material  E6010  17. Preheating  See Note 6
8. Electrical Char.  DCEP  18. Shielding Gas & Flow Rate  N/A
9. Number of Welders  1 Minimum  19. Shielding Flux  Coated

NOTES:
2. For every .125" of wall thickness less than that of the test pipe, one complete filler pass will be eliminated.
3. For every .125" of wall thickness greater than that of the test pipe, one complete filler pass will be added.
4. Add stripper passes if needed from 2-5 o'clock to complete a uniform cap pass.
5. Not to exceed 5 minutes between Root and Hot Pass. Remaining passes as soon as possible.
6. Preheating: As required by company and prevailing weather conditions: If the base metal temperature is below 50°F, preheat the base metal to at least 150°F to 250°F maximum and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.
7. (X42 pipe) E6010 5p+ for root pass, remaining passes E6010.

<table>
<thead>
<tr>
<th>Bead Number</th>
<th>Electrode Size and Type</th>
<th>Voltage</th>
<th>Amperage and Polarity</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Pass</td>
<td>3/32&quot;-1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>5&quot;-12&quot; ipm</td>
</tr>
<tr>
<td>Hot Pass</td>
<td>3/32&quot;-1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>5&quot;-12&quot; ipm</td>
</tr>
<tr>
<td>Filler Pass</td>
<td>1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>4&quot;-10&quot; ipm</td>
</tr>
</tbody>
</table>
**FOREXCO, INC.**

**WELDING PROCEDURE SPECIFICATION**

| Welding Process: Manual Shielded Metal-Arc | Pee/Fitting: Grade API X52 and Below |
| Diameter Group: Less than 2 3/8" | Wall Thicknesses Group: Less Than 3/16" |

| Diameter: 1.900" | Wall Thickness: 0.145" | Grade: API X52 | Mfg.: N/A |

<table>
<thead>
<tr>
<th>TEST MATERIAL DATA</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
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<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3/32&quot;</td>
<td>E6010</td>
<td>Lincoln</td>
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<td>20.70</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>23</td>
<td>12</td>
<td>9.00</td>
<td>30.00</td>
</tr>
<tr>
<td>2-Rem.</td>
<td>1/8&quot;</td>
<td>E6010</td>
<td>Lincoln</td>
<td>22</td>
<td>12</td>
<td>9.00</td>
<td>19.85</td>
</tr>
</tbody>
</table>

Additional passes, if required due to wall thickness variations, shall be made in accordance with the parameters of the last pass.

Visual Inspection Results: Satisfactory

Radiographic Examination Results: N/A

### TENSILE STRENGTH TEST DATA

<table>
<thead>
<tr>
<th>Specimen Number</th>
<th>Fracture Location</th>
<th>Specimen Width</th>
<th>Specimen Thickness</th>
<th>Area</th>
<th>Load (Lbs.)</th>
<th>Ultimate Tensile Strength (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-2</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-3</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-4</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### BEND AND NICK BREAK TEST DATA

<table>
<thead>
<tr>
<th>Specimen Number</th>
<th>Results</th>
<th>Specimen Number</th>
<th>Results</th>
<th>Specimen Number</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB-1</td>
<td>ok</td>
<td>FE-1</td>
<td>N/A</td>
<td>NB-1</td>
<td>ok</td>
</tr>
<tr>
<td>RB-2</td>
<td>N/A</td>
<td>FE-2</td>
<td>N/A</td>
<td>NB-2</td>
<td>ok</td>
</tr>
<tr>
<td>RB-3</td>
<td>N/A</td>
<td>FE-3</td>
<td>N/A</td>
<td>NB-3</td>
<td>N/A</td>
</tr>
<tr>
<td>RB-4</td>
<td>N/A</td>
<td>FE-4</td>
<td>N/A</td>
<td>NB-4</td>
<td>N/A</td>
</tr>
</tbody>
</table>

| Destructive Test Results: To Be Welded and Tested |

### WELDING CONDITIONS

<table>
<thead>
<tr>
<th>No. of Welders</th>
<th>Root Pass</th>
<th>Remaining Passes</th>
<th>Welder Names: To Be Determined</th>
<th>Test Welding Temp. and Conditions: In FE Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>1</td>
<td>1 Minimum</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Welding Machines:</th>
<th>Welding Technique: Stringer/Wave</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Welding Direction: Horizontal</td>
</tr>
<tr>
<td></td>
<td>Pipe Position: 45° Fixed (6G)</td>
</tr>
<tr>
<td></td>
<td>Clamp Type/Removal: N/A</td>
</tr>
<tr>
<td></td>
<td>Current/Polarity: DCRP</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Time Between Passes: All Passes completed without delay.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preheat Temperature: 180 degree F., Min.; 350 degree Max.</td>
</tr>
<tr>
<td>Preheat Method: Propane</td>
</tr>
<tr>
<td>Preheat shall be applied at all temperatures below 50 degrees F. and when C.E. is greater than 0.40%. Pipe to be dry.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Weld Joint Design</th>
<th>Additional Information:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Voltage was measured across arc for procedure development. Allow for a one to four volt increase when measuring at the machine terminals due to voltage loss.</td>
</tr>
<tr>
<td></td>
<td>A change from the above electrode size to one nominal size smaller or larger is permissible. See Below Parameters.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrode Dia.</th>
<th>Amps</th>
<th>Volts</th>
<th>Travel Speed (IPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32&quot;</td>
<td>60-90</td>
<td>20-24</td>
<td>8-15</td>
</tr>
<tr>
<td>1/8&quot;</td>
<td>80-120</td>
<td>22-30</td>
<td>9-16</td>
</tr>
</tbody>
</table>

This procedure was prepared in accordance with the Nineteenth Edition of API 1104 and DOT Parts 192 and 195.
Forexco, Inc.

Welding

WELDING PROCEDURE NO. F-10-03
(Ref. Procedure Qualification Record No. F-10-03)

1. Scope: Butt
2. Process: SMAW
3. Material: API 5L X52
4. Diameter: 2 3/8" through 6 5/8"
5. Wall Thickness: .188" to .750"
6. Joint Design: V-Bevel 60° - 70° Inclusive
7. Filler Material: E6010 - E7010
8. Electrical Char.: DCEP
9. Number of Welders: 1 Minimum
10. Position: Rolled
11. Direction of Welding: Downhill
12. Number of Passes: Minimum of 2 passes
13. Time Lapse between: See Note 5
14. Type of Line-up Clamp: External
15. Removal of Line-up Clamp: 50% of Root Pass
16. Cleaning: Power Tools or Hand Tools
17. Preheating: See Note 6
18. Shielding Gas & Flow Rate: N/A
19. Shielding Flux: Coated
20.

NOTES:
1. Root Pass, Hot Pass, and remaining passes: Electrode size 3/32" through 5/32", selection depends on pipe diameter. For 0.400 to .0750 (inclusive) wall pipe, electrode size up to and including 3/16" diameter is allowed for the filler and cap pass.
2. For every .125" of wall thickness less than that of the test pipe, one complete filler pass will be eliminated.
3. For every .125" of wall thickness greater than that of the test pipe, one complete filler pass will be added.
4. Add strippers passes if needed from 2-8 o'clock to complete a uniform cap pass.
5. Not to exceed 5 minutes between Root and Hot Pass. Remaining passes as soon as possible.
6. Preheating: As required by company and prevailing weather conditions; if the base metal temperature is below 50°F, preheat the base metal to at least 150°F to 250°F maximum, and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.
7. (X52 pipe) E6010 5p+ for root pass, remaining passes E7010.

<table>
<thead>
<tr>
<th>Welding Data</th>
<th>Bead Number</th>
<th>Electrode Size and Type</th>
<th>Voltage</th>
<th>Amperage and Polarity</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Pass</td>
<td>3/32&quot; - 1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>5&quot;-12&quot; ipm</td>
<td></td>
</tr>
<tr>
<td>Hot Pass</td>
<td>3/32&quot; - 1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>5&quot;-12&quot; ipm</td>
<td></td>
</tr>
<tr>
<td>Filler Pass &amp; Cover Pass</td>
<td>1/8&quot; - 5/32&quot; - 3/16&quot;</td>
<td>20-36</td>
<td>60-190</td>
<td>4&quot;-10&quot; ipm</td>
<td></td>
</tr>
</tbody>
</table>
# Welding Procedure Specification

**Forexco, Inc.**

**Welding Procedure Specification**

**WPS No.: FE-2228-1G**

**Rev.:**

---

**Welding Process:** Manual Shielded Metal-Arc

**Pipe/Fitting:** Grade API 5L X52

**Diameter Group:** 2 3/8" - 12 3/4"

**Wall Thickness Group:** 3/16" - 3/4"

### Test Material Data

- **Diameter:** TBD
- **Wall Thickness:** TBD
- **Grade:** API 5L X52
- **Mil.:** N/A

### Welding Parameters

<table>
<thead>
<tr>
<th>Pass</th>
<th>Electrode</th>
<th>AWD</th>
<th>Electrode</th>
<th>Amp Range</th>
<th>Voltage Range</th>
<th>Travel Speed (IPM)</th>
<th>Heat Input (Kw/inch)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/8&quot;</td>
<td>E7010</td>
<td>Lincoln</td>
<td>90 - 120</td>
<td>20 - 23</td>
<td>8 - 12</td>
<td>9.00</td>
</tr>
<tr>
<td>2-Rem.</td>
<td>1/8&quot;</td>
<td>E7010</td>
<td>Lincoln</td>
<td>90 - 120</td>
<td>22 - 25</td>
<td>6 - 12</td>
<td>8.90</td>
</tr>
</tbody>
</table>

Additional passes, if required due to wall thickness variations, shall be made in accordance with the parameters of the last pass.

**Visual Inspection Results:** Satisfactory

**Radiographic Examination Results:** N/A

---

### Tensile Strength Test Data

<table>
<thead>
<tr>
<th>Specimen Number</th>
<th>Fracture Location</th>
<th>Specimen Width</th>
<th>Specimen Thickness</th>
<th>Area Sq. In.</th>
<th>Load (Lbs.)</th>
<th>Ultimate Tensile Strength (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>Pipe</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-2</td>
<td>Weld</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-3</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-4</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Bend and Nick Break Test Data**

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Results</th>
<th>Specimen No.</th>
<th>Results</th>
<th>Nick Break Specimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB-1</td>
<td></td>
<td>FB-1</td>
<td></td>
<td>NB-1</td>
</tr>
<tr>
<td>RB-2</td>
<td></td>
<td>FB-2</td>
<td></td>
<td>NB-2</td>
</tr>
<tr>
<td>RB-3</td>
<td>N/A</td>
<td>FB-3</td>
<td>N/A</td>
<td>NB-3</td>
</tr>
<tr>
<td>RB-4</td>
<td>N/A</td>
<td>FB-4</td>
<td>N/A</td>
<td>NB-4</td>
</tr>
</tbody>
</table>

**Destructive Test Results:** To Be Welded and Tested

---

### Welding Conditions

<table>
<thead>
<tr>
<th>No. of Welds</th>
<th>Root Pass</th>
<th>Remaining Passes</th>
<th>Welder Name(s): To Be Determined</th>
<th>Test Welding Temp. and Conditions: In FE Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Welding Machine:**

- **Welding Technique:** Stringer/Weave

- **Cleaning:** Power Brushing / Grinding

- **Welding Direction:** Downhand

- **Pipe Position:** Rolled (1G)

**Clamp Type/Removal:** External-After 50% of Root Pass Completed

**Current/Polarity:** DCRP

**Time Between Passes:** All passes on all weld to be completed without delay.

**Preheat Temperature:** 150 degree F. Min / 350 degree Max; Temp. Method: Pyrometer

**Preheat shall be applied at all temperatures below 50 degrees F.** and when C.E. is greater than 0.49%. Pipe to be dry.

### Weld Joint Design

![Weld Joint Diagram]

Voltage was measured across arc for procedure development. Allow for a one to four volt increase when measuring at the machine terminals due to voltage loss.

A change from the above electrode sizes to one nominal size smaller or larger is permissible. See Below Parameters.

<table>
<thead>
<tr>
<th>Electrode Dia.</th>
<th>Amps</th>
<th>Volts</th>
<th>Travel Speed (IPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32&quot;</td>
<td>50-90</td>
<td>20-24</td>
<td>8-15</td>
</tr>
<tr>
<td>5/32&quot;</td>
<td>120-170</td>
<td>22-30</td>
<td>9-12</td>
</tr>
</tbody>
</table>

---

Additional Information:

- This procedure was prepared in accordance with the Nineteenth Edition of API 1104 and DOT Parts 192 and 193.
Forexco, Inc.

Welding

WELDING PROCEDURE NO. F-11-03
(Ref Procedure Qualification Record No. F-11-03)

1. Scope: Butt
2. Process: SMAW
3. Material: API 5L X42
4. Diameter: <= 2 3/8"
5. Wall Thickness: <= .188"
6. Joint Design: V-Bevel 60° - 70° inclusive
7. Filler Material: E6010
8. Electrical Chaf.: DCEP
9. Number of Welders: 1 Minimum
10. Position: Rolled
11. Direction of Welding: Downhill
12. Number of Passes: Minimum of 2 passes
13. Time Lapse between: See Note 5
14. Type of Line-up Clamp: External
15. Removal of Line-up Clamp: 50% of Root Pass
16. Clearing: Power Tools or Hand Tools
17. Preheating: See Note 6
18. Shielding Gas & Flow Rate: N/A
19. Shielding Flux: Coated
20. 

NOTES:
2. For every .125" of wall thickness less than that of the test pipe, one complete filler pass will be eliminated.
3. For every .125" of wall thickness greater than that of the test pipe, one complete filler pass will be added.
4. Add stripper passes if needed from 2-5 o'clock to complete a uniform cap pass.
5. Not to exceed 5 minutes between Root and Hot Pass. Remaining passes as soon as possible.
6. Preheating: As required by company and prevailing weather conditions: If the base metal temperature is below 50°F, preheat the base metal to at least 150°F to 250°F maximum and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.
7. (X42 pipe) E6010 5p+ for root pass, remaining passes E6010.

<table>
<thead>
<tr>
<th>Bead Number</th>
<th>Electrode Size and Type</th>
<th>&quot;Voltage&quot;</th>
<th>Ampéage and Polarity</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Pass</td>
<td>3/32&quot;-1/8&quot;</td>
<td>20-36</td>
<td>60-115&quot; &quot;</td>
<td>5&quot;-12&quot; ipm</td>
</tr>
<tr>
<td>Hot Pass</td>
<td>3/32&quot;-1/8&quot;</td>
<td>20-36</td>
<td>60-115&quot; &quot;</td>
<td>5&quot;-12&quot; ipm</td>
</tr>
<tr>
<td>Filler Pass &amp; Cover Pass</td>
<td>1/8&quot;</td>
<td>20-36</td>
<td>60-115&quot; &quot;</td>
<td>4&quot;-10&quot; ipm</td>
</tr>
</tbody>
</table>
FOREXCO, INC.
WELDING PROCEDURE SPECIFICATION

<table>
<thead>
<tr>
<th>Welding Process:</th>
<th>Manual Shielded Metal-Arc</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter Group:</td>
<td>Less than 2 3/8&quot;</td>
</tr>
<tr>
<td>Pipe/Fitting:</td>
<td>Grade API 5L X42</td>
</tr>
<tr>
<td>WALL THICKNESS</td>
<td>0.145&quot;</td>
</tr>
<tr>
<td>Grade:</td>
<td>API 5L X42</td>
</tr>
<tr>
<td>Mfg.:</td>
<td>N/A</td>
</tr>
<tr>
<td>TEST MATERIAL DATA</td>
<td></td>
</tr>
<tr>
<td>Diameter:</td>
<td>1.900&quot;</td>
</tr>
<tr>
<td>Wall Thickness</td>
<td>0.145&quot;</td>
</tr>
<tr>
<td>Grade:</td>
<td>API 5L X42</td>
</tr>
<tr>
<td>Mfg.:</td>
<td>N/A</td>
</tr>
</tbody>
</table>

### WELDING PARAMETERS

<table>
<thead>
<tr>
<th>Pass Number</th>
<th>electrode size</th>
<th>electrode class no.</th>
<th>Ave. Ampage Ranges</th>
<th>Voltage Ranges</th>
<th>travel speed (ft/min)</th>
<th>heat input (kJ/lin ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3/32&quot;</td>
<td>E6010</td>
<td>Lincoln</td>
<td>60-90</td>
<td>23-28</td>
<td>6.00</td>
</tr>
<tr>
<td>2-Rem.</td>
<td>1/8&quot;</td>
<td>E6010</td>
<td>Lincoln</td>
<td>90-120</td>
<td>25-30</td>
<td>9.50</td>
</tr>
</tbody>
</table>

Additional passes, if required due to wall thickness variations, shall be made in accordance with the parameters of the last pass.

Visual Inspection Results: Satisfactory
Radiographic Examination Results: N/A

### TENSILE STRENGTH TEST DATA

<table>
<thead>
<tr>
<th>Specimen Number</th>
<th>Fracture Location</th>
<th>Specimen Width</th>
<th>Specimen Thickness</th>
<th>Area (sq. in.)</th>
<th>Load (lbs.)</th>
<th>Ultimate Tensile Strength (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-2</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-3</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-4</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### BEND and NICK BREAK TEST DATA

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Results</th>
<th>Pass or Side Bend</th>
<th>Nick Break Specimen</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-1</td>
<td>ok</td>
<td></td>
<td>NB-1</td>
<td>ok</td>
</tr>
<tr>
<td>RS-2</td>
<td>ok</td>
<td></td>
<td>NB-2</td>
<td>ok</td>
</tr>
<tr>
<td>RS-3</td>
<td>N/A</td>
<td></td>
<td>NB-3</td>
<td>N/A</td>
</tr>
<tr>
<td>RS-4</td>
<td>N/A</td>
<td></td>
<td>NB-4</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Destructive Test Results: To Be Welded and Tested

### WELDING CONDITIONS

<table>
<thead>
<tr>
<th>No. of welds</th>
<th>Root Pass</th>
<th>Rematching Passes</th>
<th>Welder Names: To Be Determined</th>
<th>Test Welding Temp. and Conditions: In FE Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>1</td>
<td>Minimum</td>
<td></td>
<td>Welding Technique: Stringer/Weave</td>
</tr>
<tr>
<td>Welding Machine:</td>
<td></td>
<td></td>
<td></td>
<td>Welding Direction: Downhand</td>
</tr>
<tr>
<td>Cleaning: Power Brushing / Grinding</td>
<td></td>
<td></td>
<td></td>
<td>Pipe Position: Railed (1G)</td>
</tr>
<tr>
<td>Clamp Type/Removal:</td>
<td>N/A</td>
<td></td>
<td></td>
<td>Current/Polarity: DCRP</td>
</tr>
<tr>
<td>Weld Preheat shall be applied at all temperatures below 63 degrees F. and when C.E. is greater than 0.40%. Pipe to be dry.</td>
<td></td>
<td></td>
<td></td>
<td>Preheat Temp. Infrared Pyrometer.</td>
</tr>
<tr>
<td>Voltage was measured across arc for procedure development.</td>
<td></td>
<td></td>
<td></td>
<td>Allow for a one to four volt increase when measuring at the machine terminals due to voltage loss.</td>
</tr>
<tr>
<td>A change from the above electrode size to one nominal size smaller or larger is permissible. See Below.</td>
<td></td>
<td></td>
<td></td>
<td>Electrode Dia.</td>
</tr>
<tr>
<td>3/32&quot;</td>
<td>20-30</td>
<td>20-24</td>
<td>6-16</td>
<td></td>
</tr>
<tr>
<td>1/8&quot;</td>
<td>90-120</td>
<td>22-30</td>
<td>6-16</td>
<td></td>
</tr>
</tbody>
</table>

Additional Information:

This procedure was prepared in accordance with the Nineteenth Edition of API 1104 and DOT Parts 192 and 195.
Fillet Weld

SMAW

API 5L X52 – ASTM 105

All

All

90\textdegree, fitting with 30\textdegree to

35\textdegree bevel and, 1/16\textdegree root opening

E7010 – E7010

DEER

1 Minimum

Fixed

Downhill

Minimum of 2 passes

See Note 5

N/A

N/A

Power Tools or Hand Tools

See Note 6

N/A

Coated

1. Root Pass, Hot Pass, and remaining passes: Electrode size 3/32\textdegree through 5/32\textdegree, selection depends on pipe diameter electrode size 3/32\textdegree through 5/32\textdegree selection depends on pipe diameter.

2. For every .125\textdegree of wall thickness less than that of the test pipe, one complete filler pass will be eliminated.

3. For every .125\textdegree of wall thickness greater than that of the test pipe, one complete filler pass will be added.

4. Add stripper passes if needed from 2-3 o’clock to complete a uniform cap pass.

5. Not to exceed 5 minutes between Root and Hot Pass. Remaining passes as soon as possible.

6. Preheating: As required by company and prevailing weather conditions: If the base metal temperature is below 50\textdegree F, preheat the base metal to at least 150\textdegree F to 250\textdegree F maximum and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.

7. (X52 pipe) "8010.5+ for root pass, remaining passes E7010.

<table>
<thead>
<tr>
<th>Welding Data</th>
<th>Electrode Size and Type</th>
<th>Voltage</th>
<th>Amp\textdegree and Polarity</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Pass</td>
<td>3/32\textdegree - 1/8\textdegree</td>
<td>20-36</td>
<td>60-115</td>
<td>5\textdegree - 12\textdegree ipm</td>
</tr>
<tr>
<td>Hot Pass</td>
<td>3/32\textdegree - 1/8\textdegree</td>
<td>20-36</td>
<td>60-115</td>
<td>5\textdegree - 12\textdegree ipm</td>
</tr>
<tr>
<td>Filler Pass &amp; Cover Pass</td>
<td>1/8\textdegree - 3/32\textdegree</td>
<td>20-36</td>
<td>90-145</td>
<td>4\textdegree - 10\textdegree ipm</td>
</tr>
</tbody>
</table>
Forexco, Inc.

Welding

WELDING PROCEDURE NO. F-07-03
(Ref Procedure Qualification Record No. F-07-03)

1. Scope
   Filler Weld

2. Process
   SMAW

3. Material
   API 5L X42 – ASTM 105

4. Diameter
   All

5. Wall Thickness
   All

6. Joint Design
   90° angle, fitting with 30° to 35° bevel land, 1/16" root opening

7. Filler Material
   E6010

8. Electrical Char.
   DCEP

9. Number of Welders
   '1 Minimum'

10. Position
    Fixed

11. Direction of Welding:
    Downhill

12. Number of Passes
    Minimum of 2 passes

13. Time Lapse between
    See Note 5

14. Type of Line-up Clamp
    N/A

15. Removal of Line-up Clamp
    N/A

16. Cleaning
    Power Tools or Hand Tools

17. Preheating
    See Note 6

18. Shielding Gas & Flow Rate
    N/A

19. Shielding Flux
    Coated

20.

NOTES:


2. For every .125" of wall thickness less than that of the test pipe, one complete filler pass will be eliminated.

3. For every .125" of wall thickness greater than that of the test pipe, one complete filler pass will be added.

4. Add stripper passes if needed from 2-5 o'clock to complete a uniform cap pass.

5. Not to exceed 5 minutes between Root and Hot Pass. Remaining passes as soon as possible.

6. Preheating: As required by company and prevailing weather conditions: If the base metal temperature is below 50°F, preheat the base metal to at least 150°F to 250°F maximum and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.

7. (X42 pipe) E6010 5p- for root pass, remaining passes E6010.

<table>
<thead>
<tr>
<th>Bead Number</th>
<th>Electrode Size and Type</th>
<th>Voltage</th>
<th>Amperage and Polarity</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Pass</td>
<td>3/32&quot; - 1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>5&quot;-12&quot; ipm</td>
</tr>
<tr>
<td>Hot Pass</td>
<td>3/32&quot; - 1/8&quot;</td>
<td>20-36</td>
<td>60-115</td>
<td>.5&quot;-12&quot; ipm</td>
</tr>
<tr>
<td>Filler Pass &amp; Cover Pass</td>
<td>1/8&quot; - 5/32&quot;</td>
<td>20-36</td>
<td>90-145</td>
<td>4&quot;-10&quot; ipm</td>
</tr>
</tbody>
</table>
Forexco, Inc.

Welding

WELDING PROCEDURE NO. F-02-03
(Ref Procedure Qualification Record No. D1)

1. Scope
   Fixed Butt Welding

2. Process
   SMAW

3. Material
   API 5L Group A; \( \leq 42 \)

4. Diameter
   2 3/8” OD to 12 3/4” OD

5. Wall Thickness
   .188” to .750”

6. Joint Design
   V-Bevel, 60°-70°, included angle

7. Filler Material
   API Group I (E6010)

8. Electrical Char.
   DCBP

9. Number of Welders
   1

10. Position
    Fixed

11. Direction of Welding
    Downhill

12. Number of Passes
    Minimum of 2 passes

13. Time Lapse between
    See Note 6.

14. Type of Line-up Clamp
    Either: Internal - After 100% of completion of root weld
    External - After 50% of completion of root weld

15. Removal of Line-up Clamp
    50% of Root Pass

16. Cleaning
    Power Tools or Hand Tools

17. Preheating
    See Note 7

18. Shielding Gas & Flow Rate
    N/A

19. Shielding Flux
    Coated

20.

NOTES:
1. Root Pass and Hot Pass use E6010SP+ rod.
2. Electrode size 3/32” through 5/32” selection depends on pipe diameter. For 0.400 to 0.750 (inclusive) wall pipe, electrode size up to and including 3/16” diameter is allowed for the filler and cap pass.
3. For every .025” of wall thickness less than that of the test pipe, one complete filler pass will be eliminated.
4. For every .025” of wall thickness greater than that of the test pipe, one complete filler pass will be added.
5. Add stripper passes if needed from 2-5 o’clock to complete a uniform cap pass.
6. Not to exceed 5 minutes between Root and Hot Pass. Remaining passes as soon as possible.
7. Preheating: As required by company and prevailing weather conditions; if the base metal temperature is below 50°F, preheat the base metal to at least 150°F to 250°F maximum and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.

<table>
<thead>
<tr>
<th>Bead Number</th>
<th>Electrode Size and Type</th>
<th>Voltage</th>
<th>Amperage and Polarity</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Pass</td>
<td>See Note 2 above</td>
<td>20-40</td>
<td>90-160</td>
<td>2-12</td>
</tr>
<tr>
<td>Hot Pass</td>
<td>See Note 2 above</td>
<td>20-40</td>
<td>90-160</td>
<td>2-12</td>
</tr>
<tr>
<td>Filler Pass</td>
<td>See Note 2 above</td>
<td>20-40</td>
<td>90-190</td>
<td>2-10</td>
</tr>
<tr>
<td>Cover Pass</td>
<td>See Note 2 above</td>
<td>20-40</td>
<td>90-190</td>
<td>2-10</td>
</tr>
</tbody>
</table>
Forexco, Inc.

Welding

WELDING PROCEDURE NO. F-04-03
(Ref. Procedure Qualification Record No. D4)

1. Scope: Fixed Butt Welding
2. Process: SMAW
3. Material: API 5L: > X42 <= X52
4. Diameter: 2.3/8" OD to 12.3/4" OD
5. Wall Thickness: .188" to 0.750"
6. Joint Design: V-Bevel, 60°-70° included angle
7. Filler Material: API Group I (E6010, E7010)
8. Electrical Char.: DC EP
9. Number of Welders: 1
10. Position: Fixed
11. Direction of Welding: Downhill
12. Number of Passes: Minimum of 2 passes
13. Time Lapse between: See Note 6
14. Type of Line-up Clamp: Either Internal - After 100% of completion of root weld or External - After 50% of completion of root weld
15. Removal of Line-up Clamp: 50% of Root Pass
16. Cleaning: Power Tools or Hand Tools
17. Preheating: See Note 7
18. Shielding Gas & Flow Rate: N/A
19. Shielding Flux: Coated
20.

NOTES:

1. Root Pass E6010S+ rod, all other passes use E7010 rod. For 0.400 to 0.750 (inclusive) wall pipe, electrode size up to and including 3/16" diameter is allowed for the filler and cap pass.
2. Electrode size 3/32" through 5/32" selection depends on pipe diameter.
3. For every .125" of wall thickness less than that of the test pipe, on complete filler pass will be eliminated.
4. For every .125" of wall thickness greater than that of the test pipe, one complete filler pass will be added.
5. Add stripper passes if needed from 2.5 o'clock to complete a uniform cap pass.
6. Not to exceed 5 minutes between Root and Hot Pass. Remaining passes as soon as possible.
7. Preheating: As required by company and prevailing weather conditions; if the base metal temperature is below 50°F, preheat the base metal to at least 150°F to 250°F maximum and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.

<table>
<thead>
<tr>
<th>Welding Data</th>
<th>Voltage</th>
<th>Amperage and Polarity</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Pass</td>
<td>20-40</td>
<td>60-160</td>
<td>2-12 ipm</td>
</tr>
<tr>
<td>Hot Pass</td>
<td>20-40</td>
<td>60-160</td>
<td>2-12 ipm</td>
</tr>
<tr>
<td>Filler Pass</td>
<td>20-40</td>
<td>60-190</td>
<td>2-10 ipm</td>
</tr>
<tr>
<td>Cover Pass</td>
<td>20-40</td>
<td>60-190</td>
<td>2-10 ipm</td>
</tr>
</tbody>
</table>
Forexco, Inc.

Welding

WELDING PROCEDURE NO. F-12-03
(Ref Procedure Qualification Record No. F-10-03)

1. Scope  Repair Procedure  See Note 1, 2
2. Process  SMAW
3. Material  API 5L X42 and X52
4. Diameter  All
5. Wall Thickness  All
6. Joint Design  V-Bevel 60° - 70° Inclusive
7. Filler Material  E6010 – E7010
8. Electrical Char.  DCEP
9. Number of Welders  1 Minimum
10. Position  All
11. Direction of Welding  Downhill
12. Number of Passes  Minimum of 2 passes
13. Time Lapse between  See Note 5
14. Type of Line-up Clamp  N/A
15. Removal of Line-up Clamp  N/A
16. Cleaning  Power Tools or Hand Tools
17. Preheating  See Note 6
18. Shielding Gas & Flow Rate  N/A
19. Shielding Flux  Coated
20. 

NOTES:

1. Preheating: As required by company and prevailing weather conditions: If the base metal temperature is below 50°F, preheat the base metal to at least 150°F to 250°F maximum and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.

2. Repairs are made by grinding out the unacceptable portion of the weld and re-welding following the original procedures.
FOREXCO, INC.

WELDING PROCEDURE SPECIFICATION

WPS No.: FS-346563
Rev. 0

Diameter Group: All
Wall Thickness Group: All

TEST MATERIAL DATA:

Diameter: 12.75"  Wall Thickness: .375"  Grade: API 5L X42/X52  Mfg.: 18D

WELDING PARAMETERS

<table>
<thead>
<tr>
<th>Pass Number</th>
<th>Electrode Size</th>
<th>Electrode Class No.</th>
<th>Amperage Range</th>
<th>Voltage Range</th>
<th>Travel Speed (IPM)</th>
<th>Heat Input (Kcal/hr)</th>
<th>AVG.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.093&quot;</td>
<td>E6010</td>
<td>MIN: 120</td>
<td>MIN: 8</td>
<td>MIN: 120</td>
<td>MIN: 27.60</td>
<td>18.5</td>
</tr>
<tr>
<td>2-Rotation</td>
<td>.093&quot;</td>
<td>E7010</td>
<td>MIN: 120</td>
<td>MIN: 8</td>
<td>MIN: 120</td>
<td>MIN: 30.00</td>
<td>22.5</td>
</tr>
</tbody>
</table>

Additional passes, if required due to wall thickness variations, shall be made in accordance with the parameters of the last pass.

Visual Inspection Results: Satisfactory
Radiographic Examination Results: N/A

TENSILE STRENGTH TEST DATA

<table>
<thead>
<tr>
<th>Specimen Number</th>
<th>Fracture Location</th>
<th>Test Location</th>
<th>Specimen Width</th>
<th>Specimen Thickness</th>
<th>Area Sq. In.</th>
<th>Load (Lbs.)</th>
<th>Ultimate Tensile Strength (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>ok</td>
<td>Weld</td>
<td>1.053&quot;</td>
<td>.372&quot;</td>
<td>.392&quot;</td>
<td>27,000</td>
<td>88,876</td>
</tr>
<tr>
<td>T-2</td>
<td>ok</td>
<td>Weld</td>
<td>1.069&quot;</td>
<td>.375&quot;</td>
<td>.401&quot;</td>
<td>28,000</td>
<td>89,828</td>
</tr>
<tr>
<td>T-3</td>
<td>N/A</td>
<td>Weld</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-4</td>
<td>N/A</td>
<td>Weld</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BEND AND NICK BREAK TEST DATA

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Root of Side Bend</th>
<th>Face of Side Bend</th>
<th>Nick Break Specimen</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB-1</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
</tr>
<tr>
<td>RB-2</td>
<td>ok</td>
<td>ok</td>
<td>ok</td>
</tr>
<tr>
<td>RB-3</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>RB-4</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Destructive Test Results: To Be Welded and Tested

WELDING CONDITIONS

- No. of Welds: 1
- Root Pass: 1
- Remaining Passes: 1
- Welder Names: To Be Determined
- Welding Temp. and Conditions: In FE Shop
- Welding Technique: Stingler/Weave
- Welding Direction: Downhill/Overhead
- Pipe Position: All
- Current/Polarity: DCRP
- Time Between Passes: All repair passes to be completed without delay
- Preheat Temperature: 200 degree F. Min/ 350 degree Max
- Temp. Method: Propane
- Temp. Control: Infrared Pyrometer
- Preheat shall be applied at all temperatures for repair welding.

Additional Information:
- Voltage was measured across arc for procedure development. Allow for a one to four volt increase when measuring at the machine terminals due to voltage loss.
- A change from the above electrode size to one nominal size smaller or larger is permissible. See Below Parameters.

<table>
<thead>
<tr>
<th>Electrode Dia.</th>
<th>Amperes</th>
<th>Volts</th>
<th>Travel Speed (IPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32&quot;</td>
<td>60-80</td>
<td>20-24</td>
<td>2-15</td>
</tr>
<tr>
<td>5/32&quot;</td>
<td>120-170</td>
<td>22-30</td>
<td>9-18</td>
</tr>
</tbody>
</table>

This procedure was prepared in accordance with the Nineteenth Edition of API 1104 and DOT Parts 192 and 193.
Forexco, Inc.

Welding

WELDING PROCEDURE NO. F-03-03
(Ref Procedure Qualification Record No. D2)

1. Scope: Rolled Butt Welding
2. Process: SMAW
3. Material: API 5L Group A; <=X42
5. Wall Thickness: .188" to 0.750"
6. Joint Design: V-Bevel, 60-70°, included angle
7. Filler Material: API Group I (E6010,)
   Minimum 2 passes
8. Electrical Char.: DC/EP
9. Number of Welders: 1 Minimum
10. Position: Rolled
11. Direction of Welding: Downhill
12. Number of Passes: Minimum of 2 passes
13. Time Lapse between:
   See Note 5
14. Type of Line-up Clamp:
   Either: Internal - After 100% of completion of root weld
   External - After 50% of completion of root weld
15. Removal of Line-up Clamp: 50% of Root Pass
16. Cleaning: Power Tools or Hand Tools
17. Preheating: See Note 7
18. Shielding Gas & Flow Rate: N/A
19. Shielding Flux:
20. 

NOTES:
1. Root Pass and Hot Pass use E6010SSP+ rod.
2. Electrode size 3/32" through 5/32" selection depends on pipe diameter.
3. For every .125" of wall thickness less than that of the test pipe, one complete filler pass will be eliminated.
4. For every .125" of wall thickness greater than that of the test pipe, one complete filler pass will be added.
5. Add stripper passes if elected from 3 o'clock to complete a uniform cap pass.
6. Not to exceed 5 minutes between Root and Hot Pass. Remaining passes as soon as possible.
7. Preheating: As required by company and prevailing weather conditions: If the base metal temperature is below 50° F, preheat the base metal to at least 150° F to 250° F maximum and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.

<table>
<thead>
<tr>
<th>Bead Number</th>
<th>Electrode Size and Type</th>
<th>Voltage</th>
<th>Amperage and Polarity</th>
<th>Speed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Root Pass</td>
<td>See Note 2 above</td>
<td>20-40</td>
<td>60-160</td>
<td>2-12 ipm</td>
</tr>
<tr>
<td>Hot Pass</td>
<td>See Note 2 above</td>
<td>20-40</td>
<td>60-160</td>
<td>2-12 ipm</td>
</tr>
<tr>
<td>Filler Pass</td>
<td>See Note 2 above</td>
<td>20-40</td>
<td>60-190</td>
<td>2-10 ipm</td>
</tr>
<tr>
<td>Cover Pass</td>
<td>See Note 2 above</td>
<td>20-40</td>
<td>60-190</td>
<td>2-10 ipm</td>
</tr>
</tbody>
</table>
Forexco, Inc.

_Welding_

_WELDING PROCEDURE NO. F-05-03_
(Ref Procedure Qualification Record No. D5)

1. Scope: Rolled Butt Welding
2. Process: SMAW
3. Material: API 5L: > X42 <= X52
5. Wall Thickness: .188" to 0.750"
6. Joint Design: V-Bevel, 60-70°, included angle
7. Filler Material: API Group I (E6010), Minimum 2 passes
8. Electrical Char.: DCEP
9. Number of Welders: 1 Minimum
10. Position: Rolled
11. Direction of Welding: Downhill
12. Number of Passes: Minimum of 2 passes
13. Time Lapse between: See Note 6
14. Type of Line-up Clamp: Either: Internal - After 100% completion of root weld, External - After 50% completion of root weld
15. Removal of Line-up Clamp: 50% of Root Pass
16. Cleaning: Power Tools or Hand Tools
17. Preheating: See Note 7
18. Shielding Gas & Flow Rate: N/A
19. Shielding Flux
20. 

**NOTES:**
1. Root Pass E6010F+ rod, all other passes use E7010 rod. For 0.400 to 0.750 (inclusive) wall pipe, electrode size up to and including 3/16" diameter is allowed for the filler and cap pass.
2. Electrode size 3/32" through 5/32" selection depends on pipe diameter.
3. For every .125" of wall thickness less than that of the test pipe, one complete filler pass will be eliminated.
4. For every .125" of wall thickness greater than that of the test pipe, one complete filler pass will be added.
5. Add stripper passes if needed from 2-5 o'clock to complete a uniform cap pass.
6. Not to exceed 5 minutes between Root and Hot Pass. Remaining passes as soon as possible.
7. Preheating: As required by company and prevailing weather conditions: If the base metal temperature is below 50°F, preheat the base metal to at least 150°F to 250°F maximum and maintain this minimum temperature during welding. If the metal is damp, apply heat until the moisture has been evaporated completely.

<table>
<thead>
<tr>
<th><strong>WELDING DATA</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bead Number</strong></td>
</tr>
<tr>
<td>Root Pass</td>
</tr>
<tr>
<td>Hot Pass</td>
</tr>
<tr>
<td>Filler Pass</td>
</tr>
<tr>
<td>Cover Pass</td>
</tr>
</tbody>
</table>
FOREXCO, INC.

WELDING PROCEDURE SPECIFICATION

WPS No.: FE-1226p-1G
Rev.: 6

Welding Process: Manual Shielded Metal-Arc
Pipe/Fitting: Grade API S.X42 and below
Diameter Group: 2 3/8" - 12 3/4"
Wall Thickness Group: 3/16" - 3/4"

TEST MATERIAL DATA
Diameter: TBD
Wall Thickness: TBD
Grade: API S.X42
Npl.: N/A

WELDING PARAMETERS

<table>
<thead>
<tr>
<th>Pass</th>
<th>Electrode Type</th>
<th>ADE No.</th>
<th>Electrode Class No.</th>
<th>Electrode Mga</th>
<th>Arc Voltage Range</th>
<th>Voltage Range</th>
<th>Travel Speed (IPM)</th>
<th>Heat Input - W/Inches</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/8&quot;</td>
<td>E6010</td>
<td>Lincoln</td>
<td>90</td>
<td>120</td>
<td>20</td>
<td>23</td>
<td>6.15</td>
</tr>
</tbody>
</table>

2-Rem. | 1/8"      | E6010   | Lincoln             | 90           | 120              | 22            | 30                | 6                   | 8                   | #VALUE!             | 38.00                | #VALUE!             |

Additional notes, if required due to wall thickness variations, shall be made in accordance with the parameters of the last pass.

Visual Inspection Results: Satisfactory
Radiographic Examination Results: N/A

TENSILE STRENGTH TEST DATA

<table>
<thead>
<tr>
<th>Specimen Number</th>
<th>Fracture Location</th>
<th>Specimen Width</th>
<th>Specimen Thickness</th>
<th>Area</th>
<th>Load (lbs.)</th>
<th>Ultimate Tensile Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>yes</td>
<td>0.97&quot;</td>
<td>0.375&quot;</td>
<td>0.375</td>
<td>26,000</td>
<td>63,892</td>
</tr>
<tr>
<td>T-2</td>
<td>yes</td>
<td>1.035&quot;</td>
<td>0.375&quot;</td>
<td>0.392</td>
<td>24,000</td>
<td>62,015</td>
</tr>
<tr>
<td>T-3</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-4</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

BEND AND KICK BREAK TEST DATA

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Results</th>
<th>Specimen No.</th>
<th>Results</th>
<th>Specimen No.</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB-1</td>
<td>yes</td>
<td>FB-1</td>
<td>yes</td>
<td>NB-1</td>
<td>yes</td>
</tr>
<tr>
<td>RB-2</td>
<td>yes</td>
<td>FB-2</td>
<td>yes</td>
<td>NB-2</td>
<td>yes</td>
</tr>
<tr>
<td>RB-3</td>
<td>N/A</td>
<td>FB-3</td>
<td>N/A</td>
<td>NB-3</td>
<td>N/A</td>
</tr>
<tr>
<td>RB-4</td>
<td>N/A</td>
<td>FB-4</td>
<td>N/A</td>
<td>NB-4</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Destructive Test Results: To Be Welded and Tested

WELDING CONDITIONS

- No. of Welds: Root Pass
- Remaining Passes: To Be Determined
- Welder Name: To Be Determined
- Welding Temp. and Conditions: In FE Shop
- Welding Technique: Stinger/Weave
- Welding Direction: Downhead
- Pipe Position: Rolled (1G)
- Current/Polarity: DCRP
- Time Between Passes: 5 minutes between Root/Hot Pass, Remaining Passes within 24 Hrs.
- Preheat Temperature: 150 degree F, Min./Max. 350 and 800 degrees F; Temp. Method: Propane
- Temperature Control: Infared Pyrometer
- Preheat shall be applied at all temperatures below 50 degrees F, and when C.E. is greater than 0.40%. Pipe to be dry.

Additionall Information:
- Voltage was measured across arc for procedure development.
- Allow for a one to two volt increase when measuring at the machine terminals due to voltage loss.
- A change from the above electrode size to one nominal size smaller or larger is permissible. See Below Parameters.

<table>
<thead>
<tr>
<th>Electrode Dia.</th>
<th>Amps</th>
<th>Volts</th>
<th>Travel Speed (IPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32&quot;</td>
<td>80-90</td>
<td>20-24</td>
<td>8.15</td>
</tr>
<tr>
<td>5/32&quot;</td>
<td>120-170</td>
<td>22-30</td>
<td>9.15</td>
</tr>
</tbody>
</table>

This procedure was prepared in accordance with the Nineteenth Edition of API 1104 and DOT Parts 192 and 195.
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Forexco, Inc.

Welding

WELDING PROCEDURE NO. FPL-2
(Ref. Welder Test/Procedure Report No. FPL-2)

1. Scope Shielded Metal Arc Branch Weld Qualified to API 1104
11. Welding Technique Stringer/Weave
4. Diameter NPS 2" to NPS 12" 14. Time Lapse Between "See Note 1
5. Wall Thickness 0.188" to 0.750" 15. Type of Line-up Clamps N/A
6. Joint Design See Note 4 and Figure 2.0 16. Removal of Line-up Clamps N/A
8. Electrical Char. Direct Current Reverse Polarity 18. Preheating See Note 2
9. Number of Welders One 19. Shielding Gas, Flow Rate N/A
10. Position See Note 4 and Figure 2.0 20. Shielding Flux Coated

NOTES:
1. Not to exceed 5 minutes between Root and Hot pass, remaining passes as soon as possible but within 24 hours.
2. Preheating: None required to 50°F, if below 50°F then heat to 150°F minimum b remove moisture if present.
3. Test Pipe Material Grade and Diameter: API 5L—X62, 12-3/4" OD x 0.375" WT
4. Refer to Figure 2.0 for Weld Joint Design and location of Branch Test Weld Specimen details.
5. Select electrode sizes 3/32" through 3/16" for alternate pipe diameters and wall thicknesses.

<table>
<thead>
<tr>
<th>BEAD #</th>
<th>Electrode Size</th>
<th>Electrode Type</th>
<th>Voltage</th>
<th>AMP Current</th>
<th>Travel Speed (in/min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>#1 Root Pass</td>
<td>1/8</td>
<td>6010+</td>
<td>20-25</td>
<td>160-130</td>
<td>6-10</td>
</tr>
<tr>
<td>#3 Filler Pass</td>
<td>5/32</td>
<td>7010 A1</td>
<td>20-25</td>
<td>110-140</td>
<td>10-15</td>
</tr>
<tr>
<td>#4 Cap</td>
<td>5/32</td>
<td>7010 A1</td>
<td>20-25</td>
<td>100-130</td>
<td>7-10</td>
</tr>
</tbody>
</table>
WELDING PROCEDURE SPECIFICATION

WPS No.: FE-2229-8R
Rev.: 0

Page 1 of 1

Welding Process: Manual Shielded Metal-Arc
Pipe/Fitting: Grade APL 5L X40/32/A105/A105
Diameter Group: 2.3/8" - 12.3/4"
Wall Thickness Group: 3/16" - 3/4"
Diameter: 12.3/4" Wall Thickness: .375"
Grade: APL 5L X82
FBE: Maverick Tube

WELDING PARAMETERS

<table>
<thead>
<tr>
<th>Pass</th>
<th>Electrode</th>
<th>AWS Code</th>
<th>Electrode</th>
<th>Impedance Range</th>
<th>Voltage Range</th>
<th>Travel Speed (IPS)</th>
<th>Heat Input - Kc/mm²</th>
<th>AVG</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1/8&quot; E5010 Lincoln</td>
<td>09201000</td>
<td>Lincoln</td>
<td>90</td>
<td>120</td>
<td>20</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>2</td>
<td>5/32&quot; E7010-P1 Lincoln</td>
<td>12001000</td>
<td>Lincoln</td>
<td>120</td>
<td>150</td>
<td>22</td>
<td>30</td>
<td>10</td>
</tr>
<tr>
<td>3-Rem.</td>
<td>5/32&quot; E7010-P1 Lincoln</td>
<td>12001000</td>
<td>Lincoln</td>
<td>120</td>
<td>150</td>
<td>22</td>
<td>30</td>
<td>10</td>
</tr>
</tbody>
</table>

Additional passes, if required due to wall thickness variations, shall be made in accordance with the parameters of the last pass.

Visual Inspection Results: Satisfactory
Radiographic Examination Results: N/A

TENSILE STRENGTH TEST DATA

<table>
<thead>
<tr>
<th>Specimen Number</th>
<th>Fracture Location</th>
<th>Specimen Width</th>
<th>Specimen Thickness</th>
<th>Area</th>
<th>Load</th>
<th>Ultimate Tensile Strength (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>N/A</td>
<td>1/4&quot;</td>
<td>3/32&quot;</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>T-2</td>
<td>N/A</td>
<td>1/4&quot;</td>
<td>3/32&quot;</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>T-3</td>
<td>N/A</td>
<td>1/4&quot;</td>
<td>3/32&quot;</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>T-4</td>
<td>N/A</td>
<td>1/4&quot;</td>
<td>3/32&quot;</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

BEND and NICK BREAK TEST DATA

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Results</th>
<th>Specimen No.</th>
<th>Results</th>
<th>Specimen No.</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>RS-1</td>
<td>N/A</td>
<td>FS-1</td>
<td>N/A</td>
<td>NB-1</td>
<td>OK</td>
</tr>
<tr>
<td>RS-2</td>
<td>N/A</td>
<td>FS-2</td>
<td>N/A</td>
<td>NB-2</td>
<td>OK</td>
</tr>
<tr>
<td>RS-3</td>
<td>N/A</td>
<td>FS-3</td>
<td>N/A</td>
<td>NB-3</td>
<td>OK</td>
</tr>
<tr>
<td>RS-4</td>
<td>N/A</td>
<td>FS-4</td>
<td>N/A</td>
<td>NB-4</td>
<td>OK</td>
</tr>
</tbody>
</table>

Destructive Test Results: To Be Welded and Tested

WELDING CONDITIONS

No. of Welders: Root Pass: 1 Remaining Passes: 1
Welder Names: Steve Yost
Test Welding Temp. and Conditions: In FE Yard
Welding Machine: Lincoln SA 200
Welding Technique: Stringer/Weave
Cleaning: Pre-Fireback / Grinding
Welding Direction: Vert. Down/CH
Pipe Position: Run-Over - Branch -V. Down
Current/Polarity: DCRP
Time Between Passes: 5 Minutes between Root/Hot Pass, Remaining Passes within 24 Hrs.
Preheat Temperature: 100 degree F. Min / 350 degree Max
Temp. Method: Pyrometer
Temp. Control: Infrared Pyrometer
Preheat shall be applied at all temperatures below 50 degrees F. and when C.E. is greater than 0.40%. Pipe to be dry.
Weld: Joint Design
Additional Information:
Voltage was measured across are for procedure development. Allow for a one to four volt increase when measuring at the machine terminals due to voltage loss.
A change from the above electrode size to one nominal size smaller or larger is permissible. See Below Parameters.

<table>
<thead>
<tr>
<th>Electrode DIA.</th>
<th>Amps</th>
<th>Volts</th>
<th>Travel Speed (IPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32&quot;</td>
<td>60-90</td>
<td>20-24</td>
<td>8-15</td>
</tr>
<tr>
<td>5/32&quot;</td>
<td>120-176</td>
<td>22-30</td>
<td>9-18</td>
</tr>
</tbody>
</table>

This procedure was prepared in accordance with the Nineteenth Edition of API 1104 and DOT Parts 192 and 165.
FOREXCO, INC.

WELDING PROCEDURE SPECIFICATION

Pipe/Fitting: Grade API 5L X52 - ASTM A106

Diameter: TBD | Wall Thickness: TBD | Grade: API 5L X52-A105 | Mfg.: TBD

TEST MATERIAL DATA

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3/32&quot; E5010</td>
<td>Lincoln</td>
<td>60</td>
<td>90</td>
<td>20</td>
<td>6</td>
<td>12</td>
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<td>20.70</td>
<td>13.55</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-Rem.</td>
<td>1/8&quot; E7010</td>
<td>Lincoln</td>
<td>90</td>
<td>120</td>
<td>22</td>
<td>6</td>
<td>12</td>
<td>9.90</td>
<td>30.00</td>
<td>19.55</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Additional passes, if required due to wall thickness variations, shall be made in accordance with the parameters of the last pass.

Visual Inspection Results: Satisfactory
Radiographic Examination Results: N/A

TENSILE STRENGTH TEST DATA

<table>
<thead>
<tr>
<th>Specimen Number</th>
<th>Fracture Location</th>
<th>Weld</th>
<th>Specimen Width</th>
<th>Specimen Thickness</th>
<th>Area St. In.</th>
<th>Load (Lbs.)</th>
<th>Ultimate Tensile Strength (PSI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-1</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-2</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-3</td>
<td>N/A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>T-4</td>
<td>N/A</td>
<td></td>
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<td></td>
<td></td>
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BEND and NICK BREAK TEST DATA

<table>
<thead>
<tr>
<th>Specimen No.</th>
<th>Results</th>
<th>Specimen No.</th>
<th>Results</th>
<th>Nick Break Specimen</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>RB-1</td>
<td>N/A</td>
<td>FB-1</td>
<td>N/A</td>
<td>NB-1</td>
<td>yes</td>
</tr>
<tr>
<td>RB-2</td>
<td>N/A</td>
<td>FB-2</td>
<td>N/A</td>
<td>NB-2</td>
<td>yes</td>
</tr>
<tr>
<td>RB-3</td>
<td>N/A</td>
<td>FB-3</td>
<td>N/A</td>
<td>NB-3</td>
<td>yes</td>
</tr>
<tr>
<td>RB-4</td>
<td>N/A</td>
<td>FB-4</td>
<td>N/A</td>
<td>NB-4</td>
<td>yes</td>
</tr>
</tbody>
</table>

Destructive Test Results: To Be Welded and Tested

WELDING CONDITIONS

<table>
<thead>
<tr>
<th>No. of Welders</th>
<th>Root Pass</th>
<th>Remaining Passes</th>
<th>Welder Names: To Be Determined</th>
<th>Test Welding Temp. and Conditions: In FE Shop</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum</td>
<td>1</td>
<td>1</td>
<td></td>
<td>Welding Technique: Stinger/Weave</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Welding Direction: Downhand Position: Fitting at 12:00</td>
</tr>
<tr>
<td>Clamp Type/Removal</td>
<td>N/A</td>
<td></td>
<td></td>
<td>Current/Polarity: DCRP</td>
</tr>
</tbody>
</table>

Time Between Passes: All Passes completed without delay.
Preheat Temperature: 150 degree F. Min. / 350 degree Max.; Temp. Method: Propane
Temp. Control: Infrared Pyrometer
Preheat shall be applied at all temperatures below 50 degrees F. and when C.E. is greater than 0.40%. Pipe to be dry.

Weld Joint Design:
Additional Information:
Voltage was measured across arc for procedure development. Allow for one to four volt increase when measuring at the machine terminals due to voltage loss.
A change from the above electrode size to one nominal size smaller or larger is permissible. See Below Parameters.

<table>
<thead>
<tr>
<th>Electrode Dia.</th>
<th>Amps</th>
<th>Volts</th>
<th>Travel Speed (IPM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/32&quot;</td>
<td>60-50</td>
<td>20-24</td>
<td>8-15</td>
</tr>
<tr>
<td>5/32&quot;</td>
<td>120-170</td>
<td>22-30</td>
<td>9-18</td>
</tr>
</tbody>
</table>

This procedure was prepared in accordance with the Nineteenth Edition of API 1104 and DOT Parts 192 and 195.
Forexco, Inc.

Welding

Welding Procedure No. FPL-2
(Ref. Welder Test/Procedure Report No. FPL-2)

Figure 2.0

Weld Joint Design and Test Weld Specimen

The above drawings are excerpts from API 1164, 19th Edition.
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Forexco, Inc. Welding Procedure Legend

WELDING PROCEDURE NUMBERING SYSTEM

First Number represents the API 5L Material Pipe Grade:

- "1" - Pipe Grade Equal to or Below API 5L X42
- "2" - Pipe Grade API 5L X46 Through X60
- "3" - Pipe Grade API 5L X85
- "4" - Pipe Grade API 5L X70

Second Number Represents the API 1104 Diameter Range Group:

- "4" - < 2 3/8" O.D.
- "2" - 2 3/8" - 12 3/4" O.D.
- "3" - > 12 3/4"
- "A" - All Diameters

Third Number Represents the API 1104 Wall Thickness Range Group:

- "1" - < 3/16"
- "2" - 3/16" - 3/4"
- "3" - > 3/4"
- "A" - All Wall Thicknesses

After the Procedure Number, the Welding Process is presented and represented by letters such as "FW", "SMAW" or other Process combination. This "Process" abbreviation legend is presented on page 2 of the Welding Procedure Matrix.

The last part of the procedure number is the type of weld joint and is specified by letters such as:

- "FW" - Fillet Weld
- "FRW" - Fillet-Roll Weld
- "G" - Groove Weld
  (6G - Pipe in Horizontal; 2G - Pipe in Vertical Position; 6G Pipe at 45° Angle; 1G - Pipe rolled)
- "WOL" - Weld-O-Let
- "BR" - Branch Weld
- "SLV" - In-Service Welding (sleeves) with Low Hydrogen Electrodes
- "RR" - Repair Procedure
- "CR" - Crack Repair
- "MR" - Multiple Repair
- "2F" - Fillet Weld with Fitting in Vertical Position
- "SF" - Fillet Weld with Fitting in Horizontal Position
- "SMAW" - SMAW weld with cellulosic electrodes
- "SMAW-L" - SMAW weld with low hydrogen electrodes
- "SMAW-2" - SMAW with two passes with cellulosic electrodes followed by remainder with low hydrogen electrodes

Example:

FE-222Sca-G

X46-X60
2 3/8" - 12 3/4" O.D.
3/16 - 3/4" W.T.

Groove Weld

Shielded Metal-Arc with cellulosic electrodes
### Forexco, Inc.

**Index of Approved Welding Procedures**

<table>
<thead>
<tr>
<th>FE NUMBER</th>
<th>OLD FE NUMBER</th>
<th>PIPE GRADE</th>
<th>DIAMETER RANGE</th>
<th>WALL THICKNESS RANGE</th>
<th>FILLER METAL</th>
<th>CODE/STANDARD</th>
<th>APPROVAL DATE</th>
<th>LATEST REVISIONS</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>FE-111S-5G</td>
<td>F-08-03</td>
<td>≤ X42</td>
<td>&lt; 2 3/8&quot;</td>
<td>&lt; 3/16&quot;</td>
<td>6010</td>
<td>API 1104</td>
<td>7/11/08</td>
<td>4/26/08</td>
<td>Horizontal</td>
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<tr>
<td>FE-111S-6G</td>
<td>F-08-03</td>
<td>≤ X42</td>
<td>&lt; 2 3/8&quot;</td>
<td>&lt; 3/16&quot;</td>
<td>6010</td>
<td>API 1104</td>
<td>7/29/08</td>
<td>4/26/08</td>
<td>46°</td>
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<tr>
<td>FE-111S-IG</td>
<td>F-11-03</td>
<td>≤ X42</td>
<td>&lt; 2 3/8&quot;</td>
<td>&lt; 3/16&quot;</td>
<td>6010</td>
<td>API 1104</td>
<td>6/6/08</td>
<td>4/26/08</td>
<td>Roll Weld</td>
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<tr>
<td>FE-1AAS-6G</td>
<td>F-07-03</td>
<td>≤ X42</td>
<td>All</td>
<td>All</td>
<td>6010</td>
<td>API 1104</td>
<td>4/4/08</td>
<td>4/26/08</td>
<td>Fitting Weld</td>
</tr>
</tbody>
</table>

### X41/302 Pipe Fitting Procedures

| FE-2AAS-1R | F-12-03       | X62 and X52 | All            | All                  | 6010/07/010  | API 1104      | 4/26/08       | Repair Procedure |
| FE-2AAS-5F | F-05-03       | X52/A106    | All            | All                  | 6010/07/010  | API 1104      | 4/4/08         | 4/25/03         | Fitting Weld |

**Comments:**

Refer to the FE Welding Procedure Legend for understanding the new FE Procedure Numbering System.

Existing Forexco procedures F-04-03 and F-01-03 are the same except for the diameter. FE-222S-5G now covers both procedures. Also, existing Forexco procedures F-05-03 and F-10-03 are the same. FE-222S-1G now covers both procedures.

---

4/26/2008

JGW
### 8.6 Critical Task Procedures

1. Chemical Handling (Right to Know)  
   HH-OPS-PRO-05-02-009
2. Confined Space Entry  
   HH-OPS-PRO-05-03-003
3. Trim inspection Procedure  
   HH-OPS-PRO-05-02-010
4. Hot Work  
   HH-OPS-PRO-05-07-010
5. Hydrate Handling Procedure  
   NAO-HSEOI-PRO-05-02-007
6. Isolation and Blinding  
   HH-OPS-PRO-10-01-002
7. Lease and Building Entry  
   HH-OPS-PRO-05-02-003
8. Lighting of Non-electric Burners  
   HH-OPS-PRO-05-07-001
9. Lockout – Tag out  
   HH-OPS-PRO-10-01-005
10. Orifice Plate Change  
    HH-OPS-PRO-10-01-008
11. Pigging and Receiving  
    HH-OPS-PRO-05-02-002
12. Use and Maintenance of Personal Gas Detection  
    HH-OPS-PRO-05-02-008
13. Purging Procedure  
    HH-OPS-PRO-05-02-004
14. Respiratory Protective Equipment  
    HH-HSEOI-PRO-05-11-001
15. Safe Work Permit  
    HH-OPS-PRO-05-02-006
16. Gas Sampling Procedure  
    HH-OPS-PRO-10-01-004
17. Tank Gauging and Thieving Procedure  
    NAO-HSEOI-PRO-10-00-031
18. Truck Loading/Unloading  
    HH-OPS-PRO-10-00-030
19. Vehicle Extraction/Towing  
    HH-OPS-PRO-05-02-019
20. Working at Height  
    HH-OPS-PRO-05-02-006
21. Reciprocating Compressor Valve Removal, Inspection and Installation  
    HH-OPS-PRO-10-00-050
22. Pipeline Startup and Shutdown  
    HH-OPS-PRO-10-00-098
23. Opening/Closing of Bear Den Doors  
    HH-OPS-PRO-10-00-105
24. Compressor Operating procedure-
   Centurion Panel
25. Changing String Filter
26. Responding to LEL/Fire Alarms
27. Facility Startup/shutdown Marcellus Shale
   Compressor
28. Atmospheric Corrosion Inspection
29. Odorization of Gas
30. Ground Disturbance
31. Odorization of Gas Procedure
32. Cathodic Protection Repair
33. Atmospheric Corrosion

HH-OPS-PRO-10-00-054
HH-OPS-PRO-10-00-110
HSEOI-PRO-10-00-104
HH-OPS-PRO-10-00-053
HH-OPS-PRO-10-00-122
HH-OPS-PRO-10-00-123
HH-OPS-PRO-05-04-004
HH-OPS-PRO-10-00-123
HSSEOI-PRO-10-00-176
HH-Ops-Pro-10-00-122
**1.0 Scope**

The purpose of this procedure is to provide safe chemical handling guidelines to all Forexco employees and contractors. This section applies to any chemical which is known to be present in the workplace in such a manner that workers may be exposed under normal conditions of use or in a foreseeable emergency.

**2.0 Job or Task Description:**

Any task that exposes workers to chemical hazards for which the worker would be required to implement the appropriate work procedures or use of personal protective equipment to mitigate or eliminate harmful exposures to a chemical.

**3.0 Specific Training/Qualifications/Competencies**

Employees required to handle chemicals must:
- know the physical and health hazards associated with the chemicals they work with;
- understand the methods and observations that may be used to detect the presence or release of a hazardous chemical in the work area, such as atmospheric monitoring, visual appearance, odor, etc.;
- know the measures that can be taken to protect themselves from the applicable chemical hazards (e.g., appropriate work practices, emergency procedures and personal protective equipment to be used);
- be adequately trained to read container labeling, including but not limited to, NFPA and HMIS labeling system labels.
- be knowledgeable of the location of and be able to access the Safety Data Sheet (SDS) for all hazardous chemicals to which he/she may reasonably be exposed in the work environment.
- be task observed to this procedure.

**4.0 Personal Protective and Other Equipment (in addition to standard PPE):**

Chemical-resistant gloves (e.g., nitrile, PVC, butyl rubber, etc.), as specified by the SDS for the chemical being, Splash goggles if exposure to splash hazards exist, Chemical-resistant apron/suit, Chemical-resistant steel toe boots, Respiratory protective equipment
10.0 Special Precautions and Notes

Know the physical and health hazards associated with the chemicals you are using. Carefully read the chemical's label and SDS before using a chemical for the first time. After the potential hazards associated with the chemicals are evaluated you can establish work procedures that mitigate or eliminate the hazards.

Electrically ground containers using approved methods before transferring or dispensing a flammable liquid.

SDSs for any new chemical introduced to Forexco operations must be provided to the HSE Department for inclusion in the SDS binder.

Information and training may be designed to cover categories of hazards (e.g., flammability, carcinogenicity) or specific chemicals. Chemical-specific information must always be available through labels and SDSs.

Never smell, intentionally inhale or taste a chemical.

Smoking, drinking, eating and the application of cosmetics is forbidden in areas where hazardous chemicals are used or stored.

Chemicals can be present in the workplace in several different forms (e.g., solids, liquids, vapors, gases, powders, dusts, mists, etc.). Under no circumstances are personnel to bypass safe guards or use/wear personal protective equipment of a lower standard than that recommended in an SDS.

11.0 General Hazards and Controls

<table>
<thead>
<tr>
<th>Hazard</th>
<th>Corresponding Controls</th>
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</thead>
<tbody>
<tr>
<td>Spray/splash of chemical into eyes</td>
<td>• Use of the appropriate safety eyewear (e.g., splash goggles or safety glasses and face shield combination)</td>
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<tr>
<td>Ingestion of chemical</td>
<td>• Use of face shield</td>
</tr>
<tr>
<td></td>
<td>• Do not use mouth to siphon any chemical. Use manual or mechanical pump.</td>
</tr>
<tr>
<td>Inhalation of chemical vapors and gases (alkaline or acid gases,</td>
<td>• Use of the appropriate respiratory protective equipment</td>
</tr>
<tr>
<td>pesticides, paint vapor/mists or a mixture of these)</td>
<td>• Continuously monitor atmosphere for changing conditions.</td>
</tr>
<tr>
<td>Adsorption of chemical into skin/body</td>
<td>• Use of the appropriate chemical-resistant gloves and body garments.</td>
</tr>
</tbody>
</table>