



Francis W. Peverly  
Vice President  
Operations

August 31, 2015

By Email for Electronic Filing

Hon. Kathleen H. Burgess  
Secretary  
New York State Public Service Commission  
Three Empire State Plaza  
Albany, New York 12223

Re: Case 14-G-0212 – Proceeding on Motion of the Commission to Investigate the  
Practices of Qualifying Persons to Perform Plastic Fusions on Natural Gas Facilities

Dear Secretary Burgess:

The Public Service Commission's *Order Requiring Local Distribution Companies to Follow and Complete Remediation Plans as Modified by this Order and to Implement New Inspection Protocols* ("Order"), issued May 15, 2015, directs Orange and Rockland Utilities, Inc. ("Orange and Rockland" or the "Company") to make various improvements to its plastic fusion remediation plan. Ordering Clause 8 requires that by September 1, 2015, Orange and Rockland submit its proposed procedures to comply with Ordering Clause 7.<sup>1</sup> In addition, Ordering Clause 9 requires that by September 1, 2015, Orange and Rockland submit its proposal for implementing a record-keeping system to identify and retain in an electronic database the location of each plastic fusion, the person who completed the fusion and the name of the inspector.

Orange and Rockland sets forth below its proposal for addressing Ordering Clauses 8 and 9.

**Ordering Clause 8**

Orange and Rockland attaches draft Work Procedure WP 2048, **Plastic Pipe Installation**, and Work Procedure 2029, **Installation Electric Fusion Fittings**, which address the requirements of Ordering Clause 7. These proposed procedures will be submitted to DPS Staff on September 1, 2015. The effective date for these procedures will be October 1, 2015.

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<sup>1</sup> Ordering Clause 7 requires that Orange and Rockland shall modify and implement all operating procedures involving plastic fusions to: (a) require a successful inspection of each plastic fusion by someone other than the person who completed the plastic fusion and who is qualified to inspect plastic fusions, and (b) record the name of each person who performs each plastic fusion and the name of the person who performed the inspection for each plastic fusion.

## **Ordering Clause 9**

In response to Ordering Clause Nine and for near-term compliance purposes, Orange and Rockland proposes the "Fuse-to-Fuser" application, which has been developed as a smart device application to record, in an electronic database, the location of each plastic joint, the joiner and the inspector.

An alternative system or application may be selected long-term, based on actual experience and technology development.

Orange and Rockland has previously implemented the requirement for all plastic joints to be recorded, in the field, by mapping all joints and documenting the joint type, joiner, peer inspector, installation date, job #, etc. These records are currently being manually recorded through the use of paper forms and sketches.

The Fuse-to-Fuser application is currently under development to augment the paper form, and will also capture GPS locations, by utilizing the built in GPS of the smart-device being used. The Fuse-to-Fuser application was developed to be device/system agnostic.

Although GPS locations will be recorded through the application, Orange and Rockland will also require the drawing of an as-constructed sketch for each project. This sketch will locate all joints along the plastic pipeline, with known measurement references. This sketch will be part of the project's permanent record and is intended to accurately record the location of each plastic joint being made. The combination of this sketch with the data being entered into the Fuse-to-Fuser application will provide for a traceable record of joint location, joiner and inspector.

Pilot tests of the application are ongoing in various areas within Gas Operations and Construction Management at Consolidated Edison Company of New York, Inc. ("Con Edison"). The final deployment of this application is currently scheduled to be completed by the end of 2015, and this application is currently scheduled to be in full use by January 1, 2016.

Orange and Rockland addresses below the seven specific issues identified by Ordering Clause Nine.

### ***(1) detailed information on the costs associated with the hardware, software and training of the chosen system***

The estimates below list the implementation and ongoing costs we expect to incur for development and use of the Fuse-to-Fuser application:

#### **2015 Implementation:**

- Application development by vendor: \$93,000
- Smartphone costs: \$24,000
- Development, admin, training & testing of app: \$113,000
- Contractor costs (smart devices and fees, contract extras): \$30,000
- Additional training/qualifications for visual inspectors: \$20,000

On-going costs starting in 2016:

- Vendor subscription (licensing): \$73,000
- Contractor costs: \$20,000
- IT support: \$10,000

***(2) a breakdown of comparative costs of rejected alternatives***

The Fuse-to-Fuser application has been developed in order to conform to the PSC's May 15th Order. Some alternate solutions, such as survey-grade GPS devices, were not considered as a short-term solution, but may be considered in the future. Survey-grade GPS devices have the ability to collect all the necessary information, as well as extremely accurate mapping abilities, through sub-foot accurate GPS coordinates. While development and training costs are comparable to the Fuse-to-Fuser application, device costs are much more expensive for this type of equipment. For example, a new iPhone costs approximately \$600, whereas a survey-grade GPS device (such as a Trimble unit) costs approximately \$15,000.

Orange and Rockland is still identifying and analyzing alternate technologies that could be used to satisfy Ordering Clause Nine.

***(3) why the system chosen is an effective GPS system***

The Fuse-to-Fuser application has been designed to operate on any smart-device platform, which would tap into that device's internal GPS, to identify the joint location.

The collection of GPS coordinates in this fashion will provide a +/- 50-foot accuracy level. Because this level of accuracy is not ideal for relocation purposes, Orange and Rockland is also requiring an as-constructed sketch to be prepared, in the field, which identifies each joint, with measurements to known permanent reference points. This sketch will be stored in the Fuse-to-fuser application database.

The combination of the smart-device GPS coordinates and the as-constructed sketch will provide an accurate location of each joint being installed.

***(4) the implementation and training schedule for the system chosen***

The following items in the schedule have been completed, to date:

- Application development
- Pilot group 1: training and deployment
- iPhone purchase and distribution

The following schedule is being tracked and followed:

- Pilot group 2 (training and deployment): ongoing. Scheduled completion: September 30, 2015
- Company employee roll-out: month of October 2015
- Contractor roll-out: month of November 2015
- Full deployment completed by December 31, 2015

***(5) explanation of the problems associated with those areas in which GPS would not work***

Traditional smart-devices, as well as more accurate GPS devices, have the following problems:

- In residential areas, GPS devices can be affected by "tree cover" issues, in which the GPS signal cannot be picked up due to the height and cover of the trees.
- Phone and Wi-Fi signal problems may occur if working in an area with no service.

To address these potential problems, Orange and Rockland is requiring an as-constructed sketch be prepared in the field, which identifies each joint, with measurements to known reference points. A paper form, with the same required fields as in the application, is also available in the event of service/battery issues. If the paper form is filled out, it can later be transposed into the electronic database.

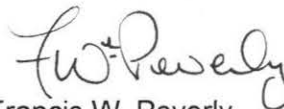
***(6) explanation of the ease with which DPS Staff can duplicate the locations for auditing purposes***

The combination of the smart-device GPS coordinates and the as-constructed sketch will provide an accurate location of each joint being installed. The as-constructed sketch will have known reference point measurements, which can be used to relocate a joint.

***(7) the implementation date of the system chosen***

According to the Company's current schedule, Orange and Rockland's Fuse-to-Fuser application will be fully deployed and implemented by January 1, 2016.

Very truly yours,

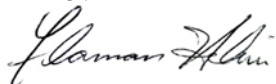


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**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION****PLASTIC PIPE HANDLING AND INSTALLATION****CONTENTS:**

- A. Maximum Pressure Allowances
- B. Qualification of Installers
- C. Transportation
- D. Material Handling
- E. Storing
- F. Inspection
- G. Joining
- H. Trenching
- I. Laying In / Clearances
- J. Pressure Test and Gas Out
- K. Future Locating
- L. Backfill
- M. Squeeze Off

**ORANGE AND ROCKLAND UTILITIES, INC.****DATE:**  
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10/01/15**DEPT.**  
Gas Operations**APPROVED BY****Reference:**255.59, .121, .123, .281, .283, .285,  
.287, .311, .321, .325, .327**PROCEDURE NUMBER:****2048-1**

**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION****A. MAXIMUM PRESSURE ALLOWANCES**

Systems containing plastic pipe cannot operate over the following pressures:

- |                   |        |         |        |
|-------------------|--------|---------|--------|
| a. High Density   | Black  | SDR 11  | 100psi |
| b. Medium Density | Orange | SDR 9.3 | 96psi  |
| c. Dupont 4A      | Green  | SDR 9.3 | 96psi  |
| d. Dupont 2A      | Tan    | SDR 11  | 80psi  |

**B. QUALIFICATION OF INSTALLERS**

1. Only installers operator qualified and also in compliance with the 12 month requalification method in accordance with this specification shall perform the covered tasks of heat fusion, electrofusion, or mechanical joining (Covered Task #50- Joining Plastic Pipe). The joints must be fabricated in accordance with appropriate Company/Manufacturer's procedures.
2. An installer who is not operator or 12 month qualified to perform the covered task of fusion cannot perform fusion or pipe joining, even if under the direction and observation of one who is qualified to perform fusion.
3. Each specimen joint (set forth in Section B.7) must be visually examined by a qualified evaluator during and after assembly and found to be have the same appearance as a joint or photographs of a joint that is acceptable as per manufacturer's guidelines, and, if applicable, to have the same appearance as a joint or photograph of a joint that is acceptable.
4. Verification of an installer's skill, by the fusion of a plastic pipe joint under each qualified fusion joining procedure (set forth in Section B.7), is necessary for operator qualification and also at the 12 month requalification method. Each specimen fusion joint must undergo visual (12 month) and destructive examination every 12 months performed by a qualified evaluator to assure it's acceptable.
5. The physical examination of each specimen joint (set forth in Section B.8) shall entail it being cut into at least three longitudinal strips, each of which is visually examined and found not to contain voids or discontinuities on the cut surfaces of the joint area. The specimens shall be deformed by bending, torque, or impact, and if failure occurs, it must not initiate in the joint area. This applies to joints made by butt fusion (both manual and hydraulic machines), sidewall fusion (manual or

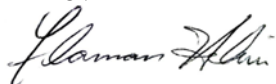
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**2048-2**



**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION**

electrofusion), socket fusion, and electrofusion. The physical examinations shall be performed at the initial qualification and every 12 month requalification.

6. Supervisors, instructors, inspectors, representatives and installers required to wear corrective lenses, must wear same to ensure proper inspection for each and every fused joint.
7. The initial operator qualification and 12 month requalification (OpQual) shall require the installer to fabricate test assemblies for fusions outlined in 255.281, 49 CFR 192 and NGA Written Plan.
8. Documentation is required to indicate that each installer has completed an acceptable fusion joint (as per for each of the test assemblies required in Section B.7) under the Company's/Manufacturer's qualified fusion joining procedures. This 12 month requalification satisfies the requirements when an installer during any 12 month period:
  - o Hasn't made any fusion/ mechanical joints under the procedure; or
  - o If 3 fusion mechanical joints or 3 percent of the fusion mechanical joints made under the procedure, whichever is greater, fail the pressure test.
9. However, a previously operator qualified or 12 month re-qualified installer must be re-qualified if the supervisor recommends that the installer be re-qualified. Failure to comply with this 12 month requalification method shall immediately disqualify the installer from performing any type of fusion joints, even though, the installer is operator qualified. The disqualified installer must then be re-qualified.
10. A qualified evaluator is a person who has been certified by appropriate training in evaluating the acceptability of plastic fusion joints made in accordance with these specifications.

11. Disqualification :

Reasons for failing either the initial operator qualification or requalification (12 month) test shall include but not be limited to the following:

a.) Written Test

Failure of the written test precludes taking the practical test.

b.) Practical Test

Butt Fusion Joints

- o Pipe end misalignment exceeds 1/32" on 1¼" and smaller pipe or tubing, and 1/16" on 2" and larger pipe.
- o Failure to check for pipe slippage at the proper fusion pressure prior to heating.

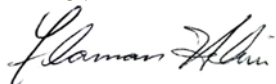
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**2048-3**

**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION**

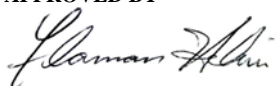
- Failure to determine the drag pressure (if any) and calculate the proper fusion pressure.
- Failure to verify the heating iron temperature with either tempil sticks (outside the fusion area) or a surface pyrometer.
- Improper fusion pressure or pressure exerted during the heating cycle.
- Insufficient or excessive melt bead.
- Inadequate bead roll-back.
- The test joints differ in appearance from a sample joint.
- A destructive test on any of the three (3) strips cut from a single test joint reveals voids in the fusion area or failure at the fusion joint during either tensile or bend tests.

**Sidewall/Saddle Fusion Joints**

- Failure to roughen both the pipe surface and the base of the tapping tee or branch saddle with 50-60 grit utility cloth.
- Failure to verify the heating iron temperature with either tempil sticks (outside the fusion area) or a surface pyrometer.
- Lack of uniform pressure both during the heating or fusion cycles.
- Slippage or rotation of heater iron or fitting on pipe during heat cycle or fusion.
- Insufficient or excessive melt bead.
- Excessive fusion pressure causing the pipe to become out-of-round.
- Inadequate bead roll-back.
- The test joint differs in appearance from a sample joint.
- A destructive test on three (3) strips cut from a single test joint reveals voids in the fusion area or failure at the fusion joint during either tensile or bend tests

**Socket Fusion Joints**

- Failure to cut pipe ends squarely.
- Pipe not chamfered.
- Failure to verify the heating iron temperature with either tempil sticks (outside the fusion area) or a surface pyrometer.
- Failure to use cold ring.
- Pipe not inserted to proper depth with cold ring.
- The test differs in appearance from a sample joint.
- A destructive test on three (3) strips cut from a single test joint reveals voids in the fusion area or failure at the fusion joint during either tensile or bend tests.

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.287, .311, .321, .325, .327**PROCEDURE NUMBER:**  
**2048-4**



**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION****Electrofusion Joints**

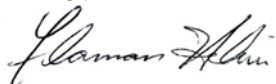
- A destructive test on three (3) strips cut from a single test joint reveals voids in the fusion area or failure at the fusion joint during either tensile or bend tests..
- Insufficient or excessive pipe scraping (10% of wall scraped away).
- Contamination of pipe ends after scraping.
- Contamination of fusion area inside coupling.
- Improper alignment of pipe ends
- Insufficient cool-down time before clamping fixture is removed.
- Improper stab depth

**C. TRANSPORTATION**

1. Bed, rails or stanchions of the truck must be free from projections or sharp objects which could scratch or puncture the plastic pipe/tubing and fittings.
2. Straight lengths of plastic pipe are to be loaded and transported in a way that will prevent excessive movement, vibration, and avoid stress concentration due to binding or strapping.
3. Plastic pipe shall not overhang more than 3 feet from the end of the truck. Stacking height must be limited to a height that produces no bending of the pipe overhang.

**D. MATERIAL HANDLING**

1. Coils of plastic pipe and tubing supplied strapped by the manufacturer should remain strapped until the moment of installation, where practical.
2. Individual pipe lengths or pallets shall not be dropped off the truck.
3. Bundles of straight lengths of plastic pipe bundled by the manufacturer may be lifted by crane or fork lift.
4. Web-type nylon, leather, rope or fabric slings shall be used for handling plastic pipe/tubing. Wire rope, chains, cables, tongs or other metallic equipment shall not be used for handling the plastic pipe/tubing. The cautious use of a fork truck to handle/lift the plastic pipe/tubing is permissible.

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.287, .311, .321, .325, .327**PROCEDURE NUMBER:**  
**2048-5**

**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION**

5. Individual lengths of plastic pipe should be lifted manually. When this is not practical, a crane, fork lift, digger or similar equipment may be used. The approximate weight of individual straight lengths of plastic pipe are shown below:

<u>Diameter</u>	<u>SDR</u>	<u>Wt per 40' Length (Pounds)</u>
2"	11	26
4"	11	92
6"	11	200
8"	11	340
12"	11	742

**E. STORING**

1. Plastic pipe shall be stored according to the current ASTM D-2513 (4.10-Outdoor Storage Stability) requirements. For Performance 8300 pipe this is for a maximum of 10 years.
2. New coils of plastic pipe and tubing shall be left on the original pallets when stored at a Company warehouse. Pallets of coils shall not be stacked.
3. Bundles of plastic pipe may be stacked but no higher than 6 high.
4. If the storage site is flat and level, individual pipe lengths (20' or 40') may be stacked to an overall height not to exceed 8'.

**PLASTIC PIPE 20'-40' INDIVIDUAL LENGTHS**

<u>Plastic Pipe Diameter</u>	<u>SDR</u>	<u>Max. Number of Rows High</u>
2"	11	45
4"	11	23
6"	11	15
8"	11	11
12"	11	7

5. At the work site, individual lengths of plastic pipe may be stored a maximum of 2 rows high directly on a smooth surface that will not cause cuts, gouges, indentations or punctures. When field conditions exist that could cause this type of damage, the pipe shall be placed on

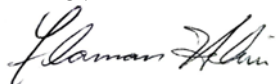
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**2048-6**

**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION**

sandbags, padding or other suitable protective material. Pipe shall not be dragged on the ground/surface.

**F. INSPECTION**

1. Minor scratching or scuffing will not impair the serviceability of plastic material. All plastic pipe and fittings shall be inspected by qualified personnel (inspect a pipe for damage task) prior to use for cuts, gouges, deep scratches and other imperfections.

Plastic Pipe Wall Thickness and Outside Diameter Specifications

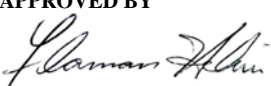
Pipe Size	SDR	Wall Thickness	10% of Wall thickness	Outside Diameter
½" CTS	7.0	0.090 - 0.099	0.009	0.621 - 0.629
½" IPS	9.3	0.090 - 0.101	0.009	0.836 - 0.844
¾" IPS	11.0	0.095 - 0.106	0.0095	1.046 - 1.054
1" IPS	11.0	0.119 - 0.133	0.0119	1.310 - 1.320
1-¼" IPS	11.0	0.151 - 0.169	0.0151	1.655 - 1.665
2" IPS	11.0	0.216 - 0.242	0.0216	2.369 - 2.381
4" IPS	11.0	0.409 - 0.458	0.0409	4.491 - 4.509
6" IPS	11.0	0.602 - 0.674	0.0602	6.614 - 6.636
8" IPS	11.0	0.785 - 0.879	0.0785	8.612 - 8.638

2. Plastic pipe which has been kinked, buckled, gouged, or scratched to a depth deeper than 10% of the wall thickness shall not be installed. Pipe so damaged shall be replaced.
3. Each length of pipe, fitting, and valve is to be inspected before installation to be sure serviceability is not affected.
4. If pipe is damaged after being joined, the damaged portion shall be cut out and replaced with a new section of pipe. If a bad fusion joint is suspected, the joint shall be removed and the pipe rejoined.
5. When in doubt as to whether it is a major or minor imperfection, remove the damaged section.

**G. JOINING**


1. Only manual and hydraulic equipment that has been inspected and approved by the Gas Training Department or Instrument Repair Shop is permitted to be used for any plastic fusion.

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**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION**

2. Plastic pipe shall be protected from any oils, cleaners, solvents, grease, lacquers, kerosene, and paint remover.
3. Fusion joints are not to be made in the rain or snow unless a canopy is used. The ends of the pipe and heating tools shall be kept dry during the entire fusion process.
4. The interior of all pipe joints shall be carefully examined for the presence of foreign matter before they are lined up for fusing. All foreign matter shall be removed by swabbing or any other means.
5. Heating iron temperatures shall be verified daily with Tempil Sticks or a pyrometer (contact or infrared). Heat may not be applied with a torch or open flame. Note: Pyrometers can be tested by placing the sensor or aiming the infrared laser at an ice bath and verifying that the reading is  $\pm 2$  degrees from 32 degrees. Should there be a discrepancy between the heating iron temperature and a pyrometer; the pyrometer shall be checked against the ice bath and a tempil stick. If the pyrometer is found to be incorrect, it shall be disposed of.
6. Joining machines should be inspected prior to use and periodically for cleanliness, tightness and lubrication to assure proper operation.
7. A clean, dry, lint free cloth should be used to remove dust, dirt, moisture, or other contaminants from the pipe ends and/or fittings to be joined. Special cleaning agents are not to be used, as some agents can contaminate fusion joints.
8. All heater faces are coated with a thin layer of non-stick material that is easily scratched or scraped off. Never use metal tools to scrape material from the coated heater faces, as the metal will damage coating. The heater tool faces are to be contaminate free and shall be cleaned after every fusion. Faces shall be cleaned with a soft wooden implement such as a tongue depressor to remove any accumulated molten plastic material and wiped with a clean, dry, lint free cloth. An adequate supply of wooden sticks and clean, dry, lint-free wiping cloths shall be readily available and used freely. Worn or damaged faces shall not be used and if damaged shall be sent to the heater manufacturer to be reconditioned and recoated. Only serrated faced heaters can be used when installing plastic service tees on a main.

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**2048-8**

**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION**

9. When joining plastic pipe, refer to the following bulletins/procedures:

- a. Performance Pipe Manual PP-750 and Bulletins PP-750-TN-05 Butt Fusion, PP-750-TN-06 Saddle Fusion, and PP-750-TN-07 Socket Fusion
- b. Electro fusing- WP 2029
- c. Stab fitting- WP 2026
- d. Transition fitting- WP 2033
- e. Compression coupling- WP 2047

10. For any fusing to Aldyl, Driscopipe 8000, or Plexco medium density (orange) - , **only electrofusion tees** and couplings shall be used.

11. Remove cap from service tee. Insert appropriate tapping tool into cutter and turn clockwise until a heavy resistance is felt and cutter bottoms out. Back up counter clockwise until the cutter is just below the top surface of the tee with one internal thread showing inside.

12. Install cap making sure "O" ring or rubber washer is in place. Screw on hand tight until it bottoms out. Soap test for leak.

13. After the fuse has been made, a second qualified person (fusion inspector) shall visually inspect the fuse for acceptability.

14. The installer(s) and the second qualified person (fusion inspector) who inspected the fuse, shall be identified on the as-built drawings and fusion drawings for any work involving connections to plastic mains/services.

15. Each new fuse shall be numbered, and measurements shall be made for each fuse. This information shall be recorded on the fusion drawings. The installers(s) and the second qualified person (fusion inspector) who inspected the fuse shall be clearly identified on the plastic pipe. The plastic pipe shall be marked adjacent to the fusion at 12 o'clock (or as close to 12 o'clock as possible) with either a black (C&S # 0240095) marker for Aldyl pipe or a white (C&S # 0240111) marker for black or yellowstripe pipe. The installer(s) and the second qualified person (fusion inspector) who inspected the fuse shall have their employee number (or Training Center training ID number) clearly printed on the pipe. The markers to be used are uni-Point Markers PX20.

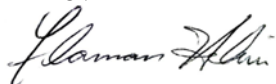
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**2048-9**

**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION**

Serrated Heater Part Numbers			
Concave (pipe side)		Convex (fitting side)	
1.25"	S230166287	1.25"	S200166300
2"	S230237287	2"	S200237300
4"	S230450287	4"	S200450300
6"	S230662287	6"	S200662300
8"	S230862287	8"	S200862300

**H.****TRENCHING**

1. Trenches will be dug by qualified personnel (operator excavation in the vicinity of a pipeline task), when in the tolerance zone of a gas facility, so as to maintain the following maximum and minimum trench dimensions.

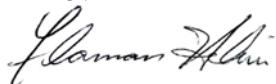
Main Size	Minimum Side Clearance Between Pipe run and Trench	Maximum Trench Width	Cover
4" and under	2"	18"	24" service/30" main
6" - 8"	2"	24"	24" service/30" main

2. The gas service should be installed with 24" cover and be at least 6" under the roadbed. Where 18" cover cannot be maintained or when the gas service is within 6" of the roadbed, steel protection plates (minimum ¼" thick) shall be installed above the gas service (6" above if possible) and Gas Engineering shall be contacted. The protection plates/shallow service shall be mapped.
3. The gas main should be installed with 30" cover and be at least 6" under the roadbed. Where 24" cover cannot be maintained or when the gas main is within 6" of the roadbed, steel protection plates (minimum ¼" thick) shall be installed above the gas main (6" above, if possible) and Gas Engineering shall be contacted. The protection plates/shallow main shall be mapped.
4. Trench bottoms shall be free of rocks and any other objects that may damage the pipe. In addition, approved sand is to be placed around the gas main. The minimum requirement shall be 4" below and 6" above and 2" on the sides of the main unless job conditions warrant a variation. In this event, the change will be made with the approval of the supervisor or Engineering and additional protection (such as rock shield) will be utilized.

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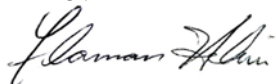
**APPROVED BY**

**Reference:**  
255.59, .121, .123, .281, .283, .285,  
.287, .311, .321, .325, .327

**PROCEDURE NUMBER:**  
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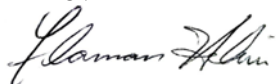
**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION****I. LAYING IN/ CLEARANCES**

1. The inside of the pipe shall be free from dirt or debris before installation in an approved trench. All matter shall be removed by pigging or other suitable means.
2. Plastic pipe shall be installed with sufficient slack (snaked) to provide for possible contraction. Normal uncoiling and placing in the trench will usually provide the necessary slack with coiled pipe.
3. There shall be at least twelve (12) inches clearance whenever possible between any buried gas main and electric or communication facilities. If not possible to achieve 12" clearance, a minimum of 6" must be maintained and the main protected from damage that might result from the proximity to the electric or communication structure. There shall be at least six (6) inches clearance whenever possible between any buried gas main and any other underground structure. If not possible to achieve 6" clearance, a minimum of 2" must be maintained and the main protected from damage that might result from the proximity to the other structure.
4. Clearances for gas and electric joint trench are more stringent. Refer to gas standards 260.1 - 260.5.
5. Plastic pipe must never be blocked and must conform to the bottom of the trench. Sand shall be used to fill low spots to provide continuous support to the plastic pipe.
6. Sweep bends are to be used wherever possible.
  - a) Straight runs of plastic pipe without fittings or fusion's can accommodate a minimum bending radius no less than 25 times the outside pipe diameter.
  - b) If a bending radius less than 25 times the O.D. of the pipe is necessary, elbows shall be used.
  - c) Care shall be taken so as not to damage or kink the plastic pipe or to reduce flow. If the plastic pipe becomes kinked, the section must be cut out.
  - d) Only molded fittings are permitted. **Factory built miters** are not permitted.
7. In all operations involving the insertion of a plastic main inside an abandoned main or casing, care shall be exercised to protect the plastic pipe.
  - a) The leading end of the inserted pipe, and at other locations where the pipe is exposed, shall be examined to be sure no damage has occurred during the insertion process.
  - b) Care shall be exercised to allow enough slack for thermal expansion.

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**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION**

- c) All sharp edges on the casing pipe shall be removed which may cause the plastic pipe to be damaged during and after insertion.
- d) That portion of the plastic pipe exposed due to the removal of a section of the casing pipe shall be of sufficient strength to withstand the anticipated external loading or it shall be protected by-a bridging piece (or other means) from crushing or shearing from external loading or settling of backfill.

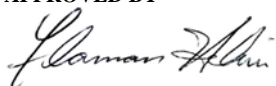
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.287,.311, .321, .325, .327**PROCEDURE NUMBER:**  
**2048-12**

**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION****J. PRESSURE TEST & GAS OUT**

1. Backfill or cover as much of a plastic main as possible.
2. Qualified personnel (performing a pressure test on a pipeline task) shall pressure test in accordance with WP 2010.
3. Qualified personnel (purging air from a pipeline task) shall purge plastic facilities in accordance with WP 2013.

**K. FUTURE LOCATING**

1. To facilitate future locating with pipe locators, a #12 copper tracer wire shall be installed by qualified personnel (install/replace a section of tracer wire task) in the trench in close proximity to the plastic pipe, but not touching, wrapped around or taped to the plastic pipe. When inserting plastic pipe in a casing, the tracer wire can be either installed in the casing pipe with the plastic pipe or, for steel sleeves, the tracer wire cadwelded or clamped to the steel casing.
2. When installing the #12 locating wire with a plastic main, the wire shall be installed on the outside of the box and into the pre-drilled ½" diameter hole near the top of the valve box/curb box. The wire shall be left continuous i.e. a loop approximately 6-8" long will be brought into the box, and will exit back out through the same ½' opening. Do not strip the coating within the box.
3. Direct buried services shall have a tracer wire installed and brought to the surface at the riser. This wire shall be connected to the tracer wire at the main by means of a split bolt (bug) connector to insure continuity of the tracer system. All bare tracer wire shall be properly sealed with approved protective tape prior to backfilling.
4. Warning mesh, or warning tape if warning mesh is not available, shall be installed directly above all new direct buried piping. It shall be installed about 12" inches (if possible) above the piping to ensure that it will be exposed by the excavator before reaching the depth of the pipe.
5. The backfilling operation will tend to push the warning mesh/tape to the side of the ditch; therefore care should be taken to position the warning mesh/tape as close to the centerline of the pipe as possible.


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**WORK PROCEDURE:****PLASTIC PIPE INSTALLATION****L. BACKFILL**

1. Backfilling shall follow the laying and lowering of the pipe as close as possible and shall be done in such a manner so that no excavated material remains on adjoining ground. Backfilling should be performed, or at a minimum, supervised by a qualified (operator excavation in the vicinity of a pipeline task) Company representative.
2. The first six (6") inches of cover over the pipe shall consist of approved sand, free of rocks or stone.
3. The backfill shall be compacted around the pipe by tamping or other approved means. No rocks larger than 6" shall be returned to the trench. No barrels, cans, drums, stumps, rubbish, welding rods, waste construction debris, or refuse shall be placed in the trench.

**M. SQUEEZE OFF**

1. When squeezing off plastic pipe greater than 1 ¼" a full seal leak clamp shall be installed at the squeeze off location if the existing main is Aldyl. For other pipe, a plastic support clamp may be utilized.
2. Squeeze off shall not be done within 3 pipe diameters of a fitting or 1 foot, whichever is greater.

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.287, .311, .321, .325, .327**PROCEDURE NUMBER:**  
**2048-14**

**WORK PROCEDURE:****INSTALLING ELECTRIC FUSION FITTINGS****A. COUPLINGS**

1. Clean all area of pipe ends to be fused . If contaminated with mud, oil, grease, etc. wipe pipe with a clean cloth and alcohol.
2. Cut pipe ends square.
3. Using the couplings molded external centerline as a guide, Coupler still in bag, mark the proper scraping distance on pipe ends.
4. Using the Uponor scraping tool, scrape off surface oxidation of all area of pipe to be fused, up to the marks previously made. Re-mark pipe as above if necessary, for proper centering when assembled.
5. Remove any shavings from pipe. Do not touch or let scraped ends of pipe become contaminated. If either the pipe or the coupling become contaminated, it must be wiped clean with alcohol.
6. Secure one pipe end into alignment clamp so that the end of the pipe is in the center of fixture.

7. Remove coupler from bag. Slide coupling fully onto clamped pipe end.

**NOTE:** If sliding coupler fully on one side of pipe, make sure the unprepared section of pipe is clean and dry.

8. Install second pipe end in alignment clamp until it butts against the first pipe. Then secure it within the clamp.
9. Center coupling by sliding it back onto second pipe. Make sure coupling is centered between both previously made insertion depth marks.
10. Test proper functioning of micro-pressure sensors on the leads from the control box .
11. Remove protective caps from terminal wells of the fitting.
12. Connect fusion control box leads to fitting. Ensure leads are connected properly.
13. Activate the fusion cycle .When the fusion is complete, the fusion end light on the control box will light. At this time, wait an additional 30 second before removing leads. NOTE: If fusion cycle is interrupted for any reason, the recommended cooling time (table) must be waited before re-starting the fusion process over.
14. Allow proper cooling time before removing clamping assembly. Refer to cooling table from instruction installed with each coupling.
15. Inspect the completed fusion by observing the polyethylene has melted and partially filled the fitting fusion wells. If no melting and filling has occurred, the fusion is unacceptable.
16. Do not fuse couplings to fittings. They are to be used only for pipe to pipe connections.
17. After the fuse has been made a second qualified person (fusion inspector) shall visually inspect the fuse for acceptability.
18. The installer(s) and the second qualified person (fusion inspector) who inspected the fuse, shall be identified on the as-built drawings and fusion drawings for any work involving connections to plastic mains/services.

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**WORK PROCEDURE:****INSTALLING ELECTRIC FUSION FITTINGS**

19. Each new fuse shall be numbered and measurements shall be made for each fuse. This information shall be recorded on the fusion drawings. The installers(s) and the second qualified person (fusion inspector) who inspected the fuse, shall be clearly identified on the plastic pipe. The plastic pipe shall be marked adjacent to the fusion at 12 o'clock (or as close to 12 o'clock as possible) with either a black (C&S # 0240095) marker for Aldyl pipe or a white (C&S # 0240111) marker for black or yellowstripe pipe. The installer(s) and the second qualified person (fusion inspector) who inspected the fuse, shall have their employee number (or Training Center training ID number) clearly printed on the pipe. The markers to be used are uni-Point Markers PX20.

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**Reference:**  
255.281-.287

**PROCEDURE NUMBER:**  
**2029-2**



**WORK PROCEDURE:****INSTALLING ELECTRIC FUSION FITTINGS****B. SERVICE TEE OR HIGH VOLUME TEE**

Clean the area of pipe where fusion is to take place. If contaminated with mud, oil, grease, etc. wipe pipe with a clean cloth and alcohol.

Position fitting next to main. Mark the end of fitting outline on the pipe.



Using the Uponor scraping tool, scrape off the full circumference of outer pipe surface between marks previously made

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**WORK PROCEDURE:****INSTALLING ELECTRIC FUSION FITTINGS**

Remove tapping tee from bag and inspect underside for contamination. If contaminated, wipe off with alcohol.



Position tapping tee in center of the scrapped area. Secure the fitting to the pipe in the following manner. NOTE: A separate, reusable installation kit is required. It is unique to the base pipe size. It contains a undersaddle clamp for 2" fittings and a Nylon belt strap for 4", 6" & 8" fittings.

(a) 2" fittings, NOTE: There is a taper to the flange of the fitting base. The undersaddle also has a taper to it. Install the open end of the undersaddle and slide it onto the small tapered end of the fitting flange. Fully engage the undersaddle clamp, with a small mallet or block of wood

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**WORK PROCEDURE:****INSTALLING ELECTRIC FUSION FITTINGS**

4", 6", 8" fittings, position re-useable nylon belt under pipe and fasten the locking pin bar into the holes of the tapping tee flange.

NOTE: The nylon belt has a limited service life. As each fusion is completed, the numbered sticker on the bar clamp must be removed to show the remaining number of applications.

Connect other side in the same manner and tighten down tensioning bolts evenly.

Lightly snug bolts down, do not over tighten.



Test proper functioning of the micro-pressure sensors by pushing down on them individually, verifying the fusion end cycle. Remove protective caps from terminal wells and connect fusion control box leads to fitting. Ensure leads are connected properly.



Activate the fusion cycle. When the fusion is complete, the fusion end light on the control box will light. At this time, wait an additional 30 second before removing leads. NOTE: If fusion cycle is interrupted for any reason, the recommended cooling time (table) must be waited before re-starting the fusion process over.

1. Allow proper cooling time before removing clamping assembly. Refer to cooling table from instruction installed with each coupling.
2. Inspect the completed fusion by observing the polyethylene has melted and partially filled the fitting fusion wells. If no melting and filling has occurred, the fusion is unacceptable.

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**WORK PROCEDURE:****INSTALLING ELECTRIC FUSION FITTINGS**

3. After the fuse has been made a second qualified person (fusion inspector) shall visually inspect the fuse for acceptability.
4. The installer(s) and the second qualified person (fusion inspector) who inspected the fuse, shall be identified on the as-built drawings and fusion drawings for any work involving connections to plastic mains/services.
5. Each new fuse shall be numbered, and measurements shall be made for each fuse. This information shall be recorded on the fusion drawings.
6. The installers(s), and the second qualified person (fusion inspector) who inspected the fuse shall be clearly identified on the plastic pipe. The plastic pipe shall be marked adjacent to the fusion at 12 o'clock (or as close to 12 o'clock as possible) with either a black (C&S # 0240095) marker for Aldyl pipe or a white (C&S # 0240111) marker for black or yellowstripe pipe. The installer(s) and the second qualified person (fusion inspector) who inspected the fuse shall have their employee number (or Training Center training ID number) clearly printed on the pipe. The markers to be used are uni-Point Markers PX20.

**C. TAPPING FITTING**

1. Remove cap from the tee.
2. Insert tapping tool into hex headed cutter. Turn clockwise until it bottoms out.
3. Unscrew (counterclockwise) tapping tool until cutter head is within the last top internal thread of fitting.
4. Remove tapping tool and reinstall fitting cap hand tight to a positive stop occurs.
5. Leak test fitting assembly.

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