TECHNICAL SPECIFICATIONS

PROJECT TITLE:

Purchase College
Natural Gas Line to Physical Education Building

PROJECT LOCATION:

Purchase College
735 Anderson Hill Road
Purchase, New York 10577

- Revision 0 -
Issued For Bid

February 19, 2019

This Page Intentionally Left Blank

TECHNICAL SPECIFICATIONS

Division 01 – General Requirements

01 56 26 – Temporary Fencing

Division 3 – Concrete

03 30 00 – Cast-in-Place Concrete

Division 23 – HVAC

23 11 23 – Facility Fuel Gas Piping

Division 31 – Earthwork

31 23 16 – Excavation

Division 32 – Exterior Improvements

32 12 16 – Asphalt Paving
32 31 13 – Chain Link Fence
32 91 19 – Topsoil Placement and Grading
32 92 19 – Seeding

Appendix A: Consolidated Edison Reference Specifications and Drawings

Note: Latest addenda of Con Edison Yellow Book Specifications shall apply

G-8062-9	Extruded Polyolefin Coating on Steel Gas Pipe
G-8100-13b	General Specification for the Installation of Gas Distribution Services
G-8104-14a	Polyethylene Pipe, Tubing and Fittings for Gas Mains and Services
G-8107-17	Steel Pipe for Gas Mains and Services
G-8121-18a	Qualification of Installers Joining Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services
G-8122-12b	Inspection, Handling, Storage, and Transportation of Polyethylene (PE) Plastic Pipe, Tubing and Fittings for Gas Mains and Services
G-8123-20a	Heat Fusion Joining of Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services
G-8129-9a	Purging Gas Mains, Services and Regulator Stations
G-8204-8c	Pressure Testing Requirements for Gas Mains and Services
IP-20-6	Installation of Mechanical Fittings for Plastic Pipe and Tubing
IP-27-5	Installation of Electrofusion Fittings on PE Plastic Pipe/Tubing and Molded Fittings using a Universal Electrofusion Processor
G-100,298-7a	Valves for Gas Transmission and Distribution Piping Systems
E0-16641	Installation of Plastic Gas Service Piping
EO-8085	General Specification for Backfill and Bedding Material for Excavations
EO-1181	General Specification for Backfilling of Trench and Small Openings

DESIGN DRAWINGS

T-001 Title Sheet, General Notes, Special Conditions & Scope of Work

ESC-1 Erosion and Sediment Control Plan & Details

SU-101 Natural Gas Line Installation - Plan

SU-102 Natural Gas Line Installation - Profiles

SU-103 Details – Sheet 1 of 2

SU-104 Details – Sheet 2 of 2

SU-105 Topographic & Utility Survey Sheet 1 of 2 (Reference Only)

SU-106 Topographic & Utility Survey Sheet 2 of 2 (Reference Only)

SUBMITTAL SCHEDULE

Legend

SD - Shop Drawing
SA - Sample
PD - Product Data
SC - Schedule
M - Operation/Maintenance Procedure
IN - Installation Procedures
TR - Tests Reports
CE - Certification / Statement
AB - As-Built

X - Submission Required

SPEC. SECTION	DESCRIPTION OF SUBMISSION	SD	SA	PD	SC	M	IN	TR	CE	AB
00 00 00	Proposed Schedule				X					
00 00 00	Work Sequence				X					
03 30 00	Concrete Mix			X					X	
03 30 00	Cementitious materials and aggregates			X						
23 22 13	Con Ed Approved Polyethylene Pipe			X					X	
23 22 13	Con Ed Approved Steel Pipe			X					X	
23 22 13	Con Ed Approved PE Fittings			X					X	
23 22 13	Con Ed Approved Steel Fittings			X					X	
23 22 13	Con Ed Approved Gas Valves			X					X	
23 22 13	Operator Qualifications								X	
23 22 13	Plastic Marking Tape			X						
23 22 13	Electronic Markers			X						
31 23 16	Con Ed Approved Backfill Material			X					X	
32 12 16	Asphalt Paving Mix			X					X	
32 91 19	Topsoil									
32 92 19	Seeding		X	X						
32 92 19	Erosion Control Blanket			X						
32 31 13	Chainlink Fence			X						

This Page Intentionally Left Blank

DIVISION 01 – GENERAL REQUIREMENTS
SECTION 01 56 26 – TEMPORARY FENCING

TABLE OF CONTENTS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Fence framework, fabric, and accessories.

B. Excavation for post bases.

C. Manual gates and related hardware.

1.02 REFERENCES

A. ASTM A116 Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.

B. ASTM A121 Zinc-Coated (Galvanized) Steel Barbed Wire.

C. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

D. ASTM A392 Zinc-Coated Steel Chain-Link Fence Fabric.

E. ASTM C94 Ready-mixed Concrete.

F. ASTM F567 Installation of Chain-Link Fence.

G. ASTM F573 Residential Zinc-Coated Steel Chain Link Fence Fabric.

H. ASTM F669 Strength Requirements of Metal Posts and Rails for Industrial Chain Link Fence.

I. ASTM F1083 Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

J. ASTM F1234 - Protective Coatings on Steel Framework for Fences.

K. Chain Link Fence Manufacturers Institute (CLFMI) - Product Manual.

1.03 SYSTEM DESCRIPTION

A. Fence Height: Height as specified on the Drawings or match existing.

B. Line Post Spacing: At intervals not exceeding 10 feet.

C. Fence Post and Rail Strength: Conform to ASTM F669 Heavy Industrial Fence quality.

1.04 SUBMITTALS FOR REVIEW

A. Section 01300 - Submittals: Procedures for submittals.

B. Product Data: None.

C. Shop Drawings: None.

1.05 SUBMITTALS FOR CLOSEOUT

A. Section 01700 - Contract Closeout: Procedures for submittals.

B. Project Record Documents: Accurately record actual locations of property perimeter posts relative to property lines [and easements].

1.06 QUALITY ASSURANCE

A. Perform Work in accordance with manufacturer's instructions.

1.07 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this section with minimum three (3) years documented experience.

PART 2 - PRODUCTS

2.01 MATERIALS AND COMPONENTS

A. Materials and Components: Conform to CLFMI Product Manual.

B. Fabric Size: CLFMI service.

C. Intermediate Posts: Type I round.

D. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round.

2.02 MATERIALS

A. Framing (Steel): ASTM F1083 Schedule 40 galvanized steel pipe, welded construction, minimum yield strength of 25 ksi; coating conforming to ASTM F1234 Type A on pipe exterior and interior.

B. Fabric Wire (Steel): ASTM A116 galvanized wire.

C. Concrete: Type specified in Section 03301.

2.03 COMPONENTS

A. Line Posts: 2.38-inch diameter.

B. Corner and Terminal Posts: 3.5 inch diameter.

C. Gate Posts: 2 k inch diameter.

D. Top and Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.

E. Gate Frame: 1.66 inch diameter for fittings and truss rod fabrication.

F. Fabric: 2-inch diamond mesh interwoven wire, 9 gage thick, top salvage bottom selvage.

G. Tension Wire: 6 gage thick Galvanized steel, single strand.

H. Tie Wire: Min. 11GA Galvanized steel wire at posts and rails.

2.04 ACCESSORIES

A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

C. Gate Hardware: Fork latch with gravity drop; a minimum of two 180 degree gate hinges per leaf and hardware for padlock.

2.05 FINISHES

A. Components and Fabric: Galvanized to ASTM A123.

B. Hardware: Galvanized to ASTM A153.

C. Accessories: Same finish as framing.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ASTM F567 or applicable manufacturer's instructions.

B. Place fabric on inside of posts and rails.

C. Set posts plumb, in concrete footings with top of footing flush with finish grade. Slope top of concrete for water runoff.

D. Line Post, Corner, Gate and Terminal Post Footing Depths Below Finish Grade: Sufficient to maintain fencing for the duration of the Work.

E. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.

F. Provide top rail through line post tops and splice with 6 inch long rail sleeves.

G. Install brace rails on corner gate leaves.

H. Do not stretch fabric until concrete foundation can adequately receive the load of the fence.

I. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

J. Position bottom of fabric at finished grade.

K. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

L. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

M. Install bottom tension wire or strap stretched taut between terminal posts.

N. Do not attach the hinged side of gate from building wall; provide gate posts.

O. Install gate with fabric and barbed wire overhang to match fence. Install three hinges per leaf with associated other hardware.

3.02 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Position: 1 inch.

C. Components shall not infringe adjacent property lines.

END OF SECTION

DIVISION 03 - CONCRETE
03 30 00 –CAST IN PLACE CONCRETE

TABLE OF CONTENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This specification defines the requirements for constructing cast in place concrete as specified herein and on the Contract Documents.

B. The work of this Section of the Specifications shall include concrete design mix, extra materials, labor, materials, tools, equipment, appliance or services necessary to complete the work as shown on the Drawings, as specified herein, or as required by the job conditions.

C. The Contractor shall furnish all supervision, labor and materials required to accomplish the work associated with completing the concrete work as specified herein and indicated on the Contract Drawings.

1.02 REFERENCES

A. All work under this section shall conform to the requirements of the "New York State Building Code", and the regulations of governmental authorities having jurisdiction.

B. American Concrete Institute (ACI):

1. ACI 117: Standard Specifications for Tolerances for Concrete Construction and Materials
2. ACI 211.1 &.2: Standard Practice for Selecting Proportions for Concrete
3. ACI 214: Recommended Practice for Evaluation of Strength Test Results of Concrete
4. ACI 304: Guide for Measuring, Mixing, Transporting, and Placing Concrete
5. ACI 305: Hot Weather Concrete
6. ACI 308: Standard Practice for Curing Concrete
7. ACI 309: Guide for Consolidation of Concrete
8. ACI 315: Details and Detailing of Concrete Reinforcement
9. ACI 318: Building Code Requirements for Reinforced Concrete

C. American Society for Testing and Materials (ASTM):

1. A185: Standard Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement
2. C31: Standard Practice for Making and Curing Concrete Test Specimens in the Field
3. C94: Standard Specification for Ready-Mixed Concrete
4. C150: Standard Specification for Portland Cement
5. C494: Standard Specification for Chemical Admixtures for Concrete

1.03 SUBMITTALS

A. The Contractor shall furnish product data for all proposed material and equipment that will be furnished to complete the work. Submittal type, quantities and distribution shall be in accordance with the General Requirements section of the Contract Documents and this Section.

B. Product Data: For each type of manufactured material and product indicated.

C. Design Mixes: For each concrete mix. Include alternate mix designs when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

1. Indicate amounts of mix water to be withheld for later addition at Project site.

D. Material Certificates: Signed by manufacturers certifying that each of the following items complies with requirements:

1. Cementitious materials and aggregates.
2. Form materials and form-release agents.
3. Steel reinforcement and reinforcement accessories.
4. Admixtures.
5. Waterstops.
6. Floor and slab treatments.
7. Bonding agents.
8. Adhesives.
9. Joint-filler strips.
10. Repair materials.

E. Minutes of pre-installation conference.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer, with minimum 5 years experience, who has completed concrete Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Construction Site Quality: Contractor shall maintain, on site, sufficient office, field engineering, and field supervision staff to assure that all materials and layout correspond with the requirements of the Contract Documents and approved drawings.

C. Concrete Supplier: A firm experienced in manufacturing ready-mixed concrete products complying with ASTM C 94 requirements for production facilities and equipment.

1. Manufacturer must be certified according to the National Ready Mixed Concrete Association's Certification of Ready Mixed Concrete Production Facilities.
2. Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, each aggregate from one source, and each admixture from the same manufacturer.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site, ready for use, in the manufacturer’s original and unopened containers or packaging. Packaging to contain material description and manufacturer information.

B. All delivered materials, products or equipment shall be stored under cover in a dry, weather-tight, and adequately ventilated location. All materials shall be elevated off of the ground.

C. Aggregates to be used in field mixed concrete or grout shall be stockpiled in separate bins or piles in a manner suitable to minimize segregation and contamination of aggregates. Field mixing is not encouraged and will not be allowed without written approval by the Owner’s Representative.

D. Admixture storage tank and dispensing equipment shall be provided and serviced by the admixture manufacturer, at no cost to the owner.

PART 2 - PRODUCTS

2.01 CONCRETE MATERIALS

A. Portland Cement: ASTM C 150, Type I or II.

B. Fly Ash: ASTM C618, Class C or F including supplementary optional requirements relating to reactive aggregates and alkalies, and loss on ignition not to exceed 5 percent.

C. Coarse Aggregates: ASTM C 33 limits deleterious substances in coarse aggregate depending on climate severity and in-service location of concrete.

1. Size #67 may be used for footings and walls over 12 inches thick.

2. Coarse aggregate for applied topping, encasement of steel columns, and metal pan stair fill shall be Size 7.

3. Maximum size of coarse aggregates not more than 1/5 of the narrowest dimension between sides of forms, 1/3 the depth of slabs, nor ¾ of the minimum clear spacing between reinforcing bars.

D. Lightweight Aggregate: ASTM C330, Table 1. Maximum size of aggregate not larger than 1/5 of the narrowest dimension between form, nor ¾ of the minimum clear distance between reinforcing bars. Contractor to furnish certified report to verify that aggregate is sound and durable, and has a durability factor of not less than 80 based on 300 cycles of freezing and thawing when tested in accordance with ASTM C666.

E. Fine Aggregate: ASTM C33 Fine aggregate for applied concrete floor topping shall pass a #4 sieve, 10 percent maximum shall pass a #100 sieve.

F. Water: Potable and complying with ASTM C 94.

2.02 ADMIXTURES

A. General: Admixtures certified by manufacturer to contain not more than 0.1 percent water-soluble chloride ions by mass of cementitious material and to be compatible with other admixtures and cementitious materials. Do not use admixtures containing calcium chloride.

B. Air-Entraining Admixture: ASTM C 260.

C. Water-Reducing Admixture: ASTM C 494, Type A.

D. High-Range, Water-Reducing Admixture: ASTM C 494, Type F.

E. Water-Reducing and Accelerating Admixture: ASTM C 494, Type E.

F. Water-Reducing and Retarding Admixture: ASTM C 494, Type D.

2.03 CURING MATERIALS

A. Water: Potable.

B. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound: ASTM C 1315, Type 1, Class A.

C. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the following:

1. Clear, Waterborne, Membrane-Forming Curing and Sealing Compound:

a. Klear-Kote Cure-Sealer-Hardener, 30 percent solids; Burke Group, LLC (The).

b. Polyseal WB; ChemMasters.

c. UV Safe Seal; Lambert Corporation.

d. Lumiseal WB Plus; L&M Construction Chemicals, Inc.

e. Vocomp-30; W. R. Meadows, Inc.

f. Metcure 30; Metalcrete Industries.

g. Vexcon Starseal 1315; Vexcon Chemicals, Inc.

2.04 CONCRETE MIXES

A. Concrete Mix Requirements: Proportions for each mix shall provide for homogeneous, cohesive, workable and dense concrete, suitable in all respects for its intended purpose. Concrete mixes shall be selected to provide an average strength not less than that required by ACI 318, Chapter 5. Selected mixes shall conform to the specified requirements, Contractor may propose with his bid a cost-savings mix design making use of fly ash, but with a maximum replacement of cement with fly ash equal to 10 percent.

B. Use a qualified independent testing agency for preparing and reporting proposed mix designs for the laboratory trial mix basis.

C. After approval of design mixes no substitution in material or change in proportions of approval mixes may be made without additional tests and approval by the Owner's Representative and Engineer.

D. Contractor shall notify the Owner's Representative of the time and location where each trial mix will be performed to permit the Testing Agency to observe the preparation, batching and testing, should the owner elect to do so.

E. Air Entrainment: Entrained air is not required for concrete for footings. All other concrete shall be air entrained to 5-1/2 percent, except pea gravel and sidewalk concrete with shall be air-entrained to 6-1/2 percent.

F. Cement Factor: Maintain minimum cement factors below regardless of compressive strength developed minimums, for air entrained concrete:

1. 4000 psi – Minimum Cement 550 (lbs/yd) – Max. Water/Cement (.50)

2. Maximum Water-Cementitious Materials Ratio: 0.45 for concrete exposed to deicers or subject to freezing and thawing while moist.

G. Cement Factor: Maintain minimum cement factors below regardless of compressive strength developed minimums, for non-air entrained concrete:

1. 4000 psi – Minimum Cement 550 (lbs/yd) – Max. Water/Cement (.55)

H. Slab-on-Grade: Proportion normal-weight concrete mix as follows:

1. Compressive Strength (28 Days): 4000 psi.

2. Maximum Slump: 4 inches.

I. Admixtures: Slump may be increased by the use of the approved high range water-reducing admixture. Tolerances are as established by ASTM C94.

1. Use water-reducing admixture or high-range water-reducing admixture (superplasticizer) in concrete, as required, for placement and workability.

2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.

2.05 STEEL REINFORCEMENT

A. Plain-Steel Welded Wire Fabric (sizes less than W4.0): ASTM A 185, fabricated from as-drawn steel wire into flat sheets.

B. Welded Steel Wire Fabric (sizes W4.0 and larger): ASTM A497.

2.06 REINFORCEMENT ACCESSORIES

A. Furnish chair supports for all steel reinforcement in floor slabs or equipment pads. Lifting the reinforcement after half the slab/pad has been poured is not acceptable.

B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire fabric in place. Manufacture bar supports according to CRSI's "Manual of Standard Practice" from steel wire, plastic, or precast concrete or fiber-reinforced concrete of greater compressive strength than concrete, and as follows:

1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected or CRSI Class 2 stainless-steel bar supports.

2. For epoxy-coated reinforcement, use epoxy-coated or other dielectric-polymer-coated wire bar supports.

C. Tie Wire: 16 gauge or heavier, black annealed wire, conforming to ASTM A82. Tie wire in concrete at exposed surfaces shall be non-corrosive; stainless steel, monel, or plastic coated.

D. Epoxy Repair Coating: Liquid, two-part, epoxy repair coating; compatible with epoxy coating on reinforcement and complying with ASTM A 775/A 755M.

PART 3 - EXECUTION

3.01 REINFORCEMENT INSTALLATION

A. General: Details of concrete reinforcement to be in accordance with ACI 318, and ACI 315, unless otherwise shown.

B. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.

C. Minimum clear distances between parallel bars, except in columns and multiple layers of bars in beams shall be equal to nominal diameter of bars. Minimum clear spacing in 1 inch or 1-1/3 times the maximum size of the coarse aggregate.

D. Place reinforcement conforming to CRSI DA4, unless otherwise shown. Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.

E. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials.

F. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars. Tie all intersections and splices with 16 gauge annealed wire.

G. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.

H. Epoxy-Coated Reinforcement: Use epoxy-coated steel wire ties to fasten epoxy-coated reinforcement. Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M.

I. Secure reinforcing bars against displacement during the placing of concrete by spacers, chairs, or other similar supports. Portions of the supports, spacers, and chairs in contact with formwork shall be made of plastic in areas that will be exposed when completed. Type, number, and spacing of supports are to conform to ACI 315.

J. Where concrete slabs are placed on the ground, use concrete blocks or other non-corrodible material of proper height, for support of reinforcement. Use brick or stone supports will not be permitted.

K. Welded Wire Fabric:

1. Install welded wire fabric in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire. Lap welded wire fabric at least 1-1/2 mesh panels plus end extension of wires not less than 12 inches in structural slabs. Lap welded wire fabric at least ½ mesh panels plus extension of wires not less than 6 inches for slabs on grade.

2. Shall be placed in sheets or strips at the depth shown on the plans. Equal clearance shall be provided on each side of the slab, and successive sheets shall be lapped, as detailed. Reinforcement shall be continuous without interruption at emergency construction joints. All laps between sheets shall be held firmly together by wires or clips spaced not more than 4 feet apart. Continuous reinforcement shall be installed in accordance with the details developed. The height of preset chairs or supports shall be that shown on the plans within a tolerance of 1/8 inch; the arrangement and spacing shall be such that the reinforcement will be supported and held in the correct position within the allowable tolerance during the placing and consolidating of the concrete; sufficient bearing at the base of the device shall be provided to prevent over-turning or penetration into the sub-base; the design of the devices shall be as not to interfere with the placing and consolidating of the concrete.

3.02 JOINTS

A. General: Construct joints true to line with faces perpendicular to surface plane of concrete.

B. Construction Joints: Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Architect.

1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints, unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.

2. Form from preformed galvanized steel, plastic keyway-section forms, or bulkhead forms with keys, unless otherwise indicated. Embed keys at least 1-1/2 inches into concrete.

3. Locate joints for grade beams and slabs in the middle third of spans.

4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.

5. Space vertical joints in walls as indicated, maximum of 30’-0” o.c. Locate joints mid-way between piers in concealed locations where possible.

6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.

C. Contraction Joints in Slabs-on-Grade: Form weakened-plane contraction joints, sectioning concrete into areas as indicated not greater than 900 sq. ft. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness, as follows:

1. Grooved Joints: Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.

D. Isolation Joints in Slabs-on-Grade: After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations.

1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface, unless otherwise indicated.

2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where waterproof cement-mortar or joint sealants, specified in Division 7 Section "Joint Sealants," are indicated.

3.03 CONCRETE PLACEMENT

A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.

B. Do not add water to concrete during delivery, at Project site, or during placement, unless approved by Architect.

C. Deposit concrete continuously or in layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as specified. Deposit concrete to avoid segregation.

D. Deposit concrete in forms in horizontal layers no deeper than 24 inches and in a manner to avoid inclined construction joints. Place each layer while preceding layer is still plastic, to avoid cold joints. Do not deposit concrete vertically more than 60”. For deeper forms deposit concrete with a tremie.

1. Consolidate placed concrete with mechanical vibrating equipment. Use equipment and procedures for consolidating concrete recommended by ACI 309R.

2. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations no farther than the visible effectiveness of the vibrator. Place vibrators to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mix constituents to segregate.

E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.

2. Maintain reinforcement in position on chairs during concrete placement.

3. Screed slab surfaces with a straightedge and strike off to correct elevations.

4. Slope surfaces uniformly to drains where required.
5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, free of humps or hollows, before excess moisture or bleedwater appears on the surface. Do not further disturb slab surfaces before starting finishing operations.

F. Hot-Weather Placement: Place concrete according to recommendations in ACI 305R and as follows, when hot-weather conditions exist:

1. Cool ingredients before mixing to maintain concrete temperature below 90 deg F at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
2. Cover steel reinforcement with water-soaked burlap so steel temperature will not exceed ambient air temperature immediately before embedding in concrete.
3. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade moisture uniform without standing water, soft spots, or dry areas.

3.04 ONCRETE FINISHES

A. Slab Finishes:

1. Comply with recommendations in ACI 302.1R for screeding, restraightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
2. Place slabs monolithically. Once slab placement commences, complete finishing operations within the same day. Slope finished slab to floor drains where they occur, whether shown or not.
3. Use straightedges specifically made for screeding, such as hollow magnesium straightedges or power strike-offs. Do not use pieces of dimensioned lumber. Strike off and screed slab to a true surface at required elevations. Use optical or laser instruments to check concrete finished surface grade after strike-off.
4. Scratch Finish: Finish for all base slabs receiving a bonded applied cementitious application. Thoroughly coarse wire broom within two hours after placing to roughen slab surface to insure permanent bond between slab and applied materials.
5. Float Finish: Slabs to receive unbonded toppings, steel trowel finish, fill, mortar setting beds, or a builtup roof, and ramps, stair treads, platforms, and equipment pads shall be floated to a smooth, dense uniform, sandy textured finish. During floating, while surface is still soft, check surface for flatness using a 10 foot straightedge. Correct high spots by cutting down and correct low spots by filling in with material of the same composition as floor finish. Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats.
6. Steel Trowel Finish: Concrete surfaces to receive resilient floor covering or carpet, monolithic floor slabs to be exposed to view in finished work, future floor roof slabs, applied toppings and other interior surfaces for which no other finish is indicated. Steel trowel immediately following floating. During final troweling, tilt steel trowel at a slight angle and exert heavy pressure to compact cement paste and form a dense, smooth surface. Finished surface shall be smooth, free of trowel marks, and uniform in texture and appearance.

7. Broom Finish: Finish exterior slabs, platforms, steps, walks, ramps, and stair treads with a bristle brush moistened with clear water after surfaces have been floated. Bush in a direction transverse to main traffic.
8. Slab Finish Flatness (FF) and Levelness (FL) shall comply with the following minimums:
   a. Areas covered with carpeting, or not otherwise included below:
      (1) Slab on Grade – Overall Value FF 25/ FL 20; Minimum Local FF 17/FL15
      (2) Level suspended slabs - Overall Value FF 25/ FL 20; Minimum Local FF 17/FL15
      (3) Slabs exposed - Overall Value FF 36/ FL 20; Minimum Local FF 24/FL15
      (4) Slabs to be covered - Overall Value FF 36/ FL 20; Minimum Local FF 24/FL15
   b. Level tolerance such that 80 percent of all points fall within a ¾ inch envelop (+3/8 inch, -3/8 inch) from the design elevation.

3.05 MISCELLANEOUS CONCRETE ITEMS

A. Filling In: Fill in holes and openings left in concrete structures, unless otherwise indicated, after work of other trades is in place. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete Work.

B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.

3.06 CONCRETE PROTECTION AND CURING

A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and with recommendations in ACI 305R for hot-weather protection during curing.

B. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces, by one or a combination of the following methods:

1. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches (300 mm), and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
   a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
   b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
   c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer recommends for use with floor coverings.
2. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period. Cure for not less than seven days. Compound shall be certified to be compatible by floor coating manufacturer.

3.07 CONCRETE SURFACE REPAIRS

A. Defective Concrete: Repair and patch defective areas when approved by Architect. Remove and replace concrete that cannot be repaired and patched to Architect's approval.

B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.

C. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.

   1. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least 3/4 inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mix as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.

D. Repair materials and installation not specified above may be used, subject to Engineer’s approval.

END OF SECTION

This Page Intentionally Left Blank

DIVISION 23 – HEATING, VENTILATING AND AIR CONDITIONING
SECTION 23 11 23 – FACILITY FUEL GAS PIPING

TABLE OF CONTENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide all work necessary to layout and install fuel gas piping systems required by this project. The piping systems shall include pipe, valves, fittings, flanges, gaskets, bolting, welding material, regulators, vents, hangers, supports, anchors and other components required for the proper and operational installation.

B. The work of this Section of the Specifications shall include all labor, materials, tools, equipment, appliance or services necessary to complete the work as shown on the Drawings, as specified herein, or as required by the job conditions.

C. All work shall conform to Con Edison's "Requirements for Gas Service Installation" book (Yellow Book). Relevant Con Edison specifications are attached to this specification section.

1.02 REFERENCES

A. All work under this section shall conform to the requirements of the "New York State Building Code", Con Edison's requirements and the regulations of governmental authorities having jurisdiction.

B. All work performed and material supplied under this Section shall be in accordance with the latest addenda thereto of the applicable codes, standards, specifications, regulations, procedures, and tests as cited.

C. Where components or materials are specified to conform to requirements of the standards of organizations such as American Society of Mechanical Engineers (ASME) or Underwriters Laboratories (UL), that use of label or listing as method of indication compliance, proof of such conformance shall be submitted and approved by the Engineer. The label or listing of the specified organization will be acceptable evidence.

1.03 SUBMITTALS

A. The Contractor shall furnish product data for all proposed material and equipment that will be furnished to complete the work. Submittal type, quantities and distribution shall be in accordance with the General Requirements section of the Contract Documents and this Section.

B. Additional submittals, as necessary, for each manufactured item shall include but are not limited to the following: manufacturer's descriptive literature, shop drawings, catalog "cuts", and mill reports.

C. Specific Submittals Include, but not limited to:

1. Pipe and Fittings (Polyethylene)
2. Pipe and Fittings (Steel)
3. Valves
4. Operator Qualifications as per Con Edison's requirements.
5. Plastic Marking Tape
6. Electric Markers

1.04 QUALITY ASSURANCE

A. Installer Qualifications: Refer to Con Edison Specification G-8121 for the "Qualification of installers joining Polyethylene (PE) plastic pipe/tubing and fittings for gas mains and services" for required qualifications.

B. Construction Site Quality: Contractor shall maintain, on site, sufficient office, field engineering, and field supervision staff to assure that all materials and layout correspond with the requirements of the Contract Documents and approved drawings.

C. All valves shall be new. Surplus, salvaged or rebuilt valves are not acceptable.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Refer to Con Edison Specification G-8122 "Inspection, handling, storage, and transportation of polyethylene (PE) plastic pipe, tubing, and fittings for gas mains and services) for additional information.

PART 2 - PRODUCTS

2.01 UNDERGROUND PIPING MATERIALS

A. All underground piping furnished as part of this Contract shall be Polyethylene (PE) Pipe. Refer to Con Edison Specification G-8104 "Polyethylene Pipe, Tubing and Fittings for Gas Mains and Services" for additional information.

B. All PE pipe/tubing, fittings and risers shall comply to the latest revision of ASTM D2513 "Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings" (except for marking requirements D2513-87).

C. All material used in the underground piping system shall be as previously approved by Con Edison. Refer to Section 13.0 in Con Edison specification G-8104 for approved manufacturers.

2.02 ABOVE GROUND PIPING MATERIALS

1. All above ground piping furnished as part of this Contract shall be as per Con Edison Specification G-8107 "Steel Pipe for Gas Mains and Services":
   a. All piping 2" and below shall be ASTM A106 Grade B, schedule 80
   b. All piping above 2" shall be ASTM A53 Grade B, schedule 40
   c. All pipe that is 2-inches in diameter and larger shall be welded.
2. All steel piping shall receive external coating as per Con Edison Specification G-8062 "Extruded Polyolefin Coating on Steel Gas Pipe".
3. All material used in the above ground piping system shall be as previously approved by Con Edison. Refer to Section 13.0 in Con Edison specification G-8107 for approved manufacturers.

B. Pressure Regulator and Accessories

1. Pressure regulator and meter assembly shall be as per Con Edison's drawing number 361693 "Installation of parallel 2" regulators with turbine meter indoors and outdoors 10,000 CFH to 60,000 CFH". Refer to detail 3/SU-103.
2. Con Edison shall supply the gas meter, gas regulator and filters as indicated on note 1 of the above referenced detail.

2.03 VALVES

A. All valves furnished as part of this project shall comply to Con Edison Specification G-100,298 "Valves for gas transmission and distribution piping systems."

B. All valve markings shall conform to MSS Specification SP-25 "Standard Marking System for Valves, Fittings, Flanges, and Unions."

C. All valves furnished as part of this project shall be lubricated plug valves. Refer to section 6.2 of Con Edison Specification G-100,298 for additional information. Refer to Section 18.0 for a list of approved manufacturers.

2.04 BACKFILL MATERIAL

A. All backfill and bedding material furnished as part of this project shall comply to Con Edison Specification EO-8085 "General Specification for Backfill and Bedding Material for Excavations"

PART 3 - EXECUTION

3.01 GENERAL

A. Refer to the attached Con Edison Specifications and Drawings for installation and testing requirements.

1. Specification G-8100 "General Specification for the Installation of Gas Distribution Services"
2. Specification G-8123 "Heat Fusion Joining of Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services"
3. Specification G-8204 "Pressure Testing Requirements for Gas Mains and Services"
4. Specification IP-20 "Installation of Mechanical Fittings for Plastic Pipe and Tubing"
5. Specification IP-27 "Installation of Electrofusion Fittings on PE Plastic Pipe/Tubing and Molded Fittings using a Universal Electrofusion Processor"
6. Drawing EO-16641-A "Installation of Plastic (Direct Burial or Insertion) Gas Service Piping"; specifically, the 'Recommended Direct Burial Installation'.

B. Trenching and Backfilling shall be as per the following Con Edison Specifications and Drawings:

1. Specification EO-1181 "General Specification for Backfilling of Trench and Small Openings"
2. Drawing 309495 "Trench Excavation for Gas Mains & Services up to 350 PSIG" (Detail 1/SU-103)

END OF SECTION

DIVISION 31- EARTHWORK
SECTION 31 23 16 – EXCAVATION

TABLE OF CONTENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This specification defines requirements for excavating, backfilling and compacting for utilities and miscellaneous structures. Where a discrepancy exist between these specifications and ConEdison's specification notify the engineer immediately.

B. All materials and methods shall conform in all respects to the highest standards of engineering, design and workmanship.

C. The contractor shall furnish all labor, materials, and equipment as required to excavate, backfill and compact the affected site areas. The Contractor shall excavate, backfill and compact in the following areas:

1. Required area for the installation of the gas line

1.02 DEFINITIONS

A. Satisfactory Materials - Satisfactory materials shall consist of any material classified by ASTM D 2487 as GW, GP, and SW.

B. Unsatisfactory Materials - Unsatisfactory materials shall be materials that do not comply with the requirements for satisfactory materials. Unsatisfactory materials include but are not limited to those materials containing roots and other organic matter, trash, debris, frozen materials and stones larger than three inches, and materials classified in ASTM D 2487 as PT, OH, and OL. Unsatisfactory materials also include man-made fills, refuse, or backfills from previous construction.

C. Cohesionless and Cohesive Materials - Cohesionless materials shall included materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH.materials classified as GM and SM will be identified as cohesionless only when the fines are non-plastic.

D. Rock - Rock shall consist of boulders measuring 2 cubic yard or more and materials that cannot be removed without systematic drilling and blasting such as rock material in ledges, bedded deposits, unstratified masses and conglomerate deposits, and below ground concrete or masonry structures, exceeding 2 cubic yard in volume, except that pavements will not be considered as rock.

E. Unyielding Material - Unyielding material shall consist of rock and gravelly soils with stones greater than three inches in any dimension or as defined by pipe manufacturer, whichever is smaller.

F. Unstable Material - Unstable material shall consist of materials too wet to properly support the utility pipe, conduit, or appurtenant structure.

G. Select Granular Material - Select granular material shall consist of well-graded sand, gravel, crushed gravel, crushed stone or crushed slag composed or hard, tough and durable particles, and shall contain not more than ten percent by weight of material passing a No. 200 mesh sieve and no less than 95 percent by weight passing the one inch sieve.

H. Initial Backfill Material - Initial backfill shall consist of select granular material or satisfactory materials free from rocks three inches (3") or larger in any dimension.

I. Degree of Compaction - Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in ASTM D 1557, Method D.

1.03 QUALITY ASSURANCE

A. The Contractor shall implement a Quality Assurance Program, which will be effective during the contract period. All quality control testing shall be the responsibility of the Contractor and shall be performed at no additional cost to the Owner.

B. Tests shall be performed by an approved commercial testing laboratory or may be tested by facilities furnished by the Contractor. No work requiring testing will be permitted until the facilities have been inspected and approved by the Engineer or Construction Representative.

C. Testing of Backfill Materials

1. Characteristics of backfill materials shall be determined in accordance with particle size analysis of soils ASTM D 422 and moisture-density relations of soils ASTM 1557, Method D.

2. A minimum of one particle size analysis and one moisture-density relation test shall be performed on each different type of material used for bedding and backfill.

3. A mechanical tamper may be used provided the results are correlated with those obtained by the referenced hand tamper in ASTM D 1557, Method D.

1.04 REFERENCES

A. All work performed where applicable under this Section shall be in accordance with the latest edition and latest addenda thereto of the applicable codes, standards, specifications, regulations, procedures, and tests of the following organizations to the extent referred to herein:

1. Environmental Protection Agency (EPA)

2. National Fire Protection Association (NFPA)

3. NYS Department of Environmental Conservation (DEC)

4. NYS Department of Labor

5. Occupational Safety and Health Administration (OSHA)

B. Standards Compliance

1. Where reference is made to codes or standards, or to technical or trade specifications (such as ASTM or ANSI), or to the Engineer's standards, the latest edition and latest addenda shall be used. In event of conflict between the reference documents, the most conservative and stringent requirements shall apply. However, any such conflicts shall be brought to the attention of the Engineer for resolution.

2. The following ASTM publications are referenced in this Section:

a. D 422 Particle-Size Analysis of Soils

b. D 1556 Density of Soil in Place by the Sand-Cone Method

c. D 1557 Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-lb Rammer and 18-in. Drop

d. D 2167 Density and Unit Weight of Soil In Place by the Rubber Balloon Method

e. D 2487 Classification of Soils for Engineering Purposes

f. D 2922 Density of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)

g. D 3017 Moisture Content of Soil and Soil-Aggregate In Place by Nuclear Methods (Shallow Depth)

PART 2 - PRODUCTS

2.01 BACKFILL MATERIAL

A. All new clean fill shall be as per ConEdison's specifications.

2.02 EXCAVATED MATERIAL

A. On-site excavated material shall not be utilized unless approved by the Engineer. The Contractor shall remove all roots, boulders, debris, stones, foreign and organic material from the excavated material prior to inspection by the Engineer. The Engineer's decision on the suitability of the excavated material will be final.

B. Backfill material shall be cohesionless material, free from organic substance and other deleterious matter. All backfill will be subject to inspection and approval by the Engineer.

C. Backfill material shall be free of clay and other deleterious materials and shall be screened free of stone or rock larger than 2 inches in size.

D. Sand or sand and gravel containing less than 10% by weight passing the #200 mesh sieve size, and having a maximum particle size less than 2 inches shall be acceptable for use as backfill

E. Particle size grading shall be within the following limits:

1. Passing the No. 2 sieve (percent): 100
2. Passing the no. 4 sieve (percent): 30-60
3. Passing the No. 200 sieve (percent): 0-15.

2.03 PLASTIC MARKING TAPE

A. Furnish and install plastic marking tape along the entire length of all utilities installed under this Contract. Plastic marking tape shall be acid and alkali-resistant polyethylene film, six inches wide with minimum thickness of 0.004 inch. Tape shall have a minimum strength of 1750 psig lengthwise and 1500 psig crosswise.

B. The tape shall be manufactured with integral wires, foil backing or other means to enable detection by a metal detector when the tape is buried up to three feet deep.

C. The tape shall be of a type specifically manufactured for marking and locating underground utilities. The metallic core of the tape shall be encased in a protective jacket or provided with other means to protect it from corrosion.

D. Tape color shall be as specified in the following table and shall bear a continuous printed inscription describing the specific utility.

Red:	Electric
Yellow:	Gas, Oil, Dangerous Materials
Orange:	Telephone, Telegraph, Television, Police, Fire Communications
Blue:	Water Systems
Green:	Sewer Systems

PART 3 - EXECUTION

3.01 GENERAL

A. Roadways, pavements, curbs, and utility lines, and structures, or facilities formed by graded earth, that are broken, damaged, settled or otherwise defective as a result of receiving, handling, or storage of materials of the performance of any work or by reason of any neglect of Contractor to properly protect pavements against damage shall be fully restored to the satisfaction of the Engineer and at the full cost and expense of the Contractor. The extent of the repairs and replacements shall be as determined by the Engineer or the Construction Representative.

B. Unless otherwise indicated, all existing roads, sidewalks and curbs shall be maintained passable by the Contractor. The Contractor shall provide steel plates, plywood, supports, flagman (when necessary), etc. to maintain all roads and walks passable. Unless otherwise indicated, all temporary decking and supports shall be designed to support the design loads of the original system.

C. The Contractor shall protect all new roads, walks and curbs until accepted by the Construction Representative.

D. All pavement, walks, curbs, and landscape disturbed or removed as part of required excavation, shall be restored to match in thickness, quality, construction and appearance the surface material that had been removed. The restoring of disturbed grass or paved areas shall be reviewed and the extent, materials and methods to be used shall be approved by the Engineer prior to commencement of backfilling.

E. The Contractor shall furnish and install barriers, lights and other precautions to the public around all open excavations. All barriers, lights and other precautions shall be as approved and directed by the Engineer. Such approval and/or direction shall not relieve the Contractor from liability in the event of any accident to persons and property due to such excavation and/or backfill.

F. The Contractor shall accurately excavate all required materials to the limits shown on the Contract Drawings. Unless otherwise approved by the Engineer, all excavated material which does not conform to the requirements outlined in the sub-paragraph ”Backfill Material”, or which are in excess of required grading volumes shall be removed from the site by the Contractor.

G. All excavation within fifteen feet of equipment and utilities shall be performed by hand unless otherwise indicated.

3.02 EXCAVATION

A. General

1. Excavation shall be performed to the lines and grades indicated.

2. Rock excavation shall include removal and disposition of material defined as rock in paragraph DEFINITIONS. Earth excavation shall include removal and disposal of material not classified as rock excavation.

3. During excavation, material satisfactory for backfilling shall be stockpiled in an orderly manner at a distance from the banks of the trench equal to 2 times the depth of the excavation, but in no instance closer than two feet.

4. Excavated material not required or not satisfactory for backfill shall be removed from the site.

5. Grading shall be done as may be necessary to prevent surface water from flowing into the excavation, and any water accumulating therein shall be removed to maintain the stability of the bottom and sides of the excavation.

B. Preparation

1. Before starting any excavation work, the Contractor shall ascertain the exact locations of all existing underground drain lines, piping and conduit.

C. Clearing and Grubbing

1. All areas within the Contract limits in which cuts, fills or structural units are to be constructed, shall be cleared of trees, stumps, tree roots, brush, grass and other surface materials, to the limits shown on the Contract Drawings, prior to the start of stripping operations. All of these materials shall be removed by the Contractor.

D. Stripping

1. All areas within the Contract limits, in which cuts, fills or structural units are to be constructed, shall be stripped of topsoil subsequent to clearing and grubbing of the area. The depth of stripping shall be such as to remove all of the organic topsoil material. In areas that are to be filled above original grade, soils containing occasional small tree roots (1/4 of one inch or less in diameter) do not have to be removed from the site by the Contractor.

2. Stripped materials, suitable and required for landscaping purposes shall be stored in areas as directed by the site representative. All other stripped materials shall be removed from the site by the Contractor.

E. Sheet Piling, Shoring and Underpinning

1. Sheet piling, shoring and underpinning for protection of excavations and protection of adjacent structures shall conform to Local and NYS Building Code, and the following requirements of the Building Code of the City of New York:

   a. 27-715 and 716 (C26-1110.0) for Underpinning

   b. 27-1026 through 1030 (C26-1902.0) for protection of adjoining property

   c. 27-1031 and 1032 (C26-1903.0) for Excavation Operations

2. All excavations shall be properly guarded and protected so as to prevent them from becoming dangerous to persons or property. Where necessary, excavations shall be sheetpiled, braced or shored to prevent the earth from caving in.

F. Foundation Excavation

1. Excavation of materials for foundations shall be to the limits and grades shown on the Contract Drawings. All trenches and excavations shall require shoring, sheeting bracing or equivalent protection for an employee working in an excavation.

2. Where excavation for foundations exceeds the depths called for on the Contract Drawings and good bearing soil on rock is undercut, the Contractor shall fill such areas with 3000 psig concrete to the proper elevations. The concrete fill shall be placed at the Contractor's expense. If this condition arises due to unsuitable bearing soils being encountered at the required depths, the Engineer shall be notified immediately and remedial measures shall be performed as directed by the Engineer.

3. Foundation excavations shall be cut neat wherever soil or rock conditions allow. The base of the excavation shall be compacted with machine tampers prior to placement of concrete.

G. Trench Excavation

1. The trench shall be excavated as required for the pipe to be installed. Trench walls below the top of the pipe shall be sloped, or made vertical, and of such width as specified. Unless otherwise specified trench walls shall be made vertical.
2. Trench walls shall be shored, cut back to a stable slope, or provided with equivalent means of protection for employees who may be exposed to moving ground or cave in. Vertical trench walls shall be shored as required.
3. Trench excavating shall conform to the following table:

Depth in Feet	Controlling Rules or Codes
0-5	N.Y. State, Industrial Code Rule 23
5 or more	OSHA

4. Trench walls which are cut back shall be excavated to at least the angle of repose of the soil. Special attention shall be given to slopes that may be adversely affected by weather or moisture content.
5. The trench width below the top of pipe shall not exceed 24 inches plus pipe outside diameter (O.D.) for pipes of less than 24 inches inside diameter and shall not exceed 36 inches plus pipe outside diameter for sizes larger than 24 inches inside diameter.
6. The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom quadrant of each section of the pipe.
7. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing.
8. Stones of three inches or greater in any dimension shall be removed to avoid point bearing.

H. Excavation for Appurtenances

1. Excavation for manholes, catch-basins, inlets, or similar structures shall be sufficient to leave at least 12 inches clear between the outer structure surfaces and the face of the excavation or support members or of sufficient size to permit the placement and removal of forms for the full length and width of structure footings and foundations as shown.
2. Rock shall be cleaned of loose debris and cut to a firm surface either level, stepped, or serrated, as shown or as directed. Loose disintegrated rock and thin strata shall be removed. Removal of unstable material shall be as specified above.
3. When concrete or masonry is to be placed in an excavated area, special care shall be taken not to disturb the bottom of the excavation.
4. Excavation to the final grade level shall not be made until just before the concrete or masonry is to be placed.

I. Jacking, Boring, and Tunneling

1. Unless otherwise indicated, excavation shall be by open cut except that sections of a trench may be jacked, bored, or tunneled if, in the opinion of the Engineer the pipe, cable, or duct can be safely and properly installed and backfill can be properly compacted in such sections.

J. Rock Excavation

1. Partially decomposed rock that can be removed with the use of a pick or by other equipment or methods used for excavating earth shall be considered as earth excavation.
2. All blasting operations shall be performed in strict accordance with ordinance and regulations relative to rock blasting and the storing and use of explosives.
3. The Contractor shall be held solely responsible for any and all damage resulting from the use and storage of explosive materials including blasting caps or any other forms of detonators.
4. Measurement of rock excavation shall be limited to the payline dimensions (both plan and grade) shown on the Contract Drawings and as outlined herein. No payment will be made for any excess quantities that may break away due to blasting methods or for other reasons. Overbreakage, which undercut the rock, shall have such areas filled with 3,00 psig concrete to the proper elevations at the Contractor's expense.
5. Prices, either lump sum or unit, shall include all costs for supervision, labor, tools, equipment and materials required for drilling, breaking or blasting rock; rock removal; disposal; protection of work, personnel and property; all costs associated with obtaining blasting permits and licenses, etc.; dewatering where and if necessary; supporting and protecting surface and subsurface structure; and all other work required to break, remove and dispose of rock as shown on the Contract Drawings and outlined herein.

K. Stockpiles

1. Stockpiles of satisfactory backfill material shall be placed and graded as specified. Stockpiles shall be kept in a neat and well drained condition, giving due consideration to drainage at all times.
2. The ground surface at stockpile locations shall be cleared, grubbed, and sealed by rubber-tired equipment.
3. Excavated satisfactory and unsatisfactory materials shall be separately stockpiled. Stockpiles of satisfactory materials shall be protected from contamination that may destroy the quality and fitness of the stockpiled material.
4. If the Contractor fails to protect the stockpiles, and any material becomes unsatisfactory, such material shall be removed and replaced with satisfactory material from approved sources at no additional cost to the Owner.
5. Locations of stockpiles of satisfactory and unsatisfactory materials shall be as indicated by the Engineer or the Construction Representative.

L. Maintenance

1. The Contractor shall keep all excavations free of all debris such as paper, wood, broken concrete, snow, stones, etc., at all times. Protection of job personnel and the public shall be maintained at all times.
2. Where sloughing or collapse of any excavation occurs due to the neglect of the Contractor, all required remedial work including supervision, labor, tools, material and equipment shall be at the Contractor's expense.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 32 12 16 – ASPHALT PAVING

TABLE OF CONTENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This specification defines the requirements for furnishing and placement of asphalt concrete pavement including base course, binder course and wearing course.

B. The Contractor shall provide all supervision, labor, materials, tools and equipment required to construct asphalt concrete pavement as indicated herein and on the Contract Drawings.

1.02 REFERENCES

A. Where reference is made to codes or standards, or to technical or trade specifications (such as ASTM or ANSI), or to the Engineer's standards, the latest edition and latest addenda shall be used. In event of conflict between the reference documents, the most conservative and stringent requirements shall apply. However, any such conflicts shall be brought to the attention of the Engineer for resolution.

B. The following ASTM publications are referenced in this Section and shall apply:

1. D 4 Bitumen
2. D 8 Roads and Pavements, Materials for
3. D 140 Sampling Bituminous Materials
4. D 242 Bituminous Paving Mixtures, Mineral Filler
5. D 290 Bituminous Mixing Plant Inspection
6. D 692 Bituminous Paving Mixtures, Coarse Aggregate
7. D 946 Asphalt Cement for Use in Pavement Construct
8. D 979 Sampling Bituminous Paving Mixtures
9. D 995 Mixing Plants for Hot-Mixed, Hot-Laid Bitumen
10. D 1073 Bituminous Paving Mixtures, Fine Aggregate
11. D 1097 Bitumen Content of Paving Mixtures by Centri
12. D 1663 Asphalt Paving Mixtures, Hot-Mixed, Hot-Laid
13. D 2041 Maximum Specific Gravity of Bituminous Paving Mixtures

1.03 DEFINITIONS

A. ROADWAY AND MISCELLANEOUS SURFACE SUBBASE: Gravel materials placed and compacted on prepared subgrade.

B. COARSE AGGREGATE: Limestone, gravel, slag, or other suitable material, predominately retained on No. 8 sieve.

C. FINE AGGREGATE: Mineral aggregate passing a No. 8 sieve.

D. HOT-MIX ASPHALT BASE COURSE: Foundation course of mineral aggregate bound with asphaltic cement, placed on subbase.

E. HOT-MIX ASPHALT INTERMEDIATE COURSE: A leveling course (binder course) of mineral aggregate bound together with asphaltic cement between a base and surface course.

F. HOT-MIX ASPHALT SURFACE COURSE: The top (wearing) course of an asphalt pavement.

G. JOB-MIX FORMULA: Formulation of aggregates and asphalt to comply with the specifications.

H. MINERAL FILLER: Mineral aggregate, 70% passing No. 200 sieve.

I. PLASTICITY INDEX (PI): A measure of cohesion and swell characteristics of soil.

J. SULPHATE SOUNDNESS TEST: Test to determine resistance of aggregates to deterioration by freezing and thawing.

K. TACK COAT: A light coat of liquid asphalt to existing asphalt or Portland cement concrete surface.

L. GUTTER: Asphalt material shaped to transport runoff.

1.04 QUALITY ASSURANCE

A. Qualifications of Asphalt Concrete Producer: Use only materials furnished by a bulk asphalt concrete producer.

B. Regulatory Requirements: Comply with applicable requirements of New York State Department of Transportation.

C. Qualifications of Testing Agency: See Section 01400.

1.05 PAVING QUALITY REQUIREMENTS

A. General:

1. Test in-place asphalt concrete courses for density, thickness, and surface smoothness.
2. Provide final surfaces to grades and cross-sections.
3. Take 4-inch diameter pavement specimens for each course, locations directed by Engineer/Architect.
4. Repair test holes as specified for patching defective work.

B. Density of Top Course:

1. Compare in-place density against specimen of same asphalt mixture, when subjected to 50 blows of standard Marshall hammer on each side of specimen.
2. Minimum acceptable density, 97% of lab specimen.

C. Surface Smoothness:

1. Test surface of each course using a 10 ft. straight-edge applied parallel to and at right angles to centerline of paved areas.
2. Check surfaced areas at intervals directed by the Engineer/Architect.
3. Surface will not be acceptable if it exceeds:
   a. Base Course: 3/8 in. in 10 ft.
   b. Surface Course: 1/4 in. in 10 ft.
   c. Crowned Surfaces:
      (a) Test with crown template, centered and at right angles to the crown.
      (b) Surface will not be acceptable if it varies more than 1/4 in. from the template.

1.06 SUBMITTALS

A. Samples: Provide samples for laboratory testing and job-mix design.

B. Certificates:

1. Provide certificate, in lieu of lab test report.
2. Certify that materials comply with specification.
3. Signed by asphalt concrete producer and Contractor.

1.07 JOB CONDITIONS

A. Weather Limitations:

1. Apply tack coats when the ambient temperature is 50° F and has not been below 35° F for 12 hours prior to application.
2. Do not apply when the base surface is wet.
3. Construct surface course only when temperature is above 40° F, when the base is dry, and when weather is not rainy.
4. Place base coarse when temperature is not below 35° F and rising.
5. Run-of-bank gravel, crushed gravel, or crushed stone may be placed under any weather conditions acceptable to the Engineer/Architect.

B. Grade Control: Maintain the required lines, grades, and widths, including crown and cross-slope, for each course.

C. Subbase Surface: The Contractor shall prime coat the subbase surface if it has been damaged by weather or use.

D. Traffic Control:

1. Maintain vehicular and pedestrian traffic during paving operations.
2. Provide flagmen, barricades, warning signs, and warning lights for movement of traffic and safety.

PART 2 - PRODUCTS

2.01 BASE COURSE GRANULAR

A. Granular base course shall consist of Type 2 under sub-section 304-2.02, Material Requirements, of Section 304 - Subbase Course, as outlined in NYSDOT standards.

2.02 BASE COURSE BITUMINOUS CONCRETE

A. Bituminous concrete base course shall consist of base course, Type 1, conforming to Table 401-1, Section 400, Bituminous Pavements, as outlined in NYSDOT standards.

2.03 BITUMINOUS CONCRETE BINDER AND TOP COURSES

A. Bituminous concrete binder and top courses shall consist of binder, Type 3 and top course, Type 7 respectively, conforming to Table 401-1, Section 400, Bituminous Pavements as outlined in NYSDOT standards.

2.04 PRIME AND SEAL COATINGS

A. Prime and/or tack coat where required shall consist of an asphalt emulsion meeting requirements of sub-section 407-2, Materials, of Section 407, Tack Coat, as outlined in NYSDOT standards.

B. Seal coat where required shall be Jennite AE as manufactured by Maintenance Inc., Wooster, Ohio or equal.

2.05 TRAFFIC AND PARKING MARKING MATERIALS

A. Traffic lane marking paint:

1. With chlorinated rubber base (state highways).
2. With Methylene chloride and toluene chloride base (all other highways)

B. Factory mixed, quick-drying and non-bleeding.

1. FS TTP-115E, Type III.
2. FS TTP-115F, Type I.

C. Color:

1. Driving lane dividers - white.
2. No parking zone markings - yellow.
3. Parking dividers - white.
4. Walking lanes - white or yellow.

PART 3 - EXECUTION

3.01 METHOD OF INSTALLATION

A. Subgrade Preparation

1. The subgrade (cut or fill) shall be properly compacted to at least a Relative Density of 85% or an equivalent acceptable to the Engineer.
2. The outside edge of the pavement section shall extend at a minimum 12 inches beyond the edge of the bituminous pavement (binder and wearing course), except where concrete curbs are installed.

B. Thickness Requirements

1. Unless otherwise indicated on the Contract Drawings, the minimum thickness and tolerances of pavement materials shall be in accordance with the following:

Material	Nominal Thickness (Inches)	Tolerance (Inches)
Granular Base Course	6	+/- ¼
Binder Course	3	+/- ¼
Top Course	1-1/2	+/- ¼

2. The thickness indicated for each course of pavement is a nominal thickness. The pavement shall be so constructed that the final compacted thickness is as near to the nominal thickness as is practical. However, the sum total thickness of all the bituminous treated courses combined shall not vary from the total of the nominal thickness by more than 3/8 of an inch.

3.02 PREPARING THE MIXTURE

A. Comply with ASTM D995 for material storage, control, and mixing, and for plant equipment and operation.

B. Stockpiles:

1. Keep each component of the aggregates in separate stockpiles.

C. Heating:

1. Heat the asphalt cement to a viscosity which can uniformly distribute the mixture.
2. Use lowest possible heat to suit viscosity of the asphalt.
3. Do not exceed 350° F (176.6° C).

D. Aggregate:

1. Heat aggregates to reduce moisture content to 1.5%.
2. Deliver dry aggregate to mixer from 250° F to 325° F to suit penetration grade and viscosity of asphalt cement, air temperature, and workability.
3. Accurately measure aggregates and asphalt cement to comply with job-mix formula.

E. Mix aggregate and asphalt cement to achieve 90-95% coating for base and 85-90% coating for surface in accordance with ASTM D2489

F. Transporting:

1. Transport mixtures from plant in tight, clean trucks.
2. Coat compartments with lime-water mixture to prevent sticking.
3. Drain compartment of excess solution before loading.
4. Provide covers to protect from weather and heat loss.
5. For cold weather or long hauls, provide insulation around entire truck bed.

3.03 PLACEMENT

A. General

1. Each bituminous material shall be laid with finishing machines having an edging attachment to aid in securing a satisfactory joint between adjacent lanes.
2. All materials shall be spread immediately upon delivery after the temperature in the delivery vehicle has been checked and approved.
3. All asphaltic materials shall be placed only on clean and dry surfaces containing no frost. Unless specifically authorized in writing by the Engineer no materials shall be placed when the shade temperature is below 50°F.
4. Where there is a substantial time span as determined by the Engineer or the Engineer's Field Representative between placing of overlying bituminous materials, the in-place bituminous

layer shall be swept clean and coated with a primer at a rate not exceeding 0.2 gallons per square yard but sufficient to totally coat the underlying layer.

B. Compaction

1. After placing, and while still hot and workable, the material shall initially be rolled with a 10-12 ton three wheel roller or an 8-10 ton tandem roller. Final finishing shall be accomplished using a tandem roller weighing at least ten tons.

2. In areas inaccessible to standard rollers, the required compression shall be secured with mechanical tampers or vibrating rollers approved by the Engineer.

C. Tack Coat:

1. Dilute with water and apply to contact surfaces of existing asphalt concrete or Portland cement concrete.

2. Apply 0.10 to 0.15 gal. per sq. yd.

3. Brush surfaces of curbs, gutters, manholes, and other structures projecting into or abutting pavement.

4. Dry to a "tacky" consistency before paving.

5. Tack coat all end transitions to existing pavement, when traffic is driven on lower paved surface, for all pavement overlays or as ordered by the Owner.

3.04 FRAME ADJUSTMENTS

A. Set frames to final grade as part of this work. Include existing and new frames furnished under other work.

B. Surround set frames with a ring of compacted asphalt up to 1 inch below top of frame, slope to grade, and compact by hand prior to paving.

C. If permanent covers are not in place, install temporary covers until rolling is complete.

3.05 MARKING ASPHALT CONCRETE PAVEMENT

A. Cleaning:

1. Sweep surface with power broom supplemented by hand brooms to remove loose material and dirt.

B. Apply paint with mechanical equipment:

1. Provide uniform straight edges.

2. Not less than 2 separate coats in accordance with manufacturer's recommended rates.

3.06 PAVEMENT MARKINGS

A. Surface Preparation

1. Allow new pavement surfaces to cure for a period of not less than 14 days before application of marking materials.

2. Thoroughly clean all surfaces to be marked before application of paint. Remove dust, dirt, and other granular surface deposits by sweeping, blowing with compressed air, rinsing with water, or a combination of these methods.
3. Completely remove rubber deposits, existing paint markings, and other coatings adhering to the pavement with scrapers, wire brushing, sandblasting, mechanical abrasion, or approved chemicals.
4. Where oil or grease are present on old pavements to be marked, scrub affected areas with several applications of trisodium phosphate solution or other approved detergent or degreaser, and rinse thoroughly after each application.
5. Pavement markings shall follow as closely as practicable after the surface shall been cleaned and dried, but do not begin any markings until the Owner has inspected the surface and gives permission to proceed.

B. Application

1. Parking stall lines shall be 18'-0" long by 0'-4" wide unless otherwise noted.
2. Apply uniformly painted pavement marking of required color(s), length, and width with true, sharp edges and ends on properly cured, prepared, and dried surfaces.
3. The length and width of lines shall conform within a tolerance of plus or minus 3 inches and plus or minus 1/8 inch, respectively.
4. Apply the paint at a wet film thickness of 0.015-inches.
5. Temperature of the surface to be painted and the atmosphere shall be above 50^{o}F and less than 95^{o}F.
6. Apply paint in one coat.

C. Protection

1. Conduct operations in such a manner that necessary traffic can move without hindrance.
2. Protect the newly painted markings so that the tires of passing vehicles will not pick up paint.
3. Place warning signs at the beginning of the wet line, and at points well in advance of the marking equipment for alerting approaching traffic from both directions.
4. Place small flags or other similarly effective small objects near freshly applied markings at frequent intervals to reduce crossing by traffic.
5. Replace damaged portions of markings at no additional cost to the Owner.

D. Detail Pavement Marking

1. Use Detail Pavement Markings on curbs, at crosswalks, at parking bays and at such other locations as shown.
2. Show the International Handicapped Symbol at indicated parking spaces. Color shall be as required by ADA. Apply paint for the symbol using suitable template that will provide marking with true, sharp edges and ends.

E. Final Clean-up

1. Remove all debris, rubbish and excess material.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 32 31 13 – CHAIN LINK FENCES AND GATES

TABLE OF CONTENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all work necessary to layout, assemble and install chain-link fencing, posts and gates indicated herein and outlined in the Contract Documents.

B. The work of this Section of the Specifications shall include all labor, materials, tools, equipment, appliance or services necessary to complete the work as shown on the Drawings, as specified herein, or as required by the job conditions.

1.02 REFERENCES

A. All work under this section shall conform to the requirements of the "New York State Building Code" and the regulations of governmental authorities having jurisdiction.

B. All work performed and material supplied under this Section shall be in accordance with the latest addenda thereto of the applicable codes, standards, specifications, regulations, and procedures.

C. ASTM A116 Zinc-Coated (Galvanized) Steel Woven Wire Fence Fabric.

D. ASTM A121 Zinc-Coated (Galvanized) Steel Barbed Wire.

E. ASTM A153 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

F. ASTM A392 Zinc-Coated Steel Chain-Link Fence Fabric.

G. ASTM C94 Ready-mixed Concrete.

H. ASTM F567 Installation of Chain-Link Fence.

I. ASTM F573 Residential Zinc-Coated Steel Chain Link Fence Fabric.

J. ASTM F669 Strength Requirements of Metal Posts and Rails for Industrial Chain Link Fence.

K. ASTM F1083 Pipe, Steel, Hot-Dipped Zinc-Coated (Galvanized) Welded, for Fence Structures.

L. ASTM F1234 - Protective Coatings on Steel Framework for Fences.

M. Chain Link Fence Manufacturers Institute (CLFMI) - Product Manual.

1.03 SUBMITTALS

A. The Contractor shall furnish product data for all proposed material and equipment that will be furnished to complete the work. Submittal type, quantities and distribution shall be in accordance with the General Requirements section of the Contract Documents and this Section.

B. Submit submittals for all proposed equipment that will be furnished to complete the work in accordance with the General Requirements section of the Contract Documents and this Section.

1.04 QUALITY ASSURANCE

A. Installer Qualifications: An experienced installer, with minimum 3 years' experience, who has completed Work similar in material, design, and extent to that indicated for this Project and whose work has resulted in construction with a record of successful in-service performance.

B. Construction Site Quality: Contractor shall maintain, on site, sufficient office, field engineering, and field supervision staff to assure that all materials and layout correspond with the requirements of the Contract Documents and approved drawings.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Materials shall be delivered to the site, ready for use, in the manufacturer's original and unopened containers or packaging. Packaging to contain material description and manufacturer information.

B. All delivered materials, products or equipment shall be stored under cover in a dry, weather-tight, and adequately ventilated location. All materials shall be elevated off of the ground.

PART 2 - PRODUCTS

2.01 GENERAL DESCRIPTION

A. Fence Height: 6 feet.

B. Security Wire or Ribbon on Top: No

C. Privacy Slats: No

D. Gate Type: Double lockable type gate assembly.

E. Gate Size: 30 inches (each).

2.02 MATERIALS

A. Framing (Steel): ASTM F1083 Schedule 40 galvanized steel pipe, welded construction, minimum yield strength of 25 ksi; coating conforming to ASTM F1234 Type A on pipe exterior and interior.

B. Fabric Wire (Steel): ASTM A116 galvanized wire.

C. Concrete: 3000 psi compressive strength.

D. Materials and Components: Conform to CLFMI Product Manual.

E. Fabric Size: CLFMI service.

F. Intermediate Posts: Type I round.

G. Terminal, Corner, Rail, Brace, and Gate Posts: Type I round.

2.03 COMPONENTS

A. Line Posts: 2.38-inch diameter.

B. Corner and Terminal Posts: 3.5-inch diameter.

C. Gate Posts: 2.5-inch diameter.

D. Top and Brace Rail: 1.66-inch diameter, plain end, sleeve coupled.

E. Gate Frame: 1.66-inch diameter for fittings and truss rod fabrication.

F. Fabric: 2-inch diamond mesh interwoven wire, 9 gage thick, top salvage bottom selvage.

G. Tension Wire: 6 gage thick Galvanized steel, single strand.

H. Tie Wire: Min. 11GA Galvanized steel wire at posts and rails.

2.04 ACCESSORIES

A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

C. Gate Hardware: Fork latch with gravity drop; a minimum of two 180-degree gate hinges per leaf and hardware for padlock.

2.05 FINISHES

A. Components and Fabric: Galvanized to ASTM A123.

B. Hardware: Galvanized to ASTM A153.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Provide all excavation and concrete fill required to support all gate, corner, and run posts. Depth of excavation shall exceed that of the established frostline, (>36 inches).

B. Install framework, fabric, accessories and gates in accordance with ASTM F567 or applicable manufacturer's instructions.

C. Place fabric on inside of posts and rails.

D. Set posts plumb, in concrete footings with top of footing flush with finish grade. Slope top of concrete for water runoff.

E. Line Post, Corner, Gate and Terminal Post Footing Depths Below Finish Grade: Sufficient to maintain fencing for the duration of the Work.

F. Brace each gate and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail one bay from end and gate posts.

G. Provide top rail through line post tops and splice with 6-inch-long rail sleeves.

H. Install brace rails on corner gate leaves.

I. Do not stretch fabric until concrete foundation can adequately receive the load of the fence.

J. Stretch fabric between terminal posts or at intervals of 100 feet maximum, whichever is less.

K. Position bottom of fabric at finished grade.

L. Fasten fabric to top rail, line posts, braces, and bottom tension wire with tie wire at maximum 15 inches on centers.

M. Attach fabric to end, corner, and gate posts with tension bars and tension bar clips.

N. Install bottom tension wire or strap stretched taut between terminal posts.

O. Do not attach the hinged side of gate from building wall; provide gate posts.

P. Install gate with fabric and barbed wire overhang to match fence. Install three hinges per leaf with associated other hardware.

Q. Erection Tolerances

1. Maximum Variation from Plumb: 1/4 inch.
2. Maximum Offset from True Position: 1 inch.
3. Components shall not infringe adjacent property lines.

END OF SECTION

DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 32 91 19 – TOPSOIL PLACEMENT AND GRADING

TABLE OF CONTENTS

PART 1 - GENERAL

1.01 GENERAL REQUIREMENTS

A. The work under this section shall be subject to the requirements of the "General Conditions" governing all contract and "Special Conditions" for site work.

1.02 SCOPE OF WORK

A. The work includes all labor, materials, equipment and appurtenances for the complete execution of all work of this section as shown on the drawing, these specifications and conditions at the site, and shall include but not be limited to the following:

1. Testing off-site sources of soil, mulch, and amendment materials for approved use in turf and planting bed soil mix. Verification testing of on-site sub-soils as required.
2. Furnishing material from approved off-site sources(s) for lawn and planting soil mixes and furnishing other soil amendment materials.
3. Amending, preparing, mixing plantings soils for turf, woodland restoration, and planting bed areas throughout the life of the contract.
4. Preparing sub-grade at turf, woodland restoration and planting bed areas.
5. Preparation shall include amending and mixing planting soil with controlled fill material soil to the depths indicated for transition zones of each planting area.
6. Placing, spreading, and fine grading pre-mixed planting soil materials indicated for plant and sod areas.
7. Protecting all plant mix installations with Construction Limit Fencing, or other means approved by the Engineer, as required until substantial completion.

1.03 DESCRIPTION

A. Related work specified elsewhere:

1. Seeding: Section 32 92 19

1.04 SUBMITTALS

A. Product Data: Submit to the Engineer technical descriptive data for each manufactured or packaged product of this Section. Include manufacturer's product testing and analysis and installation instructions for manufactured or processed items and materials.

B. Certificates: Submit certified analysis for each soil treatment, amendment, and fertilizer material specified and/or approved for use by the Engineer. Include guaranteed analysis and weight for packaged materials.

C. Test Reports: Submit to the Engineer written reports of each sample tested. Soil tests must be unique and individual to each sample taken and are not to be resubmitted or reused. Samples and analyses must be submitted within 14 calendar days of sampling. Each report shall include the following as a minimum and such other information required specific to material tested:

1. Date issued.
2. Project title and names of Contractor and material supplier.
3. Testing laboratory name, address and telephone number, and name(s), as applicable of each field and laboratory inspector.

4. Date, place, and time of sampling or test with record of temperature and weather conditions.
5. Location of material source.
6. Type(s) of test.
7. Results of tests including identification of deviations from acceptable ranges. Identify any toxic substances(s) harmful to plant growth or life.

D. Statement(s) of Qualifications: Submit within 15 days of notice to proceed to confirm qualifications as specified in Article 1.05 herein.

E. Schedule and Protection Plan: Submit a detailed plan for scheduling and sequencing of work and for protection of completed work including coordination with contractors requiring access through the site. Indicate with schedules and plans the utilization of temporary mulch pads and Construction Limit Fencing for protection against over compaction and damage to areas outside the limits of disturbance.

F. Settlement methodology: Submit a plan with a schedule describing the proposed method intended for settling installed work.

G. Quality Control Submittals:

1. Worker's Qualifications Data: Names and addresses of five similar projects that each person has worked on during the past 2 years.

1.05 QUALITY ASSURANCE

A. Qualifications:

1. Installation and Maintenance: Foreman on the job shall be experienced in landscape installation and maintenance. Perform work with personnel very familiar with planting soil preparation and lawn and planting installations under the supervision of a foreman experienced with landscape work.
2. Agricultural Chemist: Experienced person or persons employed by public or private soils testing laboratory, qualified and capable of performing tests, making soil recommendations and issuing reports as specified. Testing Laboratory and Agricultural Chemist shall be approved by the Engineer.

B. References:

1. Association of Official Agricultural Chemists.
2. American Society for Testing and Materials (ASTM) using test criteria as specified or required by other references.

C. Inspections and Testing:

1. Soil, leaf mold, mulch, and other material testing required in this Section shall be furnished and paid for by the Contractor. Contractor shall provide labor to the Engineer for performing any tests unless otherwise provided.
2. Owner’s Representative, and/or Engineer reserve the right to take and analyze at any time such additional samples of materials as deemed necessary for verification of conformance to specification requirements. Contractor shall furnish samples for this purpose upon request and shall perform testing as requested.

1.06 REGULATORY REQUIREMENTS

A. Comply with all rules, regulations, laws, and ordinances of local, state, and federal authorities having jurisdiction. Provide labor, materials, equipment, and services necessary to make Work comply with such requirements without additional cost to Owner.

B. Procure and pay for permits and licenses required for work of this section.

1.07 PROJECT/SITE CONDITIONS

A. Acquaintance with Existing Site Conditions

1. Through study of all Contract Documents, and by careful examination of the site, become informed as the nature of surface and subsurface soil conditions, the character, quality and quantity of the materials to be encountered, the character of equipment and facilities needed preliminary to and during the prosecution of the work, the general and local conditions, and all other matters which can in any way affect the work.

2. Investigate the conditions of public thoroughfares and roads as to availability, clearances, loads, limits, restrictions, and other limitations affecting transportation ingress and egress of this work site. Conform to all governmental regulations with regard to the transportation of materials to, from, and at the job site, and secure in advance such permits as may be necessary.

3. Should the Contractor, in the course of work, find any discrepancies between Contract Drawings and physical conditions or any omissions or errors in Drawings, or in layout as furnished by the Owner, it will be contractor's duty to inform the Engineer immediately in writing for clarification. Work done after such discovery unless authorized by the Engineer, shall be done at the Contractor's risk.

B. Environmental Requirements:

1. Perform both off-site mixing and on-site soil work only during suitable weather conditions. Do not disc, rototill, or work soil when frozen, excessively wet, or in otherwise unsatisfactory condition.

2. Soil mixes shall not be handled, hauled or placed during rain or wet weather or when near or above field capacity.

C. Sequencing and Scheduling: Adjust, relate together, and otherwise coordinate work of this Section with work of Project and all other sections of Project Specifications.

1.08 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packaged Materials: Deliver packaged materials to the location where soils are to be mixed, in unopened bags or containers, each bearing the name, guarantee, and trademark of the producer, material composition, and manufacturer has certified analysis, and the weight of the material. Retain packaging for the Engineer.

B. Soil, mulch, or amendment materials stored on-site temporarily in stockpiles prior to placement shall be protected from intrusion of contaminants and erosion. Engineer shall approve all temporary storage means and methods.

C. After mixing, soil materials shall be covered with a tarpaulin until time of actual use.

PART 2 - PRODUCTS

2.01 PLANT MIX MATERIALS

A. General:

1. All plant mix materials shall fulfill the requirements for new plant mixes as specified.
2. Samples of individual components of plant mixes in addition to blended plant mixes including mulch materials shall be submitted by the contractor for testing and analysis to the approved testing laboratory. Include verification testing of on-site sub-soils. Comply with specific material requirements specified.
    a. No base component material for plant mix shall be used until certified test reports by an agricultural chemist have been received and approved by the Engineer.
    b. As necessary, make any and all soil mix amendments and resubmit test reports indicating amendments until approved.
3. Owner's Representative and/or Engineer may request additional testing by Contractor for confirmation of mix quality and/or soil mix amendment at any time until completion. See Article 1.05, herein for additional requirements.

B. Base Component Material

1. At a minimum material must meet requirements contained in specifications for Soil Mix 'A' and 'B'. Base component materials, for Topsoil Mix 'A' and 'B' only, shall not be site salvaged and must be an off-site borrow material.
2. Test Base Component Materials, both individual components and mixed materials, for compliance with material specifications. These test criteria and results, when approved shall establish the standard to which all subsequent Base Component Material tests must conform.
3. Prior to mixing Base Component Material with leaf mold, have (1) composite sample tested from each 100 c.y. of material (see each mix type for rate of testing requirement) intended for use in soil mixes of lawn and planting work.
    a. Base Component Material shall meet specified requirements. The only allowable amendments to the Base Component Material will be for adjustment of nutrient levels and then only by means established by these specifications, or as per the Engineer.
    b. Perform the following agricultural soil tests and submit comprehensive test reports. Soil tests must be unique and individual to each sample taken and are not to be resubmitted, duplicated, or reused. Samples and analyses must be submitted within 14 calendar days of sampling. Failure to include any of the criteria stated below will be sufficient cause for rejection of the test reports.
        (1) Particle size analysis/distribution as defined below as well as with a hydrometer method.
        (2) Fertility analysis-Soil pH and soluble salts.
        (3) Available Nutrient analysis-Total nitrates (Nh3), phosphorus as P2O5, potassium as K20, calcium, sodium, magnesium, ammonium, iron, and manganese.
        (4) Cation exchange capacity.
        (5) Organic matter content (% ovendry weight of soil).

(6) Heavy metal analysis-Selenium, chromium, cadmium, lead, nickel, cobalt, mercury, molybdenum, zinc, aluminum, boron, copper.

(7) Material drainage rate.

(8) Carbon/nitrogen ratio.

(9) Calcium/magnesium ratio.

4. Material Requirements: Material shall substantially conform to the following:

a. Physical Analysis (Soil Texture):

Sieve Size	% Passing	% Retained	Dimension Class
1" 1	00.0	0.0	Gravel
¼"	99.8	1.2	Fine Gravel
#10	96.2	2.8	Very Coarse Sand
#20	82.6	11.4	Coarse Sand
#40	41.1	42.5	Coarse Sand
#60	15.5	23.2	Medium Sand
#80	9.1	8.8	Fine Sand
#100	6.7	3.2	Very Fine Sand
#200	3.7	5.6	Very Fine Sand
Pan		1.3	Silt/Clay

b. Chemical Analysis:

(1) Organic matter content (% ovendry weight of soil): Total content shall be 1.6-2.5%

(2) Soil reaction (pH): 4.7-6.0

(3) Soluble salt content (Conductivity): 4 mmhos/cm.

b. Hydrometer Testing

(1) Gravel-3.1

(2) Sand-86.5

(3) Silt-6.0

(4) Clay-4.4

c. Material Drainage at a rate of 60% to 70% of the total volume of water within 3 minutes. Soil should be saturated prior to conducting tests.

C. Leaf Mold (Fully Composted)

1. Leaf Mold: Shredded leaf litter, composted for a minimum of one year (12 months) and tested to confirm the following characteristics:

a. The leaf mold must be free of all inorganic debris such as plastic fragments, glass and metal fragments.

b. The leaf mold must be free of any and all stones larger than ½", large branches, and large roots over ½" in length. 100% of leaf mold must pass a ½" screen.

c. Chemical Analysis:

(1) Organic matter content (% oven-dry weight of soil): Total content shall be within a range of 45-70% (% oven-dried weight of leaf mold).

(2) Soil reaction (pH) measured as a 1:5 dilute in the range from 6.5-7.5.

(3) The carbon/nitrogen ratio should fall between 12:1 and 25:1.

(4) The calcium/magnesium ratio should fall between 2:1 and 6:1.

(5) The soluble salt content (conductivity) must be less than 150 mmhos/cm for a 1:5 leaf mold to water ratio.

(6) A fertility analysis (nitrate, phosphate, potassium, calcium, and magnesium levels) must be provided for each batch of leaf mold.

d. Material Drainage: at a rate of 55% to 70% of the total volume of water within 3 minutes. Soil should be saturated prior to conducting test.

e. The leaf mold shall be tested for nutrient content as specified below. Trace nutrient content shall fall within the range of the following indicated amounts:

Element	Acetate Extract	HCL Extract
Iron	0.5-5.0 ppm	greater than or equal to 5 ppm
Manganese	0.5-8.0 ppm	less than or equal to 15.4 ppm
Molybdenum	0.5-1.0 ppm	greater than or equal to 1.0 ppm
Zinc	0.1-1.0 ppm	greater than or equal to 4.4 ppm
Aluminum	0.1-2.0 ppm	greater than or equal to 2.0 ppm
Boron	0.1-1.0 ppm	greater than or equal to 1.7 ppm
Copper	0.1-1.0 ppm	greater than or equal to 1.0 ppm

f. The leaf mold shall be tested for toxic substance content as specified below. Heavy metal content not to exceed (less than) the following indicated amounts:

Element	Acetate Extract	HCL Extract
Lead	less than or equal to 0.1 ppm	less than or equal to 25 ppm
Selenium	less than or equal to 0.1 ppm	less than or equal to 10 ppm
Mercury	None	None
Chromium	less than or equal to 0.1 ppm	less than or equal to 1 ppm
Cadmium	less than or equal to 0.5 ppm	less than or equal to 0.2 ppm
Nickel	less than or equal to 0.5 ppm	less than or equal to 2 ppm
Cobalt	less than or equal to 0.5 ppm	less than or equal to 2 ppm

None = none detected = below detection limits of 0.01 ppm

g. Rate of testing for Leaf Mold: Have one (1) composite sample tested for each new source of supply, each variable pile within each source of supply, and/or for each 50 c.y. of material or as directed by the Engineer.

D. Mulch Materials

1. Organic mulch: Double hammered hardwood bark and/or leaf mold mixture for ground cover, annual, perennial beds and tree and shrub saucers and/or beds from the following sources:

a. “Peanut Hulls & Milled Leaf” mulch by Brookside Nurseries Inc. 228 Brookside Road, Darien, CT 06820, (203) 655-3978.

b. "Southland Soil Conditioner" mulch as provided by Southern Importers Inc. P.O. Box 8579, Greensboro, NC 27419, (919) 292-4521.

c. Or approved equal, as approved by Engineer.

2. Mulch materials shall have been composted for a minimum of 6 months and tested to confirm the following characteristics:

   a. The mulch materials must be free of all inorganic debris such as plastic fragments, glass, and metal fragments.

   b. The mulch material must be free of stones larger than ¼", branches, and large roots over ½" in length.

   c. Wood chips over ½" in length or diameter should be removed by screening.

   d. Chemical Analysis:

      (1) Organic matter content (% ovendry weight of mulch): Total content shall be 60-90%.

      (2) Soil reaction (pH) measured as a 1:5 dilute in the range from: 4.5-6.0 at time of supply. Amend pH with dolomitic limestone to bring mulch pH to 6.0-7.0 at time of installation.

      (3) The carbon/nitrogen ratio should fall between 2:1 and 6:1.

      (4) The calcium/magnesium ratio should fall between 2:1 and 6:1.

   e. Heavy metal content not to exceed (less than) the following indicated amounts:

Element	Acetate Extract	HCL Extract
Iron	0.5 ppm	3.1 ppm
Manganese	0.5 ppm	15.4 ppm
Molybdenum	0.4 ppm	0.8 ppm
Zinc	0.2 ppm	4.4 ppm
Aluminum	0.2 ppm	1.2 ppm
Boron	1.1 ppm	1.7 ppm
Copper	None	0.01 ppm
Lead	0.1 ppm	0.4 ppm
Selenium	None	0.4 ppm
Mercury	None	None
Chromium	None	None
Cadmium	None	0.02 ppm
Nickel	None	0.04 ppm
Cobalt	None	0.05 ppm

   None = none detected = below detection limits of 0.01 ppm.

3. Test mulch material

   a. Rate of Testing for Mulch Material: Have one (1) composite sample tested for each new source of supply, each variable pile within each source of supply, and/or for each 35 c.y. of material or as directed by the Engineer.

   b. In mock-up installation with Soil Mix 'B' (8 parts Soil Mix 'B' to 2 parts proposed Mulch Material) to ensure compliance with material specifications including organic

matter, pH, and heavy metal content. Use parameters for Soil Mix 'B' as standard for testing. Have one (1) composite sample tested for each new source of supply, each variable pile within each source of supply, and each 50 c.y. of material or as directed by the Engineer.

2.02 SOIL AMENDMENT MATERIAL

A. Ground Limestone: Ground Limestone as a soil amendment material will only be used pending results of analysis.

1. Provide a dolomitic limestone with a minimum of 88% of calcium and magnesium carbonates.

2. Ground limestone material shall have a total of 100% passing the 1-mesh sieve, minimum of 90% passing the 20-mesh sieve, and a minimum of 60% passing the 100-mesh sieve.

B. Common Fertilizers

1. Fertilizers (For amending Soil Mixes): Provide to extent approved by Engineer as a result of soil test recommendations for each plant condition.

   a. "Dry Roots 2 Formula" For Planting and Turf (3-3-3) as manufactured by Roots Inc. 3120 Weatherford Road, Independence, MO 64055.

   b. Multi Purpose Fertilizer for Trees, Plants and Turf (10-10-10) as manufactured by Lebanon Lawn & Garden, 1600 East Cumberland Street, Lebanon, PA 17402.

   c. Or approved equal, as approved by Engineer.

C. Compost Material

1. Biosolid material (For amending Soil Mixes): Provide to extent approved by Engineer, as a result of agricultural soil testing for available nutrients required for each plant condition.

   a. "Nutri-Brew" as distributed by Commodities Specialties, P.O. Box 610, Baldwinsville, NY 13027, Phone (315)638-1113.

   b. "Orgrow" as provided by the Professional Services Group Inc. 300 Anthony Street Schenectady, NY 12308, Phone (518)382-5025.

   c. "EarthMate" as provided by the Philadelphia Water Department Biosolids Management Unit, 4th floor, ARAMARK Tower, 1101 Market Street, Philadelphia, Pennsylvania 19107-2994, Phone (215)685-6248, Fax (215)685-6207.

   d. "Allgro" as produced by Synagro Technologies, 1800 Bering Drive, Suite 1000, Houston, TX 77057, Phone (800) 370-0035.

   e. Or approved equal, as approved by Engineer.

D. Herbicides: For possible use, if there is seed germination on-site after sub-grade placement prior to planting mix installation or after subsequent plant mixes installation. Under no circumstance are materials to be applied without specific instruction from the Engineer.

1. Herbicides shall be approved before use for type and rate of application by the owner and by local and state agencies with jurisdiction.

2. Emergent shall be "Roundup," as manufactured by Monsanto Agricultural Products Company, C3NJ, St. Louis, MO 63166, or an approved equal as approved by Engineer.

2.03 PLANTING SOIL MIXES

A. Adequate quantities of mixed planting soil materials shall be provided to attain, after compaction and natural settlement all design finish grades. Verify quantities for placement to suit conditions.

B. Uniformly mix ingredients as specified for each Mix Type (Base Component Material, leaf mold, and other ingredients deemed to be necessary as a result of testing) by wind rowing/tilling on an approved hard surface area. Organic matter shall be maintained moist, not wet during mixing.

1. Mixing of Amendments: Add leaf mold in proportions as specified and as confirmed by testing. Other amendments shall not be added unless approved to extent and quantity by Engineer and additional tests have been conducted to verify type and quantity of amendment is acceptable.

C. Testing of Plant Mixes:

1. Perform initial tests to confirm compliance with base material and mix specifications. These test results, when approved, will establish the standard to which all other tests results must conform.

2. Follow-up Testing: Have one (1) composite sample tested prior to delivery and upon arrival to the job site for each 100 c.y. of material (see each mix type for rate of testing requirement) or as required by the Engineer intended for use in each type of turf area and plant mix to include the following:

   a. Particle size analysis: Use sieve sizes as specified for Base Component Material.

   b. Composition Analysis: Use the hydrometer method and classify the soil.

   c. Nutrient Analysis:

      (1) Have available nutrient levels (nitrate nitrogen, water soluble nitrogen, phosphorous as P205, potassium as K20, magnesium, calcium, ammonium, iron, and manganese) tested, and request testing laboratory recommendations for additional fertilizer requirements at both lawn and all plant areas if nutrient levels are below average.

      (2) Available nutrient deficiencies in soil mixes for plant beds shall be corrected with amendment materials prior to installation, and shall be monitored throughout up until and including the landscape planting installation period. Deficiencies confirmed by testing shall also be corrected during the maintenance period specified.

      (3) Available nutrient deficiencies in soils of lawn areas shall be corrected with amendment materials both prior to time of lawn installation and during maintenance period as specified.

   d. Test organic matter, pH, cation exchange capacity, carbon/nitrogen ratio, calcium/magnesium ratio and material drainage rate.

D. Soil Mix Types: Provide the following planting soil mix types at the locations indicated. Percentages of components, unless-otherwise noted will be established upon completion of individual test results for components of the various mixes. The controlling factor will be the percent (0/c) organic matter as specified for each mix. Note that percent (%) by volume of components will be in large part, determined by the leaf mold and amendment materials. Specifically the bulk density reading of the leaf mold will directly impact the organic matter readings which have been specified for each mix.

1. Topsoil Mixture for Turf Restoration: Soil Mix 'A'
    a. Organic Matter: 6-8%.
    b. Base Component Materials: 60-70% by volume (Exact percent to be identified through testing as previously specified).
    c. Leaf mold: 30-40% by volume (Exact percent to be identified through testing as previously specified).
    d. Soil pH to be 6.5-7.0.
    e. Available nutrients (Nitrates/ Phosphate/ Potassium) to be Nitrates: 30-100 ppm, Phosphate: 5-25 ppm, Potassium: 15-40 ppm.
    f. Soluble salts no higher than 50.0 mmhos/cm min.
    g. Other amendments as indicated by test results and as directed by Engineer.
2. Topsoil Mixture for Planting Beds: Soil Mix 'B'
    a. Organic Matter: 12-15%.
    b. Base Component Materials: 30-50% (Exact percent to be identified through testing as previously specified.
    c. Leaf mold: 50-70% (Exact percent to be identified through testing as previously specified).
    d. Soil pH to be 6.5-7.0.
    e. Available nutrients (Nitrate/ Phosphate/ Potassium) to be Nitrates: 30-100 ppm, Phosphate: 5-25 ppm, Potassium: 15-40 ppm.
    f. Soluble Salts no higher than 50.0 mmhos/cm min.
    g. Other amendments as required by test results and as directed by Engineer.

E. Stockpiling

1. General: Stockpiling on-site, off-site and at source should be restricted to no more than the needs of what can be used in a 24 hour period. Under no circumstances shall on-site or off-site stored material exceed 50 c.y. Stockpiles should be no more than six feet in height to prevent anaerobic conditions within the pile(s). Stockpiles shall be sheltered from weather to prevent excessive water absorption and blowing by winds as approved by Engineer.

PART 3 - EXECUTION

3.01 VERIFICATIONS

A. Prior to construction and soil placement operations at planting and turf areas, ascertain the location of all existing and proposed electric, cable, conduits, under-drainage systems and utility lines. Take proper precautions so as not to disturb or damage sub-surface elements. Contractor failing to take these precautions shall be responsible for making requisite repairs to damaged utilities at Contractor's own expense.

B. Verify that required underground utilities are available in proper location, and ready for use. Coordinate with others.

C. Verify that all work requiring access through or adjacent to areas where plant mixes are to be placed has been completed and no further access (other than Landscape installation) will be required. In the event that access will be required, this must be coordinated with the Engineer.

3.02 PREPARATION OF SUB-GRADE

A. Prior to dumping and spreading soils, the Contractor shall furnish and install grade stakes on a 25-foot grid in open areas and sufficiently spaced in other areas to ensure correct line and grade of sub-grade and finished grade.

B. All amendments shall be thoroughly incorporated into the mixture to assure uniform distribution. Delay mixing of compost and/or fertilizers if planting will not follow within 48 hours.

C. Additional amendments shall be mixed into the soil as confirmed by the testing reports and as approved by the Engineer for each plant type and condition of installation.

3.03 PLACING PLANTING SOIL

A. Remove all large clods, lumps, brush, roots, stumps, litter, and other foreign material and stones one-half inch (1/2") in diameter or larger. Legally dispose of removed material off site.

B. Do not place a muddy or wet soil mix.

C. Existing Soil Conditions: Prior to placing soil, scarify or otherwise loosen 3-inches of the surface of the sub-grade to ensure proper blending of the sub-grade to new soil materials.

D. Place and spread planting soil mix of the type specified over approved sub-grade to a depth sufficiently greater than the depth required for lawn and planting areas so that after natural settlement, misting, and/or light rolling, as previously approved by the Engineer, the completed work will conform to the lines, grades, and elevations shown or otherwise indicated.

1. Turf Restoration: Soil Mix 'A' (See Section 2.03-D-1 for Soil Mix 'A')

   a. Required Soil Mix 'A' depth shall be as indicated on drawings with a minimum of six inches (6").

   b. Place fills lightly in layers of three-inch (3") lifts and settle to eliminate air pockets and minimize settlement. Lightly scarify previously placed surfaces prior to placing subsequent lifts. Fills shall not be so compacted as to restrict the flow of air or water through the soil as previously specified.

   c. Roll the whole surface of lawn bed with a hand roller weighing approximately one hundred (100 lb) per foot (12") of roller width. During the rolling, fill all depressions caused by settlement with additional planting soil, then re-grade, and add 1" leaf mold to surface as shown on drawings. Lightly roll and rake until the surface presents a smooth, even, and uniform finish that is at required grade.

   d. Allow plant mix in turf areas to remain undisturbed until fully settled in accordance with settlement methodology submitted as approved by Engineer. After any additional settlement has occurred, restore areas to finished grade prior to seeding.

   e. Protect plant mix against construction activity with Construction Limit Fencing and from the eroding effects of wind and rain with filter fabric as approved for the protection plan.

2. Planting Beds: Soil Mix 'B' (See Section 2.03-D-2 for Soil Mix 'B')

a. Required Soil Mix 'B' depths shall be as indicated on drawings with a total planting depth to be a minimum of twenty four inches (24") as measured in place in a settled position.

b. Place fills lightly in layers of maximum of twelve-inch (12") lifts and very carefully settle soils to eliminate air pockets and to minimize future settling. Lightly scarify previously placed surfaces prior to placing subsequent lifts. The Engineer shall, as previously, approve proposed method of settlement. Method may include, but is not limited to, natural settlement over an approved period of time or light hand tamping and light water misting of each layer.

c. After natural settlement has occurred, add soil to maintain finished grades. If for any reason, soil is left exposed for a long duration prior to planting, add soil, and regrade as required. Fills shall not be so compacted as to in any way restrict the flow of water or air through the soil.

d. Protect plant mix against construction activity with Construction Limit Fencing and from the eroding effects of wind and rain with filter fabric as approved for the protection plan.

E. Grading Tolerances: Turf, planting, and planting bed areas shall be fine graded within plus or minus (0.10) feet of grades indicated on drawings. Maintain all "flat" areas and slopes to allow free flow of surface drainage without ponding.

END OF SECTION

This Page Intentionally Left Blank

DIVISION 32 – EXTERIOR IMPROVEMENTS
SECTION 32 92 19 – SEEDING

TABLE OF CONTENTS

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. This specification defines the requirements for furnishing and installing tuff and grass seed as indicated on the Contract Documents.

B. The work of this Section of the Specifications shall include all labor, materials, tools, equipment, appliance or services necessary to complete the work as shown on the Drawings, as specified herein, or as required by the job conditions.

1.02 SUBMITTALS

A. Product Data; Hydro Mulch: Manufacturer's specifications and application rate.

B. Product Data; Erosion Control Blanket: Manufacturer's specifications.

C. Sample: One pound of seed in vendor's unopened package with label and seed analysis.

1.03 QUALITY ASSURANCE

A. For Turf Areas provide prepackaged seed readily available to the public with quality and purity equal to product of O.M. Scotts and Son, Marysville, OH. On-the-job or made-to-order mixes will not be accepted.

B. For Woodland Restoration Area provide custom seed product of Ernst Conservation Seeds, Meadville, PA. On-the-job or other made-to-order mixes will not be accepted.

1.04 DELIVERY STORAGE AND HANDLING

A. Deliver fertilizer in manufacturer's standard size bags or cartons showing weight, analysis, and the name of the manufacturer. Store as approved by Owner's Representative.

B. Store all seed at the site in a cool dry place as approved by the Owner's Representative. Replace any seed damaged during storage.

C. Deliver erosion control blanket in manufacturer's standard packing material, showing the name of the manufacturer. Store as approved by the Owner's Representative.

1.05 SCHEDULING

A. Time For Seeding: Sow grass seed between April 1st and May 15th or between August 15th and October 1st, except as otherwise approved in writing by the Director.

PART 2 - PRODUCTS

2.01 FERTILIZER

A. Fertilizer: Mixed commercial fertilizers shall contain total nitrogen, available phosphoric acid and soluble potash in the ratio of 10-6-4 (50% N/UF). 50% of total nitrogen shall be derived from ureaform furnishing a minimum of 3.5% water insoluble nitrogen (3.5% WIN). The balance of the nitrogen shall be present as methylene urea, water soluble urea, nitrate and ammoniacal compounds.

B. Other fertilizers meeting DOT Specification Section 713-03 Fertilizer can be used.

2.02 SEED

A. Furnish fresh, clean, new-crop seed mixed in the proportions specified for species and variety, and conforming to Federal and State Standards.

B. Acceptable material in a seed mixture other than pure live seed consists of nonviable seed, chaff, hulls, live seed of crop plants and inert matter. The percentage of weed seed shall not exceed 0.1 percent by weight.

C. All seed will be rejected if the label or test analysis indicates any of the following contaminates: Timothy, Orchard Grass, Sheep Fescue, Meadow Fescue, Canada Blue Grass, and Bent Grass.

D. Provide the following seed mixture:

1. A = Min. Percentage of Germination
2. B = Min. Purity Percentage
3. C = Percentage Pure Live Seed in Mixture

SEED MIX 'A'

Name	Variety	A	B	C
Creeping Red Fescue (Festuca rubra trichophylla)	Ensylva	95	97	40
Kentucky Bluegrass * (Poa pratensis)	Baron, Flyking, Glade, or an approved equal.	75	95	15
Perennial Ryegrass ** (Lolium perenne)	Manhatten II, Pennfine, Yorktown II, or an approved equal.	90	95	40
Annual Ryegrass (Loium multiflorum)	Commercial	98	97	5

*Approximately equal proportions of 2 or more improved Bluegrass varieties as listed in the Cornell Recommendations for Turfgrass.

**One or more of the improved Ryegrass varieties as listed in the Cornell Recommendations for Turfgrass.

SEED MIX 'B' WOODLAND RESTORATION

Name	Variety	A	B	C
Annual Ryegrass (Loium multiflorum)	Commercial	98	97	5
Northern Red Oak (Quercus Rabra)	Ernst Conservation Seeds	---	---	25

Name	Variety	A	B	C
White Oak (Quercus Alba)	Ernst Conservation Seeds	---	---	25
Red Maple (Acerrabrum)	Ernst Conservation Seeds	---	---	25
Dogwood (Cornus florida)	Commercial	---	---	10
Arrow Wood (Viburnum Dentatum)	Commercial	---	---	10

2.03 MULCH

A. Dry Application, Straw: Stalks of oats, wheat, rye or other approved crops which are free of noxious weeds. Weight shall be based on a 15 percent moisture content.

B. Hydro Application: Colored wood cellulose fiber product specifically designed for use as a hydro-mechanical applied mulch. Acceptable Product: Conwed Hydro Mulch, Conwed Fibers, 231 4th Street SW, Hickory, NC.

2.04 EROSION CONTROL BLANKET

A. Erosion Control Blanket: North American Green (Product - SC150), 14644 Highway 41 North, Evansville, IN 47711.

1. Stakes: North American Green (6” wire staples).
2. FOR USE AT ANY SECURE FACILITY.
3. Stakes: North American Green (6” Bio-Stake).

PART 3 - EXECUTION

3.01 PREPARATION

A. Seed Bed: Scarify soil to a depth of 3 inches in compacted areas. Smooth out unsightly variations, bumps, ridges, and depressions which will hold water. Remove stones, litter, or other objectionable material.

1. Obtain written approval of seed bed from the Owner’s Representative before commencing seeding operations.

3.02 FERTILIZING

A. Apply 10-6-4 fertilizer evenly at the rate of 40 pounds per 1000 sq ft or 2 pounds of nitrogen per 1000 sq ft.

3.03 SEEDING

A. Assume all risks when seed is sowed before approval of seed analysis.

B. Do not seed when the wind velocity exceeds 5 miles per hour.

C. Application Rate:

1. Seed Mix "A": 5 pounds per 1,000 sq. ft.

2. Seed Mix "B": 24 pounds per acre

D. Dry Application: Sow seed evenly by hand or seed spreader on dry or moderately dry soil.

3.04 MULCHING

A. Dry Application: Within one day after seeding, cover the seeded areas with a uniform blanket of straw mulch at the rate of 100 pounds per 1000 sq ft of seeded area.

B. Hydro Application: Apply approved mulch in accordance with the manufacturer's written instructions and recommended rates of application.

3.05 EROSION CONTROL BLANKET

A. Erosion Control Blanket: Within one day after seeding, cover sloped areas with a uniform blanket of erosion control blanket. Apply approved blanket in accordance with the manufacturer's written instructions. Do not apply straw mulch in area that erosion control blanket will be covering.

B. Stakes: Install approved stakes in accordance with the manufacturer's written instructions.

3.06 ESTABLISHMENT

A. Maintain the grass at heights between 2-1/2 inches and 3-1/2 inches and include a minimum of 2 mowings.

B. Water and protect all seeded areas until final acceptance of the turf.

3.07 FINAL ACCEPTANCE

A. Final acceptance of turf areas will be granted when a uniform stand of acceptable grass is obtained, with a minimum of 95 percent coverage. Portions of the turf areas may be accepted at various times at the discretion of the Owner's Representative.

B. Unacceptable turf areas, dry application: Reseed as specified and fertilized at one-half the specified rate.

C. Once accepted, the Owner will assume all maintenance responsibilities.

END OF SECTION

This Page Intentionally Left Blank

APPENDIX A:

CON EDISON'S SPECIFICATIONS AND DRAWINGS

(REFER TO YELLOW BOOK FOR COMPLETE SET OF SPECIFICATIONS)

This Page Intentionally Left Blank

conEdison

LAST REVIEW DATE:	REVIEW CYCLE:
6/17/14	5 Years★

SPECIFICATION: **G-8062-9**

TITLE: **EXTRUDED POLYOLEFIN COATING ON STEEL GAS PIPE**

VOLUME: **6**

REVISION: (See ★)

1) Cover Page - Changed review cycle from 10 years to 5 years.

2) Section 4.0 - Updated Surface Preparation specification.

conEdison

Gas Operations Standards

TITLE: EXTRUDED POLYOLEFIN COATING ON STEEL GAS PIPE

TABLE OF CONTENTS

1.0 SCOPE

This specification covers the requirements for the mill (factory-applied) coating of steel gas pipe with extruded polyolefin and will be applicable to all pipe sizes.

2.0 MATERIALS

2.1 The following coating systems, with their associated materials, are approved for pipe less than and equal to 4 inches in diameter:

A) X-Tru: Bredero Price Co. **or**
Liberty Coating Company

1) Adhesive: A blend of rubber, asphalt and high molecular weight resins.

2) Polyolefin: High density polyethylene, opaque yellow color.

B) Pritec: Bredero Price Co. **or**
Liberty Coating Company

1) Adhesive: Butyl Rubber

2) Polyolefin: High density polyethylene, black color.

2.2 For pipe sizes 6 inches in diameter and larger, Pritec is the only approved coating system as per 2.1B.

2.3 Pipe manufactured by submerged-arc welding as per Purchase and Test Specification G-8107 shall only be coated using Pritec as per 2.1B.

3.0 PRE-COATING INSPECTION

All pipe shall be visually inspected for defects such as dents, gouges, grooves, and arc burns as per Specification G-8107 prior to applying any coating. Any defects found shall be reported to Con Edison's Purchasing Department. Any pipe length(s) in question shall not be coated.

★ 4.0 **SURFACE PREPARATION**

The exterior of all pipe, prior to the application of the adhesive, shall be grit or sand blasted to a commercial gray metal finish in accordance with NACE/Steel Structures Painting Council - Surface Preparation Specification: NACE No. 3/SSPC-SP6.

5.0 **APPLICATION OF ADHESIVE**

5.1 After cleaning, the adhesive shall be applied to the exterior of the pipe so as to leave a uniform coating, with a minimum thickness of 10 mils, which completely covers the pipe surface to both ends.

5.2 The pipe shall be inspected for bare areas and other defects in the adhesive. If the inspection shows flooded areas, drips or that the adhesive has been applied over an improperly prepared surface, the length of pipe shall be re-cleaned and recoated.

6.0 **APPLICATION OF POLYOLEFIN**

6.1 The polyolefin shall be applied over the adhesive by extrusion.

6.2 The thickness of the polyolefin shall depend on the pipe size as follows:

Nominal Pipe Diameter (Inches)	Polyolefin Thickness (Mils) Nominal	Minimum
3/4, 1, 1 1/2	25	23
2	30	27

Nominal Pipe Diameter (Inches)	Polyolefin Thickness (Mils) Nominal	Minimum
3, 4	35	32
6 to 10*	40	36
12 to 42*	60	54

*Pritec only

6.0 **APPLICATION OF POLYOLEFIN** (Continued)

6.3 Unless otherwise specified the coating shall be cut back 6 inches from each end of the pipe length.

7.0 **INSPECTIONS AND COATING REPAIRS**

7.1 An electrical spark inspection, using an approved holiday detector, shall be made at the coating plant on all pipe coated, in accordance with this Specification and G-8201. The peak voltage of the detector shall be between 12,000 and 15,000 volts measured with the electrode in contact with the coated pipe.

7.2 The inspection in Section 7.1 shall be performed on all the coated pipe prior to the pipe being placed in storage or being shipped out, whichever is first. All defects found at this time shall be repaired by the Coater at his expense. The Coater shall furnish Con Edison's Purchasing Department written certification that the pipe has been inspected as per Section 3.0, that the coating has been applied and inspected in accordance with this specification, and that the pipe and coating are free of defects.

7.3 If the coated pipe is stored in the coating yard for a period exceeding one year, the inspection required by Section 7.1 shall be repeated just prior to shipment at the discretion of Con Edison's Purchasing Department. Repairs to defects found shall be made only after approval by Con Edison's Purchasing Department.

7.4 All coating repairs shall be done by one of the following methods:

A) Completely remove all of the adhesive and polyolefin. Clean the pipe and apply new adhesive and polyolefin as per Sections 4.0, 5.0 and 6.0 above.

B) Remove the damaged coating and install cold-applied primerless tape in accordance with the recommendations of the cold tape manufacturer and specification G-8209. Only the materials specified in Specification G-100,269 shall be used.

8.0 HANDLING, STORAGE AND TRANSPORTATION

8.1 Handling, storage and transportation of the coated pipe shall be done in accordance with Specification G-8003.

8.2 Coating damage caused by improper handling, storage, or transportation of the coated pipe by the Coater or his agent shall be repaired at the Coater's expense, no matter how long the pipe has been in storage.

8.3 Each length of coated pipe shall be sealed at each end with a plastic vented end cap. These caps shall be installed such that they will not fall off during transportation, handling, and storage of the pipe.

9.0 PIPE MARKING

Each length of coated pipe shall be marked as per Specification G-8107.

10.0 REFERENCES

G-8003	-	Transportation, Handling and Storage of Steel Pipe for Gas Mains and Services
G-8107	-	Steel Pipe for Gas Mains and Services
G-8201	-	Electrical Spark Inspection of Coating on Steel Pipe
G-8209	-	Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures
G-100,269	-	Cold-Applied Primerless Tape

conEdison

LAST REVIEW DATE: 3/3/17	**REVIEW CYCLE: 5 Years**
EFFECTIVE DATE: 5/4/17	

SPECIFICATION: **G-8100-13b**

TITLE: **GENERAL SPECIFICATION FOR THE INSTALLATION OF GAS DISTRIBUTION SERVICES**

VOLUME: **2 (Section 12.0), 10 and Yellow Book**

★ **COURSE ID:** **GAS0119**

★ **CORE GROUPS:** **Gas Construction**

★ **TARGET AUDIENCE:** **Gas Construction, Emergency Response Force (ERF), Gas Development Lab, Construction, Per Diem, and Gas Contractors**

REV 13b (6/25/17):
Section 13: Removed GAS0023, "Contaminated soil at Gas Excavation off Con Edison Property".

Appendix G-2, Note 1: Clarified to include Wrought Iron.

REV 13a (4/14/17):
Section 5.28: Clarified grounding procedures.

Section 7.1 and Appendix I: Clarified installation of Excess Flow Valve.

Section 10.1: Clarified MAOP as "greater than or equal to 125 psig".

Appendix G-1: Updated the "Plastic Service Connections to Plastic Mains" chart.

Appendix G-3, Note 1: Clarified to include Wrought Iron.

REVISIONS (See ★):

1) Added Effective Date.

2) Cover Page - Changed "Registration Number " to "Course ID". Added Core Group designation. Changed "Target Training" to "Target Audience".

3)	Signature Page	-	Added “Operations Review”.
4)	Section 4.0 (old)		Removed section 4.0(old). Moved section 4.1(old) to section 8.11. Moved section 4.2(old) to section 9.20. Moved section 4.3(old) to sections 8.12 & 9.21. Renumbered subsequent sections.
5)	Section 4.0		Updated EH&S requirements.
6)	Section 5.7		Clarified requirements for bedding and backfill material.
7)	Section 5.9(D)		Revised for clarity.
8)	Section 5.9 and Appendix I		Revised clearances between newly installed/replacement gas services and other utilities/facilities.
9)	Section 5.15		Changed name of form to document pressure test from “50-13” to “As-Constructed/Emergency Sketch”.
10)	Section 5.18	-	Reworded for clarity.
11)	Section 5.19 and 5.22		Revised for clarity.
12)	Section 5.39		Revise preparation of As-Cons/Emergency sketch section to replace sections 5.39(old), 5.40(old) and 5.41(old).
13)	Section 5.42(old)		Removed section 5.42(old) covering documentation of installed main valves and drips. Renumbered subsequent sections.
14)	Section 6.4		Added information to be submitted on the sketch when offsets are required to connect a service to the main.
15)	Section 7.1	-	Revise the requirement for installation of Excess Flow Valves.
16)	Section 9.3		Added PE Plastic Pipe description chart.
17)	Section 9.14	-	Changed size of approved plastic valves.
18)	Section 9.15 and Appendix I	-	Revised to allow MetFit fiitings to be installed directly onto plastic molded fittings.
19)	Section 9.18		Added new section regarding heat of fusion of PE plastic pipe, tubing and fittings.
20)	Section 9.19		Added new section regarding inspection of PE plastic pipe, tubing and fittings prior to installation.
21)	Section 12.2		Revised pressure test requirement for service connection to the main.
22)	Section 13.0		Updated “References” section.

(Continued)

23)	Section 14	-	Renamed Appendix C
24)	Appendix C	-	Renamed and updated PE Valve chart
25)	Appendix G-1		Updated Service to Main Connections
26)	Appendix G-2		Revised to allow welding a no blow tapping tee to wrought Iron.
27)	Appendix I		Updated Key Task Matrix for Gas Service installation.

Gas Operations Standards

TITLE: GENERAL SPECIFICATION FOR THE INSTALLATION OF GAS DISTRIBUTION SERVICES

TABLE OF CONTENTS

1.0 SCOPE

This specification details the construction requirements for the installation of new and replacement gas services designed to operate at pressures less than 125 psig.

2.0 LEGAL REQUIREMENTS

Federal: 49 CFR Part 192, Sections 123, 125, 143, 151, 159, 273, 279, 301-327, 351-383, 451-475, 479, 627, 751

State: 16 NYCRR Part 255, Sections 123, 125, 143, 151, 159, 273, 279, 301-327, 351-383, 451-475, 479, 627, 751

New York City: NYC Fuel Gas Code

3.0 DEFINITIONS

3.1 **Asbestos Containing Material (ACM)** – Asbestos or any material containing more than one percent asbestos.

3.2 **Autoseal** – a material that was used to seal cast iron main joints. This material may contain PCBs, benzene, and cresol.

3.3 **Distribution Piping** – all piping, tubing, and fittings that transport the gas to the customer's equipment/appliances *from*:

- for inside meter(s) - the meter outlet
- for outside meter(s) – outside the building wall.

3.4 **Epi-Seal** – a material that was used in the past to line gas services. This material may be ACM.

3.5 **Hazardous Material** – a material containing oil, sludge, benzene, PCBs, etc.

3.6 **Hole** – an opening in the main that is drilled only (not threaded).

3.7 **Maximum Allowable Operating Pressure (MAOP)** - the maximum pressure at which a main/service may be operated.

3.0 **DEFINITIONS** (Continued)

3.8 **Meter Piping** - If the meter(s) is/are in the building, then the meter piping is the piping from the first fitting inside the building to the outlet side of the meter(s). Meter piping does not apply to locations with outside meter(s).

3.9 **Multi-residential** – a building that contains 4 or more dwelling units.

3.10 **Operator Qualified** - An individual who has been evaluated and can perform assigned covered tasks and can recognize and react to abnormal operating conditions.

3.11 **Point of Entry (POE)** – the point of entry for the gas service into a building.

3.12 **Pressure**

Low	Pressure up to and including 12" WC.
Intermediate Ossining System	Pressure greater than 1 psig and up to and including 5 psig.
Medium	Pressure greater than 2 psig and up to and including 15 psig.
High	Pressure greater than 15 psig and up to but less than 125 psig.

3.13 **Residential** – a building that contains 1-3 dwelling units.

3.14 **Service Head Valve (SHV)** – service head valve is the valve located at the head of service

3.15 **Service Line/Piping** – all piping, tubing and fittings that transport the gas from the main *to*:

- for inside meter(s) – the outlet of the meter
- for outside meter(s) – outside the building wall

3.16 **Service Regulator** – a mechanical device that reduces gas pressure from main pressure to customer utilization pressure. This may be located on the service or meter piping.

3.0 **DEFINITIONS** (Continued)

3.17 **Taphole** – an opening in the main that is drilled and threaded.

★ 4.0 **ENVIRONMENT, HEALTH, AND SAFETY (EHS) REQUIREMENTS**

4.1 All non-hazardous pipe, tubing, fittings, and/or shavings that cannot be reused, shall be brought back to the workout location for proper disposal/recycling.

4.2 Materials for capping open ended services shall be on location. Services shall be capped when work is not in progress.

4.3 An appropriate environmental site setup shall be installed:

A) Prior to cutting a properly supported existing service, **AND**

B) Prior to disconnecting the service head piping.

The environmental site setup is dependent on the substances and quantity of material found in the main. At a minimum, the environmental site setup in the excavation and under the service head piping shall include non-skid matting, absorbent pads and catch basin.

The determination of the type of hazardous materials within the main can be made by:

A) Visual inspection of main interior via plugs/tap holes on the main.

B) Review of the M&S plate.

C) Inspection of the existing condition in the excavation or building.

D) Internal inspection of the pipe with a camera.

4.4 The removal of service regulators is covered in GEHSI E06.06, “Mercury-Containing Equipment” and **must only** be completed by trained company and/or Contractor (which includes Per Diem) personnel.

★ 4.0 **ENVIRONMENT, HEALTH, AND SAFETY (EHS) REQUIREMENTS** (Continued)

4.5 Prior to a service insertion, abandonment or "relay" replacement (full or partial), the old service pipe shall be checked for hazardous substances.

If any hazardous substances (oil, sludge, etc.), other than drip water, are found in distribution mains, immediately contact EHS Operations.

- **Free flowing liquids (non-oily)** shall be treated as drip water and handled in accordance with GEHSI E06.07, "Gas Drip Water." Drip water is any accumulation of water from outside sources (i.e., water infiltration due to corrosion, cracks, condensation or water main breaks) found inside gas distribution pipes and is hazardous for benzene.

- **Solid non-oily sludge and oily sludge** shall be handled in accordance with GEHSI E06.11, "Liquids and Solids during Main Cut-Outs."

- **Autoseal** shall be handled in accordance with Gas Operations EH&S Instruction GAS0025, "Handling Auto Seal in Gas Mains." Autoseal (A.S.) or Never Leak (N.L) were materials sprayed into cast iron mains to seal joints and may be hazardous for PCBs, benzene, and cresol.

4.6 If the existing service (that is to be replaced) is suspected to have been treated with Epi-Seal, perform the necessary steps in GAS0027, "Handling Gas Services Containing Epi-Seal" to confirm if the Epi-Seal contains asbestos.

4.7 For existing steel mains and services coated with coal tar wrap, follow the established environmental procedure in the Asbestos Management Manual (AMM), Chapter 6.04.

★ 4.8 **If** contaminated soil is discovered **off** Con Edison property, follow EH&S GEHSI E5.11 "Excavated Soils on Property Not company owned" and contact your supervisor.

4.9 Prior to excavating/operating a curb valve, check the curb valve box for oily water and, if found, follow the established environmental procedure in GEHSI E02.10, "Valve Test Boxes."

★ 4.0 **ENVIRONMENT, HEALTH, AND SAFETY (EHS) REQUIREMENTS** (Continued)

4.10 Check for "Clear Access" to the head of service piping and meter(s) location/room and other immediate areas (e.g. equipment/appliances) needed to be accessed as per Asbestos Management Manual, Chapter 6.02.

4.11 Assume that paint on inside service piping is lead paint with PCBs and handle as per GEHSI E06.04.

4.12 Check for grey duct seal at the head of service piping and handle as per Asbestos Management Manual, Chapter 6.03.

4.13 Treat meter gaskets as asbestos containing material (ACM) as per Asbestos Management Manual, Chapter 6.10.

4.14 Personnel shall not use personal electronic devices (PEDs) (e.g. cell phones, Blackberries, iPods) while performing tasks, or working with someone performing tasks described in this specification, or while in other situations in which they may be distracted and pose a safety risk to oneself or others.

EXCEPTIONS:

- It is acceptable to use Company-issued intrinsically safe radios or cell phones to communicate with the GERC, Gas Control or supervision to request assistance or to report findings.
- It is acceptable to use cell phones or cameras to document existing or new gas main or service installations only after confirming there are no gas readings using a calibrated combustible gas indicator.

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS**

OPERATOR QUALIFICATION

5.1 **Installers who tap an energized pipeline, weld steel, and join PE plastic pipe by butt fusion, branch saddle fusion, electrofusion, or with mechanical fittings must be Operator Qualified**.

All other "covered tasks" shall be completed by either Operator Qualified individuals or individuals under the direct observation of one who is Operator Qualified. "Direct observation" means that the Operator Qualified individual remains in direct visual and verbal contact at all times with the individual performing the task.

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

OPERATOR QUALIFICATION (Continued)

5.2 Installers who join PE plastic pipe/ tubing and fittings by butt fusion, branch saddle fusion, electrofusion, or with mechanical fittings must be Operator Qualified **and** in compliance with the annual requalification requirements of Gas Specification G-8121, "Qualification of Installers Joining Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services."

All butt fusion, branch saddle fusion, and electrofusion joints must be fabricated in accordance with the fusion procedures outlined in Gas Specifications G-8123, "Heat Fusion Joining of Polyethylene Plastic Pipe/Tubing and Fittings for Gas Mains and Services" and IP-27, "Installation of Electrofusion Fittings on Plastic Pipe/ Tubing and Molded Fittings Using a Universal Electrofusion Processor."

All mechanical joints must be fabricated in accordance with the installation procedures outlined in Gas Specification IP-20, "Installation of Mechanical Fittings for Plastic Pipe and Tubing."

5.3 Welders shall be Operator Qualified in accordance with the requirements in Gas Specification G-1065, "Qualification of Welders and Welding Procedures".

Welding shall be performed in accordance with Gas Specification G-1064, "Shielded Metal Arc Welding Procedures for Welding Steel Pipe and Fittings."

COVER/PROTECTION

5.4 Where possible, the direct burial of new/replacement services shall be installed with a minimum cover of 24 inches. For cover less than 24 inches, adequate protection (e.g. protection plates) shall be provided only when subsurface obstruction prevents obtaining 24 inches (See Gas Drawing EO-6799-C, "Protective Covers for Gas Main and Service Installations")

NOTE:	If a minimum of 18 inches of cover cannot be maintained, consult with the Gas Distribution Engineering Department.

5.5 "WARNING BURIED GAS LINES BELOW" TAPE (Class/Stock #024-6660) must be installed at a **minimum** of 12" above the top of the direct buried new/replacement service. When new/replacement services are inserted, the tape is to be installed in all excavations, such as the main connection, the curb valve and other excavations.

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

COVER/PROTECTION (Continued)

5.6 Electronic markers (EMs) shall be installed as per Gas Drawing 502664, "Installation of Electronic Markers on Gas Mains and Services" and noted on the emergency sketch or signed off layout. EMs shall be installed in addition to warning tape and tracer wire, when required for PE pipe.

★ 5.7 Each new/replacement service line must be properly supported on undisturbed or well-compacted soil. All installations of new/replacement direct buried (or on the exposed portion of inserted services) services shall be backfilled with a minimum of 12" above the top of the service line with sand, 3/8" clean fill or recycled screening backfill. All material used for backfill and pipe support must be free of materials that could damage the pipe or its coating. Install properly compacted suitable backfill on top of the 12" minimum backfill described above. See Gas Drawing 309495, "Trench Excavation for Gas Mains and Services up to 350 psig.

NOTE:	If a service is installed in a "rock area", a 4"- 6" bedding of sand, 3/8" clean fill or recycled screening backfill shall be used.

5.8 Adequate protection devices shall be installed in areas where the service head valve, service regulator (if required), meter(s), and associated valves are subject to vehicular damage. See Gas Drawing 502163, "Bumper Installation."

CLEARANCES

★ 5.9 Where possible, the direct burial of new/replacement services shall be installed with the following minimum required clearances between gas facilities and electric facilities, steam facilities, water and sewer facilities, and other facilities (e.g., telephone, cable, petroleum):

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

CLEARANCES (Continued)

Subsurface Facility	Gas Service	Minimum Clearance with Protection
Electric Conduit or structure	4 inches	2 inches
Electric Underground Residential Distribution System (URD) (direct buried) Cable	12 inches	2 inches
Electric Oil-o-static (Electric Transmission) *	12 inches	6 inches
Steam	4 inches (metallic gas pipe) 35 feet (PE plastic gas pipe)	2 inches (metallic gas pipe) 35 feet (PE plastic gas pipe)
Water & Sewer	6 inches	2 inches
Other Facility (e.g., telephone, cable, petroleum)	4 inches	2 inches

* Where gas mains/services run parallel to electric transmission lines for significant distances contact electric transmission for guidance.

A) For instances where the proximity of the electric facility is less than the minimum required clearance from a gas facility, either facility shall be relocated or phenolic board (Class/Stock #596-4473, 1'x2' or #596-4432, 1'x4') shall be installed between the two facilities. (See Electric Drawing EO-5570-C, "Clearances of Electric Subway from Gas Mains and Other Subsurface Structures")

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

CLEARANCES (Continued)

B) For instances where exposed electric conduits in close proximity to gas facilities are found to be deteriorated to the extent that cable is visible, the deteriorated conduits shall be removed. If it can be ascertained that the cable installation is visibly damaged or further guidance is required to repair the damaged conduits, contact the applicable Electric Operations' Control Center to coordinate the replacement of the damaged cable prior to any repair. (See Corporate Instruction CI-920-1 "Gas Facilities – Clearances, Encroachments, Interference, and Corrosion")

NOTE: Report locations where phenolic board has been installed or where conduit repair has been made as per Corporate Instruction CI-920-1

C) For instances where 6 inches cannot be maintained between a water or sewer facility and the gas service, either facility shall be relocated or water impingement rubber mat(s) (Class/Stock #059-5306,2' x 2' x ½" mat) shall be installed between the two facilities for protection. The rubber matting shall be installed either horizontally over/under the gas service or vertically alongside the gas service (DO NOT wrap the rubber mat around the gas service). The rubber matting shall be installed a minimum of 2" from the gas service and shall **not** be installed "edge to edge". When more than one rubber mat is installed to protect the gas service, the mats shall *overlap* a minimum of 6".

★ D) For instances where 35 feet cannot be maintained between a steam facility and the PE plastic gas service, the PE plastic gas service shall be relocated or the gas service shall be replaced with metallic (e.g., steel or copper) gas pipe. For instances where the proximity of the steam facility is less than 4" from a metallic gas service, the metallic gas service shall be relocated or a steam blanket (Class/Stock #415-0108) shall be installed between the two facilities for protection. (See Sections 9.9 and 9.10)

E) For instances where 4 inches cannot be maintained between a facility other than electric, steam, water, or sewer (e.g., telephone, cable, petroleum) and the gas service, either facility shall be relocated or phenolic board (Class/Stock # 596-4473 or # 596-4432) shall be installed between the two facilities for protection.

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

PIPING

5.10 Plastic pipe shall be installed so as to minimize shear or tensile stresses. Care shall be taken to prevent kinking and buckling.

5.11 All piping and associated fittings shall be checked for obstructions (e.g. end caps, dirt, debris) prior to tie-in.

5.12 For gas services installed in a casing or conduit, the casing or conduit shall be designed to withstand the superimposed loads.

5.13 Any portion of plastic piping exposed due to the removal of a section of casing or which spans disturbed earth shall be of sufficient strength to withstand the external loading and shearing forces or it shall be protected with a suitable bridging piece.

5.14 Gas services that enter a building from beneath (i.e. through the floor, rather than through the foundation/vaulted wall) the building shall be encased in a gas tight conduit that is vented to the outside atmosphere. (See Gas Drawing EO-16546-B, "Installation of Flexible Sleeve Elbow Unit Where Service Enters From Beneath Building Not Exceeding 99 PSIG")

★ 5.15 Gas services inserted/installed under an enclosed living space (e.g. an enclosed porch) shall be encased in a gas tight conduit, which is sealed at both ends and vented above ground to the outside atmosphere. If the existing service pipe is to be reused as the conduit, then it must be pressure tested at 3 psig for 5 minutes and documented on the As-Constructed/Emergency Sketch form. It shall also be sealed at both ends and vented to the outside atmosphere. All below ground vent piping shall be coated per applicable Company specifications.

(See Specification G-8096, "Sealing the Annular Space Between a Gas Pipe and a Wall, Casing Pipe, or Sleeve" and Gas Drawing EO-4890-B, "Service Pipe/Tubing And Service Sleeve Through Vault, Open Areaway, Open Area Under Stairs, Under Enclosed Area, And Into Vaulted Basement")

The recommended method to seal and vent the end of the conduit that is in the ground (under an enclosed living space) outside the building is to:

A) Install the appropriate "Renu" coupling from the list below for 1", 1 ½" and 2" pipe sizes with taphole to seal and vent (with vent cap) the end of the conduit (which could be the old service pipe **provided** it passes a 3 psig pressure test for 5 minutes) to the new service pipe/tubing.

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

PIPING (Continued)

1. 1" IPS x ½" CTS with 3/8" vent (Class/Stock # 341-5817)
2. 1 ½" IPS x 1 ¼" CTS with ¾" vent (Class/Stock # 341-5825)
3. 2" IPS x 1 ¼" CTS with ¾" vent (Class/Stock # 341-5833)

OR

B) Tap a hole in the conduit to vent (with vent cap) and install a 3M coldshrink to seal the end of the conduit (which could be the old service pipe provided it passes a 3 psig pressure test for 5 minutes) to the new service pipe/tubing.

5.16 Steel service pipe that is inside a sleeve for more than 10 feet shall be supported by insulating skids. (See Gas Specification G-100,280, "Pipeline Casing Insulating Skids")

5.17 Gas services installed through a subsurface vault or open areaway shall be sleeved (with **only** *steel* pipe as the sleeve) and the ends sealed as per Gas Drawing EO-4890-B.

★ 5.18 Gas service piping installed in an open area underneath an outside staircase shall be installed as per EO-4890-B.

Compression fittings are **not** permitted, except as indicated below:

A) **If** the gas service meter is **also** located in an open area **under** an outside staircase, **then** one compression fitting is permitted to be installed.

B) **If** there is a service regulator **and** meter located in an open area **under** an outside staircase, **then** the one permissible compression fitting shall only be installed on the (*low-pressure*) piping between the regulator outlet and meter inlet.

★ 5.19 All above ground outdoor service piping **shall** be metallic.

5.20 New service installations and replacements should be installed perpendicular to the main and should not run at angles.

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

PIPING (Continued)

5.21 Threaded pipe and fittings for gas service piping shall **not** be installed underground **except** for the **first** service connection *fitting* to the main/strap saddle (when required). (See Gas Drawing EO-16645, "Steel/Copper Service Connections to Metallic Mains")

★ 5.22 New and replacement (relayed) services that enter a building (either above ground or underground) through the building's concrete/masonry foundation/vaulted wall, shall enter via a continuous steel or PVC sleeve for a new service or relay or the old service pipe for an insertion. The annular space at each end (between the service pipe and the sleeve or old service pipe) shall be sealed with link-type seals. (See Gas Specification G-8096 and Gas Drawing EO-4890-B for requirements and methods to seal the annular space between the service pipe and the sleeve).

NOTES:	For up to 2" PE service, seal the annular space inside the building with a service head adapter. For a 2" service through a 3" sleeve or a 3" service through a 4" sleeve, use a 2" or 3" gasket accordingly with waterproof caulking material to seal the annular space. (These gaskets are available from Dresser)

5.23 New and replacement services that enter a building aboveground through the building's non-concrete/masonry foundation wall, do **not** require a wall sleeve. Seal the annular space (between the service pipe and the non-concrete/masonry wall) with waterproof caulking material.

5.24 For a service replacement, a compression coupling with a 1/8" threaded plug shall be installed on low-pressure piping at the head of service for possible future use in testing the service pressure.

NOTE:	For compression couplings greater than (>) 2" diameter, then a 1/8" hole shall be drilled, tapped and plugged into the barrel of the coupling.

5.25 Bolts or stud-bolts used shall extend completely through the nuts.

5.26 Transition fittings shall **only** be used when:

A) transitioning a plastic service (when a service head adapter is not used) outside the building wall and through the wall sleeve. The steel end of the transition fitting shall be a threaded/beveled end at the point of entry.

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

PIPING (Continued)

B) making coupled pipe connections and the plastic pipe diameter is 10" (only PE to CI connections) or 16" and above, for which restraining couplings are currently not manufactured.

NOTE: There are restraining couplings for:

- 12" PE to ST
- 12" PE to CI
- 10" PE to ST

(See Gas Specification G-8153, "Reinforcing Compression Fittings")

C) connecting to a tapping tee (weld end) or bottom out fitting at the main.

NOTE: The threaded end of steel pipe or nipples shall not be placed in compression style couplings

5.27 A #10 bonding cable (Class/Stock #563-1361) shall be installed across all steel/copper service piping cut-out sections **prior** to making the cuts to maintain electrical continuity and eliminate arcing. The bonding cable shall be attached either across the service piping or from service piping to metallic main by thermit weld (on steel piping only), clamp or magnetic connectors.

NOTE: Prior to thermit welding, check the condition of the pipe and also check for the presence of gas.

★ 5.28 Use the Arcless Static Ground (ASG) kits (Class/Stock # 025-2569) or wet rags/burlap to wrap and ground all plastic pipe/tubing in the excavation prior to disconnecting/cutting the plastic service piping to eliminate static electricity arcing.

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

VALVES

5.29 All valves shall be checked for proper operation (i.e. opened and closed) prior to installation.

5.30 All services shall have an accessible curb valve. Whenever possible, curb valves shall be installed in the sidewalk.

NOTE:	In Westchester, the curb valves shall be installed in the sidewalk (or unpaved area adjacent to the street).

5.31 Whenever possible, meters and meter/regulator sets shall be installed outdoors.

When meters and meter/regulator sets are installed indoors, they should be installed as close as practical to the POE.

For indoor meter and meter/regulator sets, the service head valve (SHV) must be accessible and shall be installed as follows:

A) Low Pressure Service

1) The indoor SHV shall be installed as close as possible and within 24" (of "running pipe" length) (NYC Fuel Gas Code) from the point the gas service connection enters the building.

NOTE:	This may allow the SHV to be used as a "bypass valve" (for "bypassing" the building) at the future date.

2) For buildings with a vaulted (and accessible) basement, the SHV shall be installed:

- in the vaulted area for a *PE plastic service;*
- either in the vaulted area or the basement for a *copper service.*

B) Intermediate, Medium or High Pressure Service

The indoor SHV shall be **the first fitting** installed inside the building.

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

VALVES (Continued)

C) For a service insertion with a service head adapter, the indoor SHV shall be the first fitting installed onto the service head adapter. However, if a "permanent" obstruction exists, then the SHV shall be installed as close as possible to the service head adapter (provided supervision approves and documents it on 50-13R).

5.32 Where the SHV is located 6 feet or more above the floor level, an operating chain or a permanent access platform shall be installed by the customer.

5.33 The SHV shall be tamperproof (up to and including 4" diameter) and shall be:

A) screw ends for all low pressure services that are 4" or less in diameter;

B) screw ends for all services operating at greater than low pressure that are 2" or less in diameter.

C) flanged (weld neck) ends for all low pressure services that are 6" and larger in diameter;

D) flanged (weld neck) ends for all services operating at greater than low pressure that are 3" and larger in diameter.

NOTE: The customer must install a flange insulating kit on the downstream side of all flanged end SHVs.

5.34 The curb valve and curb valve box shall be supported with a pre-cast base or bricks. The entire assembly should be placed on well compacted soil. (See Gas Drawings EO-16629-A, "Installation of Steel Gas Service Piping," EO-16641-A, "Installation of Plastic (Direct Burial or Insertion) Gas Service Piping," and EO-16532-A, "Installation of Copper Tubing Gas Service Piping")

5.35 A building bypass valve should be installed for new/replacement services to a building (large apartment, commercial, etc.) that may require future "bypassing".

5.36 Abandoning an Existing Curb Valve

A) To abandon an existing curb valve box in a concrete sidewalk, remove the top of the box or curb valve box cover, backfill up to 3" from the surface and then fill the remaining 3" with concrete. If feasible, break out and remove the top of the box.

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

VALVES (Continued)

B) To abandon an existing curb valve box in a soil area, remove the top of the box and fill with suitable material.

REGULATORS

5.37 Each service regulator for a new/replacement service (**except** for service replacements by insertion) must be installed **outside** of the building, unless it is impractical or unsafe.

When the service regulator must be installed within the building:

A) the service regulator shall be installed as close as practical to the SHV (see the below chart) and the location of the curb valve shall be indicated on a tag attached to the regulator vent cap. (See Gas Specification G-8028, "Requirements for Indicating the Location Of The Curb Valve Box On A Gas Service With An Indoor Regulator")

Service Pipe Diameter	Maximum Distance from SHV to Regulator "running pipe" Length
≤ 2"	4 feet
> 2" and ≤ 4"	8 feet
> 4" and ≤ 8	15 feet
> 8"	20 feet

NOTE: For footage distance in excess of the above chart, see the gas meter equipment section of the Company's "A Customer Guide to Gas Service Installation" (Yellow Book) for additional requirements that must be met to allow the excess linear footage of "running pipe" between the SHV and the regulator.

B) For regulator vent installation requirements, refer to Gas Drawing EO-17118, "Regulator Vent Installation."

5.0 **GENERAL REQUIREMENTS FOR SERVICE INSTALLATIONS** (Continued)

REGULATORS (Continued)

5.38 For buildings in flood zones with indoor or outdoor service regulators, vent lines should be elevated so the terminus is 3 feet above the base flood elevation (BFE). If this is not feasible, a Vent Line Protector (VLP) shall be installed on the vent line to prevent water intrusion. (See Gas Specifications G-8217, "Flood-Prone Areas for the Installation of Gas Service Regulator Vent Line Protectors (VLP's)" and G-699, "Installation and Inspection of Gas Service Regulator Vent Line Protectors (VLPs)"

DOCUMENTATION AND RECORD OF WORK

★ 5.39 Prepare and submit an as-constructed/emergency sketch (e.g. one-line sketch or red-lined layout) and associated paperwork necessary for mapping for all installations, replacements, or abandonments of gas mains and services as per CI-940-1 "Processing Gas Mapping Information."

5.40 For additional information on the requirements, responsibilities, and timetables for updating gas maps and records refer to Corporate Instruction CI-940-1, "Processing Gas Mapping Information".

MISCELLANEOUS

5.41 Electrically powered equipment shall **never** be used on a gas service.

EXCEPTION:	Welding/fusion equipment and equipment approved by Corrosion Control and the Gas Development Lab.

5.42 Welding or cutting shall not be performed on pipe or pipe components that contain a combustible mixture of gas and air in the area of work. Post warning signs where appropriate.

5.43 Purging equipment and purge pipes shall be electrically bonded to the main/service or ground as required. See Specification G-8129 *"Purging Gas Mains, Services and Regulator Stations."*

5.44 Refer to Gas Specification IP-16, "Operation, Maintenance, Handling and Storage of the Modular - Style, Compressed Natural Gas (CNG) Bypass Cart" for bypassing a building.

6.0 SERVICE CONNECTIONS TO MAINS

6.1 For service connections to mains, see Appendix G-1 through G-3.

NOTE: The method of service connection to the main should be documented on the paperwork for the job.

6.2 Whenever practical, all service connections to a main should be located at the top of the main. If not practical, then the service connection shall be located at the side of the main.

6.3 For all pressures, reuse existing "welded" tee if found in good condition.

★ 6.4 When offsets are required to connect a service to the main (i.e. “looped service”), the offset should be kept as close as possible to the main to reduce the possibility of a future damage to the service-to-main connection. Note on sketch as “looped service” with measurements.

6.5 All tapping/drilling shall **only** be performed with approved tapping/drilling equipment. Under no blow conditions, only tapping/drilling equipment designed to be used for no blow shall be used.

NOTE: The use of a hole saw and air drill to “drill a hole” (on live or dead main) **is prohibited.**

6.6 For cast iron, steel, or wrought iron pipe, the pipe must be reinforced when the diameter of the tap hole exceeds 25% of the nominal diameter of the pipe. See Table 1 for maximum tap hole size without reinforcement.

EXCEPTIONS:

A) A 1” tap hole can be drilled and threaded in a 3” steel or wrought iron main without reinforcement.

B) A 1¼” tap hole can be drilled and threaded in a 4” steel or wrought iron main without reinforcement.

C) A 1¼” tap hole in a 4” cast iron main must have a strap saddle (double strap) installed for the threaded connection.

D) A 1½” ” tap hole in a 6” cast iron main must have a strap saddle (double strap) installed for the threaded connection.

6.0 **SERVICE CONNECTIONS TO MAINS** (Continued)

6.7 Table 1, **Metallic Main Tap Hole Sizes**

Main Size	Maximum Tap Hole Size Without Reinforcement
3”	1”
4”	1 ¼ ” *
6”	1 ½” *
8”	2”
10”	2 ½”
12”	3”
16"	4"
18"	4"
20"	5"
24"	5"
30"	5"
36"	5"

* See EXCEPTIONS for cast iron in Section 6.6

6.8 Where the maximum “tap hole” size indicated in Section 6.7 will be exceeded, the main shall be reinforced as follows, and an anode bag shall be installed on the strap saddle or sleeve as per Gas Specification G-8205, “Corrosion Control of Buried Steel Gas Distribution Mains and Services.”

A) Installed with either a strap saddle or clamp for a 1½” drilled only hole in a 4” cast iron, steel or wrought iron main.

B) Installed with either a strap saddle or clamp for a 2” drilled only hole in a 4” or 6” cast iron, steel, or wrought iron main.

C) Reinforced with a Style 50, Style 80 or “approved special order fitting” (i.e., green sleeve) for cast iron mains.

D) Reinforced with a welded fitting (i.e., tapping tee) or “approved special order fitting” (i.e., green sleeve) for steel or wrought iron mains.

6.0 **SERVICE CONNECTIONS TO MAINS** (Continued)

6.9 When installing a plug into a taphole, the plug shall be placed on top of a cleaned area on the main (**prior** to removing tapping equipment or **prior** to disconnecting a service) and shall be slid (in contact) across the main and screwed into the taphole.

6.10 All service connections to 6" and smaller cast iron mains shall be connected to the cast iron main using an insulated strap saddle (double strap) or similar approved fitting. (See Gas Drawing EO-16645)

NOTE:	It is not necessary to tap and thread the hole when using a strap saddle or other threaded reinforcement fitting.

6.11 Intermediate and medium pressure services connected to 8" - 12" cast iron mains shall be connected using an insulated strap saddle or similar approved fitting (See Gas Drawing EO-16645)

6.12 Welding of no blow tapping tees is **always** an acceptable service connection to steel. Intermediate, medium and high pressure services connected to a steel main should be connected by welding a no-blow tee to the steel main. Only when welding is impractical, can an insulated strap saddle with a threaded no-blow tee be used to connect the service to a steel main. Catching gas on the fly is **only** permitted as specified in Gas Specification IP-30, "Procedure for Removing or Replacing Live Intermediate, Medium and High Pressure Gas Pipe and/or Fittings Without No-Blow Equipment."

6.13 For all 2" and smaller diameter low pressure PE plastic services, the **preferred** connection is to install the plastic brass based tee **directly** into the main or insulated strap saddle (as required in Section 6.8). See Appendices H-1 and H-2 for installation requirements of plastic brass-based tees.

NOTE:	When field conditions do not allow for the installation of the plastic brass based tee, the angle valve tee, posilock tee or riser/threaded tee may be installed.

6.14 PE plastic service connections to PE plastic pipe with SDR greater than (>) 15.5 **shall** be connected using an electrofusion tee with the following reduced electrofusion times. (See Gas Specification IP-27)

A) SDR 23.5 PE plastic pipe
Reduce electrofusion fusion cycle time by 10% of the time displayed when the coupling is scanned.

6.0 **SERVICE CONNECTIONS TO MAINS** (Continued)

B) SDR 26 PE plastic pipe
Reduce electrofusion cycle time by 15% of the time displayed when the coupling is scanned.

C) SDR 32.5 PE plastic pipe
Reduce electrofusion fusion cycle time by 25% of the time displayed when the coupling is scanned.

6.14 An air drill or other high speed pneumatic device shall **not** be used to "drill" the **"cookie-cutter"** down the PE plastic tee, through the plastic main and back up the plastic tee.

7.0 **EXCESS FLOW VALVES**

★ 7.1 Excess Flow Valves (EFVs) shall be installed on all new or replaced services to single family residences supplied by *high-pressure* regardless of load and new or replaced (including partial replacements) ***high-pressure*** non-single family residence services which use a meter up to and including a ***class 1000 meter*** *or* equivalent (e.g. two (2) class 500 meters, four (4) class 250 meters, one (1) class 500 and two (2) class 250 meters).

NOTE: An EFV is required for a partial service replacement only if the replacement segment is near the service-to-main connection (where an EFV is usually located). An EFV is not required for a partial service replacement if the replacement segment is far away from the main-to-service connection because EFVs in those locations may not provide excavation-damage protection.

7.2 The following rules apply to all EFV installations:

A) EFVs shall **not** be installed on services operating at low, intermediate or medium pressure.

B) EFVs shall **not** be installed where contaminants in the gas stream could interfere with the EFV operation or cause loss of service.

C) EFVs shall **not** be installed where it could interfere with necessary operation or maintenance activities, such as blowing liquids from the line.

D) Only EFVs approved by the Gas Development Lab shall be installed.

E) **For an outdoor meter installation,** install the tag (which comes with the EFV) on the “riser” valve.

7.0 **EXCESS FLOW VALVES** (Continued)

F) **For an indoor meter installation,** install the tag (which comes with the EFV) on the service head valve.

NOTE:	If there is no access to the premises at the time of the installation of the EFV, secure the EFV tag to the peck vent. When a crew comes to perform the turn-on and has access to the premises, they shall relocate the EFV tag (or install a new EFV tag) from the peck vent to the service head valve.

G) The EFV shall be installed **as close as practical** to the service tee connection at the gas main. See exception below.

H) For “branch” services, the EFVs shall be installed on each individual service, as close to the “branch connection” as possible.

EXCEPTION:	If there are only two (2) "branch" services and each service has a class 500 meter equivalent (i.e. two (2) class 250 meter), or less (i.e one (1) class 250 meter), the EFV shall be installed as close as practical to the "branch" service tee connection at the main (i.e. only one EFV is required on the branch service as close as practical to the main).

I) When gassing in or automatically resetting the service, the curb valve, service head and meter valves are to be opened slowly so as not to trip the EFV. Automatic resetting of an EFV can take from 15 seconds to 10 minutes.

J) Each EFV installation shall be indicated (using this symbol) on the emergency sketch (if applicable), “as constructed” or layout and shall be mapped on the respective mains and services (M&S) plate.

K) Layouts shall indicate where EFVs are required.

8.0 STEEL SERVICE INSTALLATIONS

8.1 Steel service piping shall be joined only by personnel, who are "Operator Qualified" in joining the steel pipe by welding or approved mechanical fittings.

> **NOTE:** Non-restraining couplings shall be reinforced, when required, as detailed in Gas Specification G-8153.

8.2 The following pipe sizes are the smallest to be used for new direct bury steel service installations (Contact Gas Distribution Engineering if less than (<) 2" low pressure or intermediate pressure service is required):

System Pressure	Minimum Pipe Size
Low or Intermediate	2"
Medium	1"
High	1"

8.3 All buried or sleeved steel service pipe, fittings, and buried vent piping shall be coated and separately protected. Cathodic protection shall be in accordance with applicable Company specifications. Corrosion Control shall prepare specifications for painting /coating.

8.4 Any portion of a new above ground gas service installation that is exposed to the atmosphere must be cleaned and coated. Coating materials must be suitable for the prevention of atmospheric corrosion.

8.5 Cathodic protection on buried steel gas mains shall be designed to protect the newly installed steel pipeline in its entirety. All new steel installations shall be coated and have adequate cathodic protection in its entirety within one calendar year of the installation of the steel pipeline. Where the pipeline has been installed in segments, the one-year calendar year requirement shall begin when the final segment is energized.

8.6 The cathodic protection of the steel service shall be checked prior to and after backfilling.

8.7 For steel services in unstable soil, offsets using compression end elbows shall be installed to provide flexibility. A brace shall also be installed inside the building wall to prevent pull-out. See Gas Specification G-11831, "Procedure for Checking Areas Where Main and/or Service Movement is Anticipated" for the required service inspections in areas of unstable soil.

8.0 **STEEL SERVICE INSTALLATIONS** (Continued)

8.8 All dents, gouges, grooves or arc burns which affect the curvature of the steel pipe at the weld or compression connection **must** be removed.

8.9 All dents, gouges, grooves or arc burns which have a depth greater than 12-1/2% of the wall thickness (See Appendix D) of the steel pipe or as determined by Gas Engineering **must** be removed by cutting out the damaged section as a cylinder. The minimum cylinder length to be removed is one pipe diameter or 12 inches, whichever is greater.

8.10 If coated pipe is installed by boring, driving or other similar method, precautions must be taken to minimize damage to the coating during installation.

★ 8.11 Steel Pipe, Valves, and Fittings

A) See Gas Specification G-8107, "Steel Pipe for Gas Mains and Services" for approved steel pipe.

B) See Gas Specification G-8003 for the inspection, handling, storage, and transportation requirements of steel pipe.

C) All steel pipe for buried or submerged installations shall be factory coated as per Gas Specification G-8062, "Extruded Polyolefin Coating on Steel Pipe" or field coated as per Gas Specification G-8209, "Field Coating of Steel Gas Pipe and Fittings Installed Underground and in Subsurface Structures".

D) See Gas Specification G-100,298, “Valves for Gas Transmission and Distribution Systems for approved metallic valves.

E) All fittings (e.g. forged tees, elbows, flanges, control fittings, mechanical couplings, etc) shall meet the requirements of the applicable Purchase and Test (Volume 6) specifications.

★ 8.12 Restrictions

The following materials shall not be installed for buried or submerged installations:

A) ductile iron pipe and fittings,

B) galvanized pipe and fittings,

C) pipe and fittings made from amphoteric metal (e.g. aluminum),

D) pipe, valves, or fittings not approved by Gas Distribution Engineering.

9.0 PE PLASTIC SERVICE INSTALLATIONS

9.1 See Gas Specification G-8104 for approved PE plastic pipe, tubing, and fittings.

9.2 The following pipe sizes are the smallest to be used for new direct bury PE plastic service installations. Contact Gas Distribution Engineering if less than (<) 2" LP or IP service is required.

System Pressure	Minimum Pipe Size
Low or Intermediate	2" IPS
Medium	1 ¼ " IPS
High	1" IPS

NOTE: 1" CTS and 1 ¼" CTS shall not be installed on any high pressure system. (See Gas Specification G-8200, "Service Sizing")

★ 9.3 PE Plastic pipe with an SDR of 11 or less (i.e. 9.3) is approved for installations up to and including 100 psig and is the **only** plastic pipe to be installed on distribution systems **above** low pressure.

PE Plastic pipe with an SDR of 15.5 has a design pressure rating (70.6 psig) well below the MAOP for most of the CECONY high pressure distribution systems, and therefore cannot be installed in the high-pressure distribution systems.

★ **NOTES: M8000** pipe was all black and replaced in 1997 with Performance Pipe 8100.

Performance Pipe 6800 is black with two thick yellow stripes at three different points on the pipe's surface.

Performance Pipe 8100 has a "yellow shell" around black pipe. This is the equivalent of Performance Pipe 8300 and JM Eagle (US Poly) UAC3700.

Performance Pipe 8300 is black with one thick yellow stripe at four different points on the pipe's surface and the print line states PE100. This is the equivalent of Performance Pipe 8100 and JM Eagle (US Poly) UAC 3700.

★ **JM Eagle (US Poly) UAC3700** is black with one yellow stripe at three different points on the pipe's surface. This is the equivalent of Performance Pipe 8100 and 8300.

9.0 **PE PLASTIC SERVICE INSTALLATIONS** (Continued)

★ **NOTES (Continued):**

★ **ENDOT EN PE 4710 (GAS)** is black with one thin yellow strip at three different points on the pipe's surface. This is equivalent to Performance Pipe 8300 and JM Eagle UAC3700.

Dura-Line Polypipe GDB50 is black with either one thin yellow stripe at three different points on the pipe's surface (similar to JM Eagle and ENDOT) or one yellow stripe at six different points on the pipe's surface.

9.4 Couplings up to and including 12" shall **only** be a restraining-type (e.g. Dresser Style 711 or CSI Maxi-Grip), so as to prevent pullout due to tensile forces.

EXCEPTION: There are currently **no** 10" PE-CI restraining-type couplings manufactured. (See Section 5.26B)

9.5 The SDR size of the stiffener **must** correspond with the SDR size of the plastic pipe. See Gas Specification IP-20 for the installation of approved mechanical fittings and stiffeners required for PE plastic pipe and tubing.

9.6 Bends in the service can be made by the use of molded elbows or by manually bending the pipe in accordance with the following table:

Plastic Pipe Size	SDR 9.3 Minimum Bending Radius	SDR 11 Minimum Bending Radius	SDR 15.5 Minimum Bending Radius
1 1/4" IPS	3 feet	4 feet	--
2" IPS	4 feet	5 feet	--
3" IPS	6 feet	8 feet	--
4" IPS	8 feet	10 feet	--
6" IPS	--	14 feet	--
8" IPS	--	18 feet	--
10" IPS	--	23 feet	25 feet
12" IPS	--	27 feet	29 feet
16" IPS	--	34 feet	--

The radius of the circular bend in the pipe must be **equal to or greater** than the footage listed above.

9.0 **PE PLASTIC SERVICE INSTALLATIONS** (Continued)

9.7 Tape a minimum #14 AWG red or yellow insulated copper tracer wire (e.g. Class/Stock # 563-0040, #12 AWG yellow) to all direct buried plastic service installations at 20 to 30 foot intervals. Bring the tracer wire to the top of the curb box or riser. See Sections 11.2 and 12.6 for tracer wire requirements for trenchless technology and service insertions. Tracer wire may not be wrapped around the plastic pipe and contact with the plastic pipe must be minimized (i.e. just to the contacts for "taping intervals").

9.8 **GROUNDING**

If conditions exist that a flammable gas - air mixture may be encountered and static charges may be present, such as during gassing-in, purging, a damage, etc., the plastic pipe shall be grounded. This may be done by using the ASG grounding kit (Class/Stock #025-2569) or by covering the pipe ends near the opening and also the remaining length of plastic pipe in the work area with wet rags saturated with soap solution to minimize the build-up of static charges. Keep the rags in contact with the soil to provide grounding.

When utilizing hand and/or pneumatically/ hydraulically powered tools on plastic pipe/tubing, and a flammable gas-air mixture may exist, always ground these tools to dissipate static electricity charges. Attach a #10 wire (Class/Stock #563-1361) to the tool and a nearby water main, fire hydrant or digging bar in earth (*not soil on a road surface*). In addition, the entire length of plastic pipe/tubing in the work area must be wrapped with ASG kits and kept wet and grounded at each end of the excavation.

When utilizing mechanical or hydraulically powered squeeze-off tools on plastic pipe/tubing, ground these tools utilizing the manufacturer's recommended grounding kit.

For additional information on static electricity and plastic pipe/tubing, refer to Gas Specification G-8178, "Shut-off of Polyethylene Plastic Pipe/Tubing Used for Gas Mains and Services."

9.9 Plastic pipe/tubing shall **not** be installed in the following areas:

A) Above ground, except on bridges as provided in Gas Specification G-8005.

B) Where the temperature of the pipe/tubing is below -20°F or exceeds 100°F.

9.0 **PLASTIC SERVICE INSTALLATIONS** (Continued)

C) In a subsurface vault or any below grade enclosure (**not** containing therein any steam facilities) unless it is completely encased in a gas tight metal pipe having adequate corrosion protection.

D) Where the soil is saturated with solvents, fuels (e.g. gasoline), or oils.

E) More than 3" beyond the inner face of the building wall (NYC Fuel Gas Code) (this includes a building's vaulted area) and the 3" (or less) of plastic pipe/tubing must be fully encased within a steel sleeve or existing service pipe. The plastic service pipe or tubing shall terminate at a transition fitting or service head adapter/basement tee.

The use of an insulok fitting (3/4", 1", 1 1/4", 1 1/2" and 2") as a **"sleeve fitting", not** as a "gas carrier fitting", is **acceptable** for all pressures. When the insulok is used as a "sleeve fitting", the green insulating gasket should be removed since it is not required.

NOTE: In the New York City gas operating areas, when working on (e.g. bypassing, main replacement, service transfer or replacement [full or partial]) a service that was previously inserted with plastic tubing inside the old service pipe through the building's vaulted area, **then** the plastic tubing must be replaced and terminate within 3" of the inner face of the building's vaulted wall.

Cut the old service (used now as a sleeve for the plastic tubing) pipe as close as possible to the building's vaulted basement wall and install an insulok and service head adapter and re-pipe with steel pipe through the vaulted basement area.

F) Within 35 feet of **any** steam facility (Company/private) or in any subsurface structure, inside of which, a steam facility is located (NYC Fuel Gas Code). (See Section 5.9)

9.10 Prior to installing PE plastic gas or steam facilities south of 97th Street in Manhattan, the following steps shall be taken:

A) Gas Engineering shall review the proposed installation with Steam Engineering to determine the location of existing or planned steam facilities.

9.0 **PLASTIC SERVICE INSTALLATIONS** (Continued)

Conversely, Steam Engineering shall provide Gas Engineering with preliminary layouts of proposed steam installations to determine the location of existing plastic gas facilities in the area.

B) All gas layouts and sketches designating the installation of plastic gas services south of 97th Street and all steam layouts calling for extension or relocation of the steam system shall be stamped or have wording indicating that the job has been reviewed for the minimum 35' clearance between plastic gas facilities and steam facilities. The reviewing engineering technician in Gas and Steam Engineering shall date and sign the documents or type name and employee number.

The stamp or layout wording shall state, as a minimum, the following:

Steam Facilities within 35' of the plastic gas pipe

Yes ☐ No ☐ (Check One)

(Gas) Signed _____ Employee # _____ Dated _____
(Steam) Signed _____ Employee # _____ Dated _____

9.11 Slack for unstable soil conditions and/or expansion and contraction shall be provided by snaking the pipe within the trench or by installing an expansion loop (check with Gas Distribution Engineering).

NOTE:	See Gas Specification G-11831 for required service inspections in areas of unstable soil.

9.12 The backfilling of new and replacement plastic service pipe should be performed **as soon as possible** to limit expansion and contraction of the plastic pipe and also to avoid possible damage to the plastic pipe.

9.13 All kinks, buckles, and dents, gouges, grooves etc. which have a depth greater than 10% of the wall thickness (See Appendix B) of the plastic pipe/tubing or as determined by Gas Distribution Engineering **must** be removed by cutting out the damaged section as a cylinder. The minimum cylinder length to be removed is one pipe diameter or 12 inches, whichever is greater.

NOTE:	Performance Pipe 8100 pipe/tubing has a "yellow shell" that is 1-2 mils (0.001-0.002) thick.

9.0 **PLASTIC SERVICE INSTALLATIONS** (Continued)

★ 9.14 Plastic valves are approved up to and including 16" diameter. Where the same diameter valve comes in reduced port and full port openings (See Appendix C), a full port valve shall be used (unless otherwise noted on a layout or requested by Gas Distribution Engineering).

★ 9.15 PE plastic molded fittings (caps, elbows, reducers, tees and valves) without pup lengths can **only** be joined to plastic pipe/tubing or other molded fittings by butt fusion, electrofusion, or MetFit fittings. (See Gas Specification G-8104 for approved fittings with pup lengths of PE plastic pipe or tubing). (See G-100,285 for approved MetFit fittings). With the exception of MetFit fittings, plastic molded fittings can **not** be joined to plastic pipe/tubing or other molded fittings by mechanical fittings.

Install and inspect MetFit mechanical fittings as per manufacturer's procedures. Molded fittings shall **not** be altered in order to utilize MetFit fittings.

9.16 A plastic service can be installed directly to a gasoline station building provided that the ground soil is **not** saturated as stated in Section 9.9.

9.17 When steel fittings are used with a plastic service installation, they shall be coated and separately protected from any steel or cast/wrought iron main. Steel fittings shall also be insulated from any copper tubing. Cathodic protection shall be in accordance with applicable Company specifications.

★ 9.18 Heat fusion of PE plastic pipe, tubing, and fittings of different SDR wall thickness shall only be performed between **one change in SDR.**

SDR	7	⇔	9/ 9.3	⇔	11	⇔	13.5	⇔	15.5

Joining of PE plastic pipe, tubing, and fittings with SDR wall thickness **greater than one change in SDR** shall be electrofused. Approved restraining-type mechanical couplings may only be used for joining PE plastic pipe and tubing when an electrofusion coupling is unavailable. (See Appendix A, "Approved Joining Methods for PE Plastic Pipe" and Gas Specifications IP-20 and G-8209)

9.0 **PLASTIC SERVICE INSTALLATIONS** (Continued)

★ 9.19 Inspect PE plastic pipe, tubing, and fittings prior to installation to verify:

1) No cuts, gouges, deep scratches, or other defects.

2) PE plastic material is high density polyethylene (HDPE), PE3408/4710, and manufactured per ASTM D2513.

3) PE plastic material is NOT older than 10 years old.

(See Gas Specification G-8122, "Transportation, Handling, and Storage of Polyethylene Plastic Pipe/Tubing, and Fittings for Gas Mains and Services")

★ 9.20 **PE Plastic Pipe, Valves, and Fittings**

A) See Gas Specification G-8104, "Polyethylene Pipe, Tubing, and Fittings for Gas Mains and Services" for approved PE plastic pipe, tubing, and fittings.

B) See Gas Specification G-8122, "Inspection, Handling, Storage, and Transportation of Polyethylene (PE) Plastic Pipe, Tubing, and Fittings for Gas Mains and Services" for the inspection, handling, storage, and transportation requirements of PE plastic pipe, tubing, and fittings.

C) See Gas Specification G-100,298 for approved PE plastic valves.

★ 9.21 Restrictions

The following materials shall not be installed for buried or submerged installations:

A) used PE plastic pipe, and

B) pipe, valves, or fittings not approved by Gas Distribution Engineering.

10.0 TRENCHLESS TECHNOLOGY

★ 10.1 In Vicinity of Mains With an MAOP Greater Than or Equal to 125 PSIG

The use of trenchless technology (i.e. directional boring, hole hog, bullet, etc.) **within 5 feet** (radial distance) running parallel or crossing gas mains/services operating at greater than or equal to 125 psig; 69 KV, 138 KV & 345 KV oil-o-static pipelines and fiber optic communication lines is **prohibited**.

NOTE:	This does **not** include insertion, PIM or Con-Split. For PIM and Consplit, a minimum of 3 feet radial distance is required.

The use of trenchless technology is permitted for radial distances greater than 5 feet and less than 15 feet **provided that** Gas Distribution Engineering is contacted to determine the number and location of test pits that are required.

The use of trenchless technology is permitted for radial distances of 15 feet or greater.

10.2 Plastic Pipe

When using trenchless technology (e.g. PIM, directional boring, hole hog, bullet) to install plastic pipe, no sleeve is required.

NOTE: For pipe bursting of steel, a sleeve shall be used.

Trace-Safe Kevlar-coated, yellow, #19 AWG tracer wire (manufactured by Neptco) (non-stock) shall be taped to the plastic pipe at appropriate intervals. Bring the tracer wire to the top of the curb valve box or riser. Tracer wire may not be wrapped around the plastic pipe and contact with the plastic pipe must be minimized (i.e. just to the contacts for "taping intervals").

10.3 If coated pipe is installed by boring, driving or other similar method, precautions must be taken to minimize damage to the coating during installation.

10.4 Appropriate excavations shall be made to determine the location of buried facilities (e.g. water, sewer and sewer laterals, telephone, electric, etc.)

11.0 PLASTIC/COPPER TUBING SERVICE INSERTION INSTALLATION

11.1 Plastic tubing shall be joined only by personnel, who are "Operator Qualified" in joining the plastic tubing by butt fusion, branch saddle fusion, electrofusion, and/or approved mechanical fittings. (See Section 5.2)

Copper tubing shall be joined only by personnel, who are Operator Qualified in joining copper tubing by approved mechanical fittings.

11.2 Brass couplings shall **only** be used to connect a copper-to-copper connection. They shall **not** be used for a plastic-to-plastic connection or a plastic to copper connection.

11.3 All copper tubing and plastic tubing in CTS sizes (except for 1/2" CTS) that is found direct buried or is direct buried as part of an insertion shall have a protective sleeve installed (around the tubing) to protect the tubing from damage. (See Section 5.13)

11.4 Protective bushings must be installed on the ends of the existing service pipe (after the pipe is cut, removed and reamed) and **prior** to insertion to protect the plastic or copper from damage.

11.5 The leading open end of the plastic or copper must be sealed prior to insertion.

11.6 A minimum #14 AWG red or yellow insulated copper tracer wire (e.g. Class/Stock # 563-0040, #12 AWG yellow) shall be taped to the plastic tubing at appropriate intervals. Bring the trace wire to the top of the curb valve box or riser. Tracer wire may not be wrapped around the plastic pipe and contact with the plastic pipe must be minimized (i.e. just to the contacts for "taping intervals").

EXCEPTION: When tight tolerances between the casing and plastic tubing prohibit the installation of tracer wire, then gaps in the casing should be jumped with tracer wire and be brought to the top of the curb valve box or riser.

11.7 The plastic or copper shall be inspected **before and after** insertion to detect any dents, gouges, grooves, etc.

11.8 All dents gouges, grooves, etc. which have a depth greater than 10% of wall thickness for copper or PE plastic, or as determined by Gas Engineering **must** be removed by cutting out the damaged section as a cylinder. The minimum cylinder length to be removed is one pipe diameter or 12 inches, whichever is greater. (See Appendix B for Plastic Pipe Defect Chart and Appendix E for Copper Tubing Defect Chart)

11.0 **PLASTIC/COPPER TUBING SERVICE INSERTION INSTALLATION** (Continued)

11.9 Each and every end of the existing service pipe, shall be sealed (between the old service pipe and new tubing) to prevent migration of gas or water.

> **NOTE:** The recommended method to seal is by using the 3M cold shrink or "Slipseals." (See Gas Specification G-8096)

11.10 When steel fittings are used with a plastic or copper insertion, they shall be coated and separately protected from any steel or cast/wrought iron main. Steel fittings shall also be insulated from any copper tubing. Cathodic protection shall be in accordance with applicable Company specifications.

11.11 The pressure ratings for PE plastic tubing are as follows:

SIZE	LOW PRESSURE (LP)	INTERMEDIATE PRESSURE (IP)	MEDIUM PRESSURE (MP)	HIGH PRESSURE (HP)
1/2" PE CTS	Yes	Yes	Yes	Yes
1" PE IPS	Yes	Yes	Yes	Yes
1" PE CTS	Yes	*	*	**No**
1 1/4" PE IPS	Yes	Yes	Yes	Yes
1 1/4" PE CTS	Yes	*	*	**No**

***** CTS tubing should **not** be installed in the event of a future MAOP upgrade.

11.12 The backfilling of the new/replacement section of tied-in PE plastic/copper tubing should be performed **as soon as possible**, so as to limit the expansion and contraction of the PE plastic tubing and also to avoid possible damage to the PE plastic/copper tubing.

11.13 The following items are also applicable to PE plastic insertions.

A) for static electricity and plastic pipe/tubing, see Section 10.8. Also see Specification G-8178.

B) for SDR size and stiffener, see Section 9.5.

C) for plastic tubing inside a building's vaulted area, see Section 9.9.

11.0 **PLASTIC/COPPER TUBING SERVICE INSERTION INSTALLATION** (Continued)

D) for areas where plastic tubing cannot be installed, see Section 9.9.

E) for administrative controls for plastic pipe/tubing in steam areas in Manhattan, see Section 9.10.

F) for plastic insertion in unstable soil, see Section 9.11.

G) for cathodic protection of steel fittings used on plastic tubing, see Section 9.17.

H) for a plastic service insertion to a gasoline station building, see Section 9.9. It may be necessary to excavate test pits over the inserted service to ensure the soil is not saturated with fuels or oils.

12.0 **PRESSURE TEST, PURGING AND GAS-IN**

12.1 Pressure test the gas service as per Specification G-8204, "Pressure Testing Requirements for Gas Mains and Services".

★ 12.2 PE plastic (i.e., electrofusion tapping tees, SPA saddles) and metallic tapping fittings used for service connections shall be pressure tested to 90 psig for LP, IP, and MP or 150 psig for HP prior to drilling and/or tapping. Alternately, if not feasible to do so, the service connections to the main can be given a leak test (i.e., soap tested) at operating pressure and documented as part of the pressure test when placed into service.

12.3 Following the successful completion of the service pressure test, purge the service pipe/tubing as per G-8129 and gas-in the service pipe/tubing and leak test the tie-in points at service line pressure.

The gas-in of a service replacement (where the building is "on bypass") should be performed **from** the building **out to** the main.

NOTE:	When installing 1-1/4" angle valve tee, utilize the 1/8" test plug to gas in. **When** it is necessary to gas-in **from** the main **to** the building, the gas must be vented to outside the building via a continuous temporary pipe/tubing connection. **Never** vent the gas into a building during gas-in.

12.0 **PRESSURE TEST, PURGING AND GAS-IN** (Continued)

12.4 **If** the customer's piping is not approved for turn-on at the time of service installation/reconnection, **or** for service replacements, where the purging and gas-in cannot be accomplished at the time of the service replacement, then the SHV, curb valve or meter valve(s) must be closed and verified that it/they is/are not passing and secured with an approved locking device(s) and all open ends plugged/capped.

NOTE:	Whenever possible, perform a double shutdown (i.e., curb valve, service head valve/riser valve, meter valve). **Verify each isolation valve(s) is off, holding, and locked.**

★ 13.0 **REFERENCES**

Bypassing Building

Operation, Maintenance, Handling and Storage of the Modular - Style, Compressed Natural Gas (CNG) Bypass Cart	IP-16

Casing Installations

Sealing the Annular Space Between a Gas Pipe and a Wall, Casing Pipe, or Sleeve	G-8096
Typical Casing End Seal For Steel Main in Cast Iron Casing	EO-14800-C

Clearances

Gas Facilities – Clearances, Encroachments, Interference, and Corrosion	CI-920-1
Clearances of Electric Subway from Gas Mains and Other Subsurface Structures	EO-5570-C

Contractor/Per Diem

Qualification of Contractors' Maintenance Engineers and Field Supervisors Engaged in Gas Maintenance / Installation of Mains and/or Services	G-8195

★ 13.0 **REFERENCES** (Continued)

Corrosion Control

Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures	G-8209
Electrical Spark Inspection of Coating on Steel Pipe	G-8201
Corrosion Control of Buried Steel Gas Distribution Mains and Services	G-8205
Corrosion Testing on Buried Steel Gas Mains and Services	G-11830

Fittings

Segmenting Long Radius Forged Elbows	EO-14620-C

Gas Main Installation

General Specification for the Installation of Gas Distribution Mains	G-8005

Gas Operations EH&S Instructions

Handling Auto Seal in Gas Mains	GAS0025
Handling Gas Services Containing Epi-Seal	GAS0027

GEHSIs And AMMs

Asbestos Duct Seal Removal Or Minor Disturbances	AMM 6.03
Asbestos Gasket Removal-Gas	AMM 6.10
Clear Access To Customer Premises	AMM 6.02
Coal Tar Wrap Removal – Gas Electric and Fuel Oil.	AMM 6.04
Excavated Soils on Property Not company owned	GEHSI E05.11
Drip Pots and Drip Pot Liquids	GEHSI E06.08
Gas Drip Water	GEHSI E06.07
Hazardous Non-PCB Contaminated Soil	GEHSI E06.12

★ 13.0 **REFERENCES** (Continued)

GEHSIs And AMMs (Continued)

Liquids and Solids from Natural Gas Mains During Mains Cutouts	GEHSI E06.11
Mercury-Containing Equipment	GEHSI E06.06
Paint Chips	GEHSI E06.04
Valve Test Boxes	GEHSI E02.10

Joining of Plastic Pipe

Qualification of Installers Joining Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services.	G-8121
Heat Fusion Joining of Polyethylene (PE) Plastic Pipe/Tubing and Fittings For Gas Mains and Services	G-8123
Installation of Mechanical Fittings for Polyethylene (PE) Plastic Pipe and Tubing	IP-20
Installation of Electrofusion Fittings on Polyethylene (PE) Plastic Pipe/Tubing and Molded Fittings Using a Universal Electrofusion Processor	IP-27

PE Plastic Pipe

Polyethylene Pipe, Tubing, and Fittings for Gas Mains and Services	G-8104
Inspection, Handling, Storage, and Transportation of Polyethylene (PE) Plastic Pipe, Tubing, and Fittings for Gas Mains and Services	G-8122

PE Plastic Pipe Installation

Shut-Off Of Polyethylene Plastic Pipe/Tubing Used For Gas Mains and Services	G-8178

Steel Pipe

Extruded Polyolefin Coating on Steel Pipe	G-8062
Steel Pipe for Gas Mains and Services	G-8107

Plugs

Wood Plugs for Use with Cast Iron and Steel Pipes	EO-3942-C

★ 13.0 **REFERENCES** (Continued)

PPE
Requirements For Airline Respirator (ALR), Flame Retardant Coveralls (FRC), Harness and Line (H&L) and Harness and Gantry — IP-42

Pressure Testing
Pressure Testing Requirements for Gas Mains and Services — G-8204

Purging
Purging Gas Mains, Services and Regulator Stations — G-8129

Reinforcement
Reinforcing Non-Restraining Compression Fittings — G-8153

Maintenance and Replacement of Gas Services
Responsibility for Maintenance and Replacement of Gas Services — G-8149

Service Connections
Steel/Copper Service Connections to Metallic Mains — EO-16645

Service Installation
Installation of Copper Tubing Gas Service Piping — EO-16532-A

Installation of Flexible Sleeve Elbow Unit Where Service Enters From Beneath Building Not Exceeding 99 PSIG — EO-16546-B

Installation of Meter Piping For Class 250 TC to 1000 TC Diaphragm Gas Meters – Outdoors — EO-16585-A

Installation of Steel Gas Service Piping — EO-16629-A

Installation of Plastic (Direct Burial or Insertion) Gas Service Piping — EO-16641-A

Service Sizing — G-8200

Procedure for Checking Areas Where Main and/or Service Movement is Anticipated — G-11831

Pipeline Casing Insulating Skids — G-100,280

★ 13.0 **REFERENCES** (Continued)

Service Installation (Continued)

Procedure for Removing or Replacing Live Intermediate, Medium and High Pressure Gas Pipe and/or Fittings Without No-Blow Equipment	IP-30
Using the “Renu” Method to Bypass a Building	IP-39
Bumper Installation	502163

Street Opening

Street Opening Color Coding, Permit Signs at Worksite and Pavement Restoration Markers	G-8194

Trenching and Backfill

Typical installation 1, 2 or 4 Duct Electric Subway with 2” to 12” Gas Main in Common Trench	EO-5571-B
General Specification for Backfilling of Trench and Small Openings	EO-1181
General Backfill and Bedding Material for Excavation	EO-8085
Trench Excavation for Gas Mains & Services Up to 350 PSI	309495
Installation of Electronic Markers on Gas Mains and Services	502664

Trenching and Backfill (Continued)

Protective Covers for Gas Main and Service Installations	EO-6799-C
Sheeting for Trenches and Excavations	EO-16954-B
Plywood Sheeting for Trenches and Excavations	EO-16965

Valves

Requirements for Indicating the Location Of The Curb Valve Box On A Gas Service With An Indoor Regulator	G-8028
Installation of Valves on Gas Distribution Mains	G-8141
Installation of 6", 8” and 12” Polyethylene Gas Valves	309808
Installation of 4"-36" Welded End Ball Valve and Valve Box	EO-13911

★ 13.0 **REFERENCES** (Continued)

Vaults/Enclosed Areas

Service Pipe/Tubing And Service Sleeve Through Vault, Open Areaway, Open Area Under Stairs, Under Enclosed Area, And Into Vaulted Basement	EO-4890-B

Common Ground Alliance (CGA) letter dated 9/30/03 to DOT, RSPA on CGA Best Practice on Minimum 12" Radial Separation

Vents

Regulator Vent Installation	EO-17118
Installation and Inspection of Gas Service Regulator Vent Line Protectors (VLPs)	G-699
Flood-Prone Areas for the Installation of Gas Service Regulator Vent Line Protectors (VLP's)	G-8217

Welding

Shielded Metal Arc Welding Procedure for Welding Steel Pipe and Fittings	G-1064
Qualification of Welders and Welding Procedures	G-1065
Radiographic Inspection of Pipeline Welds	G-1070

★ 14.0 **APPENDICES**

	A	(Deleted)
	B	Plastic Pipe Defect Chart
★	C	PE Valves
	D	Steel Pipe Defect Chart
	E	Copper Tubing Defect Chart
	F	(Deleted)

★ 14.0 **APPENDICES** (Continued)

★ G-1 Plastic Service Connections to Plastic Mains

★ G-2 Plastic Service Connection to Cast Iron, Steel and Wrought Iron Mains

★ G-3 Steel Service Connections to Cast Iron, Steel and Wrought Iron Mains

H-1 & H-2 Installation Requirements for the Plastic Brass-Based Tee

★ I Key Task Matrix for Gas Service Installation/Replacement (Gas Specification G-8100)

APPENDIX A

Appendix A Has Been Deleted

APPENDIX B

PLASTIC PIPE/TUBING CHART
MAXIMUM PERMISSIBLE DEFECT

Nominal Size	SDR	Outside Diameter	Minimum Wall Thickness	Maximum Permissible Defect
1/2” CTS	7.0	0.625”	0.090”	0.009”
1” CTS	12.5	1.125”	0.090”	0.009”
1 1/4” CTS	15.3	1.375”	0.090”	0.009”
1” IPS	9.33	1.315”	0.140”	0.014”
1” IPS	11	1.315”	0.119”	0.011”
1 1/4” IPS	9.33	1.660”	0.178”	0.017”
1 1/4” IPS	11	1.660”	0.151”	0.015”
2” IPS	9.33	2.375”	0.255”	0.025”
2” IPS	11	2.375”	0.215”	0.021”
3” IPS	9.33	3.500”	0.375”	0.037”
3” IPS	11	3.500”	0.318”	0.031”
4” IPS	9.33	4.500”	0.482”	0.048”
4” IPS	11	4.500”	0.409”	0.040”
6” IPS	11	6.625”	0.602”	0.060”
8” IPS	11	8.625”	0.785”	0.078”
10” IPS	11	10.750”	0.977”	0.097”
10” IPS	15.5	10.750”	0.694”	0.069”
12” IPS	11	12.750”	1.159”	0.115”
12” IPS	15.5	12.750”	0.823”	0.082”
16” IPS	11	16.000”	1.455”	0.145”
16” IPS	15.5	16.000”	1.032”	0.103”

★ **APPENDIX C**

PE VALVES

SIZE	BORE	*BORESIZE*	CV	EQUIV LENGTH	OVERALL LENGTH No Pups	WEIGHT
1/2"CTS	Full	1.01"	7	0.94'	12.00"	1.0lbs
1"CTS	Full	1.01"	33	2.0'	12.00"	1.0 lbs
1"IPS	Full	1.01"	42	2.6'	12.00"	1.0 lbs
1 1/4" CTS	Full	1.38"	100	1.5'	12.00”	2.0 lbs
1 1/4" IPS	Full	1.38"	100	1.6'	12.00”	2.0 lbs
2"	Full	1.85"	175	3.8'	14.7"	3.8 lbs
3"	Full	2.5"	390	5.3'	15"	8.0 lbs
4"	Full	3.62"	700	5.8'	20"	19.5 lbs
6"	Full	5.22"	1,800	6.1'	20"	38 lbs
8"	Full	6.66"	3,650	5.5'	69.5"	66.4 lbs
12"	Full	9.9"	7,000	10.6'	83.8"	305 lbs
16”	Full	11.5”	Info Pending	Info Pending	88.3”	365 lbs

APPENDIX D

STEEL PIPE CHART
MAXIMUM PERMISSIBLE DEFECT

Nominal Size	Outside Diameter	Minimum Wall Thickness	Maximum Permissible Defect
1”	1.315”	0.133"	0.017”
1 1/2"	1.900”	0.145"	0.018”
2”	2.375”	0.154"	0.019”
3”	3.500”	0.216"	0.027”
4”	4.500”	0.237"	0.030”
6”	6.625”	0.280"	0.035”
8”	8.625”	0.322"	0.040”
10”	10.750”	0.365"	0.046”
12”	12.750”	0.375"	0.047”
16”	16.000”	0.375"	0.047”
20”	20.000”	0.375"	0.047”
24”	24.000”	0.375"	0.047”
24"	24.000"	0.500"	0.063"
26"	26.000"	0.500"	0.063"
30”	30.000”	0.375”	0.047”
30"	30.000"	0.500"	0.063"
36"	36.000"	0.500"	0.063"
36"	36.000"	0.562"	0.070"
36"	36.000"	0.625"	0.078"

APPENDIX E

COPPER TUBING CHART
MAXIMUM PERMISSIBLE DEFECT

Nominal Size	Outside Diameter	Minimum Wall Thickness	Maximum Permissible Defect
1/2”	0.625”	0.049”	.005”
1”	1.125”	0.065	.007”
1 1/4"	1.375”	0.065	.007”
2”	2.125”	0.083	.008”

APPENDIX F

Appendix F has been deleted

★ APPENDIX G-1

PLASTIC SERVICE CONNECTIONS TO PLASTIC MAINS (ALL PRESSURES)

Service Size

Main Size	1/2" CTS	1" CTS	1" IPS	1-1/4" CTS	1-1/4" IPS	2" IPS	3" IPS	4" IPS	6" IPS	8" IPS	10" IPS	12" IPS
1-1/4" IPS	1		1		9							
2" IPS	1	1	1	1	1	1						
3" IPS	1	1	1	1	1	1	9					
4" IPS	1	1	1	1	1	1	2	9				
6" IPS	1	1	1	1	1	1	3	4	9			
8" IPS	1	1	1	1	1	1	5	6	6	9		
10" IPS	7	7	7	7	7	7	8	8	8	8		
12" IPS	1	1	1	1	1	1	8	8	8	8		9

Service to Main Connection

1) **Electrofuse Tapping Tee**
2) **Development Lab to electrofuse 4" X 4" branch saddle & "hot tap" (and install plastic reducer as needed.)**
3) **Development Lab to electrofuse 6" X 3" branch saddle & "hot tap"**
4) **Development Lab to fuse 6" X 4" branch saddle & "hot tap"**
5) **Development Lab to electrofuse "specially purchased" Friatec 8" X 4" branch saddle & "hot tap" (and install plastic reducer as needed.)**
6) **Development Lab to fuse 8" X 4" or 8" X 6" branch saddle & "hot tap"**
7) **Install IPEX 10" – 16" X 2" electrofuse tapping tee and install plastic reducer as needed**
8) **Development Lab to fuse 12" X 4" or 12" X 6" or 12" X 8" branch saddle and "hot tap" (and install plastic reducer as needed.)**
9) **Perform plastic main cut-out with full plastic main tee**

Note: If field conditions prohibit service/main connection specified above or for service/main combinations not listed, contact Gas Distribution Engineering for guidance and written confirmation.

★ APPENDIX G-2

PLASTIC SERVICE CONNECTIONS TO STEEL, WROUGHT IRON, AND CAST IRON MAINS

Service Size

Main Size - Steel or Wrought Iron

	≤ 1-1/4"	2"	3"	4"	≥ 6"
2" LP	1 or 2	1 or 2			
2" IP, MP & HP	1 or 2	1 or 2			
4" LP	1, 2, 4, 5, 12 or 13	1, 2, 4, 5 or 13	1 or 6	1 or 6	
4" IP, MP & HP	1, 2 or 5	1, 2 or 5	1 or 6	1 or 6	
6" LP	1, 2, 4, 5, 12 or 13	1, 2, 4, 5 or 13	1 or 6	1 or 6	1 or 6
6" IP, MP & HP	1, 2 or 5	1, 2 or 5	1 or 6	1 or 6	1 or 6
8" LP	1, 2, 4, 5, 12 or 13	1, 2, 4, 5, 12 or 13	1 or 6	1 or 6	1 or 6
8" IP, MP & HP	1, 2 or 5	1, 2 or 5	1 or 6	1 or 6	1 or 6
10" LP	1, 2, 4, 12 or 13	1, 2, 4, 12 or 13	1 or 6	1 or 6	1 or 6
10" IP, MP & HP	1 or 2	1 or 2	1 or 6	1 or 6	1 or 6
12" LP	1, 2, 4, 12 or 13	1, 2, 4, 12 or 13	1 or 7	1 or 6	1 or 6
12" IP, MP & HP	1 or 2	1 or 2	1 or 6	1 or 6	1 or 6
16" LP	1, 2, 4, 12 or 13	1, 2, 4, 12 or 13	1 or 7	1 or 8	1 or 6
16" IP, MP & HP	1 or 2	1 or 2	1 or 6	1 or 6	1 or 6
20" LP	1 or 12	1 or 12	1 or 7	1 or 8	1 or 6
20" IP, MP & HP	1	1	1 or 6	1 or 6	1 or 6
24", 30" & 36" LP	1 or 12	1 or 12	1 or 7	1 or 8	1 or 6
24", 30" & 36" IP, MP & HP	1	1	1	1	1 or 6

Service Size

Main Size - Cast Iron

	≤ 2"	3"	4"	≥ 6"
4" LP	2, 4, 5 or 13	6 or 9	6	
4" IP & MP	2 or 5	6 or 10	6 or 10	
6" LP	2, 4, 5 or 13	6, 9 or 10	6 or 10	6 or 10
6" IP & MP	2 or 5	6 or 10	6 or 10	6 or 10
8" LP	2, 3, 4, 5, 12 or 13	6, 9 or 10	6, 10 or 11	6 or 10
8" IP & MP	2 or 5	6 or 10	6 or 10	6 or 10
10" LP	2, 3, 4, 12 or 13	6	6	6
10" IP & MP	2	6 or 10	6 or 10	6 or 10
12" LP	2, 3, 4, 12 or 13	7 or 10	6 or 10	6 or 10
12" IP & MP	2	6 or 10	6 or 10	6 or 10
16" LP	2, 3, 4, 12 or 13	6, 7 or 10	6, 8 or 10	6 or 10
16" IP & MP	2	6 or 10	6 or 10	6 or 10
18", 20", 24" & 30" LP	3 or 12	6, 7 or 10	6, 8 or 10	6 or 10
36" LP	3 or 12	6 or 7	6 or 8	6

Service to Main Connection

1) Weld a no blow tapping tee (Steel or Wrought Iron Mains Only)
2) Install insulated strap saddle and threaded no blow tapping tee. *Double strap for CI main and 10" and 12" ST mains. *Single strap for ST mains (other than 10" and 12").
3) Tap main and install plastic brass based tee (Preferred)
4) Drill main only and install insulated strap saddle and plastic brass based tee (Preferred)
5) Install clamp with takeoff (FPT) and threaded no blow tapping tee
6) Install "approved special order fitting" with appropriate welded fitting(s)
7) Tap main and install 3" service with riser tee
8) Tap main and install 4" service with riser tee
9) Install Style 80 with 3" threaded takeoff (FPT) and install 3" nipple (TOE) and riser tee
10) Install Style 50 and weld a no blow tapping tee
11) Install Style 80 with 4" threaded takeoff (FPT) and install 4" nipple (TOE) and riser tee
12) Tap main and install riser tee with nipple (PE) and insulok
13) Drill main only and install insulated strap saddle with nipple (TOE) and riser tee

Steel fittings must be properly insulated, coated and cathodically protected.

FPT - Female Pipe Thread
TOE - Threaded One End
PE - Plain End (no threads)

Note: If field conditions prohibit service/main connection specified above or for service/main combinations not listed, contact Gas Distribution Engineering for guidance and written confirmation.

★ APPENDIX G-3

STEEL SERVICE CONNECTIONS TO STEEL, WROUGHT IRON, AND CAST IRON MAINS

Service Size

Main Size - Steel or Wrought Iron

	≤ 1"	1-1/2"	2"	3"	4"	≥ 6"
2" LP	1 or 2	1 or 2	1 or 2			
2" IP, MP & HP	1 or 2	1 or 2	1 or 2			
4" LP	1, 2, 6 or 7	1, 2, 3 or 7	1, 2, 3 or 7	1 or 8	1 or 8	
4" IP, MP & HP	1, 2 or 7	1, 2 or 7	1, 2 or 7	1 or 8	1 or 8	
6" LP	1, 2, 4, 5 or 7	1, 2, 4, 5 or 7	1, 2, 3 or 7	1 or 8	1 or 8	1 or 8
6" IP, MP & HP	1, 2 or 7	1, 2 or 7	1, 2 or 7	1 or 8	1 or 8	1 or 8
8" LP	1, 2, 5 or 7	1, 2, 5 or 7	1, 2, 5 or 7	1 or 8	1 or 8	1 or 8
8" IP, MP & HP	1, 2 or 7	1, 2 or 7	1, 2 or 7	1 or 8	1 or 8	1 or 8
10" LP	1, 2 or 5	1, 2 or 5	1, 2 or 5	1 or 8	1 or 8	1 or 8
10" IP, MP & HP	1 or 2	1 or 2	1 or 2	1 or 8	1 or 8	1 or 8
12" LP	1, 2 or 5	1, 2 or 5	1, 2 or 5	1 or 9	1 or 8	1 or 8
12" IP, MP & HP	1 or 2	1 or 2	1 or 2	1 or 8	1 or 8	1 or 8
16" LP	1, 2 or 5	1, 2 or 5	1, 2 or 5	1 or 9	1 or 10	1 or 8
16" IP, MP & HP	1 or 2	1 or 2	1 or 2	1 or 8	1 or 8	1 or 8
20" LP	1 or 5	1 or 5	1 or 5	1 or 9	1 or 10	1 or 8
20" IP, MP & HP	1	1	1	1 or 8	1 or 8	1 or 8
24", 30" & 36" LP	1 or 5	1 or 5	1 or 5	1 or 9	1 or 10	1 or 8
24", 30" & 36" IP, MP & HP	1	1	1	1	1	1

Service Size

Main Size - Cast Iron

	≤ 1-1/2"	≤ 2"	3"	4"	≥ 6"
4" LP	2, 4 or 7	2, 4 or 7	8, 11 or 12	8 or 12	
4" IP & MP	2 or 7	2 or 7	8 or 12	8 or 12	
6" LP	4, 7 or 14	3, 7 or 14	8, 11 or 12	8 or 12	8 or 12
6" IP & MP	2 or 7	2 or 7	8 or 12	8 or 12	8 or 12
8" LP	4, 7 or 14	3, 7 or 14	8, 11 or 12	8, 12 or 13	8 or 12
8" IP & MP	2 or 7	2 or 7	8 or 12	8 or 12	8 or 12
10" LP	2 or 5	2 or 5	8	8 or 12	8 or 12
10" IP & MP	2	2	8	8	8
12" LP	2 or 5	2 or 5	9 or 12	8 or 12	8 or 12
12" IP & MP	2	2	8 or 12	8 or 12	8 or 12
16" LP	2 or 5	2 or 5	9 or 12	10 or 12	8 or 12
16" IP & MP	2	2	8 or 12	8 or 12	8 or 12
18", 20", 24", 30" & 36" LP	5 or 12	5 or 12	9 or 12	10 or 12	8 or 12

Service to Main Connection

1) Weld a no blow tapping tee (Steel or Wrought Iron Mains Only)
2) Install insulated strap saddle and threaded no blow tapping tee. *Double strap for CI main and 10" and 12" ST mains. *Single strap for ST mains (other than 10" and 12").
3) Drill main only and install insulated strap saddle with nipple (TOE) and riser tee
4) Drill main only and install insulated strap saddle and service tee
5) Tap main and install riser tee with nipple (PE) and insulok
6) Tap main and install insulated strap saddle and service tee
7) Install clamp with takeoff (FPT) and threaded no blow tapping tee
8) Install "approved special order fitting" with appropriate welded fitting(s)
9) Tap main and install 3" service with riser tee
10) Tap main and install 4" service with riser tee
11) Install Style 80 with 3" threaded takeoff (FPT) and install 3" nipple (TOE) and riser tee
12) Install Style 50 and weld a no blow tapping tee
13) Install Style 80 with 4" threaded takeoff (FPT) and install 4" nipple (TOE) and riser tee
14) Drill main only and install insulated strap saddle and threaded no blow tapping tee

INSTALLATION REQUIREMENTS FOR THE PLASTIC BRASS-BASED TEE

THE PLASTIC BRASS–BASED TEE IS FOR LOW PRESSURE USE ONLY

	SERVICE SIZE		
MAIN MATERIAL / SIZE	1"	1 1/4"	2"
CAST IRON			
4"	CASE 2	CASE 2	CASE 2
6"	CASE 2	CASE 2	CASE 2
8" & LARGER	CASE 3	CASE 3	CASE 3
PROTECTED STEEL/ WROUGHT IRON			
4"	CASE 2	CASE 2	CASE 2
6"	CASE 2	CASE 2	CASE 2
8"	CASE 2	CASE 2	CASE 2
10"	CASE 2	CASE 2	CASE 2
12"	CASE 2	CASE 2	CASE 2
16"	CASE 2	CASE 2	CASE 2
LARGER THAN 16"	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2
UNPROTECTED STEEL			
4"	CASE 1	CASE 1	CASE 1
6"	CASE 1	CASE 1	CASE 1
8"	CASE 1	CASE 1	CASE 1
10"	CASE 1	CASE 1	CASE 1
12"	CASE 1	CASE 1	CASE 1
16"	CASE 1	CASE 1	CASE 1
LARGER THAN 16"	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2

FOR EACH NUMBER IN THIS CHART REFER TO THE CORRESPONDING CASE DRAWING IN APPENDIX H-2.

NOTES

1. IT IS ALWAYS ACCEPTABLE TO USE A STRAP SADDLE WITH A LARGER OUTLET AND CORRESPONDING PLASTIC BRASS–BASED TEE.
2. FOR STEEL MAINS GREATER THAN 16" IN DIAMETER, THERE ARE NO STRAP SADDLES AVAILABLE. IN THESE INSTANCES A PLASTIC BRASS–BASED TEE CANNOT BE USED.
3. A PLASTIC BRASS–BASED TEE SHALL NOT BE THREADED DIRECTLY INTO A STEEL OR WROUGHT IRON MAIN.

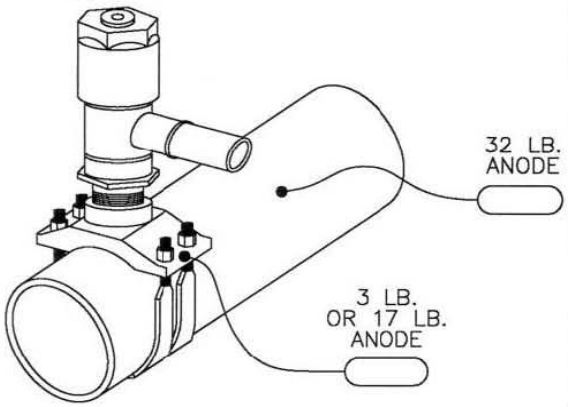
MATERIAL	CLASS/STOCK #
PLASTIC BRASS-BASED TEE	
1 ¼" BRASS INLET x 1 ¼" CTS OUTLET	341-4463
1 ¼" BRASS INLET x 1" CTS OUTLET	341-4471
1 ½" BRASS INLET x 1 ¼" CTS OUTLET	341-4588
1 ½" BRASS INLET x 1" CTS OUTLET	341-4513
2" BRASS INLET x 1" CTS OUTLET	341-4521
2" BRASS INLET x 1 ¼" CTS OUTLET	341-4505
2" BRASS INLET x 2" IPS OUTLET	341-4794
STRAP SADDLES	
4" CI x 1 ½" TAP	341-5098
4" CI x 1 ¼" TAP	341-5205
4" CI x 2" TAP	341-5221
4" ST x 1 ¼" TAP	341-5114
4" ST x 1 ½" TAP	341-5569
4" ST x 2" TAP	341-5122
6" CI x 1 ½" TAP	341-5072
6" CI x 1 ¼" TAP	341-5239
6" CI x 2" TAP	341-5254
6" ST x 1 ¼" TAP	341-5080
6" ST x 2" TAP	341-5130
8" CI or ST x 2" TAP	341-5189
10" CI or ST x 2" TAP	341-5155
12" CI or ST x 2" TAP	341-5148
16" CI OR ST x 2" TAP	CONTACT THE DEVELOPMENT LAB TO ORDER

PREPARED BY: P.SMITH
REVIEWED BY: B.DAS
APPROVED BY: M.BALDOVIN
DATE: 5/29/07

INSTALLATION REQUIREMENTS FOR THE PLASTIC BRASS-BASED TEE

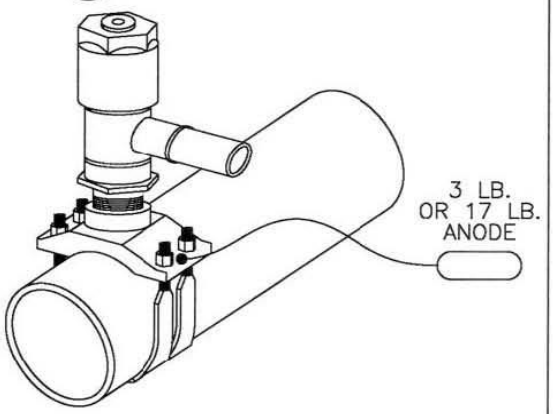
THE PLASTIC BRASS–BASED TEE IS FOR LOW PRESSURE USE ONLY

CASE (1)



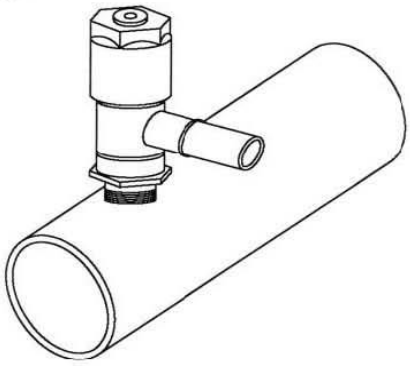
FOR UNPROTECTED STEEL MAINS, DRILL THE MAIN ONLY AND CONNECT THE BRASS–BASED TEE USING AN INSULATED STRAP SADDLE. ATTACH A 3 LB. MAGNESIUM ANODE TO 6" AND SMALLER STRAP SADDLES AND A 17 LB. MAGNESIUM ANODE TO 8" AND LARGER STRAP SADDLES. INSTALL A 32 LB. "HOT SPOT" MAGNESIUM ANODE TO THE PIPE.

CASE (2)



FOR PROTECTED STEEL, CAST IRON (6" AND SMALLER) OR WROUGHT IRON MAINS, DRILL THE MAIN ONLY AND CONNECT THE BRASS–BASED TEE USING AN INSULATED STRAP SADDLE. ATTACH A 3 LB. MAGNESIUM ANODE TO 6" AND SMALLER STRAP SADDLES AND A 17 LB. MAGNESIUM ANODE TO 8" AND LARGER STRAP SADDLES.

CASE (3)



FOR CAST IRON MAINS (8" AND LARGER), DRILL AND TAP THE MAIN AND CONNECT THE BRASS–BASED TEE DIRECTLY TO THE MAIN WITHOUT A STRAP SADDLE. NO ANODE IS NECESSARY.

PREPARED BY:	P.SMITH
REVIEWED BY:	B.DAS
APPROVED BY:	M.BALDOVIN
DATE:	5/21/07

★ APPENDIX I

KEY TASK MATRIX FOR GAS SERVICE INSTALLATION/REPLACEMENT (GAS SPECIFICATION G-8100)

Task	G-8100 Section Reference	Description	Impact
Tracing Wire Installation	**9.7** **10.2** **11.6**	For all new (direct buried/trenchless technology/insertions) plastic services, tape a minimum #14 red or yellow tracing wire to the plastic service installations at 20 to 30 feet intervals and bring end up into top of the curb box or riser. **On insertions, when tight tolerances between the casing and plastic tubing prohibit the installation of tracer wire, then gaps in the casing should be jumped with tracer wire and be brought to the top of the curb valve box or riser.** **Electronic markers are to be installed in addition to tracer wire per Gas Drawing 502664.**	Failure to properly install tracer wire causes difficulty locating facilities for code 753 mark outs Contractor damage due to mismark
★ **Maintaining Clearances**	**5.9** **CI-920-1**	Install new/replacement service with a minimum clearance of 4" from any subsurface facility or structure. **A 12" clearance is needed if electric cable is direct buried (not in conduit). A minimum clearance of 2" is acceptable, provided that the service is properly protected. Where gas mains/services run parallel to electric transmission lines for significant distances contact electric transmission for guidance..** **A minimum 6" clearance is needed around water mains and services. A rubber mat must be installed if this clearance is not maintained.**	Damage to gas service due to electric burnout in contact with gas service. Also water impingement damaging gas service.
★ **As-Constructed/Emergency Sketch Submission**	**5.39** **CI-940-1**	An "As-Constructed/Emergency Sketch" for all installation of new and replacement gas services (where horizontal lane **has** changed) shall be prepared **and emailed on the same day** as the tie-in to Gas Engineering Maps & Records. If horizontal lane **has not** changed then the emergency sketch shall be prepared and emailed **on the next business day to** Gas Engineering Maps & Records.	Damage to gas service due to unmapped facilities.

★ APPENDIX I

KEY TASK MATRIX FOR GAS SERVICE INSTALLATION/REPLACEMENT (GAS SPECIFICATION G-8100)

(Continued)

★ **Cover and Protection**	**5.4** **5.5** **EO-6799-C**	Where possible, the direct burial of new/replacement services shall be installed with a minimum cover of 24". For cover less than 24" inches steel protection plates shall be installed. "WARNING BURIED GAS LINES BELOW" tape must be installed at a **minimum** of 12" above the top of the direct buried new/replacement service.	Damage to gas services due to lack of adequate cover and/or warning tape.
★ **Excess Flow Valves**	**7.1** **7.2**	Excess Flow Valves (EFVs) shall be installed on all new or replaced services to single family residences supplied by *high-pressure* regardless of load and new or replaced (including partial replacements, See Section 7.1, Note.) ***high-pressure*** non-single family residence services which use a meter up to and including a ***class 1000 meter*** *or* equivalent (e.g. two (2) class 500 meters, four (4) class 250 meters, one (1) class 500 and two (2) class 250 meters).	Uncontrolled release of gas on a contractor damage.
★ **Piping Requirements**	**1.2** **9.9** **9.15**	Only 1/2" PE CTS may be used on elevated pressure. All other pipe sizes must be IPS. With the exception of MetFit fittings, plastic molding fittings can not be joined to plastic pipe/tubing or other molded fittings by mechanical fittings without pup lengths of PE plastic pipe or tubing. Install and inspect MetFit mechanical fittings as per manufacturer's procedures. Molded fittings shall not be altered in order to utilize MetFit fittings. Service tees and branch saddle connections shall only be connected using electro fusion or an approved mechanical tee. Sidewall fusion is not permitted. Plastic pipe/tubing shall **not** extend more than 3" beyond the foundation wall and 3" or less of plastic pipe/tubing shall be fully encased within a steel sleeve.	Gas leak due to incorrect pipe selections/installations.
Electrical Tool Use-Live Gas	**5.41**	Electrically powered equipment shall **never** be used on a gas service.	Gas fire due to electric ignition.
Grounding for Static Electricity	**9.8**	On plastic services, if conditions exist that a flammable gas-air mixture may be encountered and static charges may be present, such as during gassing-in, purging, a damage, etc, then the plastic pipe shall be grounded. This may be done by using the ASG grounding kit or wet rags saturated with soap solution to minimize the build up of static charges. Mechanical or hydraulically powered tools used on plastic pipe need to be grounded if a flammable gas-air mixture exists.	Gas fire due to static electric ignition.

★ APPENDIX I

KEY TASK MATRIX FOR GAS SERVICE INSTALLATION/REPLACEMENT (GAS SPECIFICATION G-8100)

(Continued)

Environmental Issues	**4.3** **4.5**	Determine the type and quantity of hazardous materials within the service by inspecting tap holes, reviewing M&S plate, and existing conditions in the excavation. Prior to cutting an existing service, it must be properly supported and an environmental site setup must be installed (plastic sheeting to catch any material escaping from the cut pipe). If any hazardous material is found (oil, sludge,etc.) other than drip water is found, contact EHS Operations for guidance on proper removal.	Failing to follow procedure will result in injury or damage to employees, public, and environment.
Pressure Testing	**12.1**	Pressure test services at 150 PSIG for high pressure and 90 PSIG for medium, intermediate, and low pressure. 15 min duration for service size 2" or less and 30 min for service size greater than 2". Also see Gas Specification **G-8204**	Gas leak due to pipe defects and/or improper installation.
Valve Location	**5.30**	Curb valves shall be installed in the sidewalk or unpaved area adjacent to the street in Westchester.	Unable to shut down gas service quickly in an emergency.
★ **Operator Qualifications**	**5.1** **5.2** **5.3**	Installers of new/replacement services must be "Operator Qualified". Only personnel qualified to join plastic pipe/tubing and weld or tap can perform these tasks.	Gas leak due to lack of proper training.
★ **Pipe Defects**	**8.8** **8.9** **9.13** **11.7** **11.8** **Appendix B** **Appendix D** **Appendix E** **G-8122** **G-8003**	All dents, gouges, grooves, etc which have a depth greater than 10% of the wall thickness (See Appendix B or G-8122 for plastic pipe/tubing, Appendix E for copper and Appendix D or G-8003 for steel) **must** be removed by cutting out 12" or more of the damaged section.	The defects could cause an eventual gas leak. When using perfection fittings, all scratches should be eliminated.

conEdison

LAST REVIEW DATE: 3/22/16	REVIEW CYCLE:
★EFFECTIVE DATE 3/22/16	5 Years

SPECIFICATION: **G-8104-14a**

TITLE: **POLYETHYLENE PIPE, TUBING AND FITTINGS FOR GAS MAINS AND SERVICES**

VOLUME: **6 & Yellow Book**

★ **COURSE ID:** **NONE**

★ **CORE GROUPS:** **NONE**

★ **TARGET AUDIENCE:** **NONE**

REV 14a (4/24/18):
Added Effective Date.

Cover Page: Added Course ID, Core Group, and Target Audience designations.

Section 15.0: Added new section, "Records". Renumbered subsequent sections

REVISIONS: (See★)

1) This specification has been revised to incorporate comments made by GTI's technical experts and Con Edison's subject matter experts.

2) Section 2.0 - Added Legal Requirements.

3) Section 3.0 - Added statement for "accepted revision indicated in 16 NYCRR Section 10.3." Removed "And Compliance" in General Requirements title and ASTM F714. Added ASTM F 1924, ASTM F1973, ASTM F 1948, ASME B 1.20.

4) Section 3.3 - Added manufacturer's letter of compliance requirement.

5) Section 4.1 - Added Endot, MT Deason, Plasson USA, Nupigeco, Dura-line. Changed Dow DGDA 2590 resin to 2490. Changed Chevron Phillips/Marlex resin from H525 to H516. Updated other existing abbreviations.

6)	Section 4.2	-	Revised section covering rework / regrind reflecting change to Part 192.
7)	Section 4.3	-	Removed “Department Manager.” Added “Section Manager.”
8)	Section 4.5	-	Added “Approved PE Pipe and Tubing” header.
9)	Section 4.7	-	Added “Approved PE Fittings, Transition Fittings, and Anodeless Risers” header.
10)	Section 4.8	-	Added “Fabricated Fittings and Pup Pieces” header. Added mitering remark and joiner requirement
11)	Section 5.1	-	Added Anodeless Riser requirement per ASTM F1973.
12)	Section 5.7	-	Added Anodeless Riser requirement per ASTM F1973.
13)	Section 7.1	-	Added Transition Fitting requirement per ASTM F1973.
14)	Section 7.6	-	Added Transition Fitting requirement per ASTM B1.20.1.
15)	Section 7.7	-	Added Transition Fitting approval details and Category 1 requirement
16)	Section 9.1	-	Added “or supplier”.
17)	Section 9.2	-	Added “visually unacceptable fusions per ASTM F 2620” requirement.
18)	Sections 9.6 & 9.7	-	Removed “Department Manager.” Added “Section Manager.”

19) Section 10.1 - Added “Date of manufacture” marking requirements.

20) Section 10.2 - Added Anodeless Risers Category 1 Marking requirement.

21) Section 10.3 - Added Anodeless Risers labeling of transition zone requirement.

22) Section 12.1 - Added “or non-stock numbers.”

23) Section 12.3 - Added new section. Contents previously located as individual notes in Sections 12.17 and 12.19.

24) Section 13.0 - Removed “Sizes of.” Added “Tubing” in title.

25) Section 13.1 - Added Endot, MT Deason, Dura-line, Nupigeco, and Gas Distribution (acronym GD used for JM Eagle). Renamed IPF to PUSA, CP to GFCP, and P to EP. McJunkin Red Man is now named MRC Global.

26) Section 13.2 - Removed “UAC 3700” for JM Eagle and added “PE 4710 GD.” Added Endot and Dura-line. Added “Yellowstripe” for PP. Deleted 2” and 3” 500 foot coils. Added 2” 350 foot coils. Deleted 10”, 12” and 16” SDR 15.5 pipe. Added 16” SDR 11 pipe.

27) Section 13.3 - Removed “PE 3408/4710 (SDR 11)/Steel” in title.

28) Section 13.5 - Deleted section covering molded tapping tees. Added section for bolted tapping tee.

29) Section 13.6 - Replaced 3/4" IPS X 1/2" CTS with 1” IPS X 1/2” CTS. Added 1 1/2" IPS X 1 1/4" CTS Anodeless Riser Bend with 0.151” PE wall thickness.

30) Section 13.7 - Removed PP fabricated 3-way tees.

31) Section 13.8 - Deleted note regarding MRC Global fabrication.

32) Section 13.9 - Added “Saddle” to title. Removed “Fabricated” in title. Added MRC Global part numbers. Removed CP and PP part numbers. Added 16” x 16” x 6” and 16” x 16” x 8” tees comment.

33) Section 13.11 - Removed PP Part numbers.

34) Section 13.12 - Deleted 16” fabricated 90 degree elbows from the table. Also, deleted PP 10” and 12” fabricated elbows.

35) Section 13.13 - Deleted 16” fabricated 45 degree elbows from the table. Also, deleted PP 10” and 12” fabricated elbows.

36) Section 13.14 - Deleted section covering fabricated 22 1/2 degree elbows (previously Section 12.14). Renumbered subsequent sections. Added 12” IPS 22 ½ degree elbows (non-mitered).

37) Section 13.15 - Deleted note regarding MRC Global fabrication. Added MRC Global part numbers. Removed “Fabricated” in title and added “Butt Fusion.”

38) Section 13.16 - Added MRC Global part numbers. Removed 3” IPS from table. 8” IPS is now Non-Stock in table. Removed “Fabricated” in title and added “Saddle.” Deleted note regarding MRC Global fabrication. Added Gas Development Lab note.

39) Section 13.17 - Deleted 6” x 4”, 8” x 4”, 8” x 6” (PP Part only), 10” x 4”, 10” x 6” (PP Part only), 12” x 4”, 12” x 6” (PP Part only) and 12” x 8” (PP Part only) branch saddles. Added 16” x 6” and 16” x 8” branch saddles. Added Gas Development Lab comment.

40) Section 13.18 - Updated approved manufacturers for the 1-1/4” CTS Coupling. Added 2” IPS X 1” CTS and 2” IPS X 1-1/4” IPS reducer couplings.

41) Section 13.19 - Added additional sizes of EF tapping tees to the table. Updated approved manufacturers for EF tapping tees. Removed note regarding packaging and relocated it to Section 12.3. Added note for IPEX (Friatec) tapping tee undersaddle.

42) Section 13.20 - Retitled section to reflect manufacturer’s terminology.

43) Section 13.21 - Reworded description of repair patches. Removed note regarding packaging and relocated it to Section 12.3.

44) Section 13.22 - Added new section covering EF SPA Saddles.

45) Section 13.23 - Added new section covering EF Adjustable Elbows.

46) Section 13.24 - Added new section covering EF Buttfused Repair Sleeves.

47) Section 13.25 - Added new section covering EF Branch Saddles.

48) Section 13.26 - Added new section covering EF 45° Elbows.

49) Section 13.27 - Added new section covering EF 90° Elbows.

50) Section 13.28 - Added new section covering EF Bottom Out Saddles.

51) Section 14.0 - Added G-100,298, G-8121, and G-8123.

Gas Operations Standards

TITLE: POLYETHYLENE PIPE, TUBING AND FITTINGS FOR GAS MAINS AND SERVICES

TABLE OF CONTENTS

EFFECTIVE DATE 3/22/16				
EH&S REVIEW BY: A. Moylan		Operations Review N/A		
AUTHOR:	APPROVED BY:	DATE APPROVED:	VOLUME: 6 & Yellow Book	PAGE 1 OF
A. Era	Tomas Hernandez Chief Engineer Gas Distribution Engineering	3/22/16	Purchase and Test	30 PAGES

TITLE: POLYETHYLENE PIPE, TUBING AND FITTINGS FOR GAS MAINS AND SERVICES

1.0 SCOPE

This specification establishes the requirements for the purchase of polyethylene pipe, tubing, molded fittings, fabricated fittings, transition fittings, electrofusion fittings, and anodeless risers.

2.0 LEGAL REQUIREMENTS

2.1 Code of Federal Regulations Title 49 Transportation Part 192

2.2 NYCRR Part 255 "Codes, Rules and Regulations of the State of New York, Title 16 Public Service"

3.0 GENERAL REQUIREMENTS

★ 3.1 All pipe/tubing, fittings and risers shall comply with the latest revision of ASTM D2513 "Standard Specification for Polyethylene (PE) Gas Pressure Pipe, Tubing, and Fittings" (except for marking requirements D2513-87). For references to external standards cited in this specification, use the accepted revision indicated in 16 NYCRR Section 10.3. If the external standard is not listed within section 10.3, use the latest revision of the standard.

A) API 5L, "Specification for Line Pipe," (Includes Errata and Addendum)

B) ASTM A53, "Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless"

C) ASTM F1055 "Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene Pipe and Tubing"

D) ASTM D3261 "Standard Specification for Butt Heat Fusion Polyethylene Plastic Fittings for Polyethylene Plastic Pipe and Tubing"

★ E) ASTM F1924, Specification for Plastic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing.

3.0 **GENERAL REQUIREMENTS** (Continued)

★ F) ASTM F1973 Specification for Factory Assembled Anodeless Risers and Transition Fittings

★ G) ASTM F1948 Specification for Metallic Mechanical Fittings for Use on Outside Diameter Controlled Polyethylene Gas Distribution Pipe and Tubing.

H) Plastic Pipe Institute Technical Note TN-30 “Requirements for the Use of Rework Materials in Manufacturing of Polyethylene Gas Pipe”

★ I) ASME B1.20.1, “Pipe Threads, General Purpose”

3.2 Prior to approval of material for use in the Con Edison distribution system, all manufacturers of polyethylene pipe/tubing, molded fittings, fabricated fittings, transition fittings, and risers shall:

★ A) Provide all test data required to show compliance with the appropriate code, specification or ASTM requirements to the Section Manager of Gas Operations Development Lab.

★ B) Have their product(s) comply with the requirements of the applicable ASTM specification, and all Federal and New York State regulations.

★ 3.3 Manufacturers must provide a letter of compliance for USDOT 49 CFR Part 192.283 relating to the following fusion procedures:

A) For non-lateral connections, butt fusion testing for pipe and fittings using the PPI generic butt fusion joining procedure in Appendix A of PPI Technical Report TR-33. Include additional qualification testing information of manufacturer’s D2513 high density polyethylene (PE 3408/4710) pipe joined in accordance with TR-33 and evaluated in accordance with 192.283. See list of approved pipe/tubing manufacturers in Section 13.2.

3.0 **GENERAL REQUIREMENTS** (Continued)

B) For lateral connections, saddle fusion testing for pipe and fittings using the PPI generic saddle fusion joining procedure in Appendix A of PPI Technical Report TR-41. Include additional qualification testing information of manufacturer's D2513 high density polyethylene (PE 3408/4710) pipe joined in accordance with TR-41 and evaluated in accordance with 192.283. See list of approved pipe/tubing manufacturers in Section 13.2.

C) Manufacturers must qualify their electrofusion joining procedure to ASTM F1055 in accordance with 192.283.

4.0 APPROVED PLASTIC RESIN MATERIAL

★ 4.1 The following table lists the approved resins and manufacturers for the various components:

Resin Mfr./ Resin # / Component	★DOW Chem/ DGDA 2490	Ineos/ Eltex TUB-121	Basell/ Hostalen GM5010T 2	Totalfina/ Finathene XT-10N	Totalfina/ Finathene XS-10B	★Chevron Phillips/ Marlex H516
★Pipe	EN, JM, PP, DU			PP		PP
★Tubing, Coiled	EN, JM, PP, DU			PP		PP
Transition Fittings	JM, PP			PP		
Molded Fittings	PP, EP	GFCP, EP		PP	GFCP	
Anodeless Risers, CTS	PP			PP		
Anodeless Risers, IPS	JM, PP			PP		
Electrofusion Fittings		GFCP, IF, PUSA, II,MT	IF		GFCP, NG	IF
Fabricated Fittings	PUSA, MRC	MRC		PUSA, MRC	MRC	
Sleeve Pipe	PP, DU					PP

Abbreviations: The following abbreviations are used in the table above:

★EN – Endot
IF – Ipex (Friatec)
II – Ipex (Innoge)
EP – Elster Perfection
JM – JM Eagle
MRC – MRC Global
★DU- Dura-line
JM – JM Eagle
★MT– MT Deason
★PUSA – Plasson USA
PP – Performance Pipe
★GFCP – Georg Fischer Central Plastics
★NG- Nupigeco

4.0 **APPROVED PLASTIC RESIN MATERIAL** (Continued)

★ 4.2 Rework Material

Rework and/or regrind material is not allowed in plastic pipe, tubing, and molded fittings purchased under this specification per Code of Federal Regulations.

4.3 New Suppliers

Any manufacturers of PE 3408/4710 plastic pipe/tubing, electrofusion and molded fittings, transition fittings, or risers not listed in Section 5.1 may request consideration for approval from the Section Manager of the Gas Development Lab. Submitted material shall be capable of meeting the legal and general requirements of Section 2.0 and 3.0 of this specification, as appropriate.

4.4 Changes to ASTM Standards that allow reclassification of plastic material approved under this specification does not constitute a change in formula and does not require additional testing. Suppliers of plastic materials should submit to the Section Manager of the Gas Development Lab their intention to change to the corresponding classification prior to making any change.

4.5 Approved PE Pipe and Tubing

A) Polyethylene gas tubing in copper tubing sizes (CTS) shall be supplied with a standard 0.090" minimum wall thickness. See the table in Section 13.2 for approved CTS tubing material.

B) Iron pipe sizes (IPS) shall be supplied with standard dimension ratios as indicated in Section 13.2.

4.0 **APPROVED PLASTIC RESIN MATERIAL** (Continued)

4.6 Extruded pipe, tubing, electrofusion and molded fittings shall be manufactured to dimensional tolerances as specified in ASTM D2513 or F1055 as appropriate. Molded fittings shall be smooth and have uniform dimensions internally.

4.7 Approved PE Fittings, Transition Fittings, and Anodeless Risers

All molded, electrofusion, and fabricated plastic fittings transition fittings, and anodeless risers, electrofusion and heat fusion assembled, are found in Section 13.3 through13.25 of this specification

★ 4.8 Fabricated Fittings and Pup Pieces

★ A) The mitering of any butt fusion joint is strictly forbidden.

B) Only approved plastic pipe/tubing in accordance with Section 13.2 shall be used to butt fuse “pup” lengths on molded fittings, and to manufacture fabricated fittings such as 3-way reducing tees, assembled offsets, assembled crosses, etc.

★ C) Manufacturers and suppliers must identify the heat fusion joiner on the fitting label or directly on the pipe.

D) Approved manufacturers and materials for all are shown in Section 4.1.

5.0 **ANODELESS RISER REQUIREMENTS**

★ 5.1 Anodeless Risers (riser) shall conform to requirements of ASTM F1973. The riser shall consist of combined 24” rigid and 36” flexible casings with integral service head adapter (SHA) with swivel capabilities and approved moisture seal. The service head adapter unit must be joined with crimping/swaging of a collar to the riser unit.

5.0 **ANODELESS RISER REQUIREMENTS** (Continued)

The swivel (SHA) shall consist of a bottoming swivel nut, permanent internal stiffener, compression seal and ferrule assembly and have an outlet male pipe thread. The SHA fitting shall be manufactured in accordance with ASTM F1948-05, Category 1. The SHA shall incorporate a snap – ring groove in the nut portion of the adapter that is used for the purpose of joining the nut to a flexible casing.

5.2 The riser shall completely enclose the above ground portion of the plastic service line in a metallic casing. The outlet of the riser shall be of API 5L or ASTM A53 Schedule 40 steel pipe or equivalent. The metallic casing shall have a minimum wall thickness of 0.065".

5.3 The riser shall be designed and constructed so that in the event a leak or failure of the plastic pipe within the casing, the gas would not escape from the seal at the transition zone.

5.4 All welding shall be performed in accordance with API 1104.

5.5 The underground portion of the riser shall be effectively sealed to prevent the entrance of moisture. The seal shall be designated and constructed to withstand a 10 PSIG pressure test. The moisture seal shall be manufactured from molded vinyl and tested for Dura Hard A, between 60-70 and Weight per Gal.- Liquid Plastisols 9.78-9.98 LB. and Brookfield Visc SP #4, 20 rpm @ 80 Deg F 1200 to 2400 cps.

5.6 End caps are required on both plastic and threaded steel ends.

5.7 Prior to use in the gas distribution system, all risers shall be approved for use per requirements of Section 3.2 of this specification. The manufacturer shall submit design drawings, material certifications, coating specifications, marking requirements, and performance test reports to verify compliance with ASTM F1973. All joints used in risers shall be Category 1.

6.0 TAPPING TEE REQUIREMENTS

6.1 All cutters shall be made of or plated with a corrosion-resistant material or treated with an anti-rust material and shall be capable of tapping SDR 11 and 9.3 pipe and capturing and retaining the "coupon".

6.2 The cutters of all 2" outlet tapping tees for main sizes 6" and larger shall be designed in a manner to prevent collapse of the cutter and to prevent stress cracking during tapping operations. All cutters must have internal threads or "similar design" to facilitate tapping and removal/retention of the "coupon" by the cutter.

7.0 TRANSITION FITTING REQUIREMENTS

★ 7.1 Transition fittings purchased by the company shall meet requirements of ASTM F1973.

7.2 A crimp type anode connector designed to accept a No. 10 AWG stranded wire shall be tack welded to the steel pipe as close to the transition area as possible. The anode connector shall be installed in such a way so as to not protrude excessively from the surface of pipe. Each new manufacturer (prior to approval) must submit a sketch showing the proposed location of the anode connector.

7.3 The minimum length of the steel and plastic ends of the transition fitting shall be as indicated in Section 13.3.

7.4 Each transition fitting shall be pressure tested prior to shipment. The required minimum test pressure for all transition fittings is 150 PSIG for 10 seconds.

7.5 Steel pipe used shall conform to API 5L or ASTM A53. Steel pipe shall be Schedule 40 and conform to Spec G-8107.

★ 7.6 The threads of threaded transition fittings shall conform to requirements of ASME B 1.20.1, Pipe Threads and be protected from damage. End caps are required on the plastic end.

7.0 **TRANSITION FITTING REQUIREMENTS** (Continued)

★ 7.7 Prior to use in the gas distribution system, all transition fittings shall be approved for use per requirements of Section 3.2 of this specification. The manufacturer shall submit design drawings, material certifications, coating specifications, marking requirements, and performance test reports to verify compliance with ASTM 1973. All joints used in transition fittings shall be Category 1.

8.0 **COATING REQUIREMENTS**

8.1 Transition Fittings

A) The steel pipe section of all transition fittings shall be supplied with an approved mill coating. The surface preparation and coating application shall be in accordance with the coating manufacturer's recommended procedure with minimum dry film thicknesses as listed in 8.1C in this specification.

B) The limits of the coating shall be as follows:

- sizes 3" and smaller - 6" from beveled end
- sizes 4" and larger - 8" from beveled end
- all sizes - 1" from threaded end

C) The requirement for coating material is 16 mils minimum, 18 mils average. The following coating materials have been approved for transition fittings:

- DuPont Nap-Gard 7-2530 (Gray Fusion Bonded Epoxy)
- DuPont Nap-Gard 7-2534 (Riser Gray III)

8.0 **COATING REQUIREMENTS** (Continued)

8.2 Anodeless Risers

A) The outer steel casing portion of the riser shall be supplied with an approved mill coating. The surface preparation and coating application shall be in accordance with the coating manufacturer's recommended procedure with a minimum dry film thickness as listed in 8.2B of this specification.

B) The requirement for coating material is 16 mils minimum, 18 mils average. The following coating materials have been approved for anodeless risers:

- DuPont Nap-Gard 7-2530 (Gray Fusion Bonded Epoxy)
- DuPont Nap-Gard 7-2534 (Riser Gray III)

9.0 **QUALITY CONTROL**

9.1 The manufacturer or supplier is responsible for complying with all of the provisions of this specification. Con Edison may make any investigation necessary to verify compliance by the manufacturer and may reject any material that does not comply with this specification.

9.2 Material which shows injurious defects, visually unacceptable fusions per ASTM F 2620 or which proves defective when properly applied in service will be reason to reject the manufacturer's product and remove the product from the approved list.

9.3 In the event of a discrepancy with the manufacturer's test data and the Company's Quality Control test data, a mutually agreed upon independent test lab may be used for verification testing.

9.4 If the test results confirm substandard or defective materials, the manufacturer will become responsible for all costs associated with the removal of the substandard or defective materials including independent testing lab fees.

9.0 **QUALITY CONTROL** (Continued)

9.5 At the request of the Gas Development Lab, the pipe or tubing manufacturer shall submit a Certification Letter* with the following information:

A) Customer Order Number

B) Ship Date

C) Date Manufactured

D) Nominal Size

E) Total Quantity Shipped

F) Extruded Pipe Lot Numbers (Print Line Info)

G) Footage Shipped For Each Extruded Pipe Lot Number

H) Min/Max O.D. For Each Extruded Pipe Lot Number

I) Min/Max Burst For Each Extruded Pipe Lot Number

J) Min/Max Wall Thickness for Each Extruded Pipe Lot Number

K) Min/Max Hoop stress for Each Extruded Pipe Lot Number

*This letter may be requested at time of shipment or when an adverse product condition is discovered.

★ 9.6 Approved manufacturers shall not make any change in the design, fabrication, material, marking or packaging prior to submitting written notification of change to the Section Manager of the Gas Development Lab for evaluation. Unannounced changes will result in the manufacturer's product being unapproved and removed from the Approved Vendor's list.

★ 9.7 Changes in resin formula are considered a change in design. Notification to the Section Manager of the Gas Development Lab will be made for required testing and approval.

10.0 MARKINGS AND IDENTIFICATION

★ 10.1 All pipe, tubing, electrofusion and molded fittings, fabricated fittings, transition fittings, and anodeless risers must be permanently marked in accordance with the appropriate ASTM standard. General marking requirements include the following information:

A) Manufacturer's name
B) Date of manufacture
C) Size
D) SDR or wall thickness
E) Material
F) Lot number
G) ASTM designation

★ 10.2 Anodeless risers and transition fittings shall be marked to meet Category 1 tensile strength.

★ 10.3 All anodeless risers shall be labelled to clearly show the transition zone between the plastic and metallic carrier, to prevent installation of the riser so that the transition zone is below grade.

10.4 Markings and other product identifiers shall be durable and resistant to fading. The identifier shall be permanently affixed to the product.

10.5 Supplemental markings or bar-coding relevant to the tracking of the product is acceptable on all products.

11.0 TRANSPORTATION, HANDLING AND STORAGE

(Refer to Con Ed Specification G-8122, “Transportation, Handling and Storage of Polyethylene Plastic Pipe and Fittings for Gas Mains and Service”.)

11.1 The supplier is responsible for the polyethylene pipe and fittings during transportation.

11.0 **TRANSPORTATION, HANDLING AND STORAGE** (Continued)

11.2 The manufacturer shall provide end protection of such design, material, and mechanical strength to protect the ends of the pipe and tubing from damage and entry of foreign material under normal handling and transportation conditions.

11.3 Coils of plastic pipe and tubing must be delivered on pallets or reels, whichever is applicable.

11.4 Bundles of plastic pipe shall not be stacked higher than seven (7) bundles high.

11.5 All plastic pipe, tubing, transition fittings and anodeless risers shall be supplied with plastic end closures.

11.6 Large diameter plastic pipe is to be shipped from the manufacturer with adequate separation (e.g. "lags") between each row to facilitate safe unloading using a forklift.

11.7 Upon arrival of the plastic pipe and fittings from the supplier at Company or cross docker's warehouses, the material will be inspected. Any pipe or fittings found to be damaged during this inspection will be rejected and returned to the supplier at his expense.

12.0 **PACKAGING AND LABELING**

12.1 Boxes of fittings must be labeled to show the description and quantities of the fitting, including the Con Ed class and stock number or non-stock numbers.

12.2 All coated fittings shall be adequately packaged to prevent any damage to the mill coating and threads during shipping, handling, or storage.

★ 12.3 All electrofusion fittings shall be individually sealed/packaged by the manufacturer to protect the fittings from the elements.

★ 13.0 POLYETHYLENE PIPE, TUBING AND FITTINGS

NOTE: For resin type, refer to table in Section 4.1.

★ 13.1 Abbreviations

The following abbreviations are used in the tables throughout this section:

CP – Georg Fischer Central Plastics
DU- Dura-Line Polypipe
EN - Endot
IF – Ipex (Friatec)
II – Ipex (Innoge)
PUSA –Plasson USA
EP – Elster Perfection
PP – Performance Pipe
MRC – MRC Global
MT- MT Deason
NG- Nupigeco
N/A – Not Available
GD- Gas Distribution (for JM Eagle Pipe)

★ 13.0 POLYETHYLENE PIPE, TUBING AND FITTINGS

★ 13.2 Pipe and Tubing

Nominal Size	SDR	Outside Diameter	Minimum WT	Length	★Approved Mfr/Material		Cl/Stk Number
1/2" CTS	7.0	0.625"	0.090"	500' Coil	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	360-0947
1" CTS	12.5	1.125"	0.090"	500' Coil	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	360-0988
1 - ¼" CTS	15.3	1.375"	0.090"	500' Coil	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	360-0954
1" IPS	11.0	1.315"	0.119"	500' Coil	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0351
1-1/4" IPS	11.0	1.660"	0.151"	500' Coil	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0369
★2" IPS	11.0	2.375"	0.216"	20' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0591
				40' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0856
				350' Coil	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0377
★3" IPS	11.0	3.500"	0.318"	20' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0583
				40' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0385
4" IPS	11.0	4.500"	0.409"	20' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0575
				40' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0393
6" IPS	11.0	6.625"	0.602"	20' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0567
				40' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0401
8" IPS	11.0	8.625"	0.785"	20' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0559
				40' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0518

13.0 **POLYETHYLENE PIPE, TUBING AND FITTINGS** (Continued)

Nominal Size	SDR	Outside Diameter	Minimum WT	Length	★Approved Mfr/Material		Cl/Stk Number
★12" IPS	11.0	12.750"	1.159"	40' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0641
	11.0	12.750"	1.159"	20' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300 EN PE 4710	328-0849
★16" IPS	11.0	16.000	1.455	40' Lth	JM Eagle PE 4710 GD DURA-LINE GDB50	PP Yellowstripe 8300	320-0053

13.3 Transition Fittings

The following table lists fittings that allow for a transition from schedule 40 steel pipe to PE 4710 SDR 11 polyethylene pipe:

Nominal Size	Steel End Type	Steel Length	PE Length	Class and Stock
1"	Beveled	18"	12"	341-1113
1"	Threaded	24"	12"	341-4323
1 1/4"	Beveled	18"	12"	341-1105
1 1/4"	Threaded	24"	12"	341-4331
1 1/4"	Threaded	5 ½	12"	341-5981
2"	Beveled	18"	12"	341-1097
2"	Threaded	24"	12"	341-4349
3"	Beveled	18"	12"	341-1089
3"	Threaded	24"	12"	341-4356
4"	Beveled	18"	18"	341-1071
4"	Threaded	24"	18"	341-4414
6"	Beveled	18"	18"	341-1063
8"	Beveled	18"	18"	341-2822
12"	Beveled	18"	24"	341-3820
16"✓	Beveled	18"	24"	341-0278

★ ✓Smith Blair is approved to make ***only*** the 16" (SDR 11) transition fitting.

Approved Manufacturers: Central Plastics, R.W. Lyall and Smith Blair (**only** for 16" transition fitting).

13.0 POLYETHYLENE PIPE, TUBING AND FITTINGS (Continued)

13.4 Sleeve Pipe for Trenchless Technology

Nominal Size	SDR	Outside Diameter	Minimum WT	Length	Cl/Stk
6" IPS	26	6.625"	0.255"	40'	328-0682
8" IPS	26	8.625"	0.332"	40'	328-0674
10" IPS	32.5	10.750"	0.331"	40'	328-0666

★ 13.5 Bolted Tapping Tees (NIST)

Main Size	Outlet Size	Outlet Pup Lth	Cutter Dia.	Cutter Type	Base Type	Mfr. & Part No.	Cl/Stk
1 ¼"	1 ¼" *	None	.60"	Std	Std Round	P 55505	337-9831

*__NOTE:__ Elster Perfection NIST (Non Interruptible Service Transfer) Tee

★ 13.0 **POLYETHYLENE PIPE, TUBING AND FITTINGS** (Continued)

★ 13.6 Anodeless Riser Bends

Nominal Size	PE Wall Thickness	Perfection Part No.	RW Lyall Part No.	Cl/Stk
1" IPS X 1/2" CTS	.090"	75199	Con Ed 050010B	341-3721
1" IPS X 1" CTS	.090"	75607	Con Ed 07003A	341-3739
1 1/2" IPS X 1 1/4" CTS	.090"	79055	Con Ed 090040A	341-3747
1 1/2" IPS X 1 1/4" CTS	.151"	79782	N/A	341-5650
1" IPS X 1" IPS	SDR 11	79437	N/A	341-5023
2" IPS X 2" IPS	SDR 11	78302	N/A	341-5304
3" IPS x 3" IPS	SDR 11	78512	N/A	341-5577
3" IPS Flanged x 3" IPS	SDR 11	79912	N/A	341-5593
4" IPS x 4" IPS	SDR 11	79964	N/A	341-5585
4" IPS Flanged x 4" IPS	SDR 11	79965	N/A	341-5601

★ 13.0 POLYETHYLENE PIPE, TUBING AND FITTINGS (Continued)

★ 13.7 Molded Threaded Brass Base Service Tees

Inlet Size	Outlet Size*	Outlet Pup Lth	Mfr. & Part No.	Cl/Stk
1 1/4" MPT	1" CTS	--	CP 10005417	341-4471
1 1/4" MPT	1 1/4" CTS	--	CP 10011154	341-4463
1 1/2" MPT	1" CTS	6"	CP 10011852	341-4513
1 1/2" MPT	1 1/4" CTS	--	CP 10005419	341-4588
2" MPT	1" CTS	6"	CP 10011851	341-4521
2" MPT	1 1/4" CTS	--	CP 10005421	341-4505
2" MPT	2" IPS	--	CP 10003672	341-4794

13.8 Molded 3-Way Tees

Size	SDR	Mfr. & Part No.	Cl/Stk
1" IPS	11 11	PP 1007910 CP 10003838	341-1329
1 1/4" IPS	11 11	PP 1007917 CP 10003815	341-1311
2" IPS	11 11	PP 1006426 CP 10002956	341-1303
3" IPS	11 11	PP 1007933 CP 10007746	341-1295
4" IPS	11 11	PP 1006434 CP 10012422	341-1287
6" IPS	11 11	PP 1006442 CP 10007787	341-2137
8" IPS	11 11	PP 1007945 CP 10007789	341-2830
10" IPS	11	CP 10004233	341-4083
12" IPS	11	CP 10004242	341-3853

13.9 Saddle Heat Fusion Reducing 3-Way Tees*

Size	SDR	MRC Part No	Cl/Stk
6" x 6" x 4"	11	6309-9019	341-4661
8" x 8" x 6"	11	6309-9017	341-4679
12" x 12" x 6"	11	6309-9024	341-4687
12" x 12" x 8"	11	6309-9023	341-4695

*The Gas Development Lab can special order 16" x 16" x 6" and 16" x 16" x 8" Saddle Heat Fusion 3-Way Tees.

★ 13.0 **POLYETHYLENE PIPE, TUBING AND FITTINGS** (Continued)

13.10 Molded Caps

Size	SDR	Part No.	Cl/Stk
1" IPS	11 11	PP 1007908 CP 10003837	341-2087
1 1/4" IPS	11 11	PP 1007915 CP 10001876	341-1279
2" IPS	11 11	PP 1006420 CP 10007419	341-1261
3" IPS	11 11	PP 1007930 CP 10002937	341-1253
4" IPS	11 11	PP 1006428 CP 10002938	341-1246
6" IPS	11 11	PP 1006436 CP 10007786	341-1238
8" IPS	11 11	PP 1007942 CP 10007484	341-3184
10" IPS	15.5 11	PP 1064048** CP 10009508	341-4133
12" IPS	11 11	PP 1064775** CP 10009510	341-3812

**10" and 12" caps (from Performance Pipe) are an 8" molded cap with a swaged reducer.

★ 13.0 **POLYETHYLENE PIPE, TUBING AND FITTINGS** (Continued)

13.11 Molded Reducers

Nominal Size	IPS SDR	CTS Wall Thickness	Part No.	Cl/Stk
1" IPS x 1/2" CTS	11	0.090	PP 1071055 CP 10004189	341-1196
1" IPS x 1" CTS	11	0.090	PP 1010907 CP 10004194	341-2079
1" IPS x 1 1/4" CTS	11	0.090	PP 1010910 CP 6911190	341-2749
1 1/4" IPS x 1 1/4" CTS	11	0.090	PP 1007958 CP 10003946	341-1188
2" IPS x 1 1/4" CTS	11	0.090	CP 10004200	341-1170
1 1/4" IPS x 1" IPS	11	N/A	PP 1007964 CP 10004197	341-4620
2" IPS x 1 1/4" IPS	11	N/A	PP 1007977 CP 10007479	341-1220
3" IPS x 2" IPS	11	N/A	PP 1007985 CP 10007480	341-1212
4" IPS x 2" IPS	11	N/A	PP 1006466 CP 10007481	341-2855
4" IPS x 3" IPS	11	N/A	PP 1007992 CP 10007482	341-1204
6" IPS x 4" IPS	11	N/A	PP 1006469 CP 10007784	341-4067
8" IPS x 6" IPS	11	N/A	PP 1007995 CP 10007483	341-2814
10" IPS x 8" IPS	11	N/A	CP 10009509	341-4109
12" IPS x 8" IPS	11	N/A	CP 10013268	341-3861
12" IPS x 10" IPS	11	N/A	CP 10009511	341-4927

★ 13.12 90° Elbows

Size	SDR	Part No.	Type	Cl/Stk
1" IPS	11	PP 1007909 CP 10004111	Molded Molded	341-1378
1 1/4" IPS	11	PP 1007916 CP 10002945	Molded Molded	341-1360
2" IPS	11	PP 1006422 CP 10002946	Molded Molded	341-1352
3" IPS	11	PP 1007932 CP 10007745	Molded Molded	341-1345
4" IPS	11	PP 1006432 CP 10001630	Molded Molded	341-1337
6" IPS	11	PP 1006440 CP 10007785	Molded Molded	341-2095
8" IPS	11	PP 1007944 CP 10007788	Molded Molded	341-3044
★10" IPS	11	CP 10004116	Molded	341-4141
★12" IPS	11	CP 10003853	Molded	341-3796

★ 13.13 45° Elbows

Size	SDR	Part No.	Type	Cl/Stk
3" IPS	11	PP 1007931 CP 10002941	Molded Molded	341-2103
4" IPS	11	PP 1006430 CP 10002942	Molded Molded	341-2111
6" IPS	11	PP 1006438 CP 10009505	Molded Molded	341-2160
8" IPS	11	PP 1007943 CP 10009506	Molded Molded	341-2806
★10" IPS	11	CP 10004070	Molded	341-4091
★12" IPS	11	CP 10004078	Molded	341-3804

★ 13.14 22.5° Elbows

Size	SDR	Part No.	Type	Cl/Stk
★12" IPS	11	CP 360032157	Non-mitered	341-5791

13.15 Butt Fusion Offsets

Size	SDR	MRC Part No.	Cl/Stk
4" IPS	11	6102-2226	341-4646
6" IPS	11	6102-2227	341-4638

★ 13.0 **POLYETHYLENE PIPE, TUBING AND FITTINGS** (Continued)

★ 13.16 Saddle Heat Fusion Crosses

Size	SDR	MRC Part No.	Cl/Stk
1 ¼" IPS	11	2728-0505	341-4703
2" IPS	11	2728-0507	341-4711
4" IPS	11	2728-0509	341-4737
6" IPS	11	2728-0511	341-4745
8" IPS*	11	N/A	Non-Stock

* Gas Development Lab item

★ 13.17 Branch Saddles*

*

Main Size	Outlet Size	Outlet Pup Lth	SDR	Part No.	Type	Cl/Stk
8"	6"	None	11	PP 1098236 CP 10004881	Molded Molded	341-4935
10"	6"	None	11	CP 10005030	Molded	341-4943
12"	6"	None	11	CP 10005042	Molded	341-4968
12"	8"	None	11	CP 10005043	Molded	341-5056
16"	6"	None	11	Not Available	Molded	Non-stock
16"	8"	None	11	CP 10005060	Molded	Non-stock

Gas Development Lab use only

★ 13.0 **POLYETHYLENE PIPE, TUBING AND FITTINGS** (Continued)

★ 13.18 Electrofusion Couplings/ Reducers

Main Size	Manufacturer	Density	Cl/Stk
1 ¼" CTS	Central Plastics	High	341-5957
1" IPS	Central Plastics	High	341-4224
1 ¼" IPS	Central Plastics	High	341-4174
2" IPS	Central Plastics	High	341-4216
3" IPS	Central Plastics	High	341-4208
4" IPS	Central Plastics	High	341-4190
6" IPS	Central Plastics	High	341-4182
8" IPS	Central Plastics	High	341-4976
½" CTS	Ipex (Friatec)	High	341-5866
2" IPS	Ipex (Friatec)	High	341-5387
3" IPS	Ipex (Friatec)	High	341-5403
4" IPS	Ipex (Friatec)	High	341-5379
6" IPS	Ipex (Friatec)	High	341-5395
8" IPS	Ipex (Friatec)	High	341-5411
12" IPS	Ipex (Friatec)	High	341-5429
16" IPS	Ipex (Friatec)	High	341-5858
1" CTS	Ipex (Friatec)	High	341-5965
1 ¼" CTS	PUSA	High	341-5957
1 ¼" IPS x 1" IPS	Central Plastic	High	341-5973
1" IPS	Ipex (Friatec)	High	341-5908
1 ¼" IPS	Ipex (Friatec)	High	341-5916
1" IPS x ½" CTS	Ipex(Friatec), Central Plastic	High	341-5932
2" IPS X 1" CTS	Ipex (Friatec)	High	341-0441
2" IPS X 1 ¼" IPS	PUSA	High	341-1061

★ 13.0 **POLYETHYLENE PIPE, TUBING AND FITTINGS** (Continued)

★ 13.19 Electrofusion Tapping Tees

Main Size	Outlet Size	Manufacturer	Density	Cl/Stk
1 ¼" IPS	X ½" CTS	Central Plastics	High	341-5619
1 ¼" IPS	X ½" CTS	MT Deason	High	341-5619
1 ¼" IPS	X ½" CTS	Plasson	High	338-7099
1 ¼ " IPS	X ½" CTS	Ipex (Friatec)	High	338-7099
1 ¼" IPS	X 1" IPS	Central Plastics	High	341-5627
1 ¼" IPS	X 1" IPS	Plasson	High	341-5627
1 ¼" IPS	X 1" IPS	MT Deason	High	341-5627
1 ¼" IPS	X 1" IPS	Ipex (Friatec)	High	338-7081
2" IPS	X ½" CTS	Central Plastics	High	341-5635
2" IPS	X ½" CTS	Plasson	High	341-5635
2" IPS	X ½" CTS	Ipex (Friatec)	High	341-5635
2" IPS	X ½" CTS	MT Deason	High	341-5635
2" IPS	X 1" IPS	Central Plastics	High	341-5643
2" IPS	X 1" IPS	Plasson	High	341-5643
2" IPS	X 1" IPS	Ipex (Friatec)	High	341-5643
2" IPS	X 1" IPS	MT Deason	High	341-5643
2" IPS	X 2" IPS	Ipex (Friatec)	High	337-9757
3" IPS	X 1" IPS	Ipex (Friatec)	High	341-1036
3" IPS	X 1 ¼" CTS	Ipex (EFS)	High	341-1035
3" IPS	X 2" IPS	Ipex (Friatec)	High	341-6021
4" IPS	X ½" CTS	Ipex (Friatec)	High	341-1037
4" IPS	X 1" IPS	Ipex (Friatec)	High	341-1038
4" IPS	X 1 ¼" CTS	Ipex (EFS)	High	337-9716
4" IPS	X 2" IPS	Ipex (Friatec)	High	337-9781
6" IPS	X ½" CTS	Ipex (Friatec)	High	341-1051
8" IPS	X 1 ¼" CTS	Ipex (EFS)	High	337-9732
8" IPS	X 2" IPS	Ipex (Friatec)	High	337-9773
10" IPS-16"IPS	X 2" IPS	Ipex (Friatec)	High	341-1065
12" IPS	X 1" IPS	MT Deason	High	341-1138
12" IPS	X 2" IPS	MT Deason	High	341-0980

NOTE: IPEX (Friatec) tapping tees include an undersaddle.

★ 13.0 POLYETHYLENE PIPE, TUBING AND FITTINGS (Continued)

13.20 Electrofusion Under Part Style Clamps for Central Plastics Tapping Tees

Main Size	Manufacturer	Part #	Cl/Stk
For 1 1/4" IPS Main	Central Plastics	5750014	059-5207
For 2" IPS Main	Central Plastics	5750862	059-5215

★ 13.21 Electrofusion Repair Patches

Main Size & Description	Manufacturer	Density	Cl/Stk
3" thru 6" Patch W/Saddle Clamp	Ipex (Friatec)	High	These are non-stock items purchased by the Gas Development Lab.
8" and larger Patch	Ipex (Friatec)	High	

★ 13.22 Electrofusion SPA Saddles

Main Size	Manufacturer/Part #	Rating	Cl/Stk
3" IPS SPA Saddle	Friatec/Part # 228236	HDPE 4710/PE100	341-1044
4" IPS SPA Saddle	Friatec/Part # 228237	HDPE 4710/PE100	341-1045
6" IPS SPA Saddle	Friatec/Part# 228238	125 PSI	341-1046
8" IPS SPA Saddle	Friatec/Part # 228335	125 PSI	341-1047
10"-12" IPS SPA Saddle	Friatec/Part # 228241	125 PSI	341-1049

★ 13.23 Electrofusion Adjustable Elbows

Size	Manufacturer/Part #	Rating	Cl/Stk
4" IPS Adjustable elbow	Plasson/Part # 5947B003040	100 PSI	341-1062
6" IPS Adjustable elbow	Plasson/Part # 5947B003060	100 PSI	341-1064

★ 13.24 Electrofusion Buttfused Repair Sleeves (non-leaking use only)

Size	Manufacturer/Part #	Rating	Cl/Stk
4" IPS Sleeve	Nupigeco/Part # 12EIBFRS04	125 PSI	341-0300
6" IPS Sleeve	Nupigeco /Part # 12EIBFRS06	125 PSI	341-0279

★ 13.0 **POLYETHYLENE PIPE, TUBING AND FITTINGS** (Continued)

★ 13.25 Electrofusion Branch Saddles*

Main Size	Outlet Size	Manufacturer	Density	Part #
3" IPS	X 2" IPS	Ipex (Friatec)	High	228184
4" IPS	X 2" IPS	Ipex (Friatec)	High	228185
4" IPS	X 3" IPS	Ipex (Friatec)	High	228186
6" IPS	X 2" IPS	Ipex (Friatec)	High	228184
6" IPS	X 3" IPS	Ipex (Friatec)	High	228180
8" IPS	X 2" IPS	Ipex (Friatec)	High	228146
8" IPS	X 4" IPS	Ipex (Friatec)	High	228276
8" IPS	X 6" IPS	MT Deason	High	TRI1185-D
10"-22" IPS	X 2" IPS	Ipex (Friatec)	High	228182
10"-22" IPS	X 3" IPS	Ipex (Friatec)	High	228187
12" IPS	X 4" IPS	MT Deason	High	TRI1200-D
12"IPS	X 6" IPS	MT Deason	High	TRI1205-D
12" IPS	X 8" IPS	MT Deason	High	TRI1210-D

* Gas Development Lab Use Only

★ 13.26 Electrofusion 45° Elbows

Size	SDR	Part No.	Type	Cl/Stk
2" IPS	11	TRI0420-D	Molded	341-1203
4" IPS	11	TRI0440-D	Molded	341-1205
6" IPS	11	TRI0445-D	Molded	341-1206
8" IPS	11	TRI0450-D	Molded	341-1211

★ 13.27 Electrofusion 90° Elbows

Size	SDR	Part No.	Type	Cl/Stk
2" IPS	11	TRI0475-D	Molded	341-1207
4" IPS	11	TRI0485-D	Molded	341-1208
6" IPS	11	TRI0490-D	Molded	341-1209
8" IPS	11	TRI0495-D	Molded	341-1210

★ 13.0 **POLYETHYLENE PIPE, TUBING AND FITTINGS** (Continued)

★ 13.28 Electrofusion Bottom Out Saddles*

Main Size	Outlet Size	Manufacturer	Density	Part #
12" IPS	X 4" IPS	MT Deason	High	NS0245372
12"IPS	X 6" IPS	MT Deason	High	NS0245373
12" IPS	X 8" IPS	MT Deason	High	NS0245374

* Gas Development Lab Use Only

★ 14.0 **ASSOCIATED SPECIFICATIONS**

G-100,298	-	Valves for Gas Transmission and Distribution Piping Systems
G-8107	-	Steel Pipe for Gas Mains and Services
G-8121	-	Qualification of Installers Joining Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services
G-8122	-	Inspection, Handling Storage and Transportation of Polyethylene (PE) Plastic Pipe, Tubing and Fittings for Gas Mains and Services
G-8123	-	Heat Fusion Joining of Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services
EO-16989	-	Fabricated Plastic Pipe Fittings

★ 15.0 RECORD RETENTION

Any records generated in the course of performing work in accordance with this specification shall be maintained as required by Corporate Instruction CI-870-1 "Records Management". Guidance on the retention of Company Gas Operations records can also be found on the Records Management intranet site.

This Page Intentionally Left Blank

conEdison	LAST REVIEW DATE: 08/28/18	REVIEW CYCLE:
	EFFECTIVE DATE: 9/10/18	5 Years

SPECIFICATION: **G-8107-17**

TITLE: **STEEL PIPE FOR GAS MAINS AND SERVICES**

VOLUME: **6 & Yellow Book**

COURSE ID: **NONE**

CORE GROUP: **NONE**

TARGET AUDIENCE: **NONE**

REVISIONS: (See ★)

1) Section 8.4 - Added note about internal coating.

2) Section 13.1 - Updated approved pipe manufacturers.

3) Section 15.0 - Updated references.

Gas Operations Standards

TITLE: **STEEL PIPE FOR GAS MAINS AND SERVICES**

TABLE OF CONTENTS

1.0 SCOPE

This specification concerns the purchase of steel pipe for use on the Company gas system.

2.0 DEFINITIONS

2.1 Company - Consolidated Edison Company of New York, Inc.

2.2 Manufacturer - The party that manufactures steel pipe.

2.3 Coater - The party that applies coating on bare steel pipe prior to delivery to the Company.

2.4 Vendor - The party from whom the Company purchases the pipe.

2.5 API - American Petroleum Institute.

2.6 ASTM - American Society for Testing and Materials.

3.0 GENERAL REQUIREMENTS

3.1 All steel pipe shall conform to this specification and to

- ASTM Specification A53/A53M- "*Standard Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless*" in accordance with the latest edition of A53/A53M.

or

- ASTM Specification A106/A106M - "*Standard Specification for Seamless Carbon Steel Pipe for High - Temperature Service*" in accordance with the latest edition of A106/A106M

or

- In accordance with the latest edition of API Specification 5L/ISO 3183 "*Specification for Line Pipe*" which includes the latest Errata and Addendums.

The indicated revisions are incorporated by reference in 16 NYCRR Part 10. In cases where this specification differs from the ASTM or API Specifications, this specification shall prevail.

3.2 Aluminum pipe or pipe made from amphoteric materials is not approved.

4.0 MATERIALS AND MANUFACTURING PROCESS

4.1 The following grades of steel are approved for gas piping:

A) ASTM A53 Grade B

B) ASTM A106 Grade B

C) API 5L Grades B, X42, X46, X52, X56, X60 and X70.

4.2 The following processes of manufacture conforming to ASTM A53, ASTM A106, and API 5L are approved for gas piping:

A) Seamless - all sizes

B) Electric Resistance Weld - all sizes

C) Submerged Arc Weld - 20" O.D. and larger for Grade B and for API 5L X42, X46, X52, X56, X60 and X70.

D) Double Submerged Arc Weld - 20" O.D. and larger for Grade B and for API 5L X42, X46, X52, X56, X60 and X70.

4.3 The interior of all pipes shall be smooth, free of scale, oil, grease and projections.

5.0 APPROVED STEEL PIPE SIZES AND GRADES

The following pipe sizes and grades are approved for Distribution (up to 99 psig) and Transmission (above 125 psig) for standard construction.

Nominal Pipe Size In.	Outside Diam. In.	Identification-Steel Iron Pipe Size	Sched. No.	Wall Thick. In.	CLASS & STOCK NUMBERS FOR WELDED END PIPES Distribution (<=99 psig) (see Note a) Bare SGL R/L	Bare DBL R/L	Coated SGL R/L	Coated DBL R/L	Transmission (>125 psig) (see Note b)
1	1.315	Std.	40	0.133	320-1753	non-stock	323-0372	non-stock	
1	1.315	XS	80	0.179	320-0250	non-stock	non-stock	non-stock	
1 1/4	1.660	Std.	40	0.140	320-1761	non-stock	323-0729	non-stock	
1 1/4	1.660	XS	80	0.191	320-1415	non-stock	non-stock	non-stock	
1 1/2	1.900	Std.	40	0.145	320-1779	non-stock	323-0349	non-stock	
1 1/2	1.900	XS	80	0.200	320-1423	non-stock	non-stock	non-stock	
2	2.375	Std.	40	0.154	320-0367	non-stock	non-stock	non-stock	
2	2.375	XS	80	0.218	320-1431	non-stock	non-stock	323-0711	
3	3.500	Std.	40	0.216	320-0359	non-stock	323-0299	non-stock	
3	3.500	XS	80	0.300	320-1456	non-stock	non-stock	non-stock	
4	4.500	Std.	40	0.237	320-0342	non-stock	323-0273	323-0596	Contact Gas Transmission Engineering - Major Projects to specify appropriate schedule and grade of transmission pipe (>125 psig)
4	4.500	XS	80	0.337	320-1464	non-stock	non-stock	non-stock	
6	6.625	Std.	40	0.280	320-1613	320-0334	323-0612	323-0257	

5.0 APPROVED STEEL PIPE SIZES AND GRADES (Continued)

Nominal Pipe Size In.	Outside Diam. In.	Identification-Steel Iron Pipe Size	Sched. No.	Wall Thick. In.	CLASS & STOCK NUMBERS FOR WELDED END PIPES (Continued) Distribution (<=99 psig) (see Note a) Bare SGL R/L	Bare DBL R/L	Coated SGL R/L	Coated DBL R/L	Transmission (>125 psig) (see Note b)
6	6.625	XS	80	0.432	320-1472	non-stock	non-stock	non-stock	
8	8.625	Std.	40	0.322	320-2009	non-stock	323-0620	323-0240	
8	8.625	XS	80	0.500	320-1522	non-stock	non-stock	non-stock	
10	10.750	Std.	40	0.365	320-0318	non-stock	323-0638	323-0224	
10	10.750	XS	60	0.500	320-1803	non-stock	non-stock	non-stock	
12	12.750	Std.	-	0.375	320-2025	320-0300	323-0646	323-0216	
12	12.750	XS	-	0.500	320-1530	non-stock	non-stock	non-stock	
16	16.000	Std.	30	0.375	320-0292	non-stock	non-stock	323-0208	
16	16.000	XS	40	0.500	320-1829	non-stock	non-stock	non-stock	
20	20.000	Std.	20	0.375	320-2264	320-0284	non-stock	323-0182	
20	20.000	XS	30	0.500	non-stock	non-stock	non-stock	non-stock	
24	24.000	Std.	20	0.375	320-0276	non-stock	non-stock	323-0166	
24	24.000	XS	-	0.500	320-2298	320-0243	non-stock	non-stock	
26	26.000	Std.	-	0.375	non-stock	non-stock	non-stock	non-stock	
26	26.000	XS	20	0.500	non-stock	non-stock	non-stock	non-stock	
30	30.000	Std.	-	0.375	non-stock	320-1969	non-stock	323-0737	
30	30.000	XS	20	0.500	non-stock	320-2462	non-stock	323-0810	
36	36.000	Std.	-	0.375	non-stock	320-0227	non-stock	non-stock	
36	36.000	Std.	-	0.562	non-stock	non-stock	non-stock	non-stock	
36	36.000	Std.	30	0.625	non-stock	non-stock	non-stock	non-stock	

Contact Gas Transmission Engineering - Major Projects to specify appropriate schedule and grade of transmission pipe (>125 psig)

Note a) - Any approved schedule and grade of steel may be used for distribution pipe (<=99 psig). See Section 4.1

Note b) – Contact Gas Transmission Engineering – Major Projects to specify appropriate schedule and grade of transmission pipe (> 125 psig). See §14.6 for toughness testing requirements for transmission pipe (>125 psig)

6.0 APPROVED LENGTHS

6.1 Pipe lengths approved are:

A) Single Random lengths (SR) 20 feet, and Double Random lengths (DR) 40 feet with the following tolerances:

	SR	DR
Shortest length in the entire shipment	18.0 feet	35.0 feet

6.0 **APPROVED LENGTHS** (Continued)

B) Longest lengths available.

C) Lengths as ordered on individual requisitions.

6.2 Jointers, two or more shorter lengths of pipe joined together by welding or other means to meet length requirements, are not acceptable.

7.0 **PIPE ENDS**

7.1 Pipe that is 2 inches in diameter and larger shall be beveled for welding to conform to the requirements of API 5L or ASTM A106.

7.2 End tolerances shall conform to API 5L or ASTM A106 to facilitate the installation of mechanical compression joints.

7.3 The inside and outside edges of the pipe ends shall be free of burrs, projections, dents or gouges.

8.0 **PIPE COATING**

8.1 External coating, when required shall be as per Purchase Specification G-8062, "Extruded Polyolefin Coating on Steel Gas Pipe".

8.2 Bare steel pipe supplied to the Company shall have a lacquer coating, uniform in thickness on the outside pipe surface. No coating is required on bare steel pipe supplied to a coater.

8.3 Galvanized steel pipe is not approved.

★ 8.4 Internal coating, when required shall be as per Purchase Specification G-8108, "Internal Epoxy Coating on Steel Gas Pipe". Distribution pipe is 8” and greater. Transmission pipe is 4” and greater.

9.0 **PIPE MARKINGS**

9.1 By Manufacturer - Marking of all bare pipe shall conform to the requirements of API 5L, ASTM A106 or ASTM A53.

9.2 By Coater or Vendor - Coated pipe purchased shall have the pipe diameter, wall thickness, grade, Con Ed, date pipe was coated, heat number and API or ASTM specification under which the pipe has been manufactured paint stenciled on the coating surface as per API 5L, ASTM A106 or ASTM A53 along the pipe length.

9.0 **PIPE MARKINGS** (Continued)

9.3 All required markings shall be legible and permanent.

10.0 **TRANSPORTATION AND PROTECTION OF PIPE**

10.1 Pipe transportation, handling and storage shall be in accordance with Company Specification G-8003, "Transporting, Handling, and Storing Steel Gas Pipe".

10.2 The vendor shall be responsible for damages to the pipe or coating due to transportation.

11.0 **INSPECTION AND REJECTION OF PIPE**

11.1 Bare pipe shall be visually inspected for dents, gouges, grooves, or arc burns prior to surface preparation by the Coater. Any defects found shall be reported to the Transportation and Stores Department of the Company and the damaged pipe length in question shall not be coated.

11.2 A dent that contains or affects the longitudinal weld is not acceptable.

11.3 Pipe containing a dent in which the dent contains a scratch, gouge, groove or arc burn is not acceptable. A dent may be defined as a depression, which produces a gross disturbance in the curvature of the pipe wall as opposed to a scratch or gouge that reduces the pipe wall thickness.

11.4 The pipe shall contain no dents greater than 1/4 inch. The length of the dent in any direction shall not exceed one-half the pipe diameter.

11.5 Pipe containing gouges or grooves having a depth greater than 12 percent of the specified wall thickness, measured from the surface of the pipe is not acceptable.

11.6 Pipe containing any arc burns is not acceptable.

11.7 The Company reserves the right to inspect, test and subsequently reject any pipe that does not conform in any way to the standards set forth in this specification, or the API or ASTM Specification under which the pipe is manufactured, or the associated coating specifications as set forth herein. The vendor shall be liable for all costs incurred by the Company as a result of pipe failing to comply with this specification.

12.0 RECORD RETENTION

Any records generated in the course of performing work in accordance with this specification shall be maintained as required by Corporate Instruction CI-870-1 "Records Management". Guidance on the retention of Company Gas Operations records can also be found on the Records Management intranet site.

13.0 APPROVED MANUFACTURERS

★ 13.1 The following pipe manufacturers are approved:

DOMESTIC		FOREIGN	
Mill Name	City,State	Mill Name	City, Country
American Steel Pipe	Birmingham, AL	Hyundai Pipe Co.	Ulsan, S. Korea
Berg Steel Pipe Corp.	Panama City, FL	**Salzgitter-Mannesmann**	Hamm, Germany
Dura-Bond Pipe	Steelton, PA	Mittal/Iscor Steel	Vereeniging, S. Africa
JSW Steel	Baytown, TX	Seah Steel Corp.	Pohang City, S.Korea
TMK-Ipsco Tubulars	Camanche,IA	Sumitomo Metal	Japan
TMK-Koppel Steel	Ambridge, PA	Tenaris Dalmine	Dalmine, Italy
USS-Lone Star Steel	Lone Star, TX	Tenaris Siderca	Buenos Aires, Argentina
Tenaris-Maverick Tube	Conroe, TX	Tubacero	Monterrey,Mexico
TMK–Newport Steel	Wilder, KY	Zeleziarne-Podbr.	Podbrezova, Slovakia
Paragon Industries	Sapulpa, OK		
Sharon Tube	Sharon, PA		
Stupp Corp.	Baton Rouge, LA		
Tex-Tube	Houston, TX		
USS- Div. of USX Corp.	Lorain, OH		
USS- Div. of USX Corp.	McKeesport, PA		
V&M Star	Houston, TX		
V&M Star	Youngstown, OH		
Wheatland Tube	Wheatland, PA		

Pipe manufactured by companies other than those listed above shall be purchased only with the written approval of the Chief Gas Engineer, Gas Transmission Engineering or duly authorized representative.

13.2 Manufacturers or vendors supplying pipe which do not conform to this specification and/or display poor workmanship shall not be acceptable for subsequent bids until written approval is received from the Chief Gas Engineer, Gas Transmission Engineering or duly authorized representative.

13.0 **APPROVED MANUFACTURERS** (Continued)

13.3 The Company's Purchasing Department may canvass other pipe manufacturers and direct all potential pipe suppliers to the Chief Gas Engineer, Gas Transmission Engineering or duly authorized representative who will evaluate the manufacturer's product in accordance with the contents of this specification.

13.4 Manufacturers not approved in Section 13.1 may request consideration for approval by submitting quality control procedures, specifications, catalogs, and a certificate that all pipe supplied will meet the requirements of this specification. This shall be sent to the Chief Gas Engineer, Gas Transmission Engineering or duly authorized representative.

14.0 **QUALITY CONTROL**

14.1 The vendor shall submit written notification to the Chief Gas Engineer, Gas Transmission Engineering or duly authorized representative of any changes to be made by the manufacturer concerning the design, fabrication, material or marking of the pipe. This notification shall be made in advance of any changes and must receive written approval from the Chief Gas Engineer, Gas Transmission Engineering or duly authorized representative in order to be acceptable.

14.2 The vendor shall keep records of **all** materials supplied to Con Edison. The records shall include mill certificates, the material description, the manufacturer and the heat numbers. They shall be available to Con Edison upon request.

14.3 The vendor shall maintain a quality control program to insure that all pipe shipped to Con Edison meets referenced standards.

14.4 For pipe that is 8" and larger, dimensional data shall be recorded for a minimum of 10% of each item in each shipment. Dimensional data shall include outside diameter, wall thickness, roundness, bevel ends, etc. The vendor shall externally mark each inspected length of pipe with a **painted yellow dot** readily visible to Con Edison inspectors. The vendor shall maintain these records at their facility and make them available to Con Edison upon request.

14.0 **QUALITY CONTROL**(Continued)

14.5 When an out-of-specification length of pipe is found by the vendor in a shipment, the entire shipment shall be inspected and documented before shipment to Con Edison. The vendor shall maintain these records at their facility and make them available to Con Edison upon request.

14.6 Any pipe to be used for transmission (>125psig) shall be toughness tested as per “Appendix A - Steel Pipe Toughness Standards For All New Pipe >125 Psig”. This will be requested when required. These test results will be sent to Gas Transmission Engineering – Major Projects for approval prior to delivery to the pipe coater and Con Edison. One set of toughness tests is required for every 100 lengths per heat of pipe.

★15.0 **REFERENCES**

G-8003	-	Transportation, Handling and Storage of Steel Pipe for Gas Mains and Services
G-8062	-	Extruded Polyolefin Coating on Steel Gas Pipe
G-8108	-	Internal Epoxy Coating on Steel Gas Pipe

APPENDIX A

STEEL PIPE TOUGHNESS STANDARDS FOR ALL NEW PIPE > 125 PSIG

PIPE SAMPLES:
1" through 10", cut 6" long pipe section
12" through 36", cut 8" x 8" coupons
Note: the test coupon must include the seam area on all welded pipe.

PIPE IDENTIFICATION:
Samples shall be from the same lot number or heat number.

CHARPY V-NOTCH (CVN) TOUGHNESS TESTS:
Full size samples shall be tested at a temperature of –10 degrees F and as per API 5L SR5A/SR5B, ASTM E23 and ASTM A370. Three CVN specimens shall be evaluated for each test: the Base Metal, the Weld, and the Heat Affected Zone (HAZ). Acceptable values for each test are as follows:

ABSORBED ENERGY: MINIMUM OF EACH TEST SPECIMEN ≥ 15 FT-LB

LATERAL EXPANSION: MINIMUM OF EACH TEST SPECIMEN ≥ 0.020 IN.

PERCENT SHEAR: MINIMUM OF EACH TEST SPECIMEN ≥ 20 %

Note: If subsize samples are used, the test temperature shall be lowered and absorbed energy adjusted to be equivalent to full size samples at –10 degrees F as per ASTM A370 and ASME Boiler and Pressure Vessel Code, Section VIII, Div. 1, Subsection A, UG-84 requirements. Also for this condition (sub size samples) percent shear is not required.

This Page Intentionally Left Blank

conEdison

LAST REVIEW DATE: 12/7/17	**REVIEW CYCLE: 5 Years**
EFFECTIVE DATE: 2/8/18	

SPECIFICATION: **G-8121-18a**

TITLE: **QUALIFICATION OF INSTALLERS JOINING POLYETHYLENE (PE) PLASTIC PIPE/TUBING AND FITTINGS FOR GAS MAINS AND SERVICES**

VOLUME: **2 (Section 7.0), 10, & Yellow Book**

★ **COURSE ID:** **GAS0268**

★ **CORE GROUP(S):** **NONE**

★ **TARGET AUDIENCE:** **Gas Construction, Emergency Response Force (ERF), Gas Development Lab, Per Diem, Gas Contractors, and Construction**

REV 18a (4-9-18)

Table of Contents: Added "RECORDS" Section.
Section 3.2: Added "Con Edison" trained evaluators to qualify new and existing joiners and second inspectors of PE plastic pipe.
Section 3.4 (C): Removed "Mechanical Stab fitting" from Operator Qualification.
Section7.3 (A) & (B): Removed temperature indicating crayons/sticks to verify the heating iron temperature.
Section7.3 (C) & (D): Clarified "Alcohol Wipes" requirements for Electrofusion Coupling Joints & Electrofusion Saddle joints.
Section 10.0: Added new Records section. Renumbered subsequent sections.

REVISIONS (See ★)

1)	Cover Page	-	Changed "Registration No." to "Course ID". Added Core Groups designation. Changed "Target Training Groups" to "Target Audience".
2)	Section 3.2	-	Added "second".
3)	Section 3.3	-	Added "second".
4)	Section 3.6 C) 1.	-	Added "second".
5)	Section 3.6 C) 2.	-	Added "second" and updated examples of second inspector.

6)	Section 3.7	-	Changed “peer” to “second”.
7)	Section 3.8 A)	-	Added “second”.
8)	Section 3.8 B)	-	Added “second”.
9)	Section 3.8 B) 1.	-	Added “second” and updated examples of second inspectors.
10)	Section 3.8 B) 2.	-	Added “second”.
11)	Section 7.4 A)	-	Added “second”.
12)	Section 8.1	-	Added “second”.
13)	Section 8.3	-	Added “second” and updated examples of second inspectors.
14)	Section 9.1	-	Added “second”.
15)	Section 9.2	-	Added “second”.

Gas Operations Standards

TITLE: QUALIFICATION OF INSTALLERS JOINING POLYETHYLENE (PE) PLASTIC PIPE/TUBING AND FITTINGS FOR GAS MAINS AND SERVICES

TABLE OF CONTENTS

★ EFFECTIVE DATE: 2/8/18				
EH&S REVIEW BY: J. Fox	OPERATIONS REVIEW BY: R. McGrath (Gas Constr.)			
AUTHOR:	APPROVED BY:	DATE APPROVED:	VOLUME: 2 (Section 7.0), 10, & YB	PAGE 1
Mark Baldovin	Tomas Hernandez Chief Engineer Gas Distribution Engineering	12/7/17	Construction Standards and O&M Manual	OF 14 PAGES

1.0 SCOPE

This specification establishes the procedure and evaluation requirements for initial Operator Qualification and the requalification (annual and three year) for joiners and inspectors of polyethylene (PE) plastic pipe/tubing and fittings for gas mains and services.

NOTE: "Annual" means once each calendar year at intervals not exceeding 15 months.

2.0 LEGAL REQUIREMENTS

Federal: 49 CFR Part 192, Sections 281, 283, 285, and 287.

State: 16 NYCRR Part 255, Sections 281, 283, 285, and 287.

3.0 OPERATOR QUALIFICATION

3.1 Joiners who tap an energized pipeline, weld steel, and join PE plastic pipe by heat fusion (butt fusion or branch saddle fusion), electrofusion, or with mechanical fittings shall be Operator Qualified.

All other "covered tasks" shall be completed by either Operator Qualified individuals or individuals under the direct observation of one who is Operator Qualified. "Direct observation" means that the Operator Qualified individual remains in direct visual and verbal contact at all times with the individual performing the task.

★ 3.2 Qualification of new and existing joiners and second inspectors of PE plastic pipe shall be performed and documented by Con Edison or Northeast Gas Association (NGA) trained evaluators.

★ 3.3 Disqualification of joiners and second inspectors will be documented in Industrial Training Services (ITS) as a suspension of the applicable covered task.

★ 3.4 To join PE plastic pipe by heat fusion (butt fusion or branch saddle fusion), electrofusion, or with mechanical fittings, joiners shall be qualified under the joining procedures in Gas Specifications G-8123, "Heat Fusion Joining

3.0 **OPERATOR QUALIFICATION** (Continued)

of Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services," IP-27, "Installation of Electrofusion Fittings on Plastic Pipe/Tubing and Molded Fittings Using a Universal Electrofusion Processor" and IP-20, "Installation of Mechanical Fittings for Plastic Pipe and Tubing."

The qualification for joiners includes all of the below:

A) Training

The individual must be appropriately trained or experienced in the joining procedures in Gas Specifications G-8123, IP-27, and IP-20.

A manufacturer's representative may do the initial training on a machine or equipment, but it must be documented (e.g. Hands-on-training (HOT)).

B) Knowledge Evaluation

Successful completion of the knowledge (written) evaluation to measure that an individual has the required knowledge of PE plastic pipe and the procedures to join PE plastic pipe.

★ C) Skill and Ability Evaluation

Successful completion of the skill and ability (practical) evaluations to assess that individuals can correctly demonstrate the joining of PE plastic pipe by fabricating specimen joints for each of the following:

- Butt fusion using manual machine.
- Butt fusion using hydraulic machine (McElroy 28, 412, or 618)
- Branch saddle fusion (Development Lab personnel only)
- Electrofusion coupling
- Electrofusion 16" coupling (optional)
- Electrofusion saddle
- Mechanical bolted fitting

3.0 **OPERATOR QUALIFICATION** (Continued)

- Mechanical compression fitting
- Mechanical nut follower fitting

3.5 Initial Qualification of Joiners

Initial qualification requires joiners to be qualified under the joining procedures in Gas Specifications G-8123, IP-27, and IP-20 and/or the NGA Plastic Pipe Joining Manual by meeting the requirements of:

- appropriate training or experience in the joining procedure(s),
- knowledge (written) evaluation, **and**
- skill and ability (practical) evaluation.

3.6 Requalification of Joiners

A) Following initial qualification, joiners who join PE plastic pipe shall be requalified under the joining procedures in Gas Specifications G-8123, IP-27, and IP-20 and/or the NGA Plastic Pipe Joining Manual by meeting the requirements of:

- skill and ability (practical) evaluation annually **AND**
- knowledge (written) evaluation every three (3) years, not to exceed 39 months.

B) The annual skill and ability evaluation satisfies the requirements when during any 12-month period that person does not make any joints under the joining procedures in Gas Specifications G-8123, IP-27, and IP-20.

C) At any time, joiners who join PE plastic pipe shall also be requalified under the joining procedures in Gas Specifications G-8123, IP-27, and IP-20, and/or the NGA Plastic Pipe Joining Manual if either:

★ 1. Any production joint made under the applicable joining procedure is found unacceptable by a qualified second inspector,

3.0 **OPERATOR QUALIFICATION** (Continued)

★ 2. Any production joint made under the applicable joining procedure that had been inspected by the qualified joiner is found visually unacceptable by another qualified second inspector (ie, Qualified management employee, Construction Representative (CR), Construction Inspector (CI), or independent 3rd party inspection). (See Section 7.4)

3. Any production joint made by heat fusion (butt fusion or branch saddle fusion), electrofusion, or with mechanical fittings is found unacceptable after pressure testing. (See Gas Specification G-8204, "Pressure Testing Requirements for Gas Mains and Services" **OR**

4. Company management recommends that the joiner be requalified.

★ 3.7 Initial Qualification of Second Inspectors

To be initially qualified to second inspect plastic joints:

A) A person must be either qualified as a joiner themselves, **or**

B) Meet the requirements of:

- appropriate training **and**
- knowledge (written) evaluation.

★ 3.8 Requalification of Second Inspectors

A) Following initial qualification, second inspectors shall be requalified by meeting the requirements of:

- knowledge (written) evaluation at periods of three (3) years, not to exceed 39 months.

B) At any time, second inspectors shall also be requalified, if either:

3.0 **OPERATOR QUALIFICATION** (Continued)

1. When any production joint made under the applicable joining procedure that had been inspected by the qualified second inspector is found visually unacceptable by another qualified second inspector (ie, Qualified management employee, Construction Representative (CR), Construction Inspector (CI), or independent 3rd party inspection). (See Section 8.0)

OR

2. Company management recommends that the second inspector be requalified.

4.0 **SKILL AND ABILITY EVALUATION TO JOIN PE PLASTIC BY HEAT FUSION**

4.1 No person may join PE plastic pipe/tubing and fittings by heat fusion (butt fusion-manual, butt fusion- hydraulic, and branch saddle fusion) unless that person has been qualified under the applicable joining procedure by:

A) Making specimen joints from pipe sections joined according to the procedure that passes the following inspection and test:

1) The heat fusion specimen joints must be visually examined during and after joining and found to have the same appearance as a joint or photographs of a joint that is acceptable under the procedure.

2) The heat fusion specimen joint must be destructively tested. The joints shall be cut into at least three longitudinal straps, each of which is visually examined and found not to contain voids or discontinuities on the cut surfaces of the joint area and deformed by bending, torque, or impact, and if failure occurs, it must not initiate in the joint area.

5.0 **SKILL AND ABILITY EVALUATION TO JOIN PE PLASTIC BY ELECTROFUSION**

5.1 No person may join PE plastic pipe/tubing and fittings by electrofusion (coupling and saddle) unless that person has been qualified under the applicable joining procedure by:

5.0 **SKILL AND ABILITY EVALUATION TO JOIN PE PLASTIC BY ELECTROFUSION** (Continued)

A) Making specimen joints from pipe sections joined according to the procedure that passes the following inspection and test.

1) The specimen electrofusion joints must be visually examined during and after joining and found to have the same appearance as a joint or photographs of a joint that is acceptable under the procedure.

2) The specimen electrofusion joints must be destructively tested. The electrofusion joints shall be cut into at least three longitudinal straps, each of which is visually examined and found not to contain voids or discontinuities on the cut surfaces of the joint area and deformed by bending, torque, or impact, and if failure occurs, it must not initiate in the joint area.

6.0 **SKILL AND ABILITY EVALUATION TO JOIN PE PLASTIC WITH MECHANICAL FITTINGS**

6.1 No person may join PE plastic pipe/tubing with mechanical fittings unless that person has been qualified under the applicable joining procedure by:

A) Making specimen joints from pipe sections joined according to the procedure and the manufacturer's installation guidelines that passes the following inspection and test.

1) The specimen mechanical joints must be visually examined during and after assembly and found to have the same appearance as a joint or photographs of a joint that is acceptable under the procedure.

7.0 **DISQUALIFICATION FROM JOINING PE PLASTIC**

7.1 In the event of disqualification, the joiner shall undergo remediation before being permitted to qualify/requalify.

7.0 **DISQUALIFICATION FROM JOINING PE PLASTIC** (Continued)

7.2 Knowledge Evaluation

Failure of the knowledge (written) evaluation at either the initial qualification or the three year requalification will result in disqualification for that method of joining PE plastic.

7.3 Skill and Ability Evaluation

Reasons for failing the initial or annual skill and ability evaluation include, but are not limited to:

★ A) Butt Fusion Using Manual or Hydraulic Machine

- Failure to inspect the plastic pipe/tubing for scratches or defects.
- Failure to clean the inside and outside of the pipe to be joined by wiping with a clean, dry, lint-free cloth.
- Failure to check for pipe slippage at the proper fusion pressure prior to heating.
- Failure to determine the drag pressure (if any) and calculate the proper fusion pressure.
- Failure to verify the heating iron temperature with a calibrated contact pyrometer.
- Pipe end misalignment.
- Improper fusion pressure or pressure exerted during the heating cycle.
- Insufficient or excessive melt bead.
- Inadequate bead roll-back.
- Failure to mark the pipe/tubing adjacent to the butt fused joint to identify the joiner.
- The specimen joint differs in appearance as a specimen joint or photograph of joint that is acceptable under Gas Specification G-8123.
- Failure of the destructive test. (See Section 4.1(A)(2))

7.0 **DISQUALIFICATION FROM JOINING PE PLASTIC** (Continued)

★ B) Branch Saddle Fusion Using Hydraulic Machine

- Failure to inspect the plastic pipe/tubing for scratches or defects.
- Failure to roughen both the pipe surface and the base of the branch saddle.
- Failure to clean the pipe surface and the base of the branch saddle by wiping with a clean, dry, lint-free cloth.
- Failure to verify the heating iron temperature with a calibrated contact pyrometer.
- Preheating the pipe.
- 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.
- Failure to mark the branch saddle fitting or the pipe/tubing adjacent to the branch saddle fusion joint to identify the joiner.
- The specimen joint differs in appearance as a specimen joint or photograph of joint that is acceptable under Gas Specification G-8123.
- Failure of the destructive test. (See Section 4.1(A)(2))

7.0 **DISQUALIFICATION FROM JOINING PE PLASTIC** (Continued)

★ C) Electrofusion Coupling Joint

- Failure to inspect the plastic pipe/tubing for scratches or defects.
- Failure to measure and mark the area on pipe to be scraped.
- Insufficient or excessive pipe scraping.
- Failure to clean electrofusion fitting and pipe surface with either 96% alcohol wipes (Class/Stock #689-3135 and 025-3724) or a clean, dry, lint-free non- synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687) with 99.9% liquid isopropyl alcohol (Class/Stock #630-1246) after scraping.
- Contamination of pipe ends after scraping.
- Contamination of fusion area inside coupling.
- Pipe end misalignment.
- Improper stab depth.
- Insufficient cool-down time before clamping fixture is removed.
- Failure to mark the electrofusion fitting or the pipe/tubing adjacent to the electrofusion joint to identify the joiner.
- The specimen joint differs in appearance as a specimen joint or photograph of joint that is acceptable under Gas Specification IP-27
- Failure of the destructive test. (See Section 5.1(A)(2))

★ D) Electrofusion Saddle Joint

- Failure to inspect the plastic pipe/tubing for scratches or defects.
- Failure to measure and mark the area on the pipe to be scraped.
- Insufficient or excessive pipe scraping.
- Contamination of pipe after scraping.
- Contamination of fusion area under branch saddle.
- Improper alignment of pipe ends

7.0 **DISQUALIFICATION FROM JOINING PE PLASTIC** (Continued)

★ D) Electrofusion Saddle Joint (Continued)

- Failure to clean electrofusion fitting and pipe surface with either 96% alcohol wipes (Class/Stock #689-3135 and 025-3724) or a clean, dry, lint-free non- synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687) with 99.9% liquid isopropyl alcohol (Class/Stock #630-1246) after scraping.
- Insufficient cool-down time before clamping fixture is removed.
- Failure to mark the electrofusion fitting or the pipe/tubing adjacent to the electrofusion joint to identify the joiner.
- The specimen joint differs in appearance as a specimen joint or photograph of joint that is acceptable under Gas Specification IP-27
- Failure of the destructive test. (See Section 5.1(A)(2))

★ E) Mechanical Fittings

- Failure to inspect the plastic pipe/tubing for scratches or defects.
- Failure to follow the installation procedure outlined in Gas Specification IP-20 and the manufacturer's installation procedure.
- Failure to measure and mark the correct insertion depth on the plastic pipe/tubing.
- Installing the coupling without a stiffener or with the wrong stiffener (if required).
- Failure to fully insert the plastic pipe/tubing into the coupling/fitting.
- Failure to chamfer the edge of the plastic tubing prior to inserting into coupling/fitting (if applicable).
- Failure to mark the mechanical fitting or the pipe/tubing adjacent to the mechanical fitting to identify the joiner.
- The specimen joint differs in appearance as a specimen joint or photograph of joint that is acceptable under Gas Specification IP-20.

7.0 **DISQUALIFICATION FROM JOINING PE PLASTIC** (Continued)

7.4 Poor Work Performance

★ A) A joiner will be disqualified (suspended in ITS) from joining PE plastic when any production joint made under the applicable joining procedure is found visually unacceptable by a qualified second inspector. The joiner must be requalified in that method of joining (e.g. manual/hydraulic butt fusion, electrofusion, or mechanical joining), prior to performing any additional PE plastic joining of that method.

B) At any time, Company management may disqualify an installer from joining PE plastic due to poor work performance (e.g., visually unacceptable production joints, non-compliance with joining procedures, etc.).

7.5 Main or Service Pressure Test Failure at a Joint

A joiner will be disqualified when any production joint made by heat fusion (butt fusion or branch saddle fusion), electrofusion, or with mechanical fittings is found unacceptable after pressure testing. (See Gas Specification G-8204, "Pressure Testing Requirements for Gas Mains and Services")

A) If a main or service pressure test fails at a PE plastic fuse or mechanical joint, the joiner must immediately notify their supervisor (Company employee) or Company Authorized Representative (gas contractor). The supervisor or Company Authorized Representative shall provide email notification of the disqualification to Gas Compliance (dl – Gas Quality Control)

7.6 Failure to requalify prior to the expiration dates of either the annual requalification (Skill and Ability Evaluation) or the three year requalification (Knowledge Evaluation) shall **immediately disqualify** the joiner from performing that type of PE plastic pipe joining. The disqualified installer must then be requalified.

8.0 DISQUALIFICATION FROM INSPECTING PE PLASTIC JOINTS

★ 8.1 In the event of disqualification, the second inspector shall undergo remediation before being permitted to qualify/requalify.

8.2 Knowledge Evaluation

Failure of the knowledge (written) evaluation at either the initial qualification or the three year requalification will result in disqualification for that method of inspecting PE plastic joints.

★ 8.3 Poor Work Performance

A second inspector will be disqualified from inspecting PE plastic joints when any production joint made under the applicable joining procedure is found unacceptable by another second inspector (e.g., Qualified management employee, Construction Representative (CR), Construction Inspector (CI), 3rd party inspector). The second inspector must be requalified prior to performing any additional PE plastic joint inspection.

9.0 IDENTIFICATION OF OPERATOR QUALIFICATION

★ 9.1 Each Operator Qualified joiner or second inspector shall be issued a qualification card (or equivalent) identifying the covered tasks they are qualified to perform.

★ 9.2 The qualification card (or equivalent) shall be in the joiner's/second inspector's possession whenever performing/inspecting joining of PE plastic pipe by heat fusion, electrofusion, or mechanical fittings.

★ 10.0 RECORDS

Any records generated in the course of performing work in accordance with this specification shall be maintained as required by Corporate Instruction CI-870-1 "Records Management". Guidance on the retention of Company Gas Operations records can also be found on the Records Management intranet site.

11.0 REFERENCES

G-8123 Heat Fusion Joining of Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services

G-8204 Pressure Testing Requirements for Gas Mains and Services

IP-20 Installation of Mechanical Fittings for Plastic Pipe and Tubing

IP-27 Installation of Electrofusion Fittings on PE Plastic Pipe/Tubing and Molded Fittings Using a Universal Electrofusion Processor

Con Edison's Operator Qualification Written Plan

conEdison

LAST REVIEW DATE: 3/1/17 **REVIEW CYCLE: 5 Years**
★ EFFECTIVE DATE: 5/4/17

SPECIFICATION: **G-8122-12b**

TITLE: **INSPECTION, HANDLING, STORAGE, AND TRANSPORTATION OF POLYETHYLENE (PE) PLASTIC PIPE, TUBING, AND FITTINGS FOR GAS MAINS AND SERVICES**

★ **VOLUME:** **2 (Section 7.0), 10 & Yellow Book**

★ **COURSE ID:** **GAS0343**

★ **CORE GROUPS:** **Gas Construction, and Emergency Response Force Lead Mechanic**

★ **TARGET AUDIENCE** **Gas Construction, Emergency Response Force (ERF), Gas Development Lab, Gas Contractors, Per Diem, Construction, Stores Operations, and Emergency Response Force Lead Mechanic**

REV 12b (4/9/18):

- Incorporated Records Retention Section 6.0; renumbered Section 6:0 “References” to Section 7.0 and Section 7.0 “Attachments” to Section 8.0.
- Cover Page: Added “Emergency Response Force Lead Mechanic” to Core Groups and Target Audience.

REV 12a (12/18/17):

- Cover Page: Added specification to O&M Manual (Volume 10). Added Gas Construction to Core Group(s).
- Section 2.0: Added Case 14-G-0201 and 14-G-0212 to Legal Requirements.

TITLE: INSPECTION, HANDLING, STORAGE, AND TRANSPORTATION OF POLYETHYLENE (PE) PLASTIC PIPE, TUBING, AND FITTINGS FOR GAS MAINS AND SERVICES

REVISIONS: (See ★)

1)	Added Effective Date.		
2)	Cover Page	-	Changed “Registration Number” to “Course ID”; Added “Core Groups”; Changed “Target Training” to “Target Audience”.
3)	Section 3.2 (A)	-	Reformatted. Changed “2 years” to “10 years” in (A) (2).
4)	Section 3.2 (B)	-	Added section and note referencing Appendix C.
5)	Section 3.3	-	Added requirement to utilize a pit gauge.
6)	Section 4.3 (A)	-	Changed “2 years” to “10 years”.
7)	Section 4.4 (C)	-	Clarified restriction on dragging pipe on the ground.
8)	Section 6.0	-	Revised “ASTM D2315-99 “to “ASTM D2513-09a”. Updated Performance Pipe Bulletin to Sept, 2015.
9)	Section 7.0	-	Added Attachment C.
10)	Attachments	-	Added Attachment C.

Gas Operations Standards

TITLE: INSPECTION, HANDLING, STORAGE, AND TRANSPORTATION OF POLYETHYLENE (PE) PLASTIC PIPE, TUBING, AND FITTINGS FOR GAS MAINS AND SERVICES

TABLE OF CONTENTS

TITLE: INSPECTION, HANDLING, STORAGE, AND TRANSPORTATION OF POLYETHYLENE (PE) PLASTIC PIPE, TUBING, AND FITTINGS FOR GAS MAINS AND SERVICES

1.0 SCOPE

This specification applies to the inspection, handling, storage, and transportation, of polyethylene (PE) plastic pipe, tubing, and fittings (e.g. valves, elbows, reducers, transition fittings, service tees) for gas mains and services by Company and Gas Contractor forces.

★ 2.0 LEGAL REQUIREMENTS

Federal: 49 CFR Part 192, Sections 311 and 321

New York State: 16 NYCRR Part 255, Sections 311 and 321

Case 14-G-0201 and 14-G-0212

3.0 INSPECTION AT COMPANY FACILITY, GAS CONTRACTOR YARD, AND JOB SITE

3.1 All loose and bundled/packaged PE plastic pipe, tubing, and fittings shall be inspected for PE plastic material requirements, age, and damage upon delivery to Company facilities, Gas Contractor yards, and job sites AND prior to installation.

Where PE plastic pipe is bundled upon delivery, the bundle shall be inspected for damage, PE Plastic material requirements, and age to the extent possible without unbundling. However, the pipe shall be fully inspected prior to installation.

★ 3.2 PE Plastic Material Requirements and Age

★ A) Upon delivery to Company facility (when feasible) and Gas contractor yard, and prior to installation, inspect the print line on PE plastic pipe, tubing, and the label or imprint on PE fittings to verify:

1) PE plastic material is high density polyethylene (HDPE), PE3408/4710, and manufactured per ASTM D2513.

★ 2) PE plastic material is NOT older than 10 years old.

★ B) Refer to Appendix C for guidance in determining the date of manufacture of PE plastic pipe, tubing and other PE fittings.

3.0 **INSPECTION AT COMPANY FACILITY, GAS CONTRACTOR YARD, AND JOB SITE** (Continued)

Note: Appendix C is not intended to be an all-inclusive listing. Refer to manufacturer's literature for additional information.

★ 3.3 Damage

Inspect packaged and loose PE plastic pipe, tubing, and fittings for damage greater than the maximum permissible defect depth utilizing a pit gauge (10% of the wall thickness, See Attachment A).

A) Upon delivery to Company facilities and Gas contractor yards, any PE plastic pipe or tubing received damaged (e.g. kinks, buckles, dents, gouges, grooves, etc.) deeper than the maximum permissible defect depth **must** be returned. Any damage to PE plastic fittings deeper than the maximum permissible defect depth must also be returned.

B) At the job site, any damage to PE plastic pipe or tubing (e.g. kinks, buckles, dents, gouges, grooves, etc.) deeper than the maximum permissible defect depth **must** be removed by cutting out the damaged section as a cylinder. The minimum cylinder length to be removed is one pipe diameter or 12 inches, whichever is greater. Any damage to PE plastic fittings deeper than the maximum permissible defect depth must not be installed.

4.0 **TRANSPORTATION, HANDLING, AND STORAGE**

4.1 Transportation

During transportation of the PE plastic pipe, tubing, and fittings by the Company/Gas Contractor to Company/Gas Contractor yard or job site, the following precautions shall be taken:

A) Bed, rails or stanchions of the truck must be free from projections or sharp objects which could scratch or puncture the PE plastic pipe, tubing, and fittings.

B) Straight lengths of PE 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.

4.0 **TRANSPORTATION, HANDLING, AND STORAGE** (Continued)

C) PE 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.

4.2 Handling

During handling of the PE plastic pipe, tubing, and fittings by the Company/Gas Contractor at the Company/Gas Contractor yard or job site, the following precautions shall be taken:

A) Coils of PE plastic pipe and tubing supplied strapped by the manufacturer should remain strapped until the moment of installation, where practical.

B) Individual pipe lengths or pallets shall not be dropped off the truck.

C) Bundles of straight lengths of PE plastic pipe bundled by the manufacturer may be lifted by crane or fork lift.

D) Web-type nylon, leather, rope or fabric slings shall be used for handling PE plastic pipe and tubing. Wire rope, chains, cables, tongs or other metallic equipment shall **not** be used for handling the PE plastic pipe and tubing. The cautious use of a fork truck to handle/lift the PE plastic pipe and tubing is permissible.

E) Individual lengths of PE plastic pipe should be lifted manually. When this is not practical, a crane, fork lift, backhoe or similar equipment may be used. See Table 1 for weights of 40' lengths of PE plastic pipe.

4.0 **TRANSPORTATION, HANDLING, AND STORAGE** (Continued)

Table 1, Approximate Weight of Individual Straight Lengths of PE Plastic Pipe

Diameter	SDR	Weight per 40' Length (Pounds)
2"	11	26
3"	11	56
	21 (PIM)	40
4"	11	92
6"	11	200
	26 (PIM)	89
8"	11	340
	26 (PIM)	152
10"	15.5	383
	32.5 (PIM)	190
12"	11	742
16"	11	1168
	15.5	848
	32.5 (PIM)	420

4.3 Storage at Company/Gas Contractor Yard

★ A) PE plastic pipe, tubing, and fittings shall be inventory controlled to prevent material older than 10 years old from being issued or used by field personnel for installation.

B) New coils of PE plastic pipe and tubing shall be left on the original pallets

C) Bundles of PE plastic pipe may be stacked evenly upon each other to an overall height of about six feet (6') high. If the storage site is not flat and level, limit the stacking height to about four feet (4') height.

D) Bundles of PE plastic pipe shall be placed on evenly spaced wood pallets or steel I-Beam support racks. The I-Beams shall have padding or wood installed that will sufficiently cushion the PE plastic pipes against damage.

E) Individual/loose straight lengths of PE plastic pipe may be stacked in rows. Pipes should be laid straight, not crossing over or entangled with each other. The base row must be placed on evenly spaced wood and installed to prevent sideways movement or shifting. (See Tables 2 and 3).

4.0 **TRANSPORTATION, HANDLING, AND STORAGE** (Continued)

Table 2, Maximum Number of Rows High for Stacking 20' - 40' Individual Straight Lengths of PE Plastic Pipe

Plastic Pipe Diameter	SDR	Maximum Number of Rows High
2”	11	24
3”	11	18
4”	11	12
6”	11	8
8”	11	6
10”	15.5	5
12”	11	4
16”	15.5	3
16”	11	3

Table 3, Maximum Number of Rows High for Stacking 20' - 40' Individual Straight Lengths of PE Plastic Pipe PIM Sleeve

PE Plastic Pipe Diameter	SDR	Maximum Number of Rows High
3”	21	14
6”	26	10
8”	26	8
10”	32.5	6
16”	32.5	4

4.4 Storage at Job Site

A) The storage area should provide adequate protection against physical damage. If possible, follow storage guidelines for Company/Gas Contractor yard (see Section 4.3).

4.0 TRANSPORTATION, HANDLING, AND STORAGE (Continued)

4.4 Storage at Job Site (Continued)

B) Individual/loose straight pipes of PE plastic pipe may be stored 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 evenly spaced sandbags, padding, or other suitable protective material.

★ C) Pipe shall not be dragged on the ground/surface that will cause cuts, gouges, indentations or punctures, unless protection is provided.

5.0 MISCELLANEOUS

5.1 The Gas Contractor is responsible for the PE plastic pipe, tubing, and fittings once in their possession. Any damage or loss incurred during transportation, storage, and/or handling operations shall be replaced at the Gas Contractor's expense.

5.2 All scrap PE plastic pipe and/or tubing that cannot be reused, shall be brought back to the Con Edison workout location for proper disposal/recycling.

★ 6.0 RECORDS RETENTION

Any records generated in the course of performing work in accordance with this specification shall be maintained as required by Corporate Instruction CI-870-1 "Records Management". Guidance on the retention of Company Gas Operations records can also be found on the Records Management intranet site.

★ 7.0 REFERENCES

G-8104 - Polyethylene Pipe and Fittings for Gas Mains and Services

★ ASTM D2513-09a - Standard Specification for Thermoplastic Gas Pressure Pipe, Tubing, and Fittings

Plastics Pipe Institute (PPI) Material Handling Guide (2001)

★ Performance Pipe Bulletin PP-901 Sept, 2015)

★ 8.0 ATTACHMENTS

Attachment A – PE Plastic Pipe/Tubing Chart Maximum Permissible Damage

Attachment B – PE Plastic Pipe and Tubing Information

Attachment C – Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

ATTACHMENT A

PE PLASTIC PIPE/TUBING CHART
MAXIMUM PERMISSIBLE DAMAGE

Nominal Size	SDR	Outside Diameter	Minimum Wall Thickness Of Pipe / Tubing	Maximum Permissible Defect Depth
1/2” CTS	7.0	0.625”	0.090”	0.009”
1” CTS	12.5	1.125”	0.090”	0.009”
1 1/4” CTS	15.3	1.375”	0.090”	0.009”
1” IPS	11	1.315”	0.119”	0.011”
1 1/4” IPS	11	1.660”	0.151”	0.015”
2” IPS	11	2.375”	0.215”	0.021”
3” IPS	11	3.500”	0.318”	0.031”
4” IPS	11	4.500”	0.409”	0.040”
6” IPS	11	6.625”	0.602”	0.060”
8” IPS	11	8.625”	0.785”	0.078”
10” IPS	11	10.750”	0.977”	0.097”
10” IPS	15.5	10.750”	0.694”	0.069”
12” IPS	11	12.750”	1.159”	0.115”
16" IPS	11	16.000"	1.455"	0.145"

ATTACHMENT B

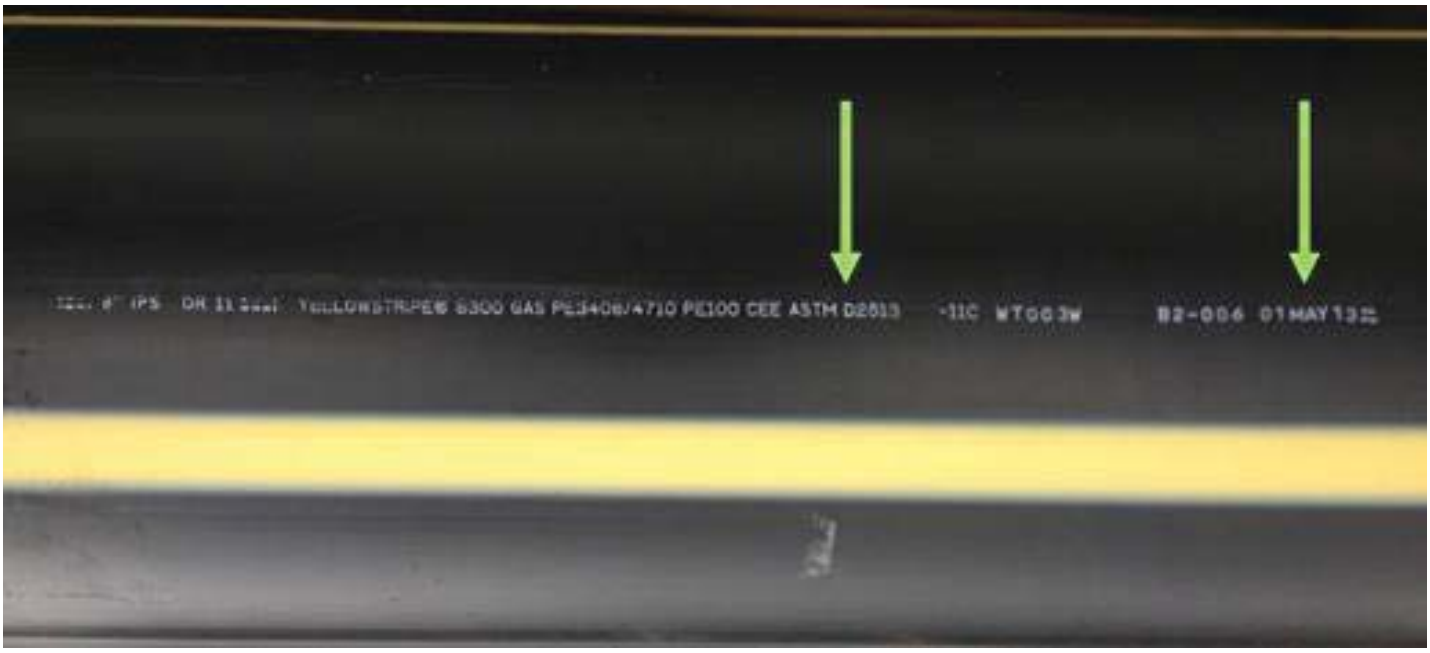
PE PLASTIC PIPE AND TUBING INFORMATION

C/S #	DESCRIPTION							
8300 COILED TUBING / PIPE		**Lbs per Foot**	**Coil Weight**	**Feet per Truck**	**Weight per Truck**	**Coils per Pallet**	**Pallets per Truck**	**Packaging**
360-0947	1/2" CTS (.090 WT) - 500' coils	0.066	33	156,000	10,296	12	26	Pallet
360-0988	1" CTS (.090 WT) - 500' coils	0.13	65	104,000	13,520	8	26	Pallet
360-0954	1-1/4" CTS (.090 WT) - 500' coils	0.16	80	72,000	11,520	6	24	Pallet
328-0351	1" IPS (SDR 11) - 500' coils	0.20	100	78,000	15,600	6	26	Pallet
328-0369	1-1/4" IPS (SDR 11) - 500' coils	0.31	155	42,000	13,020	12	7	Pallet
328-0377	2" IPS (SDR 11) - 350' coils	0.64	224	___	___	___	___	Pallet
8300 PIPE - 40 FOOT LENGTHS		**Lbs per Foot**	**Lbs per Length**	**Feet per Truck**	**Weight per Truck**	**Lengths per Bundle**	**Bundles per Truck**	**Bundle Style**
328-0856	2" IPS Pipe (SDR 11)	0.64	25.6	49,280	31,539	88	14	Hard
328-0385	3" IPS Pipe (SDR 11)	1.40	56.0	28,000	39,200	50	14	Soft
328-0393	4" IPS Pipe (SDR 11)	2.30	92.0	16,240	37,352	29	14	Soft
328-0401	6" IPS Pipe (SDR 11).	5.01	200.4	7,280	36,473	13	14	Soft
328-0518	8" IPS Pipe (SDR 11)	8.49	339.6	3,600	30,564	9	10	Soft
328-0658	10" IPS Pipe (SDR 15.5)	9.58	383.2	2,520	24,142	5 & 4	7 & 7	Bulk
328-0641	12" IPS Pipe (SDR 11)	18.55	742.0	1,920	35,616	4	12	Bulk
328-0831	16" IPS Pipe (SDR 15.5)	21.21	848.4	1,200	25,452	3	10	Bulk
320-0053	16” IPS Pipe (SDR 11)	29.21	1168.4	1,200	35,052	3	10	Bulk
8300 PIPE - 20 FOOT LENGTHS		**Lbs per Foot**	**Lbs per Length**	**Feet per Truck**	**Weight per Truck**	**Lengths per Bundle**	**Bundles per Truck**	**Bundle Style**
328-0591	2" IPS Pipe (SDR 11)	0.64	12.80	49,280	31,539	88	28	Hard
328-0583	3" IPS Pipe (SDR 11)	1.40	28.00	28,000	39,200	50	28	Soft
328-0575	4" IPS Pipe (SDR 11)	2.30	46.00	16,240	37,352	29	28	Soft
328-0567	6" IPS Pipe (SDR 11).	5.01	100.20	7,280	36,473	13	28	Soft
328-0559	8" IPS Pipe (SDR 11)	8.49	169.80	3,600	30,564	9	20	Soft
328-0849	12" IPS Pipe (SDR 11)	18.55	371.00	1,920	35,616	4	24	Bulk

★ ATTACHMENT C

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

Polyethylene Gas Pipe or Tubing



Pipe / tubing was manufactured per ASTM D2513 (gas piping).
The date of manufacture is indicated as May 1, 2013

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

Fitting With Label

Date of Manufacture:The date can be found on the label and is shown as the month/year. In the photo above 4/14 (April, 2014).

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

2 inch IPS Metfit Mechanical Coupling

Date of Manufacture: The date is indicated by the year in the center of the dial with the arrow pointing to the month. In the photo above 9/14 (Sept, 2014)

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

Central 4” IPS Cap

Date of manufacture: The date can be found on the label and is shown as the month/year. In the photo above 10/14 (October, 2014)

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

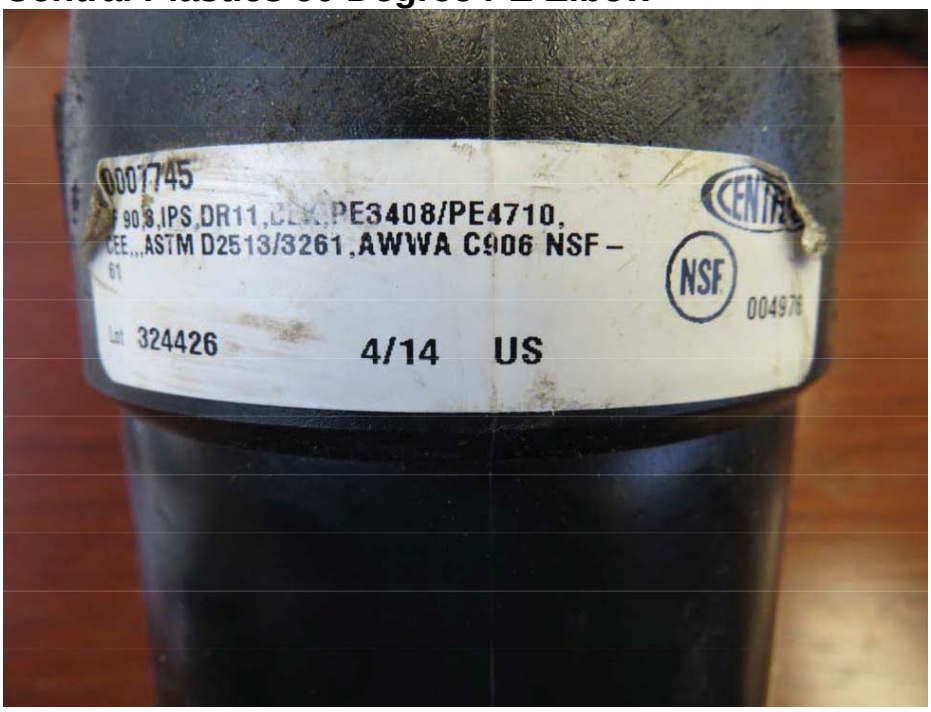
Central Plastics 2” x 1-1/4” IPS PE Reducer

Date of manufacture: The date can be found on the label and is shown as the month/year. In the photo above 3/15 (March, 2015)

Date of manufacture: The date can also be indicated by the year in the center of the dial and the arrow pointing to the month. In the photo above 3/15 (March, 2015)

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

Central Plastics 90 Degree PE Elbow

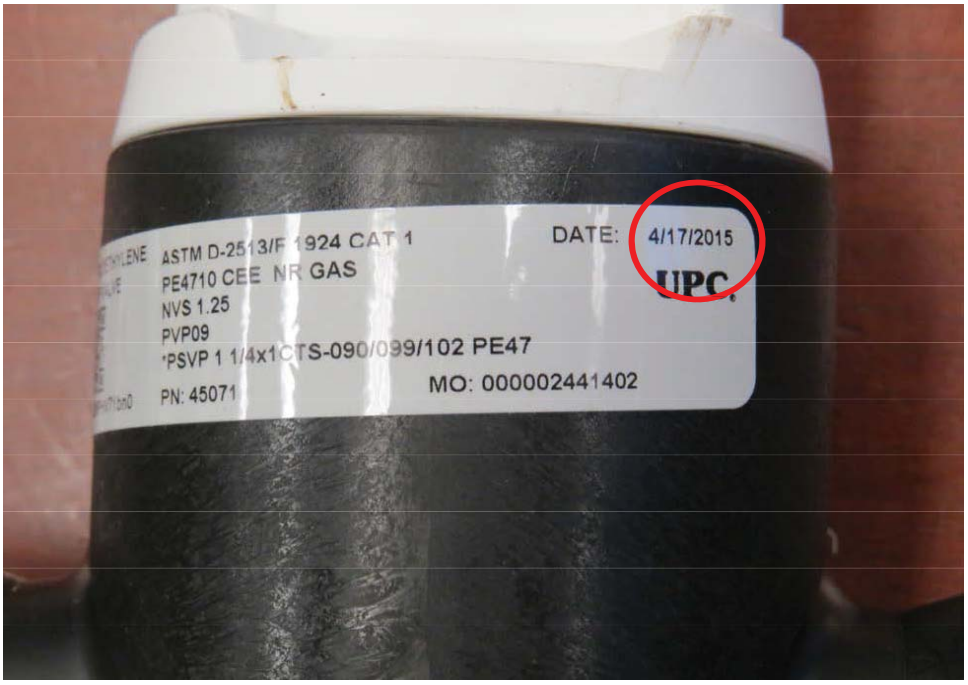


Date of manufacture: The date can be found on the label and is shown as the month/year. In the photo above 4/14 (April, 2014)

Date of manufacture: The date can also be indicated by the year in the center of the dial and the arrow pointing to the month. In the photo above 4/15 (April, 2014)

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

Elster Perfection PE Ball Valve

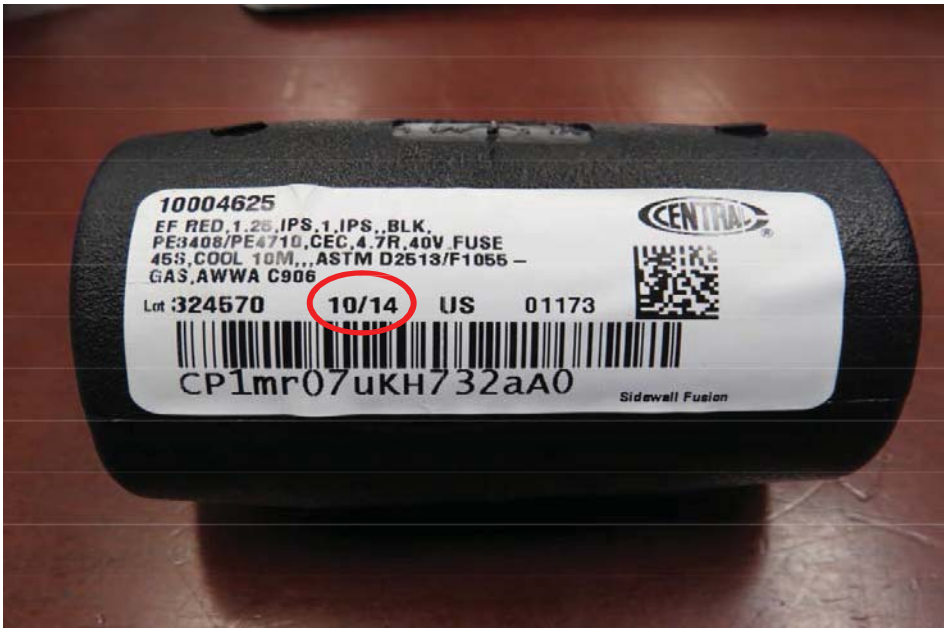


The date on the sticker is the assembly and test date. In this case 4/17/2015.

Date of Manufacture: The date is indicated by the year in the center of the dial with the arrow pointing to the month. In the photo above 1/15 (Jan, 2015.) The expiration date should be taken as 10 years from the oldest month/year. For the valve shown above, the expiration date should be January, 2017

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

Central Plastics 1.25” x 1” Electrofusion Reducer



Date of manufacture: The date can be found on the label and is shown as the month/year. In the photo above 10/14 (October, 2014)

Date of manufacture: The date can also be indicated by the year in the center of the dial and the arrow pointing to the month. In the photo above 10/14 (October, 2014)

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

2” Polyvalve PE Valve

The label does not have information regarding the date of manufacture. (See below).

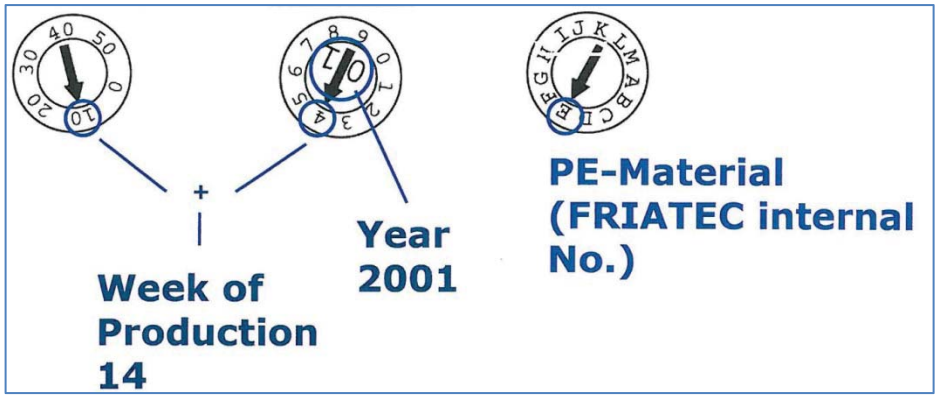
Date of Manufacture: The date is branded onto the body of the valve as YY/MM/DD. In the photo above, November, 4, 2014.

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

Frialen 2” IPS Electrofusion Coupling

The label does not have information regarding the date of manufacture. (See below).

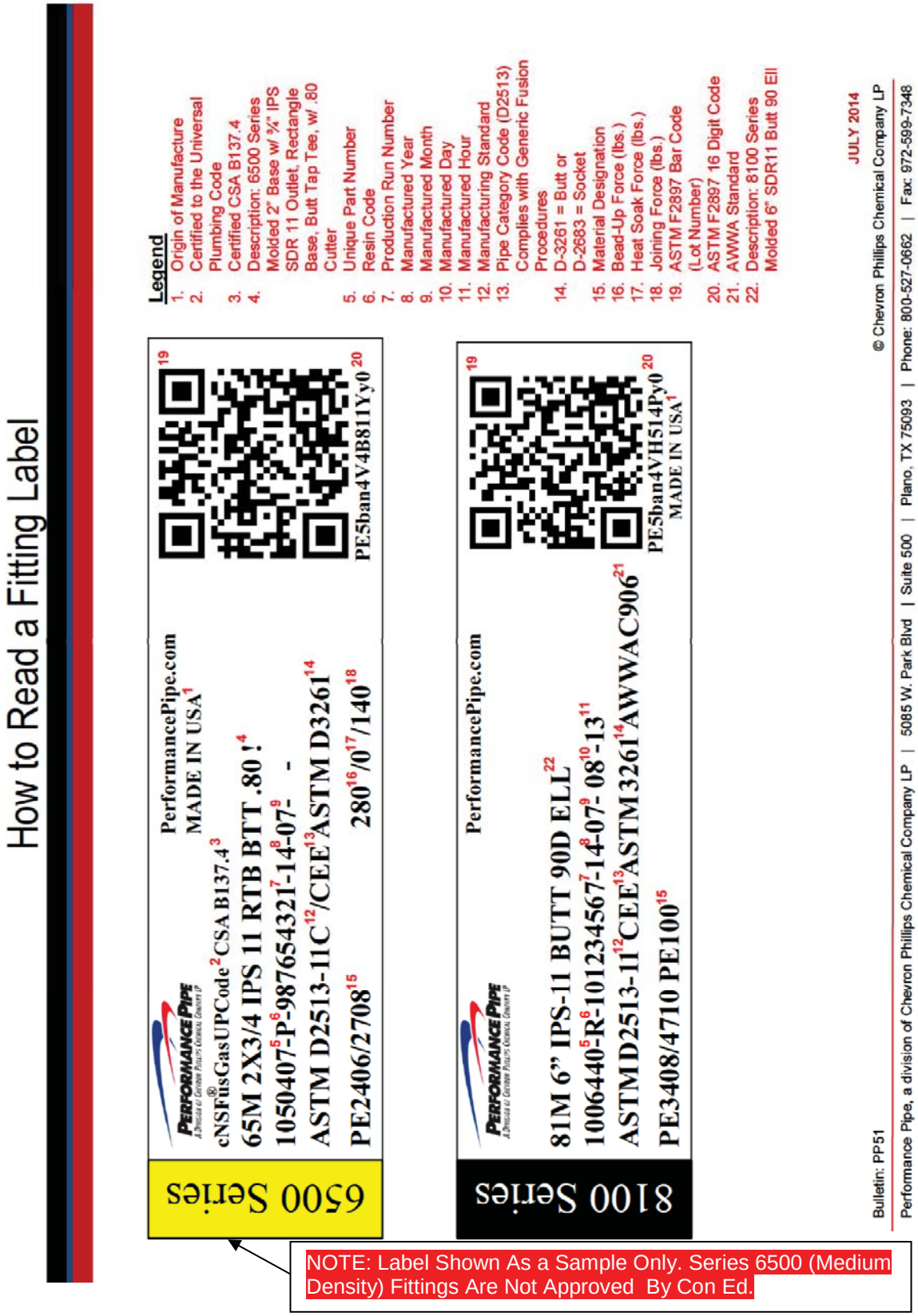
Date of Manufacture is indicated as described below. For the coupling above, it was manufactured the week 44 of 2013.



Note: This diagram is not associated with the photographs above.

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

Performance Pipe Fittings



NOTE: Label Shown As a Sample Only. Series 6500 (Medium Density) Fittings Are Not Approved By Con Ed.

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

Frialen XL Couplers

FRIALEN® XL

FRIATEC an OAltaxis company

Batch coding for FRIALEN XL couplers

Batch code stamped into the coupler, unremoveable

1. Week pipe/blank
2. Year
3. Initial PE-raw material
4. Worker no.
5. Machine no.
6. Production week

Revised August 8, 2016

www.friatec.de

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

Plasson Molded Fittings

Date of manufacture: The date is indicated by the five digit number embossed onto the body of the valve below the sticker. The first digit is the number of the machine that molded the fitting. The next two digits are the week that the fitting was manufactured and the last set of digits is the year of manufacture. In this case the number "12615" indicates the fitting was manufactured in week 26 of 2015.

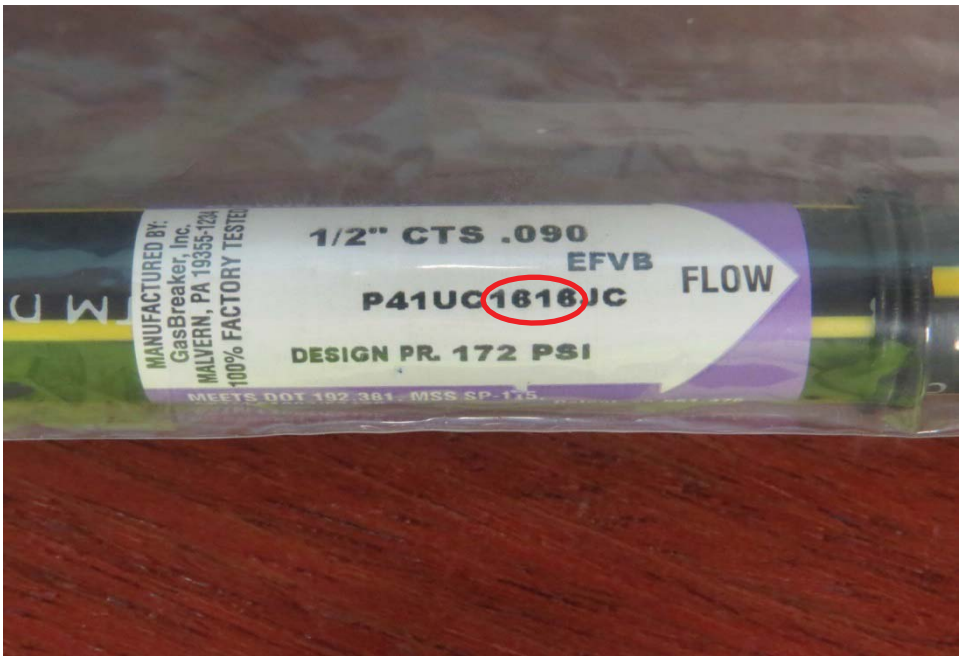
Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

IPEX Electrofusion Fittings

Date of manufacture is indicated by the digits imprinted next to the sticker. The first two digits are the week that the fitting was manufactured while the second set of digits show the year of manufacture. In this case, "4414" indicates that <u>the body of the fitting</u> was manufactured in week 44 of 2014.

Guidelines for Determining the Age of PE Pipe, Tubing and Fittings

GasBreaker Excess Flow Valve



Date of manufacture: The manufacture date is determined by the four digits circled above. The first two digits provide the week of manufacture and the second set of digits provide the year of manufacture. In this case the fitting was manufactured in week 16 of 2016.

This Page Intentionally Left Blank

conEdison

LAST REVIEW DATE: 12/7/17	**REVIEW CYCLE: 5 Years**
EFFECTIVE DATE: 2/8/18	

SPECIFICATION: **G-8123-20a**

TITLE: **HEAT FUSION JOINING OF POLYETHYLENE (PE) PLASTIC PIPE/TUBING AND FITTINGS FOR GAS MAINS AND SERVICES**

VOLUME: **2 (Section 7.0), 10, and Yellow Book**

COURSE ID: **GAS0452**

CORE GROUP: **Gas Construction**

TARGET AUDIENCE: **Gas Construction, Emergency Response Force (ERF), Gas Development Lab, Construction, Per Diem, and Gas Contractors**

REV 20a (4-9-18)

Table of Contents: Added "RECORDS" Section.
Section 4.1 & 4.3: Updated Company approved markers.
Section 4.4: Updated section to reference GAS6006 for marking PE joints.
Section 11.0: Added new Records section. Renumbered subsequent sections.

REVISIONS (See ★):

1)	Table of Contents, Section 4.0	-	Changed "Peer" to "Second".
2)	Section 3.3	-	Changed "Peer" to "Second".
3)	Section 4.0	-	Changed "Peer" to "Second".
4)	Section 4.2	-	Changed "Peer" to "Second".
5)	Section 4.3	-	Changed "Peer" to "Second" and defined "P" as "Pass".
6)	Section 4.4	-	Changed "Peer" to "Second".

conEdison

Gas Operations Standards

TITLE: HEAT FUSION JOINING OF POLYETHYLENE (PE) PLASTIC PIPE/TUBING AND FITTINGS FOR GAS MAINS AND SERVICES

TABLE OF CONTENTS

1.0 SCOPE

This specification details the requirements for heat fusion joining of polyethylene (PE) plastic pipe, tubing, and molded fittings for gas mains and services by butt fusion and branch saddle fusion.

See Gas Specification IP-27, “Installation of Electrofusion Fittings on Polyethylene (PE) Plastic Pipe/Tubing and Molded Fittings Using a Universal Electrofusion Processor” for the requirements to join PE plastic pipe, tubing, and molded fittings by electrofusion.

See Gas Specification IP-20, “Installation of Mechanical Fittings for Polyethylene (PE) Plastic Pipe and Tubing” for the requirements to join PE plastic pipe and tubing with mechanical fittings.

2.0 LEGAL REQUIREMENTS

Federal: 49 CFR Part 192, Sections 273, 281, 283, 285, and 287.

State: 16 NYCRR Part 255, Sections 273, 281, 283, 285, and 287.

National Safety Transportation Board (NTSB) Accident DCA14MP002, Safety Recommendations P-15-034 and P-15-035

3.0 OPERATOR QUALIFICATION

3.1 **Installers who tap an energized pipeline, weld steel, and join PE plastic pipe must be Operator Qualified**.

All other “covered tasks” shall be completed by either Operator Qualified individuals or individuals under the direct observation of one who is Operator Qualified. “Direct observation” means that the Operator Qualified individual remains in direct visual and verbal contact at all times with the individual performing the task.

3.2 Installers who join PE plastic pipe/ tubing and fittings must be Operator Qualified **and** in compliance with the annual requalification requirements of Gas Specification G-8121, "Qualification of Installers Joining Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services."

A) All heat fusion joints must be fabricated in accordance with the fusion

3.0 **OPERATOR QUALIFICATION** (Continued)

procedures outlined in this specification, the Northeast Gas Association (NGA) Plastic Pipe Joining Manual, and the manufacturers' operating manual for the approved heat fusion joining equipment. (See Sections 7.1 and 8.2)

B) All electrofusion joints must be fabricated in accordance with the fusion procedures outlined in IP-27, "Installation of Electrofusion Fittings on Polyethylene (PE) Plastic Pipe/ Tubing and Molded Fittings Using a Universal Electrofusion Processor."

C) All mechanical joints must be fabricated in accordance with the installation procedures outlined in Gas Specification IP-20, "Installation of Mechanical Fittings for Polyethylene (PE) Plastic Pipe and Tubing".

★ 3.3 Second Inspectors of PE Plastic Joints

★ A) Second inspectors who inspect PE plastic pipe joints (heat fusion, electrofusion, or with mechanical fittings) shall be Operator Qualified and in compliance with the annual requalification stipulated in Gas Specification G-8121 **OR** Operator Qualified to visually inspect PE plastic joints (e.g. Covered Task 52 or equivalent) and current with 3 year requalification.

★ 4.0 **REQUIREMENTS FOR INSTALLERS AND SECOND INSPECTORS**

★ 4.1 All installers (Company, Contractor, Per Diem) of heat fusion joints on PE plastic pipe, tubing, and molded fittings shall identify the installer by marking the plastic pipe, tubing, or fittings adjacent to the heat fusion joint at 12 o'clock (or as close to 12 o'clock as is possible) with a Company approved marker (e.g. PX-20 White Paint Marker (C/S # 024-7106) or Silver Sharpie).

A) Company installers shall clearly print "J" for joiner **AND** their 5 digit employee number.

B) Contractor and Per Diem installers shall clearly print "J" for joiner **AND** their respective NGA Industrial Training Service (ITS) Operator Qualification identification number.

★ 4.2 After the heat fusion joints have cooled and solidified, the Operator Qualified

★ 4.0 **REQUIREMENTS FOR INSTALLERS AND SECOND INSPECTORS** (Continued)

installer **and** the Operator Qualified second inspector shall visually inspect all heat fusion joints around the entire circumference of the joint and compare against visually acceptable butt fusion joints in the NGA Plastic Pipe Joining Manual.

A) Butt fusion joints should have uniform double fusion beads rolled over to the surface, be uniformly rounded, and consistent in size all around the joint. The PE plastic pipe, tubing, and fittings must be properly aligned (NOT angled or mitered).

NOTES:

When butt fusing to molded fittings, the fitting side bead may have an irregular appearance. This is acceptable provided the pipe side bead is correct.

This bead configuration DOES NOT apply to joints made with Dupont Aldyl A MDPE, Uponor Aldyl A MDPE or Phillips Driscopipe 7000 and 8000 HDPE.

B) Branch saddle fusion joints should have a characteristic three (3) bead shape and all beads should be uniformly sized all around the fitting base. The first bead (fitting base melt bead) and the third or center bead (main pipe melt bead) should be about the same size all around the fitting base. The PE plastic pipe must be properly aligned.

★ 4.3 All second inspectors (Company, Contractor, Per Diem) of heat fusion joints on PE plastic pipe, tubing, and molded fittings shall identify the second inspector by marking the plastic pipe, tubing, or fittings adjacent to the heat fusion joint at 12 o'clock (or as close to 12 o'clock as is possible) with a Company approved marker (e.g. PX-20 White Paint Marker (C/S # 024-7106) or Silver Sharpie).

A) Company second inspectors shall clearly print “P” for second inspector, CE (for Con Edison), **AND** their 5 digit employee number.

B) Contractor and Per Diem second inspectors shall clearly print “P” for ”Pass” **AND** their respective Learning Center Operator Qualification identification number (as noted on Con Edison Operator Qualification card) or NGA ITS Operator Qualification identification number.

★ 4.0 **REQUIREMENTS FOR INSTALLERS AND SECOND INSPECTORS** (Continued)

★ 4.4 All PE plastic joints, joiners, and second inspectors shall be marked and documented as per DOJT GAS6006, "Documentation and Inspection of Polyethylene (PE) Plastic Joints on Gas Mains and Services."

5.0 QUALIFICATION OF HEAT FUSION JOINING PROCEDURES

The heat fusion joining procedures outlined in this specification have been qualified in conjunction with:

- TR-33, "Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe"
- TR-41, "Generic Saddle Fusion Joining Procedure for Polyethylene Gas Piping," and
- the NGA Plastic Pipe Joining Manual
- GT-14-048-1 Procedure for Qualifying Sidewall Plastic Pipe Joints
- GT-14-048-3A Procedure for Qualifying Manual Butt Fusion Plastic Pipe Joints
- GT-14-048-3B Procedure for Qualifying Hydraulic Butt Fusion Plastic Pipe Joints

6.0 GENERAL GUIDELINES

6.1 The preferred methods to join PE plastic pipe and tubing are heat fusion and electrofusion. (See Gas Specification IP-27)

When heat fusion or electrofusion is not practical or available, only approved restraining-type mechanical fittings shall be installed on PE plastic pipe and tubing per Gas Specification IP-20. All steel mechanical fittings shall be cathodically protected per Gas Specification G-8209, "Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures."

6.2 All approved manual and hydraulic heat fusion joining equipment are for Dura-Line Polypipe GDB5, Performance Pipe 8300, JM Eagle UAC 3700, and ENDOT PE-100/PE-4710 high density PE pipe/tubing (PE 3408/4710).

6.0 **GENERAL GUIDELINES** (Continued)

See Operation of Fusion Equipment for approved heat fusion joining equipment.

See Gas Specification G-8104, "Polyethylene Pipe, Tubing, and Fittings for Gas Mains and Services" for approved PE plastic pipe, tubing, and fittings.

NOTES:

M8000 pipe was all black and replaced in 1997 with Performance Pipe 8100.

Performance Pipe 6800 is black with two thick yellow stripes at three different points on the pipe's surface.

Performance Pipe 8100 has a "yellow shell" around black pipe. This is the equivalent of Performance Pipe 8300 and JM Eagle (US Poly) UAC3700.

Performance Pipe 8300 is black with one thick yellow stripe at four different points on the pipe's surface and print line indicates PE 100. This is the equivalent of Performance Pipe 8100 and JM Eagle (US Poly) UAC 3700.

JM Eagle (US Poly) UAC3700 is black with one yellow stripe at three different points on the pipe's surface and the print line states PE100. This is the equivalent of Performance Pipe 8100 and 8300.

ENDOT EN PE 4710 (Gas) is black with one thin yellow stripe at three different points on the pipe's surface. This equivalent to Performance Pipe 8300 and JM Eagle (US Poly) UAC 3700.

Dura-Line Polypipe GDB50 is black with either one thin yellow stripe at three different points on the pipe's surface (similar to JM Eagle and ENDOT) or one yellow stripe at six different points on the pipe's surface.

6.0 **GENERAL GUIDELINES** (Continued)

6.3 Inspect PE plastic pipe, tubing, and fittings prior to installation to verify:

A) No cuts, gouges, deep scratches, or other defects.

B) PE plastic material is high density polyethylene (HDPE), PE3408/4710, and manufactured per ASTM D2513.

C) PE plastic material is NOT older than 10 years old.

(See Gas Specification G-8122, "Transportation, Handling, and Storage of Polyethylene Plastic Pipe/Tubing, and Fittings for Gas Mains and Services")

6.4 Quality fusion requires using all of the required tools and equipment, and following all of the steps in the procedure in the correct sequence. Faulty fusion is caused by improper or defective equipment, or not following the procedure (omitting steps or performing steps out of sequence).

6.5 PE plastic molded fittings (without pup lengths) **can only** be joined to PE plastic pipe, tubing and other molded fittings by butt fusion, electrofusion, or MetFit fittings. (See Gas Specification G-8104 for approved fittings with pup lengths of PE plastic pipe or tubing). (See G-100,285 for approved MetFit fittings). With the exception of MetFit fittings, mechanical fittings **cannot** be installed directly onto a PE plastic molded fitting without pup lengths of pipe or tubing.

Install and inspect MetFit mechanical fittings as per manufacturer's procedures. Molded fittings shall **not** be altered in order to utilize MetFit fittings.

6.6 Heat fusion of PE plastic pipe, tubing, and fittings of different SDR wall thickness shall only be performed between **one change in SDR.**

SDR	7	⇔	9/ 9.3	⇔	11	⇔	13.5	⇔	15.5

Joining of PE plastic pipe, tubing, and fittings with SDR wall thickness **greater than one change in SDR** shall be electrofused. Approved restraining-type mechanical couplings may only be used for joining PE plastic pipe and tubing when an electrofusion coupling is unavailable. See Gas Specifications IP-20 and G-8209.

6.0 **GENERAL GUIDELINES** (Continued)

6.7 Table 1, **Approved Joining Methods for PE Plastic Pipe/Tubing (Note: this table does not apply to valves and other fittings)**

PE Plastic Pipe	SDR	Vintage	Distribution Pressure *	Heat Fusion	Electrofusion	Mechanical Joints
0.5" CTS	7	All	IP, MP, HP	YES	YES	YES, stiffener = 0.090" WT
1"-1.25" CTS		All	LP, IP, MP, HP (1" ≤ 89 psi) HP (1.25" ≤ 71 psi)	YES	YES	YES, stiffener = 0.090" WT
1" – 8", 12" IPS	11	All	LP, IP, MP, HP	YES	YES	YES, stiffener = black
1"-4" IPS	9.3	Pre-1990	LP, IP, MP, HP	YES	YES	YES, stiffener = blue
Up to 4"IPS Aldyl-A	9.3	1970's	LP, IP, MP, HP (≤ 80 psi)	***NO***	YES	***NO***
	26	2000's (Subcoil)	LP	***NO***	YES, reduce electrofusion cycle time by 15%	***NO***
6" IPS	23.5	1970's	LP, IP, MP	***NO***	YES, reduce electrofusion cycle time by 10%	YES, stiffener = orange
6" IPS	26	1970's	LP, IP, MP	***NO***	YES, reduce electrofusion cycle time by 15%	***NO***
6" IPS	26	ONLY as sleeve for Trenchless Technology	LP, IP, MP, HP	YES	YES	***NO***
6" IPS	32.5	1970's	LP, IP, MP	***NO***	YES, reduce electrofusion cycle time by 25%	***NO***
22.5" IPS Subline	23.5	2000's	HP	***NO***	YES, reduce electrofusion cycle time by 10%	***NO***

***** LP = low pressure, IP = intermediate pressure, MP = medium pressure, HP = high pressure

6.0 **GENERAL GUIDELINES** (Continued)

6.8 It is important that the pipe is clean and dry before installing in the fusion machine to avoid contaminating fusion machine parts that contact the pipe, such as the heating iron or the facer. If the heating iron or facer becomes contaminated, the contamination may be transferred back to the pipe, possibly compromising fusion joint quality.

A) Clean the pipe outside diameter (OD), inside diameter (ID), and ends with a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687)

If the contamination cannot be removed in this way, wash the pipe with water and a clean, lint-free, non-synthetic cloth/paper towel to remove the contamination. Then rinse the pipe with water and dry thoroughly with a clean, lint-free, non-synthetic cloth/paper towel. **Do NOT use soap water (leak detection solution) to clean the pipe.**

B) **Prior to installing the pipe in the fusion machine, the pipe shall be cleaned with 96% alcohol wipes** (Class/Stock # 689-3135 and 025-3724) **or 99.9% liquid isopropyl alcohol** (Class/Stock # 630-1246) **with a clean, lint-free, non-synthetic cloth/paper towel.** *Never use alcohol wipes after facing (for butt fusion) or after abrading with emery cloth (for branch saddle fusion).*

Wear nitrile gloves when using alcohol wipes. Wear nitrile gloves and goggles when using the liquid isopropyl alcohol with a clean, lint-free, non-synthetic cloth/paper towel. When using liquid isopropyl alcohol, place plastic sheeting and absorbent pads underneath the fitting. The used wipes/cloth/absorbent pads shall be disposed as non-hazardous industrial waste. Liquid isopropyl alcohol shall be disposed as flammable hazardous waste. Contact EH&S Operations for guidance when disposing liquid isopropyl alcohol.

C) If the pipe becomes contaminated after being placed in the fusion machine, remove the pipe and clean per sections 6.8 A and B. **Do NOT use the facer to remove contamination.**

6.9 All scrap PE plastic pipe, tubing, and/or fittings that cannot be reused, shall be brought back to the workout location for proper disposal/ recycling.

7.0 BUTT FUSION JOINING GUIDELINES

7.1 The Butt Fusion Joining Procedure in the NGA Plastic Pipe Joining Manual and the manufacturers' operating manual for the approved butt fusion joining equipment shall be followed.

7.2 See the Operation of Fusion Equipment for approved manual and hydraulic butt fusion joining equipment. See Appendix A of the Operation of Fusion Equipment for manufacturers' hydraulic fusion machine proper fusion pressures (hydraulic chart pressure + drag pressure).

7.3 PE plastic pipe shall not be joined by a field fabricated miter (angled) joint. Only use approved fabricated or molded fittings per Gas Specification G-8104.

7.4 Whenever practical, no more than one length (40 feet) of PE plastic pipe (properly supported with rollers at 12' intervals) should be placed in the movable jaw of the fusion unit. If the first length (40') of PE plastic pipe is not properly supported **OR** if it becomes necessary to place more than one length of pipe in the movable jaw of the fusion unit, the hydraulic chart pressure must be increased by the **drag pressure** (force required to move the pipe once clamped in the machine) to compensate for the additional weight of the pipe material. A drag pressure of 30 psig was used to calculate the gauge pressures in the hydraulic chart pressures found in the Appendices of the Operation of Fusion Equipment..

When fusing more than one length of PE plastic pipe in the moveable side of the carriage, the drag pressure above 30 psig must be added to the hydraulic chart pressure. **Use equations in the box below**

The measured drag pressure is determined by clamping the pipe into the movable jaw, placing the travel control lever in the closed position, and slowly increasing the hydraulic pressure until the pipe **just** begins to move. This pressure on the hydraulic gauge is the measured drag pressure.

Drag Pressure = Measured drag pressure – 30 psig

Proper Fusion Pressure = Hydraulic Chart Pressure + Drag Pressure

7.0 BUTT FUSION JOINING GUIDELINES (Continued)

NOTE:

To minimize drag pressure when placing more than one 40' length of PE plastic pipe in the movable jaw, properly support the pipe at 12’ intervals. If this is impractical (due to numerous lengths of plastic pipe extending from the movable jaw), then at approximately 60’ back from the movable jaw, "droop" the plastic pipe between the rollers.

The amount of "droop" is determined by the distance the movable jaw has to travel to bring the pipe ends together for fusion. Therefore, the movable jaw will only have to drag (or pull) the 60 feet plus the "droop" of the pipe between the rollers, thereby minimizing drag pressure.

7.5 When making the final tie-in to existing PE plastic pipe in the ground, use electrofusion coupling(s) to make the final tie-in, rather than trying to butt fuse in the excavation to make the final connection.

8.0 BRANCH SADDLE FUSION INSTALLATION GUIDELINES

8.1 Branch saddle fusion shall **only** be performed by the Development Lab.

8.2 The Saddle Fusion Joining Procedure in the NGA Plastic Pipe Joining Manual and the manufacturers’ operating manual for the approved branch saddle fusion joining equipment shall be followed.

8.3 See the Operation of Fusion Equipment for approved branch saddle fusion joining equipment. See Appendix B of the Operation of Fusion Equipment for manufacturers’ proper branch saddle fusion melt and fusion pressures.

9.0 HEAT FUSION EQUIPMENT

9.1 All fusion equipment (i.e., butt and branch saddle fusion machines, heater irons/plates, electric facers, contact pyrometers, electrofusion processors) shall be inspected by the Gas Development Lab prior to initial use and prior to the inspection due date (once every 6 months). Otherwise, the fusion equipment shall not be used.

9.0 **HEAT FUSION EQUIPMENT** (Continued)

EXCEPTION:	Contact pyrometers are to be inspected once every 6 months, not to exceed a year.

9.2 Prior to performing heat fusion, the fusion equipment (i.e, fusion machines, heating tools, electric facers) shall be checked for damage and to verify they are in good working order. If any part of the fusion equipment is found to be damaged or defective, the equipment shall be not be used.

9.3 Heating tool surfaces (i.e. heater iron/adapter plate) must be undamaged, clean, and at the correct surface temperature.

A) Prior to heating (when the heating tool is cold), the surfaces of the heater iron/adapter plates shall be **cleaned** to remove any plastic build-up or contaminants (e.g., dirt, grease).

1. To remove PE plastic pipe residue build-up on the heater iron/adapter plate surface, clean with a non-abrasive scotch pad (Class/Stock # 023-2181) and then wipe with a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687).

2. To remove other contaminants on the iron/adapter, wipe the heater iron/adapter plate surface with a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687).

B) When the thermometer on the heating tool reaches approximately 425° F, use a Company approved contact pyrometer (e.g. Cooper Atkins AquaTuff) to verify the heating iron surface temperature is within 400° - 450°F. See HOT GAS6027, "Use of Contact Pyrometers for Heat Fusion."

1. To adjust the heater iron/adapter plate temperature, follow the manufacturers' guidelines for adjusting heater temperature. Allow the heater iron/adapter plate to stabilize at the new temperature and recheck.

9.4 Heating irons and electric facers are **not** intrinsically safe and should not be used in a hazardous environment.

9.5 In order to prevent damage to the fusion equipment, it is important that the electrical power service and extension wires are properly sized for each unit.

10.0 HEAT FUSION DURING COLD AND/OR INCLEMENT WEATHER

10.1 Heat fusion during cold and/or inclement weather is permitted provided the following are observed:

A) Temperatures below 40°F

1. The specified heating tool surface temperature shall be maintained. **Do NOT increase heating tool surface temperature.**
2. Store heating iron in thermally insulated protective box or bag.
3. Pipe and fittings should be about the same temperature when they are fused together.

B) During inclement weather (rain or snow)

1. Store heater iron in protective box.
2. The pipe must clean and dry before, during, and after heat (butt or branch saddle) fusion or electrofusion.
3. Approved fire resistant tents (Class/Stock # 689-3929, 10’ x 8’ or Class/Stock # 659-3945, 6’ x 6’) shall only be used to protect the PE plastic pipe at the point of joining during inclement weather and shall **not** be used when there is escaping gas. **Gas must be allowed to rise and vent unobstructed.**

★ 11.0 RECORDS

Any records generated in the course of performing work in accordance with this specification shall be maintained as required by Corporate Instruction CI-870-1 “Records Management”. Guidance on the retention of Company Gas Operations records can also be found on the Records Management intranet site.

12.0 REFERENCES

ASTM F2620-13 — Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings

DOJT GAS6006 — Documentation and Inspection of Polyethylene (PE) Plastic Joints on Gas Mains and Services

HOT GAS6027 — Use of Contact Pyrometers for Heat Fusion

G-8104 — Polyethylene Pipe, Tubing and Fittings for Gas Mains and Services

G-8121 — Qualification of Installers Joining Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services

G-8122 — Inspection, Handling, Storage, and Transportation of Polyethylene (PE) Plastic Pipe, Tubing, and Fittings for Gas Mains and Services

G-8209 — Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures

IP-20 — Installation of Mechanical Fittings for Polyethylene (PE) Plastic Pipe and Tubing

IP-27 — Installation of Electrofusion Fittings on Polyethylene (PE) Plastic Pipe/Tubing and Molded Fittings Using a Universal Electrofusion Processor

Northeast Gas Association (NGA) Plastic Pipe Joining Manual

Con Edison Operation of Fusion Equipment

TR-33 — Generic Butt Fusion Joining Procedure for Field Joining of Polyethylene Pipe (Plastic Pipe Institute, 2012)

TR-41 — Generic Saddle Fusion Joining Procedure for Polyethylene Gas Piping (Plastic Pipe Institute, 2002)

GT-14-048-1 Procedure for Qualifying Sidewall Plastic Pipe Joints

GT-14-048-3A Procedure for Qualifying Manual Butt Fusion Plastic Pipe Joints

GT-14-048-3B Procedure for Qualifying Hydraulic Butt Fusion Plastic Pipe Joints

This Page Intentionally Left Blank

conEdison

LAST REVIEW DATE: 3/31/16	**REVIEW CYCLE: 5 Years**
★EFFECTIVE DATE: 5/2/16	

SPECIFICATION: **G-8129-9a**

TITLE: **PURGING GAS MAINS, SERVICES AND REGULATOR STATIONS**

VOLUME: **2 (Section 8.0), 10**

★ **COURSE ID:** **GAS0150**

★ **CORE GROUP(S):** **Gas Construction and Emergency Response Force Lead Mechanic**

TARGET AUDIENCE: **Gas Construction, Emergency Response Force (ERF), Gas Transmission Engineering, Pressure Control, Per Diem, Gas Contractors, Construction, and Emergency Response Force Lead Mechanic**

REV 9a:	Incorporated Records Retention Section 11.0; renumbered subsequent sections. Reformatted cover page and footer to align with current specification standard and format. Changed “Registration No.” to “Course ID”; “Target Training Groups” to “Target Audience”; and added “Core Group(s)”. Added “Emergency Response Force Lead Mechanic” to Target Audience. **(4/9/18)**

REVISIONS:

This specification has been revised to incorporate comments made by GTI’s technical experts and Con Edison’s subject matter experts.

Gas Operations Standards

TITLE: PURGING GAS MAINS, SERVICES AND REGULATOR STATIONS

TABLE OF CONTENTS

TITLE: PURGING GAS MAINS, SERVICES AND REGULATOR STATIONS

1.0 SCOPE

This specification covers the requirements for purging operations for gas mains, services and regulator stations.

See Gas Specification IP-9, “Requirements for Written Procedures and Contingency Plans" for inert purge barrier requirements for welded tie-ins or torch cutting metallic mains.

2.0 LEGAL REQUIREMENTS

Federal: 49 CFR Part 192, Section 629.

State: 16 NYCRR Part 255, Section 629.

3.0 OPERATOR QUALIFICATION

Installers who tap an energized pipeline, weld steel, and join Polyethylene (PE) plastic pipe by butt fusion, branch saddle fusion, electrofusion, or with mechanical fittings must be Operator Qualified.

All other “covered tasks,” including purging operations, shall be completed by either Operator Qualified individuals or individuals under the direct observation of one who is Operator Qualified. “Direct observation” means that the Operator Qualified individual remains in direct visual and verbal contact at all times with the individual performing the task.

NOTE:	Company Chemists may take natural gas readings using a calibrated combustible gas indicator under the direct observation of an Operator Qualified individual.

4.0 ENVIRONMENT, HEALTH, AND SAFETY (EHS) REQUIREMENTS

4.1 Refer to Gas Specification IP-42, “Requirements for Airline Respirator (ALR), Flame Retardant Coveralls (FRC), Harness and Line (H&L) and Harness and Gantry” for all personal protective equipment (PPE) requirements when purging gas mains, services and regulator stations.

4.2 Prior to purging, ensure that the piping to be purged is dry as per GEHSI E06.11 "Liquids and Solids from Natural Gas Mains during Main Cut-Outs."

4.0 ENVIRONMENT, HEALTH, AND SAFETY (EHS) REQUIREMENTS (Continued)

4.3 When nitrogen is used to purge a pipe into or out of service, atmospheric testing for oxygen deficiency shall be performed in excavations prior to and during occupation by any personnel.

5.0 GENERAL REQUIREMENTS

5.1 Purging is the act of removing the content of a gas pipe or equipment and replacing with another gas.

A) When a gas main, service, or regulator station is taken out of service or abandoned, it must be purged out of service. (See Section 8.0)

B) When a gas main, service, or regulator station is replaced, reactivated, or installed, it must be purged into service. (See Section 9.0)

5.2 Purging by completely filling the gas main or service requires, at a minimum, the amount of air/inerts equal to 1.25 times the internal volume of the pipe segment being purged. Purging is complete when the requirements of Sections 8.3, 9.2, and 10.0 are achieved.

A) 4" and smaller diameter mains and services ***may*** *be* purged out of service and into service using only air.

B) 6" and larger diameter mains and services *shall be* purged out of service and into service with inerts. (See Section 7.0)

NOTE:	Purging an additional 25%-50% volume of inerts as a safety margin ensures that the pipe is void of flammable mixture

5.3 Purging shall be designed so that the flow path of the purge gas (inert or air) is direct from the point of injection to the vent location.

5.4 When purging PE **plastic** mains or services:

A) Assure that the pressure in the PE plastic main or service does not exceed 200 psig.

B) Bulk N_2 in liquid form shall not be used.

5.0 **GENERAL REQUIREMENTS** (Continued)

5.5 Whenever practical, consideration should be given to not releasing natural gas to the atmosphere (e.g. use of no-blow tools, natural gas recovery trailer).

6.0 **PURGE EQUIPMENT AND PURGE PIPE REQUIREMENTS**

6.1 Prior to thermit welding, the excavation and banks of the excavation shall be checked for gas readings.

6.2 Purging equipment and purge pipes shall be electrically bonded or grounded to the main/service, as required.

6.3 Purging Equipment

A) *For metallic pipe*, the purging equipment shall be electrically bonded to the pipe (being purged) in order to dissipate static charges. Metal tubing or metallically reinforced rubber hose is sufficient. If unreinforced rubber hose is used, an electrical bond shall be made between the cylinder(s) and the main using a bonding wire *not thinner* than #14 AWG (e.g. #19 AWG is thinner than #14 AWG and shall not be used). The bonding wire shall be attached by thermit weld, clamp or magnetic connectors. The *preferred* connection of the bonding wire to the purging equipment (cylinders) is a magnetic connection.

B) *For plastic pipe*, the purging equipment shall be electrically bonded to the ground in order to dissipate static charges. The plastic pipe to be purged shall also be electrically bonded to the ground by using the ASG ground (Class/Stock # 025-2569) or by placing soapy wet (and keep rags wet) rags around the pipe at the inlet and outlet, making sure that the soapy wet rags touch the soil.

6.4 Purge Pipes

A) *Metallic purge pipes* **not threaded directly** into the metallic main must be electrically bonded to the main prior to purging, using a bonding wire *not thinner* than #14 AWG (e.g. #19 AWG is thinner than #14 AWG and shall not be used). The bonding wire shall be attached by thermit weld, clamp or magnetic connectors. Metallic purge pipes attached to plastic tapping tees for plastic mains must be grounded.

6.0 **PURGE EQUIPMENT AND PURGE PIPE REQUIREMENTS** (Continued)

B) *For plastic purge pipes*, the entire surface area of the plastic purge pipe shall be wet with soapy water and the plastic purge pipe inlet and outlet shall be grounded by using the ASG ground (C/S# 025-2569) or by wrapping the inlet and outlet with soapy wet (and keep rags wet) rags, making sure that the soapy wet rags touch the soil.

NOTE: The outlet of a plastic purge pipe must be metallic.

C) All purge pipes must extend a **minimum** of 6' above street grade.

7.0 **APPROVED INERT MATERIALS**

7.1 The inert gas approved for use is commercial grade nitrogen gas (N_2).

NOTE: Liquid nitrogen changes to gaseous nitrogen at minus 320 degrees Fahrenheit and is unacceptable unless approved in advance, in writing by Gas Transmission Engineering – Major Projects. This written approval is predicated on the contractor supplying all information on the heat exchanger to be used and also the minimum temperature of the nitrogen gas at the outlet of the heat exchanger.

7.2 Bulk deliveries of nitrogen for purging metallic mains shall be checked by the company Chemist prior to use.

7.3 Cylinders of nitrogen shall be properly marked as to their contents.

A) Full N_2 Cylinder = 225 cubic feet @ 2200 psig

7.4 To calculate the minimum amount of inerts needed when purging by completely filling the gas main or service (see Section 5.2):

Volume of inerts (ft^3) = (0.0082 x d^2 x L) + safety margin (25-50%)

d = diameter of pipe, in inches
L = length of pipe, in feet

7.0 **APPROVED INERT MATERIALS** (Continued)

Table 1: **Inert Amounts**

Pipe Size and Minimum Amount of Inerts Needed When Purging by Completely Filling Line

Nominal Pipe Size	Volume (ft^3) of Inerts Per 100 ft
6”	30 cubic feet
8”	55 cubic feet
10”	80 cubic feet
12”	120 cubic feet
16”	210 cubic feet
18””	260 cubic feet
20”	330 cubic feet
24”	470 cubic feet
30”	740 cubic feet
36”	1060 cubic feet

7.4 Table 1: **Inert Amounts** (Continued)

For example: A 160 foot long section of 12" main/service needs to be inerted.

Minimum Volume of Inerts (ft^3) = (0.0082 x d^2 x L) + safety margin
= (0.0082 x $(12)^2$ x 160) + safety margin
= (0.0082 x 144 x 160) + safety margin
= (188 ft^3 of inerts) + safety margin
= 188 ft^3 + safety margin
= 188 ft^3 + (0.25 x 188 ft^3)
Minimum Volume of Inerts = 188 ft^3 + 47 ft^3 = 235 ft^3

8.0 **PURGING A GAS MAIN OR SERVICE OUT OF SERVICE**

8.1 Purging a gas main or service out of service is replacing the natural gas with

- air (pipe less than or equal to 4” diameter) or
- inerts (pipe greater than 4” diameter). (See Section 7.0)

8.0 PURGING A GAS MAIN OR SERVICE OUT OF SERVICE (Continued)

8.2 All services shall be purged to outside the building.

8.3 Purging is complete when a reading of *less than* 3% natural gas is obtained using a calibrated combustible gas indicator (e.g. GMI FR2).at the purge vent.

8.4 All gas pipe(s) to be taken out of service (abandoned) shall be physically disconnected from all sources of gas and the open ends sealed.

8.5 If the gas pipe (main or service) is purged with inerts, the pipe shall then be purged with air **when** either the gas pipe is to be used as a sleeve or abandoned in place. This is done to ensure that personnel are not exposed to nitrogen when working on a sleeve or abandoned pipe.

8.6 Each abandoned vault must be filled with a suitable compacted material.

8.7 For each abandoned pipeline facility that crosses over, under or through a commercially navigable waterway, the last operator of that facility shall file a report upon abandonment of that facility in accordance with 49 CFR 192.727(g).

9.0 PURGING A GAS MAIN OR SERVICE INTO SERVICE

9.1 Purging a gas main or service into service (gassing in) is the task of replacing air with:

- natural gas (pipe less than or equal to 4” diameter) or
- inerts (pipe greater than 4” diameter) (see Section 7.0) and then replacing the inerts with natural gas.

9.2 Purging into service (gassing in) is complete when a reading of 100% natural gas is obtained using a calibrated combustible gas indicator (e.g. GMI FR2) at the purge vent.

9.3 Inerts left in the main or service shall be maintained at approximately 3 psig upon completion of inerting or pressure drop test until tie-in operations are ready to commence.

10.0 PURGING GAS REGULATOR STATIONS

10.1 Purging a gas regulator station out of service is replacing the natural gas with

- air (pipe less than or equal to 4" diameter) or
- inerts (pipe greater than 4" diameter). (See Section 7.0)

A) Street inlet and outlet valves must be closed and purge equipment and purge pipes installed.

B) Check inlet and outlet valves for leakage prior to starting the purge. If valves leak, station piping may require physical disconnection from the gas distribution system.

C) The use of a non-combustible Coppus blower to exhaust any residual gas to atmosphere is acceptable when a bubble tight (100%) shut down of a regulator station is required and cannot be attained through a station inlet or outlet valve.

10.2 Purging a regulator station out of service is complete when a reading of less than 3% natural gas is obtained using a calibrated combustible gas indicator.

10.3 Torch cutting or welding methods shall only be utilized when the regulator station has been purged down to 0% (verified using a calibrated combustible gas indicator) and an inert barrier is installed per the requirements in Gas Specification IP-9.

10.4 Purging a regulator into service is complete when a reading of 100% natural gas is attained using a calibrated combustible gas indicator at the purge vent.

★ 11.0 RECORDS RETENTION

Any records generated in the course of performing work in accordance with this specification shall be maintained as required by Corporate Instruction CI-870-1 "Records Management". Guidance on the retention of Company Gas Operations records can also be found on the Records Management intranet site.

12.0 REFERENCES

G-8005 General Specification for the Installation of Gas Distribution Mains

G-8100 General Specification for the Installation of Gas Distribution Services

IP-7 Cut-Outs and Tie-Ins of Existing Gas Mains

IP-9 Requirements for Written Procedures and Contingency Plans

IP-42 Requirements for Airline Respirator (ALR), Flame Retardant Coveralls (FRC), Harness and Line (H&L) and Harness and Gantry

GEHSI E06.11 Liquids and Solids from Natural Gas Mains During Main Cut-Outs

American Gas Association's "Purging Principles and Practice" Third Edition, June, 2001

conEdison

LAST REVIEW DATE: 12/9/16 **REVIEW CYCLE: 5 Years**
★ EFFECTIVE DATE: 2/8/17

SPECIFICATION: **G-8204-8c**

TITLE: **PRESSURE TESTING REQUIREMENTS FOR GAS MAINS AND SERVICES**

★ **VOLUME:** **2 (Section 8.0), 10, & Yellow Book**

★ **COURSE ID:** **GAS0219**

★ **CORE GROUP(S):** **Gas Construction and Emergency Response Force Lead Mechanic**

★ **TARGET AUDIENCE:** **Gas Construction, Emergency Response, Force (ERF), Gas Transmission Engineering, Gas Distribution Engineering, Per Diem, Gas Contractors, Construction and Emergency Response Force Lead Mechanic**

REV 8c (4/2518):
- Section 12.1(c), 12.2 (c), and 12.3(b): Revised both statements to reference CI-870-1.

REV 8b (4/9/18):
- Cover Page: Added Emergency Response Force Lead Mechanic to Core Group(s) and Target Audience
- Section 12.4: Added Records Retention reference.

REV 8a (12/18/17):
- Cover Page: Added to Yellow Book; Changed Registration No. to Course ID; Added Core Group(s) designation; Changed Target Training Groups to Target Audience.
- Section 2.0: Added Case 14-G-0201 and 14-G-0212 to Legal Requirements.
- Section 6.8: Added new section to General Procedures for clarity.
- Sections 9.1, 9.2, 9.3 and 9.4: Clarified documentation requirements.
- Appendix C: Updated the As-Constructed Emergency Sketch sample form.

REVISIONS (See ★):

1) Table of Contents - Section 7.0 (previous Section 8.0) renamed.

2) Section 6.5 - New section; renumbered subsequent sections. Removed previous section 6.5 (duplicate of Section 5.3).

(Continued)

3)	Section 7.0	-	Revised title of section.
4)	Section 8.0	-	Added new section, contents previously located in 7.7 - 7.9.
5)	Sections 8.1	-	A(1), B(2), C(2), D(2), and D(3) reworded for clarity. Added class and stock # of 2 psig test gauge to C(2) and D(1). Added alternate requirements for PE insertions greater than 1000 feet and less than or equal to 1500 feet.
6)	Section 8.2(B)	-	Reworded for clarity.
7)	Sections 8.3	-	Revised section.
8)	Section 8.4	-	New section.
9)	Section 8.5	-	Revised section to include test pressures for Cured-in-Place liners.
10)	Section 10.3 (NOTE)	-	Reworded for clarity.
11)	Section 12.0	-	Revised record keeping requirements for pressure testing distribution services, distribution mains, and transmission mains/services.
12)	Section 13.0	-	Added CI-870-1 and PSC Case 03-G-1507.
13)	Section 14.0	-	Added Appendix C.
14)	Appendix A	-	Revised to add alternate requirements for PE insertions greater than 1000’ and less than or equal to 1500 ‘.
15)	Appendix C	-	Added as new attachment.

conEdison

Gas Operations Standards

TITLE: PRESSURE TESTING REQUIREMENTS FOR GAS MAINS AND SERVICES

TABLE OF CONTENTS

★ EFFECTIVE DATE: 2/8/17				
EH&S REVIEW BY: J. Fox				
AUTHOR:	**APPROVED BY:**	**DATE APPROVED:**	**VOLUME: 2 (Section 8.0), 10, & Yellow Book**	**PAGE 1**
V.S. Weidemann	**Tomas Hernandez Chief Gas Engineer Gas Distribution Engineering**	**12/9/16**	**Construction Standards, O&M Manual**	**OF 19 PAGES**

TITLE: PRESSURE TESTING REQUIREMENTS FOR GAS MAINS AND SERVICES

1.0 SCOPE

This specification details the requirements for pressure testing new/replacement gas mains and new/replacement and temporarily disconnected gas services, including cured-in-place liners.

★ 2.0 LEGAL REQUIREMENTS

Federal: 49 CFR Part 192, Sections 501-517, 725.

State: 16 NYCRR Part 255, Sections 503-517, 725,

Case 14-G-0201 and 14-G-0212

PSC Order dated 6/29/83 and PSC Correspondence dated 10/20/93 and 3/2/95 (Requirement that 10% of all pressure tests be randomly witnessed by a Company Supervisor)

3.0 DEFINITIONS

3.1 Distribution Pressure Main/Service – a gas main or service operating at less than (<) 125 psig

A) Low Pressure (LP) - Pressure up to and including (≤) 12" water column (WC)

B) Intermediate Pressure (IP)/Ossining System - Pressure greater than (>) 1 psig and up to and including (≤) 5 psig.

C) Medium Pressure (MP) - Pressure greater than (>) 2 psig and up to and including (≤) 15 psig.

D) High Pressure (HP) - Pressure greater than (>) 15 psig and up to but less than (<) 125 psig.

3.2 Transmission Pressure Main/Service – a gas main or service operating at or more than (≥) 125 psig.

4.0 OPERATOR QUALIFICATION

4.1 Installers who tap an energized pipeline, weld steel, and join PE plastic pipe by butt fusion, branch saddle fusion, electrofusion, or with mechanical fittings must be Operator Qualified.

4.0 **OPERATOR QUALIFICATION** (Continued)

All individuals preparing for or performing a main/service pressure test shall be Operator Qualified (or under the direction and observation of one who is qualified) to perform the "covered task" of pressure testing.

5.0 **ENVIRONMENT, HEALTH, & SAFETY (EHS) REQUIREMENTS**

5.1 See Gas Specifications G-8005, “General Specification for the Installation of Gas Distribution Mains” and G-8100, “General Specification for the Installation of Gas Distribution Services” for all distribution main and service EH&S requirements.

5.2 All pressure testing shall be performed with due diligence for the safety of Company employees, gas contractors, the general public, and public property.

5.3 All Company personnel, Per Diem, and Gas Contractors shall remain outside the excavation while the pressure test is initiated, except for personnel who are directly responsible for initiating the pressure test. Once the test pressure is reached, all personnel directly responsible for initiating the pressure test shall exit and remain outside the excavation.

6.0 **GENERAL REQUIREMENTS**

6.1 The minimum test pressure (after stabilization) for distribution pressure mains and services (see Section 3.1) shall be as follows:

A) 90 psig for LP, IP, and MP

B) 150 psig for HP

6.2 The source of the pressure shall be isolated and the proper pressure stabilized before the required duration of the pressure test can commence.

6.3 When testing with air or nitrogen, after the test pressure is reached and stabilized for at least 15 minutes, all exposed fittings and joints shall be checked for leakage with a leak detecting solution.

For hydrostatic testing, all exposed facilities under test shall be visually inspected for leakage.

6.0 **GENERAL REQUIREMENTS** (Continued)

6.4 Prior to pressure testing PE plastic pipe/tubing and fittings joined by heat fusion (e.g. butt fusion or saddle fusion) or electrofusion, the joints must be allowed sufficient time to properly cool. (See Gas Specification G-8123, "Heat Fusion Joining of Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services")

★ 6.5 During the pressure test of PE plastic pipe/tubing and fittings, the temperature of the PE material may not be more than 100°F.

6.6 If any pressure test does not indicate a sound, gas-tight piping system, corrective measures shall be taken to eliminate potential testing errors, and then another pressure test shall be conducted.

NOTE:	If a main or service pressure test fails at any production PE plastic joint made by butt fusion, branch saddle fusion, electrofusion, or with mechanical fittings, the joiner is immediately disqualified from that method of joining PE plastic pipe. (See Gas Specification G-8121, "Qualification of Installers Joining Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services")

6.7 Gas mains or services where the flow of gas is interrupted (but not physically disconnected) due to water main breaks, contractor damage to a main (not service), human error or some other unplanned work do **not** require a pressure test prior to reinstating the flow of gas.

At a minimum, a leak survey (using a DPIR or similar sensitive equipment) of the affected gas mains and services shall be performed and documented after reinstating the flow of gas. The respective Gas Operations organization should review the cause and extent of the outage as well as the number and age of gas services affected to determine if additional leak surveys are to be performed.

★ 6.8 The test medium must be relatively free of sedimentary materials.

★ 7.0 APPROVED END CLOSURES FOR PRESSURE TESTING DISTRIBUTION MAINS/SERVICES

7.1 Approved End Closures for Pressure Testing Steel Distribution Mains/Services

A) Welded line (end) cap: all sizes.

B) Blind flange: all sizes.

C) Threaded line (end) cap: only sizes up to and including 4".

D) Restraining type compression line (end) cap: ¾" through 12", except for 10".

E) Non-restraining type compression line (end) cap: all sizes.

7.2 Approved End Closures for Pressure Testing Polyethylene (PE) Plastic Distribution Mains/Services

A) Fused PE plastic end cap: all IPS sizes.

B) Service head or stab end adapter with stiffener and with an end closure (threaded end cap or valve): sizes up to and including 2" IPS.

C) Met-Fit, LycoFit, or Perfection caps: sizes up to and including 1 ¼" CTS.

D) McElroy Test Caps: sizes up to and including 2" IPS.

E) Restraining type compression end cap: IPS sizes up to and including 12", except for 10".

7.3 Approved End Closures for Pressure Testing Copper Distribution Services

A) Restraining type compression end cap (IPS size) with gasket adapter for CTS: sizes 1" and 1 ¼".

B) Service head or stab end adapter (for copper only) with an end closure (threaded end cap or valve): sizes up to 1 ¼" CTS.

C) Restraining type compression coupling (for copper to IPS), with a PE plastic pipe and compression line (end) cap. The coupling is not restraining on the copper size.

★ 7.0 **APPROVED END CLOSURES FOR PRESSURE TESTING DISTRIBUTION MAINS/SERVICES** (Continued)

7.4 Compression Line (End) Caps

A) All **restraining type** compression line (end) caps **shall be braced** to prevent movement or pullout during the pressure test. See Gas Specification G-8153, "Reinforcing Compression Fittings."

NOTE:	The reuse of a **restraining type compression line** (end) cap is permissible, provided that the cap is inspected for wear, tear, and damage ***before*** *each reuse.* The cap shall be replaced if there are any worn/damaged parts (e.g. gasket, grip ring, back up ring, bolts, etc.).

B) For 90 psig pressure test, **non-restraining type** compression line (end) caps shall be secured as follows:

1) Line cap sizes ¾" to 2" shall be **braced**.

2) Line cap sizes 3" to 30" and greater shall be **reinforced per Gas** Drawing EO-16031-B, "Reinforcement of Non-Restraining Type Compression Line Caps on 3" to 30" Dia. Steel Gas Mains and Services."

C) For 150 psig pressure test, **non-restraining type** compression line (end) caps shall be secured as follows:

1) Line cap sizes ¾" to 1 ¼" shall be **braced**.

2) Line cap sizes 1 ½" and greater shall be **reinforced** per Gas Drawing EO-16031-B.

D) See Gas Specifications G-8153 and G-100,285, "Compression End Couplings, Tees, Elbows, Line Caps, and Riser Tees for Gas Pipe and Tubing" for approved compression couplings, caps, and fittings.

★ 7.0 **APPROVED END CLOSURES FOR PRESSURE TESTING DISTRIBUTION MAINS/SERVICES** (Continued)

7.5 Compression Fittings

A) Exposed **non-restraining type** compression fittings (couplings, tees, elbows, and riser tees) to be included in a pressure test shall first **be reinforced** per Gas Drawing EO-16880-B, "Reinforcement of Non-Restraining Compression Couplings for 2" to 24" Dia. Mains."

B) Exposed **restraining type** compression fittings do not require reinforcement.

C) When Company M&S plates or layouts indicate that **buried (non-exposed) non-restraining type** compression fittings will be included in a pressure test, the embedment calculation shall be performed to determine if reinforcement is required. See Gas Specification G-8153.

★ 8.0 **PRESSURE TESTING REQUIREMENTS FOR DISTRIBUTION MAINS/SERVICES**

★ 8.1 Distribution Mains

A) Tie-in Joint/Weld

★ 1) Each tie-in joint (e.g. mechanical coupling, electrofusion coupling) or weld used to tie-in a tested segment of distribution main shall be given a leakage test (i.e., soap tested) at operating pressure when placed into service.

B) New and Replacement Sections of Steel or PE Plastic Main Less than or Equal to (≤) 1000'

1) The test medium shall be air or an inert gas. Water shall be used only when directed by Gas Transmission Engineering or Gas Distribution Engineering.

★ 2) The test pressure must be maintained at or above the test pressure for at least one (1) hour after stabilization. A calibrated pressure gauge that will indicate two (2) psig increments or less shall be used for testing (Class & Stock #459-7050). (See Section 6.1)

★ 8.0 **PRESSURE TESTING REQUIREMENTS FOR DISTRIBUTION MAINS/SERVICES**
(Continued)

C) New and Replacement Sections of Steel or PE Plastic Main Greater Than (>) 1000'

1) The test medium shall be air or an inert gas. Water shall be used only when directed by Gas Transmission Engineering or Gas Distribution Engineering.

★ 2) The test pressure must be maintained at or above the test pressure for at least two (2) hours after stabilization. A calibrated pressure gauge that will indicate two (2) psig increments or less shall be used for testing (Class & Stock #459-7050). (See Section 6.1)

D) PE Plastic Main Insertions

★ 1) A calibrated pressure gauge that will indicate two (2) psig increments or less shall be used for testing (Class & Stock #459-7050). (See Section 6.1)

★ 2) For insertions 1000' or less, the test pressure must be maintained at or above the test pressure for a minimum of one (1) hour. (See Section 6.1)

Alternatively, the test duration may be **30 minutes prior to insertion**, followed by a **30 minute test after insertion** and a visible inspection of the PE plastic pipe for damage (i.e., gauges, scrapes, dents) per Gas Specification G-8005.

★ 3) For insertions greater than (>) 1000', the test pressure must be maintained at or above the test pressure for a minimum of two (2) hours. (See Section 6.1)

Alternatively, for insertions greater than (>) 1000' and ≤ 1500' the test duration may be **1 ½ hours prior to insertion**, followed by a **30 minute test after insertion** and a visible inspection of the PE plastic pipe for damage (i.e., gauges, scrapes, dents) per Gas Specification G-8005.

★ 8.0 **PRESSURE TESTING REQUIREMENTS FOR DISTRIBUTION MAINS/SERVICES**
(Continued)

4) All "aboveground" pressure testing shall be performed with "extra due diligence" to secure the pipe during the pressure test for the safety of employees, contractors, and the general public.

"Aboveground" pressure tests shall be limited to less than or equal to (≤) 4" diameter PE plastic pipe (straight and coiled).

"Aboveground" pressure tests on greater than or equal to (≥) 6" diameter PE plastic pipe (straight and coiled) must be reviewed and approved by Gas Distribution Engineering.

8.2 New, Replacement, and Temporarily Disconnected Distribution Services

A) The test medium shall be air or inert gas. The test indicator must be such that any loss of pressure can be readily detected.

★ B) The test pressure must be maintained at or above the test pressure for the following minimum times. (See Section 6.1)

1) 2" diameter and smaller - **15 minutes**

2) Greater than 2" diameter - **30 minutes**

C) The limits of the pressure test shall be as follows. The service connection to the main need not be included in these tests if it is not feasible to do so. However, it must be given a leakage test (i.e., soap tested) at operating pressure and documented as part of the pressure test when placed into service (See Section 12.0).

1) New and replacement services:

a) Inside meter/meter-regulator
From the main to the first fitting inside the wall of the customer's structure through which the service enters.

b) Outside meter/meter-regulator
From the main to the meter riser valve, if any, or the first fitting on the riser upstream of the regulator where one is installed; or

★ 8.0 **PRESSURE TESTING REQUIREMENTS FOR DISTRIBUTION MAINS/SERVICES**
(Continued)

c) Inside meter with an outside regulator
From the main to the first fitting on the riser upstream of the regulator.

2) Temporarily disconnected services:

a) Inside meter/meter-regulator
From the point of disconnection to the first fitting inside the wall of the customer's structure through which the service enters.

b) Outside meter/meter-regulator
From the point of disconnection to the meter riser valve, if any, or the first fitting on the riser upstream of the regulator where one is installed.

c) Inside meter with an outside regulator
From the point of disconnection to the first fitting on the riser upstream of the regulator.

3) Removal/replacement/installation of first fitting inside the wall of the customer's structure (e.g. service head valve)

a) Inside meter/meter-regulator
From the point of gas isolation (e.g. curb valve, squeeze-off location) to the new first fitting inside the wall of the customer's structure through which the service enters.

b) Inside meter with an outside regulator
From the point of gas isolation (e.g. curb valve, squeeze-off location) to the new first fitting inside the wall of the customer's structure through which the service enters.

NOTE: If provisions are made to maintain continuous service (e.g. installation of a bypass), any part of the original service line used to maintain continuous service need ***not*** be tested.

D) Steel services temporarily disconnected shall be maintained or replaced per Gas Specification G-8149, "Responsibility for Maintenance and Replacement of Gas Services."

★ 8.0 **PRESSURE TESTING REQUIREMENTS FOR DISTRIBUTION MAINS/SERVICES**
(Continued)

★ 8.3 PE Plastic and Welded Metallic Tapping Fittings

The test pressure for PE plastic heat fusion or electrofusion fittings (i.e., electrofusion tapping tees, SPA saddles) or welded metallic fittings used for stopper, purge, and bypass connections must be maintained at or above the following test pressures for a minimum of 15 minutes prior to drilling and/or tapping:

1) 90 psig for LP, IP and MP.

2) 150 psig for HP.

★ 8.4 Mechanical Metallic Tapping Fittings

The test pressure for metallic reinforcement tapping sleeves (e.g. Style 50, Style 80, green sleeve) must be maintained at or above the following test pressures for a minimum of 15 minutes prior to drilling and/or tapping:

1) 5 psig for LP

2) 20 psig for IP and MP.

3) 150 psig for HP.

NOTE:	Threaded service connections at the main must be given a leakage test at the operating pressure when placed in service (ie, soap test).

★ 8.5 Cured-In-Place (CIP) Liners

A) The test pressure for cast iron or steel mains and services with Cured-In-Place (CIP) liners must be maintained at or above the following test pressures for a minimum of two (2) hours:

1) 10 psig for LP.

2) 90 psig for IP and MP.

3) 150 psig for HP.

★ 8.0 **PRESSURE TESTING REQUIREMENTS FOR DISTRIBUTION MAINS/SERVICES** (Continued)

B) For pressure testing mains/ services with cured in place liners, all buried non-restraining compression couplings or joints must be reinforced per Gas Specification G-8153. Reinforcement welding on pipe or couplings shall be completed prior to insertion of the CIP liner. If impractical to reinforce the compression couplings or joints, **the end of the pipe must be anchored or braced to prevent movement or pullout during the pressure test.** Contact Gas Distribution Engineering to design the required anchoring or blocking the ends of the pipe.

9.0 WITNESS REQUIREMENTS FOR PRESSURE TESTING DISTRIBUTION MAINS/ SERVICES

★ 9.1 Pressure tests performed by Company crews and Per Diem on all **distribution mains (10" diameter and less) and services** shall be witnessed and documented (including employee name and number or ITS number) by any of the following:

A) Company management employee (e.g. Gas Operations Gas Supervisor, Gas Planner, Construction Management Chief Construction Inspector, Project Specialist, Construction Services Supervisor)

B) Company Operator Qualified (OQ) Gas Mechanic

C) Per Diem OQ Gas Mechanic

★ 9.2 A Company management employee must witness and document (including employee name and number or ITS number) at least **fifty percent (50%)** of all pressure tests on distribution services performed by Company crews, Per Diem, and Gas Contractors managed by Gas Operations. This fifty percent (50%) shall be randomly selected without prior notification to the person performing the actual construction and gassing-in of the service line.

★ 9.3 Pressure tests performed by Company crews and Per Diem on all **distribution mains 12" and larger** shall be witnessed and documented (including employee name and number or ITS number) by a Company Operator Qualified (OQ) management employee.

9.0 **WITNESS REQUIREMENTS FOR PRESSURE TESTING DISTRIBUTION MAINS/ SERVICES** (Continued)

★ 9.4 Pressure tests performed by all OQ Gas Contractors on all **distribution mains and services** shall be witnessed and documented (including employee name and number or ITS number) as follows:

A) Distribution Services (all sizes)

1) Company management employee, Construction Representative (CR), or Company Construction Inspector (CI) shall witness and document **at least fifty percent (50%)** of all OQ Gas Contractor performed pressure tests on services. (See Section 8.2)

2) The **remaining fifty percent (50%)** shall be witnessed and documented by an OQ Gas Contractor Mechanic

B) Distribution Mains (10" and smaller)

1) Company management employee, CR, CI, or CCI shall witness and document **one hundred percent (100%)** of OQ Gas Contractor performed pressure tests on distribution mains 10" and less in diameter.

C) Distribution Mains (12" and larger)

1) Company Operator Qualified (OQ) management employee shall witness and document **one hundred percent (100%)** of OQ Gas Contractor performed pressure test on mains 12" and larger in diameter.

10.0 **PRESSURE TESTING REQUIREMENTS FOR TRANSMISSION MAINS/SERVICES**

10.1 Notification

At least five (5) business days prior to starting the pressure test, Gas Transmission Engineering shall notify the Gas and Water Division of the Department of Public Service (PSC). In order to maintain continuity of service during emergencies, shorter notice is permissible. Pressure tests are not considered satisfactory, unless certified by a designated PSC inspector.

10.0 **PRESSURE TESTING REQUIREMENTS FOR TRANSMISSION MAINS/SERVICES** (Continued)

10.2 The test medium shall be water.

The discharge of water from a hydrostatic pressure test (process or industrial wastewater) to publicly owned sewer systems is regulated. Refer to CEHSP E02.04, "Wastewater Discharges to Publicly Owned Sewer Systems or On-Site Septic Disposal Systems" for the requirements for proper discharge of this wastewater. A pig, sphere, or similar equipment shall be used to remove any remaining water from the tested pipe, where practical, and shall be disposed of in the proper manner. Contact EHS Operations for assistance.

Note: Elevation variations can significantly impact pressure tests with water and shall be taken into consideration (See Section 12.3 (A) (6)).

★ 10.3 Each segment of a new/replaced steel transmission main/service must be strength tested in accordance with this section to substantiate the proposed MAOP.

NOTE:	The section of pipe to be used for the "tie-in piece" shall have been previously strength tested in accordance with this section. The "tie-in welds" shall be given a leakage test at the operating pressure when placed in service (ie, soap test).

10.4 The minimum test pressure shall be 1 ½ times the maximum allowable operating pressure (MAOP).

10.5 Test Duration (after pressure stabilization)

A) 12 hours

B) 4 hours for a short length of pipeline (100 feet or less), which has not been backfilled and where, throughout its entire length, its entire circumference can be readily examined visually for the detection of leaks.

NOTE:	Contact the PSC for concurrence to perform a 4 hour test for exposed lengths greater than 100 feet.

C) 2 hours for transmission service lines 2" diameter and smaller.

10.0 **PRESSURE TESTING REQUIREMENTS FOR TRANSMISSION MAINS/SERVICES** (Continued)

10.6 A calibrated recording pressure gauge with increments of 5 psig or less, and a dead-weight tester shall be used. Dead-weight tester readings shall be taken at least hourly for the first and last two hours of the test. Calibrated pressure, temperature (pipe and ambient), and dead-weight tester readings shall be recorded per Section 12.3.

11.0 WITNESS REQUIREMENTS FOR PRESSURE TESTING TRANSMISSION MAINS/SERVICES

An engineer from Gas Transmission Engineering must witness and document (including employee number and his/her signature) the results of all pressure tests performed on **transmission mains/ services**. An inspector from the PSC shall also certify the satisfactory completion of the pressure test. (See Section 10.1)

12.0 **RECORDS AND RETENTION**

12.1 Distribution Services

A) A record of **distribution service** pressure tests shall be made and shall contain at least all of the following information:

★ 1) Name and employee number of Company Operator Qualified gas mechanic, or name and ITS # of Operator Qualified gas contractor mechanic performing the pressure test.

★ 2) Name and employee number of Company employee, or name and ITS # of gas contractor mechanic who witnesses the pressure test (as required per Section 9.0).

3) Test medium used

4) Test pressure

5) Test duration

6) Location and date of test

12.0 **RECORDS AND RETENTION** (Continued)

12.1 Distribution Services (Continued)

★ 7) Length, diameter, material, and line pressure (e.g. LP, IP, MP, or HP) of the service tested

8) Limits of the service pressure test indicating if the service connection to the main was included in the pressure test. (See Section 8.2.C)

★ B) Pressure test results for installed, replaced, inserted**,** or reconnected **distribution services** shall be recorded on the "As-Constructed/ Emergency Sketch" drawing.

★ C) The respective Area Gas Operations organization where the distribution service is installed shall retain the pressure test records for distribution services in accordance with CI-870-1.

★ 12.2 Distribution Mains

A) A record of **distribution main** pressure tests shall be made and shall contain at least all of the following information:

1) Name and employee number of Company Operator Qualified gas mechanic, or name and ITS # of Operator Qualified gas contractor mechanic performing the pressure test.

2) Name and employee number of Company employee, or name and ITS # of gas contractor mechanic who witnesses the pressure test (as required per Section 9.0).

3) Test medium used

4) Test pressure

5) Test duration

6) Pressure recording charts, or other record of pressure readings (e.g. "As-Constructed/Emergency Sketch")

7) Elevation variations, whenever significant for the particular test

NOTE: Pressure tests with air or inert gas are not impacted by elevation variations. (See Section 12.3(A)(7))

12.0 **RECORDS AND RETENTION** (Continued)

★ 12.2 Distribution Mains (Continued)

8) Location and date of test

9) Length, diameter, material, and line pressure (e.g. LP, IP, MP, or HP) of the main tested

10) Leaks and failures notes and their disposition.

B) Pressure test results for installed, replaced, inserted, or reconnected **distribution mains** shall be recorded on the "As-Constructed/ Emergency Sketch" drawing.

C) The respective Area Gas Operations organization where the distribution main is installed shall retain the pressure test records in accordance with CI-870-1.

★ 12.3 Transmission Mains/Services

A) A record of **transmission main/services** pressure tests shall be made and shall contain at least all of the following information:

1) Name and employee number of employee performing the pressure test (e.g. Pressure Control mechanic) and the name of any test company used

2) Name and employee number of Engineer from Gas Transmission Engineering who witnesses the pressure test (as required per Section 11.0).

3) Test medium used

4) Test pressure

5) Test duration

6) Pressure recording charts, or other record of pressure readings (e.g. temperature (pipe and ambient) chart, and pressure/temperature table).

7) Elevation variations, whenever significant for the particular test

NOTE: Pressure tests with water can be significantly impacted by elevation variations (See Section 10.2).

12.0 **RECORDS AND RETENTION** (Continued)

★ 12.3 Transmission Mains/Services (Continued)

8) Location and date of test

9) Length, diameter, material of the main tested

10) Leaks and failures notes and their disposition.

B) Gas Transmission Engineering shall retain the transmission mains/services pressure test records as per CI-870-1 "Records Management".

12.4 Records Management

Any records generated in the course of performing work in accordance with this specification shall be maintained as required by Corporate Instruction CI-870-1 "Records Management". Guidance on the retention of Company Gas Operations records can also be found on the Records Management intranet site.

★ 13.0 **REFERENCES**

CI-870-1	Records Management
G-8005	General Specification for the Installation of Gas Distribution Mains
G-8100	General Specification for the Installation of Gas Services
G-8121	Qualifications of Installers Joining Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services
G-8123	Heat Fusion Joining of Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services
G-8149	Responsibility for Maintenance and Replacement of Gas Services
G-8153	Reinforcing Buried Compression Fittings
G-8218	Gas Transmission Records Management and Retention

★ 13.0 **REFERENCES** (Continued)

G-100,285 Compression End Couplings, Tees, Elbows, Line Caps, and Riser Tees for Gas Pipe and Tubing

CEHSP E02.04 Wastewater Discharges To Publicly Owned Sewer Systems or On-Site Septic Disposal Systems

PSC Case 15686, order dated 6/29/83 and issued 7/11/83 – Order directing Con Edison to revise its construction standards to require a Company Supervisor to witness and endorse the record of each service line pressure test.

PSC Case 03-G-1507, order dated 5/14/04 and issued 6/3/04 – Order granting New York members of the Northeast Gas Association a waiver of the requirements of 16 NYCRR 255.756 and 255.757 to conduct a pilot program to allow limited application of cured-in-place (CIP) cast iron pipe liners in lieu of replacement of sections of cast iron mains affected by excavation activities

PHMSA 49 CFR Part 192, Sections 513 Interpretation Letter dated September 16, 1992.

PSC Case 94-G-0650, AVP Mr. V. Richard Conforti letter dated 10/20/93 to the Honorable John J. Kelliher, Secretary, State of New York, Public Service Commission (Letter petitions relief from 100% service witness by Company Supervisor)

PSC Recommendation at the Session of 2/22/95. Issued and effective 3/2/95 Recommendation reduces 100% service pressure test witness by Company Supervisor to 10% random witness.

In January, 2003, Construction Management Best Practices Committee recommended the pressure test witnessing be increased as discussed in Section 9.0.

ASME B31.8 (2014)

★ 14.0 **ATTACHMENTS**

APPENDIX A Pressure Testing Requirements

APPENDIX B Witness Requirements for Pressure Testing

APPENDIX C Sample “As-Constructed/Emergency Sketch”

★ APPENDIX A

Pressure Testing Requirements for New and Replacement Steel and Direct Buried PE Plastic Distribution Mains

MATERIAL	LENGTH	TEST METHOD	TEST PRESSURE	PRESSURE DURATION (after stabilization)
Steel & PE Plastic Mains	Tie-In Section	Soap test all joints/welds used at tie-in locations (e.g. welds, mechanical couplings & electrofusion couplings) when placed into service	Line Pressure	N/A
Steel & PE Plastic Mains	≤ 1000’	Pressure test with air or inert gas	90 psig for LP, IP, & MP 150 psig for HP *	One (1) hour
Steel & PE Plastic Mains	> 1000’	Pressure test with air or inert gas	90 psig for LP, IP, & MP 150 psig for HP *	Two (2) hours

Pressure Testing Requirements for New and Replacement PE Plastic Distribution Main Insertion

MATERIAL	LENGTH	TEST METHOD	TEST PRESSURE	PRESSURE DURATION (after stabilization)
PE Plastic Main Insertion	Tie-In Section	Soap test all joints/welds used at tie-in locations (e.g. welds, mechanical couplings & electrofusion couplings)	Line Pressure	N/A
PE Plastic Main Insertion	≤ 1000’	Pressure test with air or inert gas	90 psig for LP, IP, & MP 150 psig for HP *	One (1) hour **OR** 30 minutes prior to insertion **AND** 30 minutes after insertion
★ PE Plastic Main Insertion	> 1000’ to ≤ 1500’	Pressure test with air or inert gas	90 psig for LP, IP, & MP 150 psig for HP *	Two (2) hours **OR** 1 ½ hours prior to insertion **AND** 30 minutes after insertion
★ PE Plastic Main Insertion	> 1500’	Pressure test with air or inert gas	90 psig for LP, IP, & MP 150 psig for HP *	Two (2) hours

Pressure Testing Requirements for New, Replacement, and Temporarily Disconnected Distribution Services

MATERIAL	Service Size	TEST METHOD	TEST PRESSURE	PRESSURE DURATION (after stabilization)
PE Plastic or Steel	≤ 2”	Pressure test with air or inert gas	90 psig for LP, IP, & MP 150 psig for HP *	15 minutes
Copper	≤ 2”	Pressure test with air or inert gas	90 psig for LP, IP, & MP *	15 minutes
PE Plastic or Steel	> 2”	Pressure test with air or inert gas	90 psig for LP, IP, & MP 150 psig for HP *	30 minutes
At line pressure, soap test service connection to main.				

*** LP = low pressure, IP = intermediate pressure, MP -= medium pressure, HP = high pressure**

APPENDIX B

Witness Requirements for Pressure Testing Distribution Main/Services

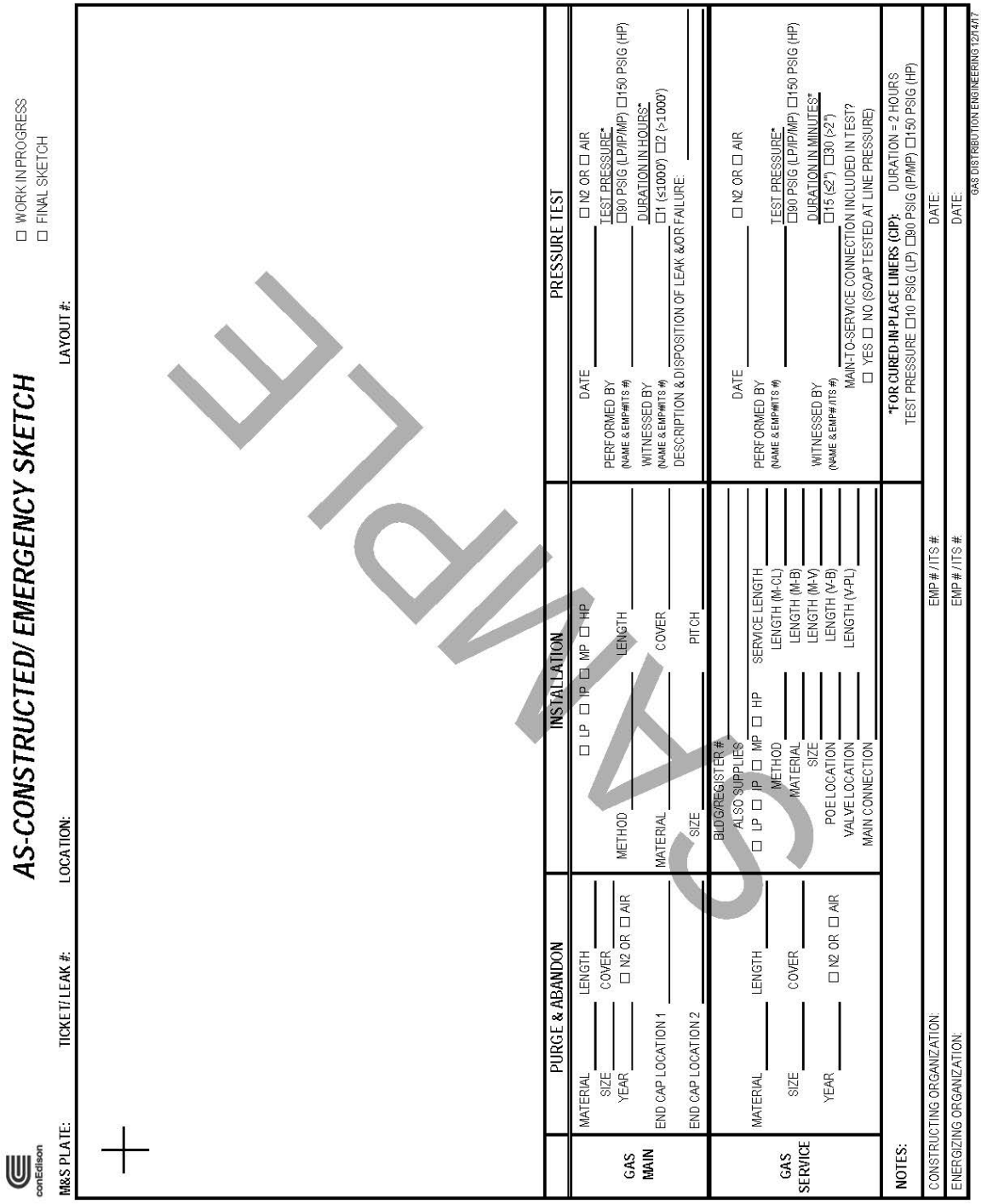
PRESSURE TEST PERFORMED BY	SERVICES	MAINS ≤ 10”	MAINS ≥12”
Company Personnel	≥ 50% random witness by Company management Remainder by Company OQ Gas Mechanic	100% by Company management **OR** Company OQ Gas Mechanic	100% by Company OQ management
Per Diem	≥ 50% random witness by Company management Remainder by Per Diem OQ Gas Mechanic	100% by Company management **OR** Per Diem OQ Gas Mechanic	100% by Company OQ management
Gas Contractors Managed by Gas Ops	≥ 50% random witness by Company management Remainder by Contractor OQ Gas Mechanic	100% by Company management	100% by Company OQ management
Gas Contractors Managed by Construction Management	≥ 50% random witness by Company CR, CI, **OR** management Remainder by Contractor OQ Gas Mechanic	100% by Company CR, CI, **OR** management	100% by Company OQ management

OQ = Operator Qualified, CR = Construction Representative, CI = Construction Inspector

★ APPENDIX C

Sample "As-Constructed/Emergency Sketch" Form

Click on the following hyperlink for the latest As-Constructed Emergency Sketch forms.



conEdison

LAST REVIEW DATE:	REVIEW CYCLE:
11/27/12	5 Years

SPECIFICATION: **IP-20-6**

TITLE: **INSTALLATION OF MECHANICAL FITTINGS FOR PLASTIC PIPE AND TUBING**

VOLUME: **2 (Section 4.0) and 10**

REGISTRATION NO: **GAS0099**

★ **TARGET TRAINING GROUPS:** **Gas Construction, Emergency Response Force (ERF), Gas Development Lab, Construction Management, Per Diem, and Other Gas Contractors**

REVISIONS: (See ★)

1)	Target Training	-	Added Gas Development Lab.
2)	Table of Contents	-	Renamed Section 6.0.
3)	Section 2.0	-	Revised references to Federal and State regulations.
4)	Section 3.0	-	Moved Sections 3.3 and 3.7 to Section 5.0. Moved Sections 3.4, 3.5, 3.8, 3.9, 3.10, 3.11, 3.12, 3.13, and 3.14 to Section 4.0.
5)	Section 3.1	-	New Section.
6)	Section 3.2	-	Previous Section 3.1; Reworded for clarity and added reference to G-8199.
7)	Section 3.3	-	Previous Section 3.2; Added manufacturer's installation guidelines.
8)	Section 3.4	-	Previous Section 3.6; Added reference to G-8209.
9)	Section 4.1	-	Combined Sections 4.1 and 4.2; Reworded for clarity.
10)	Section 4.2	-	Previous Section 3.8.
11)	Section 4.3	-	Previous Section 3.13; Reworded for clarity and added stab depth.

(Continued)

12) Section 4.4 - Previous Section 3.11; Added reference to G-100,291.

13) Section 4.5 - Previous Section 3.12; Added color coding for SDR 11 and SDR 9.3 stiffeners; Added reference to G-100,291; Changed notes to numbers; Added electrofusion cycle time for SDR 23.5 and SDR 26 plastic pipe; Added C.

14) Section 4.6 - Previous Section 3.4; Reworded for clarity.

15) Section 4.7 - Previous Section 3.10, Reworded for clarity.

16) Section 4.8 - Previous Section 3.14, Reworded for clarity.

17) Section 4.9 - Previous Section 3.5; Removed pipe material and black marker; Revised responsible organization to maintain contractor 3 letter code listing to Gas EH&S.

18) Section 4.10 - Previous Section 3.9; Reworded for clarity.

19) Section 5.0 - Removed reference to obsolete listing of approved mechanical fittings on Outlook.

20) Section 5.1 - Previous Section 3.3; Added Volume 6 gas specifications that include restraining-type mechanical fittings approved by the Development Lab.

21) Section 6.0 - Renamed Section; Added G-8104.

conEdison

Gas Operations Standards

TITLE: INSTALLATION OF MECHANICAL FITTINGS FOR PLASTIC PIPE AND TUBING

EFFECTIVE DATE: December 27, 2012

★ **TABLE OF CONTENTS**

TITLE: INSTALLATION OF MECHANICAL FITTINGS FOR PLASTIC PIPE AND TUBING

1.0 SCOPE

This specification details the requirements for the installation of approved mechanical fittings on plastic pipe and tubing.

★ 2.0 LEGAL REQUIREMENTS

This specification is in full compliance with the applicable sections of:

- Code of Federal Regulations Title 49, Part 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards"
- Official Compilation of Codes, Rules and Regulations of the State of New York (NYCRR) Public Service Part 255, "Transmission and Distribution of Gas"

3.0 GENERAL REQUIREMENTS

★ 3.1 The preferred methods to join plastic pipe and tubing are butt fusion and electrofusion. Mechanical fittings may be installed when butt fusion or electrofusion are not practical or available.

★ 3.2 Only installers Operator Qualified and in compliance with the 12 month requalification stipulated in Specification G-8199, “Qualification of Installers Who Join Plastic Pipe/Tubing with Mechanical Couplings/Fittings” shall join plastic pipe/tubing with mechanical fittings.

NOTE: An installer who is not Operator Qualified or out of compliance with the 12 month qualification **cannot** perform mechanical joining of plastic pipe/tubing and fittings, even if under the direction and observation of one who is qualified to perform mechanical joining of plastic pipe/tubing and fittings.

★ 3.3 The installation procedures outlined in this specification and the manufacturer’s installation guidelines shall be followed during the qualification test for installers of plastic pipe/tubing.

★ 3.4 All steel mechanical fittings shall be cathodically protected per Specification G-8209, “Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures.”

NOTE: If the backfilling of the steel fitting(s) is not performed the same day as the installation of the steel fitting(s), then the cathodic protection of the steel fitting(s) shall be rechecked prior to backfilling.

★ 4.0 INSTALLATION REQUIREMENTS

★ 4.1 Each individual manufacturer's installation instruction is to be completely and thoroughly followed. All mechanical fittings are required to be "individually packaged" with the fitting's proper installation instructions included.

★ 4.2 The sealing area of the plastic pipe/tubing shall be free of any scratches, gouges, grooves, dirt, debris, or other foreign material.

★ 4.3 Ensure "measure and mark" for proper stab depth is performed when required by the manufacturer's installation instruction.

★ 4.4 For plastic tubing in CTS sizes, ensure that the stiffener(s) is marked 0.090. See Specification G-100, 291, "Adapters and Stiffeners" for approved rigid internal tubular stiffeners.

★ 4.5 For plastic pipe in IPS sizes, ensure that the SDR marked on the plastic pipe(s) corresponds to the SDR marking on the stiffener(s). See Specification G-100, 291, for approved rigid internal tubular stiffeners.

A) Plastic pipe in sizes 1" IPS through 8" IPS, and 12" IPS is SDR 11. The stiffener for SDR 11 is color coded black.

B) Prior to 1990, 4" and smaller IPS plastic pipe was SDR 9.3. The stiffener for SDR 9.3 is color coded blue.

C) In the 1970's, thin walled 6" IPS SDR 23.5 and SDR 26 plastic pipe was installed on the low pressure gas distribution system. **Do <u>not</u> butt fuse 6" IPS SDR 23.5 or SDR 26 plastic pipe.**

- 6" IPS SDR 23.5 plastic pipe shall **only** be joined by either an electrofusion coupling or a mechanical restraining coupling with SDR 23.5 stiffener (color coded orange). Reduce electrofusion cycle time by 10%.

- 6" IPS SDR 26 plastic pipe shall **only** be joined by an electrofusion coupling. Reduce electrofusion cycle time by 15%.

<u>EXCEPTION:</u> 6" IPS SDR 26 installed as a <u>sleeve</u> for Trenchless Technology may be joined by either butt fusion or an electrofusion coupling.

★ 4.0 **INSTALLATION REQUIREMENTS** (Continued)

★ 4.6 Mechanical fittings **cannot** be installed **directly** onto a plastic molded fitting without pup lengths of pipe or tubing. Plastic molded fittings (without pup lengths) **can only** be joined to plastic pipe, tubing and other molded fittings by butt fusion or electrofusion.

★ 4.7 Ensure that the proper chamfer tool is used for mechanical fittings that require the plastic pipe/tubing to be chamfered.

★ 4.8 A torque wrench is to be used when the manufacturer's installation instruction requires a specific torque (ft-lbs) to tighten the fitting.

★ 4.9 All installers (Company, Contractor, Per Diem) of mechanical fittings on plastic pipe or tubing shall identify the installer by marking the fitting itself or the plastic pipe/tubing adjacent to the fitting at "12 o'clock" (or as close to 12 o'clock as is possible) with a white marker (Class/Stock #024-7106). Company installers shall clearly print CE (for Con Edison) and their 5 digit employee number. Contractor and Per Diem installers shall clearly print their designated contractor 3 letter code (to identify the Contractor; e.g. HAL for Hallen) and their respective Learning Center training ID number. Gas EH&S will establish the designated contractor 3 letter code for new contractors upon approval of the contractor's Drug and Alcohol Plan. Gas EH&S will notify the Learning Center of any new designations and will maintain the listing of contractor 3 letter codes on Outlook.

★ 4.10 See Specification G-8100, "General Specification for the Installation of Gas Distribution Services," Appendices H-1 and H-2 for the installation requirements for molded threaded brass base service tee.

★ 5.0 **APPROVED MECHANICAL FITTINGS FOR PLASTIC PIPE/TUBING**

★ 5.1 Only restraining-type mechanical fittings approved by the Development Lab and included in the following Volume 6, Purchase and Test, specifications shall be installed on plastic pipe and tubing:

- G-100,285, "Compression End Coupling ,Tees, Elbows, Line Caps and Riser Tees for Gas Pipe & Tubing"
- G-100, 291, "Adapters and Stiffeners"
- G- 8104, "Polyethylene Pipe, Tubing and Fittings for Gas Mains and Services"

★ 6.0 **REFERENCES**

G- 8100	-	General Specification for the Installation of Gas Distribution Services
★ G-8104	-	Polyethylene Pipe, Tubing, and Fittings for Gas Mains and Services
G-8153	-	Reinforcing Compression Fittings
G-8199	-	Qualification of Installers Who Join Plastic Pipe/Tubing with Mechanical Couplings/Fittings
G-8209	-	Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures
G-100,285	-	Compression End Coupling ,Tees, Elbows, Line Caps, and Riser Tees for Gas Pipe & Tubing
G-100,291	-	Adapters and Stiffeners

This Page Intentionally Left Blank

conEdison

LAST REVIEW DATE:	REVIEW CYCLE:
8/31/15	5 Years

SPECIFICATION: **IP-27-5**

TITLE: **INSTALLATION OF ELECTROFUSION FITTINGS ON PE PLASTIC PIPE/TUBING AND MOLDED FITTINGS USING A UNIVERSAL ELECTROFUSION PROCESSOR**

VOLUME: **2 (Section 4.0) and 10**

REGISTRATION NO: **GAS0173**

TARGET TRAINING GROUPS: **Gas Construction, Emergency Response Force (ERF), Gas Development Lab, Construction, Per Diem, and Gas Contractors**

REVISIONS:

This specification has been revised to incorporate comments made by GTI's technical experts and Con Edison's subject matter experts.

conEdison

Gas Operations Standards

TITLE: INSTALLATION OF ELECTROFUSION FITTINGS ON PE PLASTIC PIPE/TUBING AND MOLDED FITTINGS USING A UNIVERSAL ELECTROFUSION PROCESSOR

EFFECTIVE DATE: September 30, 2015

TABLE OF CONTENTS

1.0 SCOPE

This specification describes the requirements for the installation of approved electrofusion fittings on polyethylene (PE) plastic pipe, tubing, and molded fittings using a universal electrofusion processor.

See Gas Specification G-8123, “Heat Fusion Joining of Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services “for the requirements to join PE plastic pipe, tubing, and molded fittings by butt fusion and branch saddle fusion.

See Gas Specification IP-20, “Installation of Mechanical Fittings for Plastic Pipe and Tubing” for the requirements to join PE plastic pipe and tubing with mechanical fittings.

2.0 LEGAL REQUIREMENTS

Federal: 49 CFR Part 192, Sections 273, 281, 283, 285, and 287.

State: 16 NYCRR Part 255, Sections 273, 281, 283, 285, and 287.

3.0 OPERATOR QUALIFICATION

3.1 Installers of PE Plastic Pipe

A) Installers who tap an energized pipeline, weld steel, and join PE plastic pipe by heat fusion (butt fusion or branch saddle fusion), electrofusion, or with mechanical fittings shall be Operator Qualified.

All other “covered tasks” shall be completed by either Operator Qualified individuals or individuals under the direct observation of one who is Operator Qualified. “Direct observation” means that the Operator Qualified individual remains in direct visual and verbal contact at all times with the individual performing the task.

B) Installers who join PE plastic pipe/tubing and fittings by heat fusion (butt fusion or branch saddle fusion) shall be Operator Qualified **and** in compliance with the annual requalification requirements of Gas Specification G-8121, "Qualification of Installers Performing Heat Fusion or Electrofusion of Polyethylene Plastic Pipe/Tubing and Fittings for Gas Mains and Services."

All heat fusion joints must be fabricated in accordance with the fusion procedures outlined in Gas Specification G-8123.

3.0 **OPERATOR QUALIFICATION** (Continued)

C) Installers who join PE plastic pipe/tubing and fittings by electrofusion shall be Operator Qualified **and** in compliance with the annual requalification requirements of Gas Specification G-8121.

All electrofusion joints must be installed in accordance with the electrofusion procedures outlined in this specification, the 2015 Northeast Gas Association (NGA) Plastic Pipe Joining Manual, and manufacturer's assembly instructions included with the electrofusion fitting.

D) Installers who join PE plastic pipe/tubing with mechanical fittings, shall be Operator Qualified **and** in compliance with the annual requalification requirements of Gas Specification G-8199, "Qualification of Installers Who Join Plastic Pipe/Tubing with Mechanical Fittings."

All mechanical joints must be installed in accordance with the installation procedures outlined in Gas Specification IP-20.

3.2 Peer Inspectors of PE Plastic Joints

A) Peer inspectors who inspect PE plastic pipe joints (heat fusion, electrofusion, or with mechanical fittings) shall be Operator Qualified and in compliance with the annual requalification stipulated in Gas Specifications G-8199 and G-8121 **OR** Operator Qualified to visually inspect PE plastic joints (e.g. CCM 0003, GAS6016) and current with 3 year requalification.

B) Peer inspectors who are required to wear corrective lenses, must wear same to ensure proper inspection of PE plastic joints.

4.0 **REQUIREMENTS FOR INSTALLERS AND PEER INSPECTORS**

4.1 All installers (Company, Contractor, Per Diem) of heat fusion joints on PE plastic pipe, tubing, and molded fittings shall identify the installer by marking the plastic pipe, tubing, or fittings adjacent to the heat fusion joint at 12 o'clock (or as close to 12 o'clock as is possible) with a Company approved marker (e.g. Class/Stock # 024-7106).

A) Company installers shall clearly print their 5 digit employee number and "J" for joiner.

4.0 **REQUIREMENTS FOR INSTALLERS AND PEER INSPECTORS** (Continued)

B) Contractor and Per Diem installers shall clearly print their respective Learning Center Operator Qualification identification number (as noted on Con Edison Operator Qualification card) **and** "J" for joiner.

4.2 Following completion of the electrofusion cycle, the Operator Qualified installer and the Operator Qualified peer inspector shall visually inspect the entire area of the electrofusion fitting and compare against visually acceptable electrofusion fittings in the 2015 Northeast Gas Association (NGA) Plastic Pipe Joining Manual and the manufacturers' recommended appearance guidelines.

A) The electrofusion fitting must closely resemble visually acceptable electrofusion fittings in the 2015 Northeast Gas Association (NGA) Plastic Pipe Joining Manual and the manufacturers' recommended appearance guidelines. Misalignment, melt out, and exposed wire are unacceptable.

B) If there is any reason to believe the electrofusion fitting is defective, it shall be removed and replaced.

4.3 All peer inspectors (Company, Contractor, Per Diem) of electrofusion fittings on PE plastic pipe, tubing, and molded fittings shall identify the inspector by marking the plastic pipe, tubing, or fittings adjacent to the electrofusion fitting at 12 o'clock (or as close to 12 o'clock as is possible) with a Company approved marker (e.g. Class/Stock # 024-7106).

A) Company inspectors shall clearly print CE (for Con Edison), their 5 digit employee number **and** "P" for peer inspector.

B) Contractor and Per Diem inspectors shall clearly print their respective Learning Center Operator Qualification identification number (as noted on Con Edison Operator Qualification card) **and** "P" for peer inspector.

4.4 All PE plastic joints, joiners, and peer inspectors shall be documented as per GAS6006, "Documentation and Inspection of Polyethylene (PE) Plastic Joints on Gas Mains and Services."

5.0 GENERAL GUIDELINES

5.1 The preferred methods to join PE plastic pipe and tubing are heat fusion and electrofusion. (See Gas Specification G-8123)

When heat fusion or electrofusion is not practical or available, only approved restraining-type mechanical fittings shall be installed on PE plastic pipe and tubing per Gas Specification IP-20. All steel mechanical fittings shall be cathodically protected per Gas Specification G-8209, "Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures."

5.2 All approved electrofusion fittings are for use with all legacy PE plastic pipe as well as currently approved high density PE 3408/4710 plastic pipe and tubing.

See Specification G-8104, “Polyethylene Pipe, Tubing, and Fittings for Gas Mains and Services” for all approved PE plastic pipe, tubing, and fittings.

See the GasHub for manufacturer’s installation instructions and approved electrofusion processors’ operating manuals.

NOTES:

M8000 pipe was all black and replaced in 1997 with Performance Pipe 8100.

Performance Pipe 6800 is black with two thick yellow stripes at three different points on the pipe’s surface.

Performance Pipe 8100 has a “yellow shell” around black pipe. This is the equivalent of Performance Pipe 8300 and JM Eagle (US Poly) UAC3700.

Performance Pipe 8300 is black with one thick yellow stripe at three different points on the pipe's surface. This is the equivalent of Performance Pipe 8100 and JM Eagle (US Poly) UAC 3700.

JM Eagle (US Poly) UAC3700 is black with one thin yellow stripe at three different points on the pipe’s surface and the print line states PE100. This is the equivalent of Performance Pipe 8100 and 8300.

5.3 Quality fusion requires using all of the required tools and equipment, and following all of the steps in the procedure in the correct sequence. Faulty fusion is caused by improper or defective equipment, or not following the procedure (omitting steps or performing steps out of sequence).

5.0 **GENERAL GUIDELINES** (Continued)

5.4 Electrofusion fittings **must** be installed at least three (3) pipe diameters or 12", whichever is **greater**, from a squeeze-off point.

5.5 Inspect PE plastic pipe, tubing, and fittings prior to installation to verify:

- No cuts, gouges, deep scratches, or other defects.
- PE plastic material is high density polyethylene (HDPE), PE3408/4710, and manufactured per ASTM D2513.
- PE plastic material is NOT older than 2 years old.

(See Gas Specification G-8122, "Transportation, Handling, and Storage of Polyethylene Plastic Pipe/Tubing, and Fittings for Gas Mains and Services")

5.6 Before beginning the process to install an electrofusion fitting, ensure the pipe is clean and dry. Clean the pipe outside diameter (OD), inside diameter (ID), and ends with a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687).

If the contamination cannot be removed in this way, wash the pipe with water and a clean, lint-free, non-synthetic cloth/paper towel to remove the contamination. Then rinse the pipe with water and dry thoroughly with a clean, lint-free, non-synthetic cloth/paper towel. **Do NOT use soap water (leak detection solution) to clean the pipe.**

If the contamination still cannot be removed with water and a clean, lint-free, non-synthetic cloth/paper towel, then 96% alcohol wipes (Class/Stock # 689-3135 and 025-3724) or 99.9% liquid isopropyl alcohol (Class/Stock # 630-1246) with a clean, lint-free, non-synthetic cloth/paper towel (e.g. NS0209687) may be used to clean extremely dirty pipe or cutting oil.

Wear nitrile gloves when using alcohol wipes. Wear nitrile gloves and goggles when using the liquid isopropyl alcohol with a clean, lint-free, non-synthetic cloth/paper towel. When using liquid isopropyl alcohol, place plastic sheeting and absorbent pads underneath the fitting. The used wipes/cloth/absorbent pads shall be disposed as non-hazardous industrial waste. Liquid isopropyl alcohol shall be disposed as flammable hazardous waste. Contact EH&S Operations for guidance when disposing liquid isopropyl alcohol.

5.0 **GENERAL GUIDELINES** (Continued)

5.7 All scrap PE plastic pipe, tubing, and/or fittings that cannot be reused, shall be brought back to the workout location for proper disposal/ recycling.

6.0 **ELECTROFUSION COUPLING INSTALLATION GUIDELINES**

6.1 When making the final tie-in to existing PE plastic pipe in an excavation, electrofusion coupling(s) should be used to make the final tie-in, rather than trying to butt fuse or use mechanical fittings in the excavation. Use of two (2) electrofusion couplings with a short length of plastic pipe will facilitate pipe lineup. If electrofusion fittings cannot be used due to a hazardous environment, mechanical fittings are permitted. (See Section 9.2)

6.2 Misaligned PE plastic pipe shall **not** be joined using electrofusion couplings, butt fusion, or mechanical fittings in order to prevent mechanical stress on the pipe and joint during and after the joining process. PE plastic pipe alignment in the field can be corrected prior to joining to other PE plastic, steel, or cast iron pipe in the following manner:

A) For all pipe diameters, use approved molded fittings. (See Gas Specification G-8104 for approved molded fittings)

B) For smaller diameter pipe, and where practical for larger diameters, expose sufficient pipe at the tie-in point to take advantage of PE plastic pipe flexibility. (See Gas Specifications G-8005, “General Specification for the Installation of Gas Distribution Mains” and G-8100, “General Specification for the Installation of Gas Distribution Services for plastic pipe bending radii)

6.3 Plastic molded fittings without pup lengths **can only** be joined to PE plastic pipe, tubing and other molded fittings by heat fusion or electrofusion. (See Gas Specification G-8104 for approved fittings with pup lengths of PE plastic pipe or tubing)

Mechanical fittings **cannot** be installed **directly** onto a plastic molded fitting without pup lengths of PE plastic pipe or tubing.

6.0 **ELECTROFUSION COUPLING INSTALLATION GUIDELINES** (Continued)

6.4 Heat fusion of PE plastic pipe, tubing, and fittings of different SDR shall only be performed between **one change in SDR. SDR is found on the print line of the PE plastic pipe and tubing, or on the fitting label.**

SDR	7	⇔	9/9.3	⇔	11	⇔	13.5	⇔	15.5

Joining of PE plastic pipe/fitting with SDR wall thickness **greater than one change in SDR** shall only be done using electrofusion. Approved restraining-type mechanical couplings may only be used for joining PE plastic pipe when an electrofusion coupling is unavailable. (See Gas Specifications IP-20 and G-8209)

A) Plastic pipe in sizes 1" IPS through 8" IPS, and 12" IPS is SDR 11.

B) Prior to 1990, 4" and smaller IPS plastic pipe was SDR 9.3.

C) Medium density Aldyl-A PE plastic pipe (tan or green) shall only be joined by electrofusion.

D) In the 1970's, thin walled 6" IPS SDR 23.5, SDR 26, and SDR 32.5 plastic pipe was installed on the low and medium pressure gas distribution systems. **Do not butt fuse 6" IPS SDR 23.5, SDR 26, or SDR 32.5 PE plastic pipe.**

- 6" IPS SDR 23.5 PE plastic pipe shall **only** be joined by either an electrofusion coupling or a mechanical restraining coupling with SDR 23.5 stiffener (color coded orange). Reduce electrofusion fusion time by 10% of the time displayed when the coupling is scanned.

- 6" IPS SDR 26 or SDR 32.5 PE plastic pipe shall **only** be joined by an electrofusion coupling. For SDR 26, reduce electrofusion cycle time by 15%. For SDR 32.5, reduce electrofusion fusion time by 25% fusion time of the time displayed when the coupling is scanned.

  EXCEPTION: 6" IPS SDR 26 installed as a sleeve for Trenchless Technology may be joined by either butt fusion or an electrofusion coupling.

E) In the 2000's, thin walled 6" IPS SDR 23 or thinner Subcoil pipe was installed on the low pressure gas distribution system and 22.5" IPS SDR 23 Subline was installed on the high pressure gas distribution system. Do not heat fuse to Subcoil or Subline PE plastic pipe.

6.0 **ELECTROFUSION COUPLING INSTALLATION GUIDELINES** (Continued)

6.5 The following installation guidelines detail the steps necessary to install an electrofusion coupling using a universal electrofusion processor and inspect the completed joint.

For detailed instructions on installing electrofusion couplings, refer to the manufacturer's assembly instructions included with the fitting and the 2015 Northeast Gas Association (NGA) Plastic Pipe Joining Manual.

For detailed instructions on using the universal electrofusion processor, refer to the manufacturer's operating manual. (See Section 9.1)

A) Inspect PE plastic pipe, tubing, and fittings for cuts, gouges, deep scratches or other defects prior to installation of electrofusion fittings. (See Gas Specification G-8122)

B) Keep electrofusion coupling in the plastic bag provided until needed to avoid accidental contamination.

V**isually inspect the inside of the coupling for defects and then check the coupling for electrical continuity (e.g. fluke meter).** If any defects are noted, or if there is no electrical continuity, the electrofusion coupling shall not be installed.

C) **Cut the pipe ends to ensure a square**, even surface. Remove any burrs or shavings with a clean knife.

D) **Check pipe for out-of-round.** Use a re-rounding clamp or other device to bring the pipe back to round.

E) **Clean pipe ends and surface area to be scraped** by removing dirt, mud, and other debris with clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687). (See Section 5.6)

F) **Measure and mark the pipe insertion depth** (half the length of the coupling). Marks should be approximately 1" outside the footprint of the fitting. Use only a Company approved marker (e.g. Class/Stock # 024-7106). Do not use keel or a lumber crayon to mark the PE plastic pipe.

6.0 **ELECTROFUSION COUPLING INSTALLATION GUIDELINES** (Continued)

G) **Scrape the marked area on the outside of the pipe to remove surface oxidation** using an approved scraping tool (e.g. universal scraper, spring loaded scraper, and half-moon scraper). **Do not** use a file or sandpaper.

Chamfer the pipe ends and bevel the outer edge more than the inner edge.

H) Remove any debris from the inside of the pipe with a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687)

I) Clean the scraped area of the pipe and the inside of the fitting with either 96% alcohol wipes (Class/Stock #689-3135 and 025-3724) or a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687) with 99.9% liquid isopropyl alcohol (Class/Stock #630-1246). Make sure pipe and fitting surfaces are completely dry before assembly.

(See Section 5.6 for EH&S requirements for protective gloves and alcohol disposal requirements)

Never clean electrofusion molded fittings with leak detection solution.

J) **Remark the stab depth,** if required, by measuring half the length of the coupling and remark each pipe end.

K) If the electrofusion fitting or the surface of the scraped pipe becomes contaminated with dirt, debris, water, finger marks or other foreign substances, clean again with either 96% alcohol wipes (Class/Stock #689-3135 and 025-3724) or a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687) with 99.9% liquid isopropyl alcohol (Class/Stock #630-1246). Make sure pipe and fitting surfaces are completely dry before assembly.

(See Section 5.6 for EH&S requirements for protective gloves and alcohol disposal requirements)

L) **Install the coupling to the marked insertion depth on pipe**. PE plastic pipe and coupling should be kept clean, supported, and free of any external stresses.

6.0 **ELECTROFUSION COUPLING INSTALLATION GUIDELINES** (Continued)

If there is excessive resistance while sliding the coupling onto the pipe, use a re-rounding clamp or other device to bring the pipe back to round. Clean pipe as needed after removing the re-rounding clamp.

M) Insert the plastic pipe into the opposite end of the coupling. Check both measurement marks for the proper stab depth when this is completed.

NOTE: If it is difficult to install the two pipe ends into the electrofusion coupling because of lack of movement that occurs with short pieces or larger pipe sizes, it may be necessary to slide one coupling completely onto one of the pipe ends, bring the two pipes together, then slide the coupling from the fully stabbed pipe back to the other until the proper insertion depth is reached on both pipes. For additional details on this technique, see Section 8.0.

N) While maintaining the marked stab depth, keep the pipe secured from movement and the coupling supported during both the fusion and cooling cycles. Cooling time is noted as “CT” on the fitting label.

O) Connect the universal electrofusion processor to an adequate AC power source. If using a generator, turn the generator on and allow it to run for 30 seconds before connecting the universal electrofusion processor. Turn on the universal electrofusion processor.

P) Connect fusion plugs to the contact pins on the fitting.

NOTE: Couplings 12” and larger are bi-filament and each side of the coupling must be fused independently.

6.0 **ELECTROFUSION COUPLING INSTALLATION GUIDELINES** (Continued)

16" electrofusion couplings require pre-heating each side of the coupling prior to the fusion cycle.

Seal the annular gap between the 16" coupling and the pipe with tape. If installing the coupling one side at a time, the annular gap can be sealed with tape or by securing the plastic bag around the coupling and the pipe. Connect the fusion plugs to the contact pins on the coupling and scan the pre-heating **(yellow)** barcode. On completion of the pre-heating cycle, allow 10 minutes to warm through. If annular gap is still not sealed, scan the pre-heating (yellow) barcode again. On completion of additional pre-heating cycle, allow 10 minutes to warm through.

Start the fusion process by scanning the coupling (white) barcode. Repeat the pre-heating and fusion process on the other side of the coupling.

Q) Following the applicable universal electrofusion processor's operating manual, scan the fitting barcode (verify the fitting information), and begin the fusion process. (See Section 6.4 for electrofusion to different SDR PE plastic pipe)

R) Keep the pipe secured from movement and the coupling supported during both the fusion and cooling cycles. Do not handle, pressure test, or backfill the coupling until completion of the cooling cycle(s). Cooling time is noted as CT on the fitting label.

S) Following completion of the fusion cycle, the entire area of the electrofusion joint shall be visually inspected by the Operator Qualified installer and by an Operator Qualified peer inspector. (See Section 4.2)

T) Mark the designated installer and peer inspector identification next to the coupling. (See Sections 4.1 and 4.3)

7.0 PE PLASTIC PIPE REPAIR GUIDELINES

7.1 Damaged PE pipe, sizes 3" to 16" IPS, may be repaired by an electrofusion repair patch installed by the Development Lab. Repair patches may be installed on live low pressure PE pipe that is damaged. Damaged elevated pressure (intermediate, medium, and high pressure) PE plastic pipe must have the flow of gas stopped prior to installation of the repair patch. (See Gas Specification G-8178, "Shut-Off of Polyethylene Plastic Pipe/Tubing Used for Gas Mains and Services)

7.2 Damaged PE plastic pipe, sizes 1/2" CTS to 16" IPS, may be repaired by cutting out the damaged section of PE plastic pipe and installing a replacement piece of pipe with two electrofusion couplings.

7.3 The following installation guideline details the steps necessary to cut-out and replace a damaged section of PE plastic pipe with two electrofusion couplings using a universal electrofusion processor and to inspect the completed joints.

Electrofusion control units are not intrinsically safe and must not be used until the gas flow has been stopped.

For detailed instructions on installing electrofusion couplings, refer to the 2015 Northeast Gas Association (NGA) Plastic Pipe Joining Manual and the manufacturer's assembly instructions included with the fitting. For detailed instructions on using the universal electrofusion processor, refer to the manufacturer's operating manual. (See Section 9.1)

A) For damaged PE plastic gas mains, safely stop off and control the flow of gas by operating an isolation valve or stop off using the approved methods in Gas Specification G-8178.

B) For damaged PE plastic gas services, safely stop-off and control the flow of gas by operating an isolation valve or stop-off using the approved methods in Gas Specification G-8178. If feasible, replace the entire section of damaged service pipe (e.g., main to valve, valve to building).

C) Cut-out and remove the damaged section of pipe per Gas Specifications IP-40, "Cut-Outs and Tie-Ins of Existing Plastic or Plastic / Metallic Gas Mains" and IP-9, "Requirements for Written Procedures and Contingency Plans." Be sure the pipe ends on the pipe are square and evenly cut. Remove any burrs or shavings from the pipe ends that may have developed during the cutting process.

7.0 **PE PLASTIC PIPE REPAIR GUIDELINES** (Continued)

D) Measure the repair section of pipe to fit within 1/16 of the open section length.

For PE plastic gas main replacement, use pretested pipe or pressure test the replacement piece prior to installation. (See Gas Specification G-8204, "Pressure Testing Requirements For New and Replacement Gas Mains and Services")

E) Clean the pipe ends inside and out with a dry, clean lint-free cloth to remove all dirt and contaminants.

F) **Measure and mark the pipe insertion depth on the existing pipe and the repair segment** Marks should be approximately 1" outside the footprint of the fitting. Mark half the length of the coupling on the existing pipe ends and a full coupling length on **both** ends of the repair segment.

G) **Follow the scraping procedure** in Section 7.5(G) for the existing pipe ends, and the ends of the repair segment.

H) Once scraping is completed, use a clean knife to remove any burrs. Remove any debris from the inside of the pipe with a dry, clean lint-free cloth.

I) Clean the scraped area of the pipe and the inside of the fitting with either 96% alcohol wipes (Class/Stock #689-3135 and 025-3724) or a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687) with 99.9% liquid isopropyl alcohol (Class/Stock #630-1246). Make sure pipe and fitting surfaces are completely dry before assembly.

(See Section 5.6 for EH&S requirements for protective gloves and alcohol disposal requirements)

J) **Remark the stab depths** if needed at both tie-in points on the existing pipe, and the repair segment.

7.0 **PE PLASTIC PIPE REPAIR GUIDELINES** (Continued)

K) Keep electrofusion coupling in the plastic bag provided until needed to avoid accidental contamination.

Visually inspect the inside of the coupling for defects and then check the coupling for electrical continuity (e.g. fluke meter). If any defects are noted, or if there is no electrical continuity, the electrofusion coupling shall not be installed.

If the electrofusion coupling(s) or the surface of the scraped pipe becomes contaminated with dirt, debris, water, finger marks or other foreign substances, clean with either 96% alcohol wipes (Class/Stock #689-3135 and 025-3724) or a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687) with 99.9% liquid isopropyl alcohol (Class/Stock #630-1246) Make sure pipe and fitting surfaces are completely dry before assembly.

(See Section 5.6 for EH&S requirements for protective gloves and alcohol disposal requirements)

L) For most gas main repairs, remove the center stops in both couplings. Slide each coupling onto the repair segment for the full length of the coupling. Place the repair segment between the two pipe ends, and slide both electrofusion EF couplings onto the existing pipe to the correct insertion depth.

For most service repairs where sufficient material is exposed, there is enough flexibility in the pipe/tubing to install electrofusion couplings without removing center stops.
If there is excessive resistance while sliding either coupling onto the pipe, use a re-rounding clamp or other device to bring the pipe back to round. Clean pipe as needed after removing the re-rounding clamp.

M) Connect the universal electrofusion processor to an adequate AC power source. If using a generator, turn the generator on and allow it to run for 30 seconds before connecting the universal electrofusion processor. Turn on the universal electrofusion processor.

N) Connect fusion plugs to the contact pins on the first coupling.

NOTE: Couplings 12” and larger are bi-filament and each side of the coupling must be fused independently.

7.0 **PE PLASTIC PIPE REPAIR GUIDELINES** (Continued)

O) Following the applicable universal electrofusion processor's operating manual, scan the fitting barcode (verify the fitting information) and begin the fusion process for each coupling. (See Section 7.4 for electrofusion to different SDR PE plastic pipe)

Keep the pipe secured from movement and the coupling supported during both the fusion and cooling cycles. Do not handle, pressure test, or backfill the coupling until completion of the cooling cycle(s). Cooling time is noted as "CT" on fitting label.

P) Following completion of the fusion cycle, the entire area of the electrofusion joint shall be visually inspected by the Operator Qualified installer and by an Operator Qualified inspector. (See Section 4.2)

Q) Following completion of the cooling cycle, the repaired PE plastic gas service replacement shall be pressure tested from the point of disconnect to the service head valve. (See Gas Specification G-8204)

R) Mark the designated installer and peer inspector identification next to the coupling. (See Sections 4.1 and 4.3)

S) For repaired PE plastic gas main replacement, all tie-in joints/welds shall be soap tested for leakage with leak detecting solution **only after** the line has been gassed-in and the line pressure has been achieved. (See Gas Specification G-8204)

8.0 **ELECTROFUSION TAPPING TEE AND SPA SADDLE INSTALLATION GUIDELINES**

8.1 The following installation guideline details the steps necessary to install an electrofusion tapping tee or a SPA saddle (up to 8") on a PE plastic gas main using a universal electrofusion processor and to inspect the completed joints.

For detailed instructions on installing electrofusion tapping tees and SPA saddles, refer to the 2015 Northeast Gas Association (NGA) Plastic Pipe Joining Manual, and the manufacturer's assembly instructions included with the fitting. For detailed instructions on using the universal electrofusion processor, refer to the manufacturer's operating manual. (See Section 9.1)

8.0 **ELECTROFUSION TAPPING TEE AND SPA SADDLE INSTALLATION GUIDELINES** (Continued)

A) Inspect PE plastic pipe, tubing, and fittings for cuts, gouges, deep scratches or other defects prior to installation of electrofusion fittings. (See Gas Specification G-8122)

B) **Clean the pipe** with a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687) to remove any dirt, mud, or other debris. (See Section 5.6)

C) Keep electrofusion tapping tee/SPA saddle in the plastic bag provided until needed to avoid accidental contamination.

Visually inspect the bottom of the tapping tee/SPA saddle for defects and then check the tapping tee/SPA saddle for electrical continuity (e.g. fluke meter). If any defects are noted, or if there is no electrical continuity, the electrofusion fitting shall not be installed.

D) Center the tapping tee/SPA saddle on the pipe and mark the surface area covered by the base of the tee on the PE plastic pipe. Marks should be approximately 1" outside the footprint of the fitting. Use only a Company approved marker (e.g. Class/Stock # 024-7106). Do not use keel or a lumber crayon to mark the PE plastic pipe.

E) **Check pipe for out-of-round.** Use a re-rounding clamp or other device to bring the pipe back to round.

F) **Scrape the marked area on the outside of the pipe to remove surface oxidation** using an approved scraping tool (e.g. universal scraper, spring loaded scraper, and half-moon scraper). **Do not** use a file or sandpaper.

G) Clean the scraped area of the pipe and the inside of the fitting with either 96% alcohol wipes (Class/Stock #689-3135 and 025-3724) or a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687) and 99.9% liquid isopropyl alcohol (Class/Stock #630-1246). Make sure pipe and fitting surfaces are completely dry before assembly.

(See Section 5.6 for EH&S requirements for protective gloves and alcohol disposal requirements)

8.0 **ELECTROFUSION TAPPING TEE AND SPA SADDLE INSTALLATION GUIDELINES** (Continued)

H) Remove the tee/SPA saddle from the bag, visually inspect for dirt or contaminants, and center the tapping tee on the freshly scraped pipe surface.

If the electrofusion fitting or the surface of the scraped pipe becomes contaminated with dirt, debris, water, finger marks or other foreign substances, clean with either 96% alcohol wipes (Class/Stock #689-3135 and 025-3724) or a clean, dry, lint-free non-synthetic (e.g. cotton) cloth or paper towel (e.g. NS0209687) with 99.9% liquid isopropyl alcohol (Class/Stock #630-1246) Make sure pipe and fitting surfaces are completely dry before assembly.

(See Section 5.6 for EH&S requirements for protective gloves and alcohol disposal requirements)

1. For Central Plastics tapping tees, a removable saddle clamp must be placed under the pipe adjacent to the tapping tee prior to fusing. Slide the saddle clamp onto the edges of the tapping tee until the saddle clamp is squarely aligned beneath the tee. Tighten the saddle clamp to secure the tee to the plastic pipe.

2. For IPEX/Friatec tapping tees and SPA saddles, release the pre-assembled screws on one side of the tee. Using the side of the tapping tee that is still bolted together as a hinge, open the upper and lower sections of the tapping tee. Place the tapping tee onto the scraped and cleaned area of the PE plastic pipe. Evenly tighten all four screws to the stops. The bottom section of the tapping tee will remain on as a permanent component of the tee.

I) Connect the universal electrofusion processor to an adequate AC power source. If using a generator, turn the generator on and allow it to run for 30 seconds before connecting the universal electrofusion processor. Turn on the universal electrofusion processor.

J) Connect fusion plugs to the contact pins on the tapping tee.

K) Following the applicable universal electrofusion processor's operating manual, scan the fitting barcode (verify the fitting information) and begin the fusion process for the tapping tee. (See Section 7.4 for electrofusion to different SDR PE plastic pipe)

8.0 **ELECTROFUSION TAPPING TEE AND SPA SADDLE INSTALLATION GUIDELINES** (Continued)

L) Keep the pipe secured from movement during both the fusion and cooling cycles. Do not handle, pressure test, tap, or backfill the tapping tee until completion of the cooling cycle. Cooling time is noted as CT on the fitting label.

1. For Central Plastics tapping tees, keep the saddle clamp in place until completion of the cooling time(s). When the tapping operation is to be performed, the saddle clamp **must** be reinstalled.

M) Following completion of the fusion cycle, the entire area of the electrofusion joint shall be visually inspected by the Operator Qualified installer and by an Operator Qualified inspector. (See Section 4.2)

N) Mark the designated installer and peer inspector identification next to the coupling. (See Sections 4.1 and 4.3)

9.0 **ELECTROFUSION EQUIPMENT**

9.1 The following universal electrofusion processors are approved for use:

- EF Technologies - Phoenix Electrofusion Processor
- Georg Fischer Central Plastics – Easy Fuse Electrofusion Processor
- Georg Fischer Central Plastics – Emie Electrofusion Processor
- Georg Fischer Central Plastics – MSA 340 Polyvalent Electrofusion Processor
- IPEX - Friamat 1 and 2 Electrofusion Processor
- IPEX - Genesis F3 Electofusion Processor

The operating manuals are located in the GasHub.

9.2 Electrofusion processor units are not intrinsically safe and shall not be used in a hazardous environment.

9.3 Due to the high amperage draw of electrofusion fittings, the electrical source should not be loaded down by other equipment when an electrofusion is being performed and the use of an extension cord is not encouraged. In the event an extension cord is needed, the following is recommended:

9.0 **ELECTROFUSION EQUIPMENT** (Continued)

Cord Length	**Wire Gauge**
≤ 25 ft.	# 12/3
25 ft.	# 10/3
50 ft.	# 8/3
100 ft	**DO NOT USE**

NOTE: Extension cords should not be used for electrofusion 16” couplings.

9.4 The following are requirements and precautions regarding the electrical equipment required to perform electrofusion:

Fitting	Fitting Size	AC Power	AMPS	Minimum Generator Wattage	Minimum Allowable Generator Output Voltage
Central Plastics	1/2" CTS to 8" IPS	110V	20	3,500	90 VAC
Friatec	2" to 6" IPS	110V	20	3,500	90 VAC
Friatec	8" IPS to 20" IPS	110V	30	4,500	95-135 VAC

10.0 **ELECTROFUSION DURING COLD AND/OR INCLEMENT WEATHER**

10.1 Extreme weather conditions may affect the quality of the electrofusion joint. The recommended ambient temperature range is as follows:

TEMPERATURE RANGE	FITTINGS	ELECTROFUSION PROCESSOR
-10°F to 120°F	Central Plastics	MSA 340
	Frialen	Genesis
-4°F to 122°F	-	Friamat
0°F to 120°F	-	Phoenix

10.2 Temperatures below 40°F

A) Pipe and fittings should be about the same temperature when they are electrofused.

10.3 During inclement weather (rain or snow)

A) Protect universal electrofusion processor and leads from the rain or snow.

10.0 ELECTROFUSION DURING COLD AND/OR INCLEMENT WEATHER

B) The pipe must clean and dry before, during, and after electrofusion.

C) Approved fire resistant tents (Class/ Stock # 689-3929, 10' x 8' or Class/ Stock # 659-3945, 6' x 6') shall only be used to protect the PE pipe at the point of joining during inclement weather and shall **not** be used when there is escaping gas.

If gas is escaping, it must be allowed to rise and vent unobstructed. If a connection is needed and the cause of the escaping gas can't be repaired in a timely manner, then making the joint with a mechanical fittings should be considered.

11.0 REFERENCES

G-8005 General Specification for Installation of Gas Distribution Mains

G-8100 General Specification for Installation of Gas Distribution Services

G-8104 PE Pipe, Tubing, and Fittings for Gas Main and Services

G-8121 Qualification of Installers Performing Heat Fusion or Electrofusion of Polyethylene (PE) Plastic Pipe/Tubing for Gas Mains And Services

G-8122 Inspection, Handling, Storage, and Transportation of Polyethylene (PE) Plastic Pipe, Tubing, and Fittings for Gas Mains And Services

G-8123 Heat Fusion Joining Of Polyethylene (PE) Plastic Pipe and Fittings for Gas Mains and Services

G-8149 Responsibility for Maintenance and Replacement of Gas Services

G-8178 Shut-Off of Polyethylene Plastic Pipe/Tubing Used for Gas Mains and Services

G-8199 Qualification Procedure for Personnel Who Join Plastic Pipe/Tubing with Mechanical Fittings

G-8204 Pressure Testing Requirements for New and Replacement Gas Mains and Services

11.0 **REFERENCES** (Continued)

G-8209	Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures
IP-9	Requirements for Written Procedures and Contingency Plans
IP-20	Installation of Mechanical Fittings for Plastic Pipe and Tubing
IP-40	Cut Outs and Tie-Ins of Existing Plastic or Plastic/Metallic Gas Mains
DOJT GAS6006	Documentation and Inspection of Polyethylene (PE) Plastic Joints on Gas Mains and Services
HOT GAS6015	Procedure for Pressure Testing and Tapping Using the Spa Saddle Tapping Tool

2015 Northeast Gas Association (NGA) Plastic Pipe Joining Manual

This Page Intentionally Left Blank

conEdison

LAST REVIEW DATE: 9/26/17 **REVIEW CYCLE: 5 Years**
★EFFECTIVE DATE: 11/9/17

SPECIFICATION: **G-100,298-7a**

TITLE: **VALVES FOR GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEMS**

VOLUME: **6**

★ COURSE ID.: **None**

★ CORE GROUP(S): **None**

★ TARGET AUDIENCE: **None**

REV 7a (4/23/18):
Added Effective Date.

Cover Page: Added Course ID, Core Group, and Target Audience designations.

Section 16.0: Added new section, "Records". Renumbered subsequent sections

REVISIONS: (See ★)

1)	Cover Page	-	Added "Effective Date", "Course ID.", "Core Groups", and "Target Audience".
2)	Table of Contents	-	Added Section 18.0: "Approved Valve List Summary Table" to Table of Contents; Merged "Environmental Review By" and "Safety Review By" to read "EH&S Review By" and added "Effective Date" to Footer.
3)	Section 18.0	-	Created new section for "Approved Valve Summary Table".
4)	Section 19.0	-	Re-sequenced from Section 18.0.
5)	Main Document: Footer	-	Added "Effective Date".

Gas Operations Standards

TITLE: VALVES FOR GAS TRANSMISSION AND DISTRIBUTION PIPING SYSTEM

★ EFFECTIVE DATE: 11/9/17				
★ EH&S REVIEW BY: Anthony DeGennaro				
AUTHOR:	**APPROVED BY:**	**DATE APPROVED:**	**VOLUME: 6**	**PAGE 1 OF**
J. Madia	**Tomas Hernandez Chief Engineer Gas Distribution Engineering**	**9/26/17**	**Purchase and Test**	**28 PAGES**

1.0 SCOPE

1.1 This specification sets forth the minimum requirements for ball and plug valves for all sizes and pressure ratings that are furnished by suppliers for installation on mains and services in Consolidated Edison's natural gas transmission and distribution systems.

1.2 Unless otherwise specified, only valves listed in Section 17.0 of this specification are approved for purchase.

1.3 All valves furnished under this specification are to be new. Reclaimed or rebuilt valves are not acceptable.

1.4 All coatings, lubricants and grease mentioned in this specification must be approved by Con Edison's Environmental, Health and Safety (EH&S) Department.

2.0 DEFINITIONS

"Company"	-	Consolidated Edison Company of New York, Inc., or its duly authorized representative
"Supplier"	-	Valve manufacturer or his authorized distributor
"ANSI"	-	American National Standards Institute
"ASME"		American Society of Mechanical Engineers
"ASTM"	-	American Society of Testing Materials
"MSS"	-	Manufacturers' Standardization Society of the Valve and Fitting Industry
"CWP"	-	Cold Working Pressure or Maximum Working Pressure (PSIG).
"C_v"	-	Capacity Factor (Flow Coefficient for Valves).
"ALT valve"	-	An alternative valve that meets the requirements of API 6D.

3.0 LEGAL REQUIREMENTS

For references to external standards cited in this specification, use the accepted revision indicated in 16 NYCRR Section 10.3. If the external standard is not listed within section 10.3, use the latest revision of the standard.

Valves purchased under this specification shall comply with the requirements in:

3.1 Title 49, Code of Federal Regulations, Part 192, Sections 192.145 and 192.363

3.2 State of New York Code, Rules and Regulations 16 NYCRR 255 "Transmission and Distribution of Gas", Sections 255.145 and 255.363.

3.3 New York City Fuel Gas Code, Appendix E, "Meters and Gas Service Piping."

4.0 MARKING AND IDENTIFICATION

4.1 All valves shall be identified with the valve type and the Company Class and Stock Number. This information shall be included on a corrosion-resistant tag permanently secured to the valve or, if space permits, included on the valve nameplate. Tags shall not be wired to the valve hand-wheel.

4.2 Markings shall conform to MSS Specification SP-25 "Standard Marking System for Valves, Fittings, Flanges, and Unions". The information listed below is also required:

A) Manufacturer/Type/Model No.
B) Figure No. or Part No.
C) Pressure Rating
D) Size
E) Serial No.
F) The gear operator model number (if applicable) and the number of turns required to fully operate gear operated valves shall be permanently marked on gear housing, the valve nameplate, or on a tag securely fastened to the valve.
G) ALT valve designations

5.0 PACKAGING AND TRANSPORTATION

5.1 Deficiencies

The supplier shall be liable to correct any deficiencies noted prior to installation that are due to damage or his failure to suitably protect all surfaces, including end connections.

5.2 Assembled Valve Requirements

A) All inside valve surfaces which will be exposed to natural gas products shall be free of metal chips, weld splatter, slag, grease, dirt, and other foreign materials.

B) Valve stem packing and bonnet gaskets shall be asbestos free and suitable for use in natural gas piping systems.

C) Valve ends shall be sealed to prevent entrance of water, dirt, or foreign materials.

D) Valves shall be shipped with the ball or plug in the following position(s):

Valve Manufacturer	**Position**
Andronaco	Fully Opened
Balon	Fully Opened
Cameron	Fully Opened
Delta	Fully Opened
Dresser	Fully Opened
Grove	Fully Opened
Kerotest	Fully Opened
Mueller	Fully Opened
Nordstrom	Fully Opened
Orbit	**Fully Closed**
Walworth	Fully opened

E) All valves shall be fully assembled; no loose parts shall be shipped in the body cavity.

F) Ball valves shall be shipped without any emergency seal lubricant in the seat areas.

6.0 METALLIC VALVE GENERAL DESIGN REQUIREMENTS

6.1 Travel and Stops

A) Valves shall operate in the clockwise direction when going from the opened to close position and shall have stops in the full open and full closed position.

B) Stops must be designed to resist being sheared off by a standard street tee wrench.

6.2 Plug Valves

A) Lubricated plug valves shall be equipped with tapered plugs.

B) Lubricated plug valves shall be provided with double ball check assemblies in the stem area to prevent leakage of gas to atmosphere when the lubrication fitting is removed.

C) Lubrication fittings shall be a combination type with a button-head end allowing lubrication with either a high-pressure gun or by the stick sealant method.

D) Lubricated plug valves shall be lubricated at the factory with an approved sealant as per Con Edison Specification G-100,011, "Valve Lubricants for Mains and Services".

E) Valve flow coefficient values (C_v values) for all valves along with their equivalent lengths shall be made available upon request to the supplier, by the Company unless this information is available on the supplier or manufacturer's website.

6.3 Ball Valves

A) The following port designs are acceptable:
- ANSI Class 150- Full port or Reducing Port (Venturi Opening)
- ANSI Class 300- Full port

B) The approved valve seat materials are Buna-N, Nylatron GSM, Hycar, Viton and Nylon. Seats shall be resistant to cracking, abrasion, cuts, or deterioration from hydrocarbons and other foreign materials common to the gas stream. Manufacturer's offering seats

6.0 METALLIC VALVE GENERAL DESIGN REQUIREMENTS (Continued)

other than the type listed above shall submit test reports demonstrating that the material is at least equivalent to those listed.

6.3 Ball Valves

C) Ball valves shall be provided with double block and bleed unless otherwise specified. An accessible vent plug must be provided in the valve body to check for leakage past either seat. The vent plug shall be designed so that it cannot blow out during operation. Body vent plugs shall be installed with teflon tape prior to the manufacturer's pressure test.

D) If a relief valve is provided as part of the valve body, the manufacturer or suppliers of valves shall remove the relief valve and install a 3000 lb. forged steel plug with ANSI tapered thread. The plug shall be seal welded. Steel plugs and button head lubrication fittings shall be installed prior to performing the pressure tests.

E) All 6" and larger size ball valves shall be provided with an emergency lubrication system so in the event of damage to the elastomer seats, a bubble-tight shutoff can be aided by injecting a sealant, as per Con Edison Specification G-100,011, through fittings in the valve seat area.

F) Dust caps shall be provided on all lubrication fittings.

7.0 METALLIC VALVE END REQUIREMENTS

7.1 Welding Ends

Steel-bodied valves with welding ends shall have the ends beveled for butt-welding to steel pipe as per ASME B16.25, "Butt-Welding Ends" - Figs. 1 and 2 (no backing ring), and ASME B31.8 Gas Transmission and Distribution Piping Systems, Appendix I, unless otherwise specified.

7.2 Flanged Ends

Steel-bodied valves with flanged ends shall have ends faced and drilled in accordance with ASME B16.5, "Steel Pipe Flanges and Flanged Fittings"

7.0 **METALLIC VALVE END REQUIREMENTS** (Continued)

and MSS SP-44, "Steel Pipe Line Flanges". Gasket surface finish shall be either concentrically or phonographically (spirally) serrated.

7.2 Flanged Ends (Continued)

Cast iron valves with flanged ends shall have ends faced and drilled in accordance with ASME B16.1, "Cast Iron Pipe Flanges and Flanged Fittings, 25, 125, and 800 lb." for Class 125 lb. flanges.

7.3 Compression Ends

Compression ends shall have conductive gaskets to provide electrical continuity between the valve and the steel gas pipe.

Material, fabrication and marking requirements for compression ends shall be in accordance with G-100,285 "Compression Couplings, Tees, Elbows, and Line Caps for Gas Pipe and Tubing."

7.4 Screwed Ends

All valves with screwed ends shall be supplied with internal Standard Taper Pipe Threads in accordance with ASME B1.20.1, "Pipe Threads, General Purpose".

8.0 VALVES FOR THE GENERAL GAS DISTRIBUTION SYSTEM

8.1 **Main and Service Curb Valves** (For buried applications)

A) Gear operated valves shall be equipped with watertight housings filled with approved machine grease. The grease or lubricant must be approved by Con Edison's Gas EH&S Department.

B) All metallic valves, except for "weld-end" valves shall be supplied with a copper crimp-on connector attached to the body of the valve for bonding, or cathodic protection requirements. The connector shall be large enough to accept a No.10 AWG stranded copper wire.

C) Buried valves shall not include relief valves.

8.0 **VALVES FOR THE GENERAL GAS DISTRIBUTION SYSTEM** (Continued)

8.2 **Service Head, Meter and Service Regulator Valves** (For above ground applications)

A) Service head valves up to 4 inch size and meter and regulator valves up to 6 inch size shall have valve stems operable with an open end wrench or equivalent.

B) Wrench-operated valves shall be designed to accommodate a locking device in the closed position.

C) Wrench-operated service head and meter valves shall be of a tamper-proof design such that removal of the gland bolts cannot be compromised or accomplished with ordinary household tools.

D) Gear-operated valves shall have steel hand-wheels capable of being replaced by a chain-wheel or having a chain operator adapter attached to it. The gearing shall be enclosed in a metal housing.

E) Valves in this section shall **not** be coated, but approved shop primer is acceptable.

8.3 **Regulator Station Valves** (For Vault Applications)

A) All ball valves shall be flanged and supplied with a hand-wheel operator.

B) Valves 6" and larger shall be equipped with a gear operator enclosed in a watertight housing.

C) All plug valves listed shall be wrench operated.

D) Valves in this section shall **not** be coated, but approved shop primer is acceptable.

8.4 **Compressor Station Valves**

No valve having shell (body, bonnet, cover, and/or end flange) components made of cast iron, malleable iron, or ductile iron may be used in the gas pipe components of compressor stations (192.145 (e) & 255.145(c))

9.0 ACCESSORIES

Operating Adapter

Main and service curb valves shall be equipped with 2" square adapters for wrench operation (unless hand-wheels or levers are specified on the purchase order). The adapter will be securely fastened to the stem so that it cannot loosen, stick to the operating key, or jam against the gear housing.

10.0 RADIOGRAPHING OF WELDS AND CASTINGS FOR ANSI CLASS 300 VALVES

10.1 When radiographic inspection of ANSI Class 300 valves is requested by the Company, the manufacturer shall inspect in accordance with API Standard 1104, "Standard for Welding Pipe Lines and Related Facilities."

10.2 All radiographs shall be marked so that they may be readily identified with the weld. Castings shall be radiographed in accordance with MSS SP-54 "Radiographic Examination Method" and MSS SP-55 "Visual Method."

11.0 STEEL AND CAST IRON VALVE MATERIAL AND PRESSURE RATING

11.1 For steel valves furnished as ANSI 150 and 300 classes (unless otherwise specified), the maximum working pressures or CWP ratings shall be 285 and 740 psig, respectively. These valves shall be steel as per ASTM 216 grade WCB or WCC or ASTM A350LF2 according to the manufacturer.

11.2 For Cast Iron valves furnished in accordance with ASTM A126 Class B, the maximum working pressures or CWP rating shall be between 125 and 200 psig.

12.0 TESTING

12.1 The Company's Purchasing Department may canvass manufacturers and direct all potential suppliers of valves to the Gas Development Lab for the approval process covered in Section 12.4.

12.2 Each steel ball and plug valve must be hydrostatically shell and seat tested by the manufacturer to meet the minimum requirements of API 6D

12.0 **TESTING** (Continued)

"Specification for Pipeline Valves", Section 11.0 prior to shipment to the Company.

12.3 Each cast iron valve must be tested by the manufacturer and meet the requirements set forth in MSS SP-78 "Cast Iron Plug Valves, Flanged and Threaded Ends", Tables II and III prior to shipment to the Company.

12.4 Certification of tests performed shall be submitted to the Company by the manufacturer when the valve is purchased.

12.5 The Test Report/Certificate of Compliance shall contain the Procurement Dept. Purchase Order Number, and Company Work Order number to facilitate Transmission System record keeping requirements.

12.6 For all ANSI 300 class valves, a copy of the individual valve's Test Report/Certificate of Compliance shall accompany each valve when shipped to Con Edison. A copy shall also be sent to the Manager of Major Projects, Gas Engineering Department, 1615 Bronxdale Avenue – Bldg 21 – 2nd Floor, Bronx, New York 10462

12.7 When approving a new valve for service, the Gas Development Lab may perform extended testing of valves as outlined in "Tests for Valves" based on Company Specifications and Industry Standards'. These tests do not qualify new valves per API 6D or any other industry standard and are not meant to replace the aforementioned industry testing standards. Acceptance of new valves for use in the distribution and transmission system shall include a qualification documentation review and consultation with the manufacturer and their authorized representative(s).

12.8 The Gas Development Lab shall test one size of a specific design valve of the same manufacturer. Acceptance or rejection shall apply to all valves of same design. Changes to the design between sizes will require additional testing. The Lab shall produce an Acceptance Test Report which describes all tests that were performed and the results of such tests.

12.9 The approval of any valve shall be through the Lab's Acceptance Test report. This report will document all reviews and/or appropriate extended test results. It will then recommend the valve's approval to the appropriate Section Manager. The Section Manager shall then approve the valve by signing the Lab's Acceptance Report.

13.0 POLYETHYLENE VALVE GENERAL REQUIREMENTS

13.1 Travel and Stops

A) Valves shall operate in the clockwise direction when going from the opened to close position and shall have stops in the full open and full closed position.

B) Stops must be designed to resist being sheared off by a standard street tee wrench.

13.2 Polyethylene (PE) valves shall meet the requirements of ASME B16.40, ASTM D2513 and ASTM D3261.

13.3 All PE resins used in the fabrication of ball and plug valves shall be meet the minimum requirements of ASTM Material Designation PE3408 or PE4710 for high density polyethylene materials.

13.4 All IPS and 1/2" CTS valves must be rated for operating pressures up to 100 psig, and for service temperatures ranging from minus 20° F to 140° F.

13.5 All 1" CTS and 1 1/4" CTS valves must be rated for operating pressures up to 89 psig and 72 psig, respectively and for service temperatures ranging from minus 20°F to 140°F.

13.6 All polyethylene valves 8" I.P.S and greater that will be installed in the distribution system by using either heat fusion or electrofusion shall be supplied by the manufacturer with 10" long "pup" pieces butt fused onto each end. Manufacturers shall supply letters of compliance that show their joining procedure is qualified per 49 CFR §192.283.

14.0 COATING

14.1 Unless otherwise specified, all metallic valves for underground use or use in regulator manholes shall be supplied factory coated. The surface preparation and coating application shall be in accordance with the coating manufacturer's recommended procedure. All coatings must be approved by Con Edison's Corrosion Control Section. Approved coatings and minimum dry film thicknesses shall be as follows:

Valve Manufacturer	Approved Mill Coating	Minimum Dry Film Thickness
Delta	Tarset	20 Mils
Grove	Tarset	20 Mils
Orbit	Tarset	20 Mils
Cameron	Bitumastic No. 300-M	20 Mils
Nordstrom	Tarset	20 Mils
Walworth	Scotchkote 309	20 Mils
Southern Manufacturing	Bitumastic No. 300-M	20 Mils
Dresser	1) Al-Clad Plastisol 017 for Black Valve Bodies and compression end nuts	35 Mils
	2) Al-Clad E-Coat Black (2" Sq. Operating nut only)	0.8 Mils

14.2 Bare welding ends, flange ends, and areas of the valve which will not be exposed to the environment after installation need not be coated. However, these areas must be protected to prevent corrosion during storage and shipment. Flange faces and the inside of anode connectors shall not be coated.

14.3 Valves supplied with welding ends shall have the coating cut back 2" from each end unless valve end geometry makes this impractical. After coating, all valves shall be operated one complete cycle to ensure operability.

14.0 **COATING** (Continued)

14.4 All valves shall be adequately packaged to prevent any damage to the coating during shipping, handling, or storage.

15.0 **APPROVALS**

15.1 Engineering drawings and component material specifications and MSDS sheets (coatings, shop primers, lubricants) must be submitted to the Gas Development Lab by manufacturers who wish to have their valves considered for approval in accordance with testing requirements of Section 12 of this specification. Specific samples shall be supplied by the manufacturer for testing when requested.

15.2 The Gas Development Lab will notify the Chief Gas Distribution Engineer, the Chief Gas Transmission Engineer, and the Purchasing Department of valves that have successfully passed Company reviews and/or testing requirements and are approved for inclusion on the Material Management System. A hard copy of this approval letter shall be kept with the file.

15.3 The manufacturer shall make no variation in the valve design, materials of construction, coatings or markings after inclusion of the valve in any of the approved lists of this specification. Proposed modifications shall be submitted to the Gas Development Lab for consideration for approval.

15.4 Approval of a specific valve design applies to all size valves and pressure classes made in the same design and by the same manufacturer. When applicable, the approval will be indicated in the Lab's Acceptance Test Report which is signed by the appropriate Chief Engineer in Gas Engineering.

16.0 **RECORD RETENTION**

Any records generated in the course of performing work in accordance with this specification shall be maintained as required by Corporate Instruction CI-870-1 "Records Management". Guidance on the retention of Company Gas Operations records can also be found on the Records Management intranet site.

17.0 REFERENCE SPECIFICATIONS

G-100,285 - "Compression Couplings, Tees, Elbows, and Line Caps for Gas Pipe and Tubing

G-100,011 - "Valve Lubricants For Gas Mains and Services"

18.0 APPROVED VALVE LIST

18.1 Plug Valves: Cast Iron - Compression Ends - Wrench Operated

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
1"	Non-Lub	Southern Manufacturing	0100-425-D-1-RS49	175	374-2145
		Dresser	0175-0127-288	175	
1 ¼"	Non-Lub	Southern Manufacturing	0125-425-D-1-RS49	175	374-2152
		Dresser	0175-0128-288	175	
1 ½"	Non-Lub	Southern Manufacturing	0150-425-D-1-RS49	175	374-2160
		Dresser	0175-0129-288	175	
2"	Non-Lub	Southern Manufacturing	0200-425-D-1-RS49	175	374-2178
		Dresser	0175-0130-288	175	

(Continued on next page)

18.0 **APPROVED VALVE LIST** (Continued)

18.1 **Plug Valves: Cast Iron -Compression Ends - Wrench Operated** (Continued)

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
3"	Non-Lub	Southern Manufacturing	0300, FIG 425, D, 1, RS49, BNG479 (PN 9183270) * see note	175	374-2194
4"	Non-Lub	Southern Manufacturing	0400, FIG 425, D, 1, RS49, BNG479 (PN 9243236) * see note	175	374-2202
6"	Lub	Nordstrom	24191	200	374-2210

* Valves with an asterisk should include Dresser followers, gaskets, nuts and bolts, ground lug for 8 AWG wire, surface preparation per SSPC-SP5 and coatings per section 14.1

18.2 **Plug Valves: Cast Iron - Screwed - Wrench Operated (Short Pattern)**

Size	Type	MFR	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
3/4"	Non-Lub Lub Lub	Dresser Walworth Nordstrom	0175-0007-161 1796T 142T	175 200 200	374-2350
1"	Non-Lub Lub Lub	Dresser Nordstrom Walworth	0175-0011-161 142T 1796T	175 200 200	374-0248
1 1/4"	Non-Lub Lub Lub	Dresser Nordstrom Walworth	0175-0012-161 142T 1796T	175 200 200	374-2434
1 1/2"	Non-Lub Lub Lub	Dresser Nordstrom Walworth	0175-0013-161 142T 1796T	175 200 200	374-2095

(Continued on next page)

18.0 **APPROVED VALVE LIST** (Continued)

18.2 **Plug Valves: Cast Iron –Screwed - Wrench Operated (Short Pattern)** (Continued)

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
2"	Non-Lub Lub Lub	Dresser Nordstrom Walworth	0175-0006-161 142T 1796T	175 200 200	374-0321
3"	Lub	Nordstrom	142T	200	374-0354
4"	Lub	Nordstrom	142T	200	374-2103

18.3 **Plug Valves: Cast Iron - 125 Lb.Flanged - Wrench Operated (Short Pattern)**

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
3"	Lub	Nordstrom Walworth	143T 1797F	200	374-1345
4"	Lub	Nordstrom Walworth	143T 1797F	200	374-2335
6"	Lub	Nordstrom Walworth	143T 1718F	200	374-0413
8”	Lub	Nordstrom Walworth	143T 1718F	200	374-0507

18.0 **APPROVED VALVE LIST** (Continued)

18.4 **Plug Valves: Cast Iron - 125 Lb.Flanged - Gear Operated (Short Pattern)**

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
6"	Lub Lub	Nordstrom Walworth	50169 1727F	200 200	374-2269
8"	Lub Lub	Nordstrom Walworth	50169 1727F	200 200	374-2285
10"	Lub	Walworth	1727F	200	Non-Stock
12"	Lub Lub	Nordstrom Walworth	50169 1727F	200 200	374-2301
16”	Lub	Nordstrom	50169	200	374-2582

18.5 **Plug Valves: Cast Iron - Screwed - Wrench Operated (Regular Pattern)**

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
4"	Lub	Nordstrom	524	500	Non-Stock

18.0 **APPROVED VALVE LIST** (Continued)

18.6 **Plug Valves: Cast Iron - 125 Lb Flanged- Wrench Operated (Regular Pattern)**

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
4"	Lub	Nordstrom	525	500	Non-Stock
6"	Lub	Nordstrom	525	500	
	Lub	Walworth	1700FT	200	Non-Stock

18.7 **Plug Valves: Cast Iron - 125 Lb Flanged - Gear Operated (Regular Pattern)**

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
6"	Lub	Nordstrom	50169	200	
	Lub	Walworth	1707F	200	374-2277
8"	Lub	Nordstrom	50169	200	
	Lub	Walworth	1707F	200	374-2293
10"	Lub	Nordstrom	50169	200	
	Lub	Walworth	1707F	200	374-2772
12"	Lub	Nordstrom	50169	200	
	Lub	Walworth	1707F	200	374-2319

18.0 **APPROVED VALVE LIST** (Continued)

18.8 **Plug Valves: Steel – Butt Welding – Wrench Operated (Short Pattern)**

Size	Type	WE Wall Thickness, In.	Mfr	Figure Number	ANSI Class	Con Edison Stock #
1"	Lub	0.179	Nordstrom	2024 1/2*	300	374-1634*****
2"	Lub Lub	0.154	Nordstrom Walworth	1925 1/2 1749WE	150 150	374-2392
2"	Lub	0.218	Nordstrom	2045 1/2	300	374-2632
3"	Lub Lub	0.216	Nordstrom Walworth	1925 1/2 1749WE	150 150	374-2400
3"	Lub	0.216	Nordstrom	2045 1/2	300	Non-Stock
4"	Lub	0.237	Nordstrom	1925 1/2	150	374-2418
6"	Lub Lub	0.280	Nordstrom Walworth	4185 1/2 1967WE	150 150	374-2426 374-2426

****** *Valves with an asterisk are socket weld*

18.9 **Plug Valves: Steel - Screwed - Wrench Operated (Short Pattern)**

Size	Type	Mfr	Figure Number	ANSI Class	Con Edison Stock #
1"	Lub	Nordstrom	2024	300	374-1360
2"	Lub	Walworth Nordstrom	1760 2024	300 300	374-1865

18.10 **Plug Valves: Steel - Butt Welding - Gear Operated**

Size	Type	WE Wall Thickness, In.	Mfr	Figure Number	ANSI Class	Con Edison Stock #
8"	Lub	0.322	Nordstrom	4187 1/2	150	374-2236
10”	Lub	0.365	Nordstrom	4187 1/2	150	374-2244
12"	Lub	0.375	Nordstrom	4187 1/2	150	374-2251

18.0 **APPROVED VALVE LIST** (Continued)

18.11 **Plug Valves: Steel - 150 Lb Flanged - Wrench Operated (Short Pattern)**

Size	Type	Mfr	Figure Number	ANSI Class	Con Edison Stock #
2"	Lub Lub	Nordstrom Walworth	1925 1749FT	150 150	374-2343
3"	Lub Lub	Nordstrom Walworth	1925 1749FT	150 150	Non-Stock
4"	Lub Lub	Nordstrom Walworth	1925 1749FT	150 150	374-2764
6"	Lub	Nordstrom	1945	150	Non-Stock

18.12 **Ball Valves: Steel – 150 Lb Flanged – W/Handwheel (Full Port)**

Size	Type	Ball Bore	Mfr	Figure Number	ANSI Class	Con Edison Stock #
2"	Double Block & Bleed	2.06”	Orbit Cameron	1123MBB-RF 800101-2-216	150	379-5853
3"	Double Block & Bleed	3.13”	Orbit Cameron	1123BB 800101-2-216	150	379-5838
4"	Double Block & Bleed	4.06”	Orbit Cameron	1123MSBB 800101-2-216	150	379-5861
6"	Double Block & Bleed	6.00”	Orbit Grove Cameron Delta	1123BBGS B-5 800101-2-216 Type 55	150 150 150 150	379-5887
8"	Double Block & Bleed	8.00”	Orbit Grove Cameron Delta	1123MBB-RF B-5 800101-2-452B Type 55	150 150 150	374-2871
10"/12" 16"	Double Block & Bleed	10” 12” 15.25”	Orbit Grove Cameron Delta	1123BB B-5 800101-2-452B Type 55	150 150 150 150	Non-Stock

18.0 **APPROVED VALVE LIST** (Continued)

18.12a Ball Valves: Steel -150 Lb Flanged

Size	Mfr	Figure Number	ANSI Class	Con Edison Stock #
2”	Ball-O-Max Kerotest	2BMF285RP 72566896	150 150	379-7222
3”	Ball-O-Max Kerotest	3BMF285RP 72566904	150 150	379-7214
4”	Ball-O-Max Kerotest	4BMF285RP 72566912	150 150	379-7206

18.13 Plug Valves: Steel - 300 Lb Flanged - Wrench Operated (Short Pattern)

Size	Type	Mfr	Figure Number	ANSI Class	Con Edison Stock #
1"	Lub	Nordstrom	2025	300	374-0180
2"	Lub	Nordstrom	2025	300	374-0842

18.13a Plug Valves: Steel - 300 Lb Flanged - Venturi Pattern

Size	Type	Mfr	Figure Number	ANSI Class	Con Edison Stock #
6”	Lub	Nordstrom	4249	300	374-0198

18.0 **APPROVED VALVE LIST** (Continued)

18.14 **Ball Valves: Steel - 300 Lb Flanged - W/Handwheel (Full Port)**

Size	Type	Ball Bore	Mfr	Figure Number	ANSI Class	Con Edison Stock #
2"	Double Block & Bleed	2.06”	Orbit Cameron	1223MBB-RF T-31	300	379-5846
3"	Double Block & Bleed	3.13”	Orbit Cameron	1223MBB-RF T-31	300	379-5812
4"	Double Block & Bleed	4.06”	Orbit Cameron	1223MBB-RF T-31	300	379-5879
6"	Double Block & Bleed	6.00”	Orbit Grove Cameron Delta	1223MBB-RF B-5 T-31 Type 55	300	379-5820
8"	Double Block & Bleed	8.00”	Orbit Grove Cameron Delta	1223MBB-RF B-5 T-32 Type 55	300	379-7180
10"	Double Block & Bleed	10.00”	Grove Orbit Cameron Delta	B-5 1223MBB-RF T-32 Type 55	300	379-6703
12", 16", 20"	Double Block & Bleed	12.00” 15.25” 19.25”	Grove Orbit Cameron Delta	B-5 1223MBB-RF T-32 Type 55	300	Non-Stock

18.15 **Ball Valves: Steel - Butt Welding - Wrench Operated (Full Port)**

Size	Type	WE Wall Thickness, In.	Mfr	Figure Number	ANSI Class	Con Edison Stock #
2"	Double Block & Bleed	0.218 0.154	Cameron Cameron	T-31 T-31	300 150	Non-Stock Non-Stock
3"	Double Block & Bleed	0.216 0.216	Cameron Cameron	T-31 T-31	300 150	Non-Stock Non-Stock
4"	Double Block & Bleed	0.237 0.237	Cameron Cameron	T-31 T-31	300 150	379-7164 379-7164

18.0 **APPROVED VALVE LIST** (Continued)

18.16 **Ball Valve: Steel - Butt Welding - Gear Operated (Full Port)**

Size	Type	WE Wall Thickness, In.	Mfr	Figure Number	ANSI Class	Con Edison Stock #
6"	Double Block & Bleed	0.280	Grove	B-5	300	374-2525
		0.280	Cameron	T-31	300	374-2525
		0.280	Delta	Type 55	300	374-2525
		0.280	Grove	B-5	150	374-2525
		0.280	Cameron	T-31	150	374-2525
		0.280	Delta	Type 55	150	374-2525
8"	Double Block & Bleed	0.322	Grove	B-5	300	374-2517
			Grove	B-5	150	Non-Stock
			Cameron	T-32	300	374-2517
			Cameron	T-32	150	Non-Stock
			Delta	Type 55	300	374-2517
			Delta	Type 55	150	
10"	Double Block & Bleed	0.365	Grove	B-5	300	Non-Stock
			Grove	B-5	150	Non-Stock
			Cameron	T-32	300	Non-Stock
			Cameron	T-32	150	Non-Stock
			Delta	Type 55	300	Non-Stock
			Delta	Type 55	150	
12"	Double Block & Bleed	0.375	Grove	B-5	300	374-2509
			Cameron	T-32	300	374-2509
			Delta	Type 55	300	Non-Stock
16"	Double Block & Bleed	0.375	Grove	B-5	300	374-2491
			Grove	B-5	150	Non-Stock
			Cameron	T-32	300	374-2491
			Cameron	T-32	150	Non-Stock
			Delta	Type 55	300	374-2491
			Delta	Type 55	150	Non-Stock
20"	Double Block & Bleed	0.375	Grove	B-5	300	374-2483
		0.375	Grove	B-5	150	Non-Stock
		0.500	Grove	B-5	300	379-7487
		0.375	Cameron	T-32	300	374-2483
		0.375	Cameron	T-32	150	Non-Stock
		0.500	Cameron	T-32	300	379-7487
		0.375	Delta	Type 55	300	374-2483
		0.375	Delta	Type 55	150	Non-Stock
		0.500	Delta	Type 55	300	379-7487

(Continued on next page)

18.0 **APPROVED VALVE LIST** (Continued)

18.16 **Ball Valve: Steel - Butt Welding - Gear Operated (Full Port)** (Cont'd)

Size	Type	WE Wall Thickness, In.	Mfr	Figure Number	ANSI Class	Con Edison Stock #
24"	Double Block & Bleed	0.375	Grove	B-5	300	379-6695
		0.375	Grove	B-5	150	Non-Stock
		0.500	Grove	B-5	300	379-7479
		0.500	Cameron	T-32	300	379-7479
		0.500	Cameron	T-32	150	Non-Stock
		0.375	Cameron	T-32	300	379-6695
		0.375	Delta	Type 55	300	379-6695
		0.375	Delta	Type 55	150	Non-Stock
		0.500	Delta	Type 55	300	379-7479
		0.500	Delta	Type 55	150	Non-Stock
30"	Double Block & Bleed	0.375	Grove	B-5	300	Non-Stock
		0.375	Grove	B-5	150	Non-Stock
		0.500	Grove	B-5	300	379-6687
		0.500	Cameron	T-32	300	379-6687
		0.375	Cameron	T-32	150	Non-Stock
		0.375	Cameron	T-32	300	Non-Stock
		0.375	Delta	Type 55	300	Non-Stock
		0.375	Delta	Type 55	150	379-6687
		0.500	Delta	Type 55	300	
36"	Double Block & Bleed	0.562	Grove	B-5	300	379-0457 *
		0.375	Grove	B-5	150	379-7461
		0.562	Cameron	T-32	300	379-0457 *
		0.375	Cameron	T-32	150	379-7461
		0.562	Delta	Type 55	300	379-0457 *
		0.375	Delta	Type 55	150	379-7461

***** *Valves with an asterisk include pup pieces*

18.0 **APPROVED VALVE LIST** (Continued)

18.17 Plastic Plug Valves - Wrench Operated

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
1/2"	CTS .090 WT	Perfection	45054	100	374-2798
1"	CTS .090 WT	Perfection	45071	89	374-2731
	IPS SDR-11	Perfection	45200	100	374-2665
1 1/4"	CTS .090 WT	Perfection	45183	72	374-2749
	IPS SDR-11	Perfection	45161	100	374-2657

18.18 Plastic Ball Valves - Wrench Operated

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG
1/2"	CTS .090 WT	Andronaco Polyvalve	.589500.090	100
1"	CTS .090 WT	Andronaco Polyvalve	1-89500.090	89
	PS SDR-11	Andronaco Polyvalve	1-89500.101	100
1 1/4"	CTS .090 WT	Andronaco Polyvalve	1-89500.090	72
	IPS SDR-11	Andronaco Polyvalve	1-2589211	100

18.0 **APPROVED VALVE LIST** (Continued)

18.19 **Plastic Ball Valves - Wrench Operated Full Port**

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
2”	IPS SDR 11	Andronaco Polyvalve RW Lyall Polytec Valve Broen Kerotest	89111 BV0200Y-MFNO-000 SDR11 PE FP B VLV BF PEB2IHD 100 DR11 14 99052011	100	379-4229
3"	IPS SDR 11	Andronaco Polyvalve RW Lyall Polytec Valve Broen Kerotest	89111 BV0300Y-MFNO-000 SDR11 PE FP B VLV BF PEB3IHD 100 DR11 14 99053011	100	379-7412
4"	IPS SDR 11	Andronaco Polyvalve RW Lyall Polytec Valve Broen Kerotest	89111 BV0400-MFNO-000 SDR11 PE FP B VLV BF PBE4IH 100 DR11 14 99054011	100	379-7271
6"	IPS SDR 11	Andronaco Polyvalve RW Lyall Polytec Valve Broen Kerotest	89111 BV0600Y-MFNO-000 SDR11 PE FP B VLV BF PEB6IHD100 DR11 14 99056011	100	374-2921
8”	IPS SDR 11	Andronaco Polyvalve RW Lyall Polytec Broen Kerotest	89111 BV0800-MFNO-000 SDR11 PE FP B VLV BF PEB8IHD100 DR11 14 99058011	100	374-2939

(Continued on next page)

18.0 **APPROVED VALVE LIST** (Continued)

18.19 **Plastic Ball Valves - Wrench Operated Full Port** (Continued)

Size	Type	Mfr	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
12"	IPS SDR 11	Andronico Polyvalve Broen Kerotest	89111 PEB12IHD100 DR11 51 99159311	100	379-7198
16"	IPS SDR 11	Broen	PEB16IHD100 DR11 51	100	374-0263

18.20 **Meter Valves (Security-Type) - Screwed Wrench Operated**

Size	Type	MFR	Figure Number	Max Working Pressure PSIG	Con Edison Stock #
3/4"	Shur-Stop	Mueller Co.	805002	175	374-2616
3/4"		AY McDonald Dresser Jomar	560P 275 T-175LWN	175 175 175	374-0644
	Tamper-proof	Muller Co.	H-11118-B	100	
1"	Shur-Stop	Mueller Co.	805006	175	374-2624
1"		AY McDonald Dresser Jomar	560P 275 T-175LWN	175 175 175	374-0651
	Tamper-proof	Muller Co.	H-11118-B	100	
1 1/4"		AY McDonald Dresser Jomar	560P 275 T-175LWN	175 175 175	374-2897
	Tamper-proof	Muller Co.	H-11118-B	100	
1 1/2"		AY McDonald Jomar	560P T-175LWN	175 175	374-2905
	Tamper-proof	Muller Co.	H-11118-B	100	
2"		AY McDonald Jomar	560P T-175LWN	175 175	374-2913
	Tamper-proof	Muller Co.	H-11118-B	100	

★ 19.0 APPROVED VALVE LIST SUMMARY TABLE

All of the approved valves which appear in Section 17.0 are conveniently summarized in a table which includes the *number of turns* and the *turning direction for each valve*. This table appears in the home page of the Gas Hub's Gas Specifications Website and is available by clicking the following link:

Approved Valve List for Gas Transmission and Distribution Piping Systems

★ 20.0 VALVE MANUFACTURERS

Periodically, valve manufacturers change ownership and the names listed on the nameplates change. Attached is a list of valve name equivalents for valve approval reference.

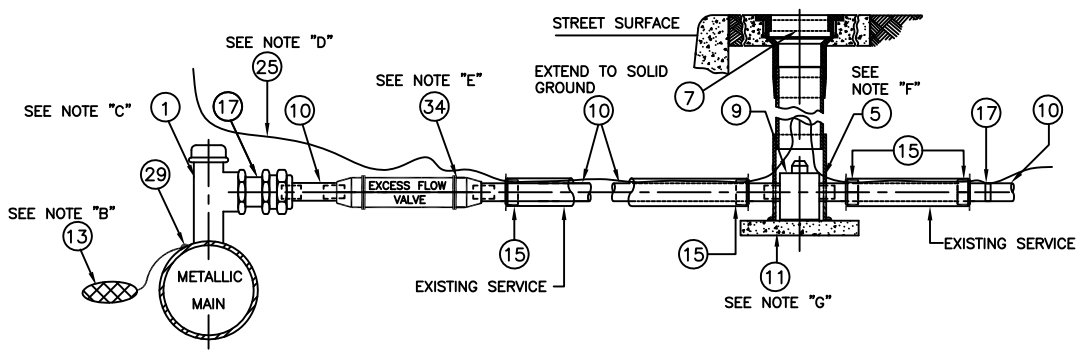
Manufacturer – New Designation	**Manufacturer** – Old Designation
Dresser	Grove
Southern Manufacturing	Dezurik

This Page Intentionally Left Blank

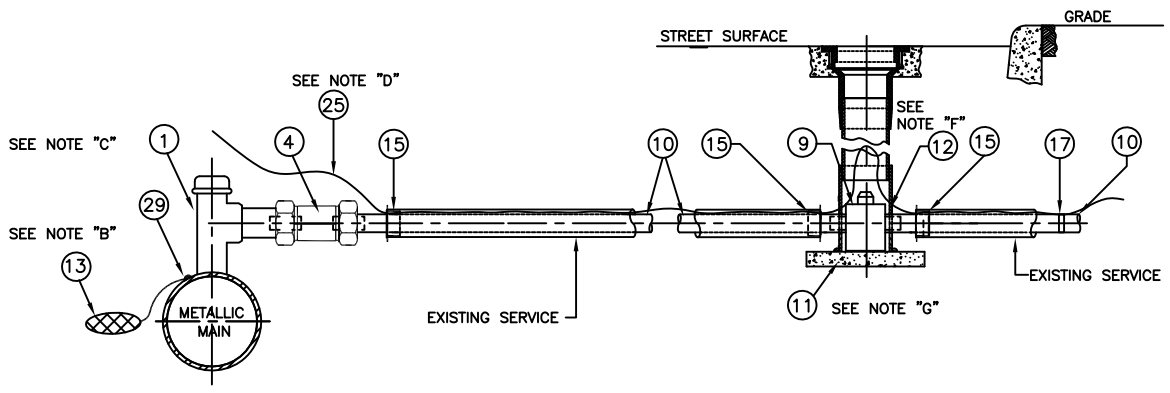
EO-16641-A SHEET 1 OF 4

REVISIONS

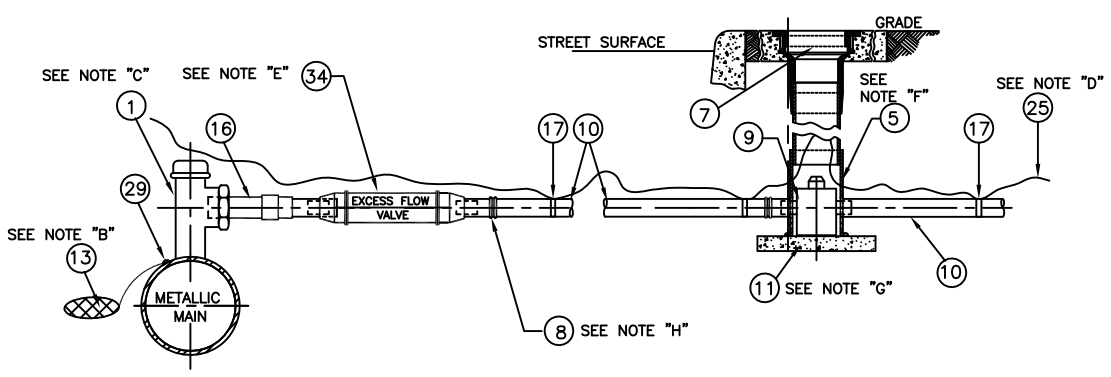
M. BALDOVIN B.DAS	2
REDRAWN BY CAD. UPDATED DWG. REVISED NOTES. ADDED SHEET #4 OF 4 RAJ 5/16/06	
M. BALDOVIN 7/27/06	3
REVISED DWG AND NOTES. CP 6/23/06	
M. BALDOVIN 6/22/11	4
REVISED DRAWING AND NOTES. D.J. 6/22/11	



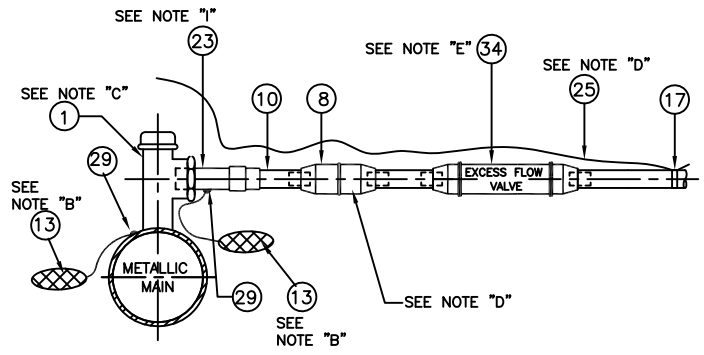
RECOMMENDED INSERTION INSTALLATION



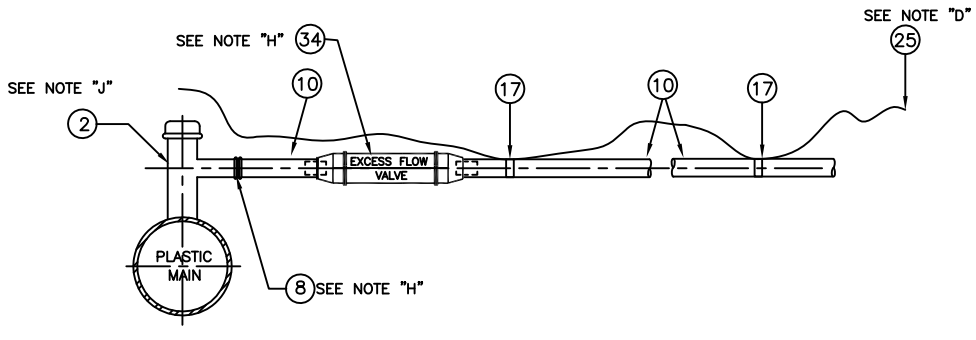
ALTERNATE INSTALLATION OF CURB VALVE FOR SERVICE RENEWALS BY REAMING THROUGH THE EXISTING CURB VALVE (SEE NOTE D)



RECOMMENDED DIRECT BURIAL INSTALLATION



ALTERNATE TEE CONNECTION



TYPICAL HP DIRECT BURIAL INSTALLATION

SEE ADDITIONAL SHEETS 2 OF 4 OF THIS DRAWING # EO-16641-A INSTALLATION OF PLASTIC (DIRECT BURIAL OR INSERTION) GAS SERVICE PIPING, AND SHEETS 3 & 4 FOR BILL OF MATERIALS.

CONST.STDS. VOLUME 2

INSTALLATION OF PLASTIC (DIRECT BURIAL OR INSERTION) GAS SERVICE PIPING

CONSOLIDATED EDISON COMPANY OF N.Y., INC.
GAS ENGINEERING DEPT

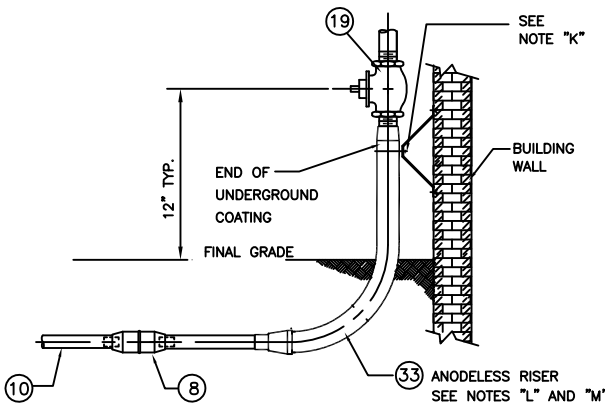
DATE 2/9/84
LAST REV. 6/22/11

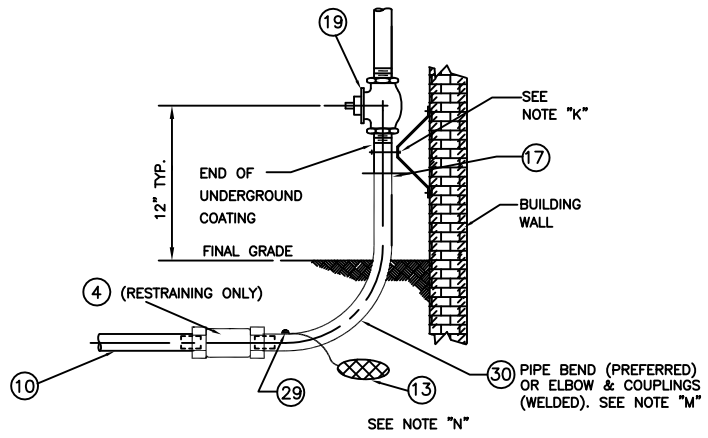
DWG. NO EO-16641-A REV. 4
SHEET 1 OF 4

EO-16641-A-2 SHEET 2 OF 4

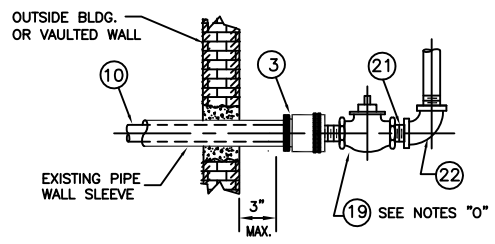
REVISIONS

M. BALDOVIN B. DAS	2
REDRAWN BY CAD UPDATED DRAWING REVISED NOTES. ADDED SHEET #4 OF 4 RAJ. 5/16/06	
M. BALDOVIN 7/27/06	3
UPDATED DRAWING REVISED NOTES. C.P. 6/26/06	
M. BALDOVIN 6/22/11	4
UPDATED DRAWING REVISED NOTES. D.J. 6/22/11	

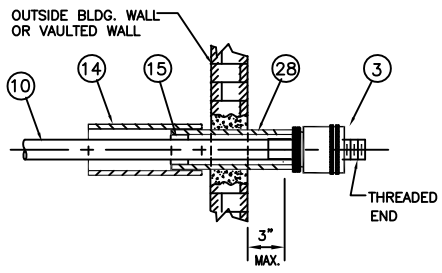




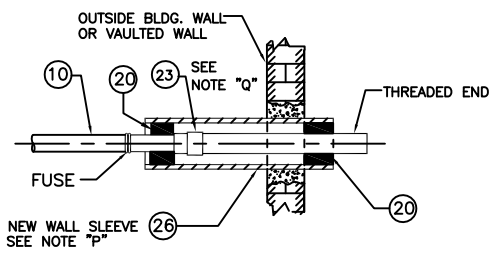
OUTSIDE CONNECTION TO CUSTOMER'S PIPING



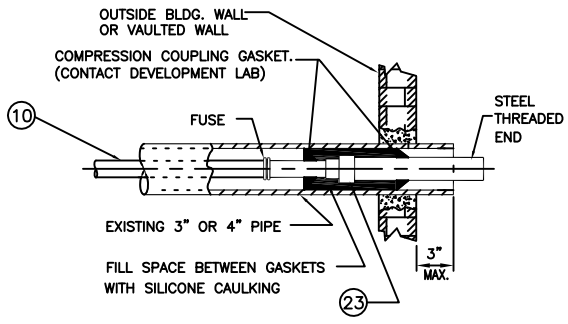
INSIDE CONNECTION TO CUSTOMER'S PIPING



INDOOR SERVICE HEAD ADAPTER WITH NEW WALL SLEEVE UP TO 2" PE SERVICE



ALTERNATE CONNECTION TO CUSTOMER'S PIPING



INSERTION OF 2" PLASTIC INTO 3" STEEL PIPE OR 3" PLASTIC INTO 4" STEEL PIPE

NOTES:

A – ALL CUSTOMER'S WORK SHALL CONFORM TO THE "REQUIREMENTS FOR GAS SERVICE INSTALLATIONS" BOOK AND ALL LOCAL CODE REQUIREMENTS.
B – REFER TO G–8205 FOR MAGNESIUM ANODE INSTALLATION REQUIREMENTS ON UNPROTECTED STEEL GAS MAINS AND METALLIC FITTINGS.
C – REFER TO G–8100 FOR INSTALLATION REQUIREMENTS OF SEVICE TEES ON PLASTIC MAINS. FOR LIVE 1¼" IPS PLASTIC MAINS, SERVICE TEE SHALL ONLY BE CONNECTED VIA ELECTROFUSION OF APPROVED MECHANICAL TEE. DO NOT SIDEWALL FUSE ON A LIVE 1¼" IPS PLASTIC MAIN. FOR DEAD 1¼" IPS PLASTIC MAINS, SERVICE TEES MAY BE CONNECTED VIA SIDEWALL FUSION, ELECTROFUSION, OR APPROVED MECHANICAL TEE.
D – REFER TO G–8100 FOR TRACER WIRE INSTALLATION REQUIREMENTS ON DIRECT BURIED PLASTIC SERVICES, TRENCHLESS TECHNOLOGY AND INSERTED SERVICES.
E – REFER TO G–8100 FOR EXCESS FLOW VALVE (EFV) INSTALL REQUIREMENTS. PREFERRED METHOD OF INSTALLATION IS EFV WITH STAB ENDS INTO STAB END ADAPTER ON TEE.
F – PLASTIC CURB VALVE BOX (ITEM 5) SHALL BE USED IN SIDEWALK AND NON–PAVED AREAS; CAST IRON CURB BOX (ITEM 13) SHALL BE USED IN THE STREET.
G – SUPPORT THE CURB VALVE BOX (ITEM 12) WITH PRE–CAST BASE (ITEM 11) OR BRICKS (ITEM 27). ENTIRE ASSEMBLY SHOULD BE ON WELL COMPACTED SOIL.
H – REFER TO G–8100 FOR THE INSTALLATION OF PLASTIC MOLDED FITTINGS REQUIREMENTS. PLASTIC MOLDED FITTINGS CAN NEVER BE JOINED TO PLASTIC PIPE/TUBING OR OTHER MOLDED FITTINGS BY MECHANICAL FITTINGS.
I – REFER TO G–8100 FOR INSTALLATION REQUIREMENTS OF TRANSITION FITTINGS.
J – REFER TO G–8100 AND EO–16645–B FOR INSTALLATION REQUIREMENTS OF SERVICE CONNECTIONS TO MAINS.
K – RISER SUPPORT TO BE INSULATED FROM PIPE WITH NEOPRENE (OR EQUIVALENT) WRAPPED AROUND PIPE.
L – IPS PLASTIC PIPE CONNECTIONS SHALL BE BUTT FUSED WHENEVER POSSIBLE. FOR CTS PLASTIC PIPE CONNECTIONS, USE PERMASERT COUPLINGS (ITEM 8). COUPLINGS UP TO AND INCLUDING 12" SHALL ONLY BE A RESTRAINING–TYPE.
M – REFER TO G–8100 FOR INSTALLATION REQUIREMENTS OF GAS SERVICES THAT ENTER A BUILDING THROUGH THE FLOOR; GAS SERVICES INSERTED/INSTALLED UNDER AN ENCLOSED LIVING SPACE; GAS SERVICES INSTALLED THROUGH A SUBSURFACE VAULT OR OPEN AREAWAY; GAS SERVICES INSTALLED IN AN OPEN AREA UNDERNEATH AN OUTSIDE STAIRCASE. SEE EO–16546–B, EO–4890–B, G–8096.
N – REFER TO G–8205 FOR MAGNESIUM ANODE INSTALLATION REQUIREMENTS ON PIPE BEND AND COUPLINGS; ANODE NOT REQUIRED FOR ANODELESS RISER INSTALLATION.
O – REFER TO G–8100 FOR SERVICE HEAD VALVE (S/H/V) INSTALLATION REQUIREMENTS.
P – REFER TO G–8096 FOR ANNULAR SPACE SEALING REQUIREMENTS. USE TRANSITION FITTING FOR ≥1¼" IPS PLASTIC PIPE AND INSTALL LINK SEAL (ITEM 20). FOR ½" CTS – 1¼" CTS/IPS PLASTIC PIPE, EXTEND PLASTIC THROUGH A THREADED STEEL WALL SLEEVE (ITEM 26) AND SEAL THE ANNULAR SPACE INSIDE THE BUILDING BY INSTALLING SERVICE HEAD VALVE ADAPTER (ITEM 3). THE OUTSIDE ANNULAR SPACE SHALL BE SEALED BY USING 3M COLD SHRINK OR "SLIPSEALS" (ITEM 20).
Q – FOR IPS PLASTIC PIPE, USE TRANSITION FITTING (ITEM 23). FOR CTS PLASTIC PIPE, USE STAB END ADAPTER (ITEM 16) AND PVC SLEEVE (ITEM 14).
R – ALL DIRECT BURIED PLASTIC SERVICES USING 1" OR 1¼" CTS PLASTIC PIPE SHALL BE INSTALLED IN A SLEEVE (ITEM 14) AND SHALL ONLY BE USED FOR LOW PRESSURE SERVICES.
S – "WARNING BURIED GAS LINES BELOW" TAPE (ITEM 31) MUST BE INSTALLED AT A MINIMUM OF 12" ABOVE THE TOP OF THE DIRECT BURIED NEW/REPLACEMENT SERVICE. WHEN NEW/REPLACEMENT SERVICES ARE INSERTED, THE TAPE IS TO BE INSTALLED IN ALL EXCAVATIONS, SUCH AS THE MAIN CONNECTION, THE CURB VALVE AND OTHER EXCAVATIONS.

SEE ADDITIONAL SHEETS 3 OF 4 AND 4 OF 4 FOR BILL OF MATERIAL

CONST. STDS.
VOLUME 2

INSTALLATION OF PLASTIC (DIRECT BURIAL OR INSERTION) GAS SERVICE PIPING

CONSOLIDATED EDISON COMPANY OF N.Y., INC.
GAS ENGINEERING DEPT.

DATE LAST REV. 6/22/11

DWG. NO. EO-16641-A SHEET 2 OF 4

REV. 4

EO-16641-A SHT 3 OF 4

REVISIONS

M. BALDOVIN B. DAS	0
REDRAWN BY CAD RAJ. 5/16/06	
M. BALDOVIN 7/27/06	1
CHANGED MATERIAL LIST CP 6/26/06	
M. BALDOVIN 6/22/11	2
CHANGED MATERIAL LIST. D.J. 6/22/11	

CONST. STDS.
VOLUME 2

ITEM NO.	CLASS & STOCK NO.	DESCRIPTION	DWG. NO. SPEC. NO.
8		COUPLING, PLASTIC COMPRESSION (MET–FIT)	
	341 – 5775	2" IPS	
	341 – 5767	1 1/4" IPS	
	341 – 5783	1" IPS	
	341 – 3952	1 1/4" CTS	
	341 – 3960	1" CTS	
	341 – 3945	1/2" CTS	
8		COUPLING, PLASTIC TO PLASTIC (DRESSER)	G–100,285
	337 – 9229	1 1/4" CTS	
	337 – 9237	1" CTS	
	337 – 9245	1/2" CTS	
7	003 – 4215	COVER, PLASTIC PLATE	EO–14021–D
6	020 – 1145	LOCK, CURB VALVE BOX	EO–13987–B
5	003 – 9172	BOX, CURB VALVE, PLASTIC	
	003 – 7762	BOX, CURB VALVE, PLASTIC (UP TO 1 1/2" VALVE)	EO–16260–B
	003 – 8729	BOX, CURB VALVE, PLASTIC (2", 3", 4" VALVE)	EO–16933–B
	002 – 2673	CURB VALVE BOX, CONCRETE COVER (S/W)	EO–4067
4		COUPLING COMPRESSION, METALLIC	G–100,285
	337 – 7876	4" BOLTED	
	337 – 8700	3" BOLTED	
	337 – 8932	2" x 1 1/2" REDUCER	
	337 – 8924	2" x 1 1/4" REDUCER	
	337 – 8916	2" x 1" REDUCER	
	337 – 8106	2" CONDUCTIVE	
	337 – 8908	1 1/2" x 1 1/4" REDUCER	
	337 – 8890	1 1/2" x 1" REDUCER	
	337 – 8858	1 1/2" CONDUCTIVE	
	337 – 8882	1 1/4" x 1" REDUCER	
	337 – 8874	1 1/4" x 3/4" REDUCER	
	337 – 8098	1 1/4" CONDUCTIVE	
	337 – 8866	1" x 3/4" REDUCER	
	337 – 8841	1" CONDUCTIVE	
	337 – 8833	3/4" CONDUCTIVE	
3		ADAPTER SERVICE HEAD	G–100,291
	341 – 0958	2" FPT x 1 1/4" CTS x 1 1/2" MPT	
	341 – 4786	2" FPT x 1" IPS x 1" MPT	
	341 – 0941	1 1/2" FPT x 1 1/4" CTS x 1 1/2" MPT	
	341 – 2467	1 1/2" FPT x 1 1/4" CTS x 1 1/4" MPT	
	337 – 6480	1 1/2" FPT x 1" CTS x 1 1/2" MPT	
	337 – 7330	1 1/4" FPT x 1" CTS x 1 1/2" MPT	
	341 – 2186	1 1/4" FPT x 1" CTS x 1 1/4" MPT	
	337 – 6035	1 1/4" FPT x 1/2" CTS x 1 1/4" MPT	
	337 – 5631	1" FPT x 1/2" CTS x 1" MPT	
	337 – 1648	3/4" FPT x 1/2" CTS x 1" MPT	
	341 – 1022	3/4" FPT x 1/2" CTS x 3/4" MPT	
	341 – 2764	1 1/2" THD. INLET x 1 1/4" CTS. PLAST. OUTLET INNER–TITE	
	341 – 2756	1 1/4" THD. INLET x 1" CTS. PLAST. OUTLET INNER–TITE	
2		ELECTROFUSION FITTING – TAPPING TEE	G–8104
	341 – 5643	2" IPS x 1" IPS CENTRAL PLASTICS – HDPE	
	341 – 5635	2" IPS x 1/2" CTS CENTRAL PLASTICS – HDPE	
	341 – 5627	1 1/4" IPS x 1" IPS CENTRAL PLASTICS – HDPE	
	341 – 5619	1 1/4" IPS x 1/2" CTS CENTRAL PLASTICS – HDPE	
		SIDEWALL FUSION PLASTIC BODY–TAPPING TEE	
	341 – 3788	12" MAIN x 2" IPS OUTLET	
	341 – 3879	12" MAIN x 1 1/4" CTS OUTLET	
	341 – 4760	12" MAIN x 1/2" CTS OUTLET	
	341 – 4125	10" MAIN x 2" IPS OUTLET	
	341 – 4166	10" MAIN x 1 1/4" IPS OUTLET	
	341 – 2798	8" MAIN x 2" IPS OUTLET	
	341 – 3887	8" MAIN x 1 1/4" CTS OUTLET	
	341 – 2780	8" MAIN x 1" IPS OUTLET	
	341 – 4604	8" MAIN x 1/2" CTS OUTLET	
	341 – 1121	6" MAIN x 2" IPS OUTLET	
	341 – 3895	6" MAIN x 1 1/4" CTS OUTLET	
	341 – 2145	6" MAIN x 1" IPS OUTLET	
	341 – 4612	6" MAIN x 1/2" CTS OUTLET	
	341 – 2202	4" MAIN x 2" IPS OUTLET	
	341 – 3903	4" MAIN x 1 1/4" CTS OUTLET	
	341 – 1139	4" MAIN x 1" IPS OUTLET	
	341 – 4596	4" MAIN x 1/2" CTS OUTLET	
	341 – 2194	3" MAIN x 2" IPS OUTLET	
	341 – 3911	3" MAIN x 1 1/4" CTS OUTLET	
	341 – 1147	3" MAIN x 1" IPS OUTLET	
	341 – 1154	2" MAIN x 1" IPS OUTLET	
	341 – 3291	2" MAIN x 1/2" CTS OUTLET	
	341 – 1162	1 1/4" MAIN x 1" IPS OUTLET	
	341 – 3283	1 1/4" MAIN x 1/2" CTS OUTLET	
1		TEE PLASTIC TO METAL (BRASS BASED)	
	341 – 4794	2" X 2" IPS	
	341 – 4505	2" X 1 1/4 CTS	
	341 – 4521	2" X 1" CTS	
	341 – 4588	1 1/2 " 1 1/4 CTS	
	341 – 4513	1 1/2 " x 1" CTS	
	341 – 4463	1 1/2 " x 1" CTS	
	341 – 4471	1 1/4" x 1" CTS	
		TEE METALIC BODY	EO–16645–B
	337 – 5763	2" WELD INLET x 2" INSUL.COMP. OUTLET	
	337 – 6811	2" THD. INLET x 2" PLAIN OUTLET	
	337 – 5789	2" THD. INLET x 2" INSUL.COMP. OUTLET	
	337 – 6449	1 1/4" WELD. INLET x 1 1/4" WELD OUTLET	
	337 – 6852	1 1/4" THD. INLET x 1 1/4" PLAIN OUTLET	
	337 – 6910	1" THD. INLET x 1" COMP OUTLET	
	337 – 5656	1" THD. INLET x 1" INSUL.COMP. OUTLET	
	337 – 6431	1" WELD INLET x 3/4" INSUL.COMP. OUTLET	
	337 – 7686	3/4" WELD INLET x 1" COMP OUTLET SELF TAPPING FOR MP & HP USE ONLY	

BILL OF MATERIAL

CONTNUED ON SHEET 4 OF 4

ITEM NO.	CLASS & STOCK NO.	DESCRIPTION	DWG. NO. SPEC. NO.
18	686 – 0134	ROCK SHIELD, PLASTIC MESH	
17	596 – 2436	TAPE, ELECTRICAL P.V.C.	
16		ADAPTER W/STIFFENER, STAB END	G–100,291
	341 – 4075	2" IPS x 1 1/4" CTS	
	341 – 0925	1 1/2" IPS x 1 1/4" CTS	
	341 – 3341	1 1/4" IPS x 1 1/4" CTS	
	341 – 2178	1 1/4" IPS x 1" CTS	
	337 – 6027	1 1/4" IPS x 1/2" CTS	
	337 – 5839	1" IPS x 1/2" CTS	
	341 – 1014	3/4" IPS x 1/2" CTS	
15		BUSHING END PROTECTOR	
	341 – 2269	2" IPS	
	341 – 2251	1 1/2" IPS	
	341 – 2244	1 1/4" IPS	
	341 – 2236	1" IPS	
	341 – 2228	3/4" IPS	
14		SLEEVE, PROTECTIVE, PVC:	
	341 – 0974	3" OD WITH 2" SLOT	
	341 – 0966	3" OD WITH 1 1/2" SLOT	
	341 – 0800	2" OD WITH 1" SLOT	
	341 – 0792	1 1/2" OD WITH 3/4" SLOT	
13		ANODE MAGNESIUM:	G–8102
	079 – 0048	32 LBS	
	079 – 0030	17 LBS	
	079 – 0014	3 LBS	
12		BOX, CURB VALVE:	EO–4045–C
	003 – 9172	WHITE PLASTIC WITH YELLOW COVER	
	003 – 9602	CAST IRON C/V BOX EXTENSION	
	003 – 3423	BOX, CURB VALVE, CI 24"	
	003 – 3365	BOX, CURB VALVE, CI 36"	
11	002 – 5114	BASE, CURB VALVE	EO–9241–D
10		PIPE AND TUBING, PLASTIC	G–8104
	328 – 0641	12" IPS (40' LENGTHS)	
	328 – 0849	12" IPS (20' LENGTHS)	
	328 – 0518	8" IPS (40' LENGTHS)	
	328 – 0559	8" IPS (20' LENGTHS)	
	328 – 0401	6" IPS (40' LENGTHS)	
	328 – 0567	6" IPS (20' LENGTHS)	
	328 – 0393	4" IPS (40' LENGTHS)	
	328 – 0575	4" IPS (20' LENGTHS)	
	328 – 0690	4" IPS (500' COIL)	
	328 – 0385	3" IPS (40' LENGTHS)	
	328 – 0583	3" IPS (20' LENGTHS)	
	328 – 0708	3" IPS (500' COIL)	
	328 – 0591	2" IPS (20' LENGTHS)	
	328 – 0377	2" IPS (500' COIL)	
	328 – 0369	1 1/4" IPS (500' COIL)	
	328 – 0351	1" IPS (500' COIL)	
	360 – 0954	1 1/4" CTS (500' COIL)	
	360 – 0988	1" CTS (500' COIL)	
	360 – 0947	1/2" CTS (500' COIL)	
9		VALVE, PLASTIC	G–100,298
	379 – 7198	12" IPS FULL PORT	
	379 – 2939	8" IPS FULL PORT	
	379 – 2921	6" IPS FULL PORT	
	379 – 7271	4" IPS FULL PORT	
	379 – 7412	3" IPS FULL PORT	
	379 – 4229	2" IPS	
	374 – 2657	1 1/4" IPS W/PERMASERT TYPE ENDS	
	374 – 2749	1 1/4" CTS W/PERMASERT TYPE ENDS	
	374 – 2665	1" IPS W/PERMASERT TYPE ENDS	
	374 – 2731	1" CTS W/PERMASERT TYPE ENDS	
	374 – 2798	1/2" CTS W/PERMASERT TYPE ENDS	
8		COUPLING – ELECTROFUSION	
	341 – 4976	8" IPS CENTRAL PLASTICS	
	341 – 4182	6" IPS CENTRAL PLASTICS	
	341 – 4190	4" IPS CENTRAL PLASTICS	
	341 – 4208	3" IPS CENTRAL PLASTICS	
	341 – 4216	2" IPS CENTRAL PLASTICS	
	341 – 4174	1 1/4" IPS CENTRAL PLASTICS	
	341 – 4224	1" IPS CENTRAL PLASTICS	
	341 – 5429	12" IPS FRIATEC	
	341 – 5411	8" IPS FRIATEC	
	341 – 5395	6" IPS FRIATEC	
	341 – 5379	4" IPS FRIATEC	
	341 – 5403	3" IPS FRIATEC	
	341 – 5387	2" IPS FRIATEC	
	341 – 5916	1 1/4" IPS FRIATEC	
	341 – 5908	1" IPS FRIATEC	
	341 – 5866	1/2" CTS FRIATEC	
8		COUPLING, PERMASERT	G–8104
	341 – 4836	1 1/4" CTS	
	341 – 4877	1" CTS	
	341 – 4869	1/2" CTS	

NOTE;

SEE SHEETS NO 1 OF 4 AND 2 OF 4 OF THIS DRAWING # EO-16641 INSTALLATION OF PLASTIC (DIRECT BURIAL OR INSERTION) TO INDOOR / OUTDOOR METER, GAS SERVICE PIPING.

INSTALLATION OF PLASTIC (DIRECT BURIAL OR INSERTION) GAS SERVICE PIPING BILL OF MATERIAL

CONSOLIDATED EDISON COMPANY OF N.Y., INC.
GAS ENGINEERING DEPT

DATE 5/16/06
LAST REV. 6/22/11

DWG. NO. EO-16641-A REV. 2
SHEET 3 OF 4

EO-16641-A-0 SHEET 4 OF 4

REVISIONS

M. BALDOVIN B. DAS	0
REDRAWN BY CAD RAJ. 5/16/06	
M. BALDOVIN 7/27/06	1
UPDATED MATERIAL LIST C.P. 6/26/06	
M. BALDOVIN 6/22/11	2
UPDATED MATERIAL LIST D.J. 6/22/11	

CONST. STDS.
VOLUME 2

ITEM NO.	CLASS & STOCK NO.	DESCRIPTION	DWG. NO. SPEC. NO.
31	024 – 6660	TAPE, "WARNING GAS LINES BELOW"	G–8100
30		BEND, PIPE, RISER:	
	003 – 0700	2" IPS	
	003 – 1047	3" IPS	
29	058 – 3534	THERMIT WELD: FOR STEEL.	G–100,279
28		SLEEVE,WALL,SCH.40,STEEL.THREAD ONE END	
27	000 – 0372	BRICK, NO.1 COMMON RED:	
26		SLEEVE,WALL,SCH.40,STEEL OR P.V.C. PIPE.	G–8096
25	563 – 0199	WIRE, PLASTIC COATED COPPER,RED,NO.14	
	563 – 1361	WIRE, PLASTIC COATED COPPER,RED,NO.10	
24		REDUCER,PLASTIC:	G–8104
	341 – 1220	2" IPS x 1¼" IPS	
	341 – 1170	2" IPS x 1¼" CTS	
	341 – 2749	1" IPS x 1¼" CTS	
	341 – 2079	1" IPS x 1" CTS	
	341 – 1196	1" IPS x ½" CTS	
23		FITTING, TRANSITION, PLASTIC TO STEEL, THREADED END	G–8104
	341 – 4414	4" IPS x 4" IPS	
	341 – 4356	3" IPS x 3" IPS	
	341 – 4349	2" IPS x 2" IPS	
	341 – 4331	1¼" IPS x 1¼" IPS	
	341 – 4323	1" IPS x 1" IPS	
		FITTING, TRANSITION, PLASTIC TO STEEL, BEVELED END	
	341 – 3820	12" IPS x 12" IPS	
	341 – 1113	10" IPS x 10" IPS	
	341 – 2822	8" IPS x 8" IPS	
	341 – 1063	6" IPS x 6" IPS	
	341 – 1071	4" IPS x 4" IPS	
	341 – 1089	3" IPS x 3" IPS	
	341 – 1097	2" IPS x 2" IPS	
	341 – 1105	1¼" IPS x 1¼" IPS	
	241 – 1113	1" IPS x 1" IPS	
	341 – 2152	½" IPS x ½" CTS	
22		ELBOW, THREADED END	ANSI B 16.3
	332 – 1080	3"	
	332 – 1049	2"	
	332 – 1023	1½"	
	332 – 1007	1¼"	
	332 – 0983	1"	
	332 – 1429	¾"	
21		NIPPLE,STEEL,SHOULDER.SCH.80	ASTM A53 GR B
	330 – 1694	4" x 4" LONG	
	330 – 1629	3" x 4" LONG	
	330 – 1322	2" x 3½" LONG	
	330 – 3286	1½" x 2½" LONG	
	330 – 2999	1¼" x 2" LONG	
	330 – 0837	1" x 2½" LONG	
	330 – 0662	¾" x 2" LONG	
20		SEAL, LINK	G–100,237
	341 – 0776	12" x 16" (12 LINKS)	
	341 – 1030	10" x 16" (10 LINKS)	
	341 – 1006	8" x 12" (12 LINKS)	
	341 – 1006	6" x 10" (10 LINKS)	
	341 – 0750	4" x 6" (10 LINKS)	
	341 – 0750	3" x 5" (6 LINKS)	
	341 – 0750	2" x 4" (6 LINKS)	
	NON – STOCK	1¼" x 3" (8 LINKS)	
	341 – 0750	1" 3" (4 LINKS)	
		3M COLD SHRINK	
	341 – 5676	1" x ¾" (WILL ALSO SEAL 1" x ½")	
	341 – 5684	1½" x 1¼" (WILL ALSO SEAL 1½" x 1¼")	
	341 – 5692	2" x 1½" (WILL ALSO SEAL 2" x 1¼")	
	341 – 5700	3" x 2" (WILL ALSO SEAL 3" x 1½" ,BUT NOT 1¼")	
19		VALVE, PLUG, SERVICE HEAD	G–100,298
	374 – 2319	12" FLANGED END	
	374 – 2772	10" FLANGED END	
	374 – 2293	8" FLANGED END	
	374 – 2277	6" FLANGED END	
	374 – 2335	4" FLANGED END	
	374 – 2103	4" THREADED END	
	374 – 1345	3" FLANGED END	
	374 – 0354	3" THREADED END	
	374 – 0321	2" THREADED END	
	374 – 2095	1½" THREADED END	
	374 – 2434	1¼" THREADED END	
	374 – 0248	1" THREADED END	
	374 – 2350	¾" THREADED END	
ITEM NO.	CLASS & STOCK NO.	DESCRIPTION	DWG. NO. SPEC. NO.

BILL OF MATERIAL
CONTINUED FROM SHEET 3 OF 4

ITEM NO.	CLASS & STOCK NO.	DESCRIPTION	DWG. NO. SPEC. NO.
35		SIDEWALL FUSION TAPPING TEE w/EFV & PERMASERT END	G–8104
	341 – 5452	12" MAIN x ½" CTS OUTLET	
	341 – 5460	8" MAIN x ½" CTS OUTLET	
	341 – 5478	6" MAIN x ½" CTS OUTLET	
	341 – 5486	4" MAIN x ½" CTS OUTLET	
	341 – 5494	2" MAIN x ½" CTS OUTLET	
	341 – 5445	1¼" MAIN x ½" CTS OUTLET	
34		EXCESSFLOW VALVES	G–8100
	341 – 5528	1" IPS x ½" CTS x 1" IPS (STAB ENDS)	
	337 – 9492	¾" IPS x ½" CTS x ¾" IPS (STAB ENDS)	
	341 – 4893	½" CTS WITH PERMESRT ENDS	
	341 – 4844	1" IPS WITH BLANK ENDS	
33		BEND, ANODELESS RISER	G–8104
	341 – 5601	4" IPS x 4" IPS FLANGED	
	341 – 5585	4" IPS x 4" IPS THREADED	
	341 – 5593	3" IPS x 3" IPS FLANGED	
	341 – 5577	3" IPS x 3" IPS THREADED	
	341 – 5304	2" IPS x 2" IPS	
	341 – 5023	1" IPS x 1" IPS	
	341 – 3747	1¼" CTS x 1½" IPS	
	341 – 3739	1" CTS x 1" IPS	
	341 – 3721	½" CTS x 1" IPS	
32		ELBOW, PLASTIC, 90 DEGREES, " MET–FIT "	G–8100
	341 – 3994	1¼" CTS	
	341 – 3986	1" CTS	
	341 – 3978	½" CTS	
		ELBOW, PLASTIC, 90 DEGREES, " PERMASERT "	
	341 – 4810	1¼" CTS	
	341 – 4802	1" CTS	
	341 – 4828	½" CTS	
		ELBOW, PLASTIC, 90 DEGREES	
	341 – 3796	12" IPS	
	341 – 4141	10" IPS	
	341 – 3044	8" IPS	
	341 – 2095	6" IPS	
	341 – 1337	4" IPS	
	341 – 1345	3" IPS	
	341 – 1352	2" IPS	
	341 – 1360	1¼" IPS	
	341 – 1378	1" IPS	
		ELBOW, PLASTIC, 45 DEGREES	
	341 – 3804	12" IPS	
	341 – 2806	8" IPS	
	341 – 2160	6" IPS	
	341 – 2111	4" IPS	
	341 – 2103	3" IPS	
ITEM NO.	CLASS & STOCK NO.	DESCRIPTION	DWG. NO. SPEC. NO.

BILL OF MATERIAL

NOTES :

SEE SHEETS NO1 OF 4 AND 2 OF 4 OF THIS DRAWING # EO-16641 INSTALLATION OF PLASTIC (DIRECT BURIAL OR INSERTION) GAS SERVICE PIPING.

INSTALLATION OF PLASTIC (DIRECT BURIAL OR INSERTION) GAS SERVICE PIPING
BILL OF MATERIAL

CONSOLIDATED EDISON COMPANY OF N.Y., INC.
GAS ENGINEERING DEPT

DATE 5/16/06
LAST REV. 6/22/11

DWG. NO. EO-16641-A SHEET 4 OF 4 REV. 2

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
4 IRVING PLACE
NEW YORK, NY 10003

DISTRIBUTION ENGINEERING
DISTRIBUTION EQUIPMENT

SPECIFICATION EO-8085
REVISION 9
NOVEMBER 2013

EFFECTIVE DATE
NOVEMBER 30, 2013

GENERAL SPECIFICATION FOR BACKFILL AND BEDDING MATERIAL FOR EXCAVATIONS

FILE: PURCHASE AND TEST STANDARDS, MANUAL NO. 6, SECTION 16

TARGET AUDIENCE	**REGIONAL CONSTRUCTION**
NESC REFERENCE	**NONE**

TABLE OF CONTENTS

1.0 PURPOSE

This specification applies to backfill and bedding material for use around conduits, manholes, vaults, underground residential distribution (URD) installations, and coated steel pipes for 69KV, 138KV and 345KV electric cable circuits, and all gas mains and all gas mains and services.

2.0 APPLICATION

All Customer Service Areas and Gas Operations.

3.0 DEFINITIONS

3.1 The term "Con Edison" as used in this Specification refers to the Consolidated Edison Company of New York, Inc.

3.2 The term "Con Edison Engineer" as used in this Specification refers to the project engineer.

3.3 The term "Con Edison Construction Representative" as used in this Specification refers to the Construction Manager, Contract Construction Manager or his authorized representative.

4.0 GENERAL APPROVALS

The Con Edison Engineer or Con Edison Construction Representative shall have the right to examine all fill ordered in accordance with this Specification prior to its placement and reject any order which does not comply with this Specification. The Contractor shall be responsible for the trucking cost of any loads, which are rejected.

5.0 MATERIAL

5.1 **Backfill** - Material to be used for backfill shall conform to the following types. Type 3/8 - This material shall be clean fill material conforming to the sieve analysis shown in Table 1. It shall have a pH value greater than 5.5 and shall be free of cinders, ashes, vegetable matter, rubbish or any foreign matter. Type I - This material shall be clean fill material conforming to the sieve analysis shown in Table 2. It shall have a pH value greater than 5.5 and shall be free of cinders, ashes, vegetable matter, rubbish or any foreign matter. Type II - This material shall be clean sand conforming to the sieve analysis shown in Table 3. It shall have a pH value greater than 5.5 and shall be free of cinders, ashes, vegetable matter rubbish or any foreign matter.

5.2 **Recycled Backfill** - Backfill material composed of excavated material recycled at a New York State Department of Environmental Conservation

certified recycling facility is permitted. The recycled backfill shall conform to the requirements of paragraph 5.1.

5.3 **Fill Materials** – Fill materials containing or comprised of "Stone Dust", or "Pond Fill" (crystalline silica) shall not be used as backfill material.

6.0 COMPACTION

The compaction criteria specified in EO-1181 shall be followed for all installations listed in Section 1.0.

Mohsen Shaaker (Signature on File)
Mohsen Shaaker
Manager
Tools and Structures
Distribution Engineering Department

ATTACHMENT: Table 1, 2, & 3

L. Kandic

REVISION No. 9	**FILE:**
1) Revised cover page (pg. 1) to: add "Specification for" 2) Revised cover page (pg. 1) to reflect Purchase and Test Standard Manuals 3) Revised Table of Contents (pg. 2) to reflect added Section 6.0 Compaction 4) Revised pg. 4 to add Section 6.0 Compaction	Purchase and Test, Manual No. 6, Sect. 16 - Pipe Type Cable Field Manual # 22, Sec. 10

ATTACHMENT

TABLE 1

Sieve Size	Percent Passing
3/8”	100
#4	95-100
#8	80-100
#16	50-85
#30	25-60
#50	10-30
#200	0-0

TABLE 2

Sieve Size	Percent Passing
1”	100
¾”	95-100
#4	60-85
#8	45-70
#30	15-30
#50	5-20
#200	0-3

TABLE 3

Sieve Size	Percent Passing
2”	100-85
¾”	
#4	
#8	45-70
#30	
#50	
#200	0-15

CONSOLIDATED EDISON COMPANY OF NEW YORK, INC.
4 IRVING PLACE
NEW YORK, NY 10003

DISTRIBUTION ENGINEERING
TOOLS AND STRUCTURES

SPECIFICATION EO-1181
REVISION 6
May 2010

EFFECTIVE DATE
June 1, 2010

GENERAL SPECIFICATION FOR BACKFILLING OF TRENCH AND SMALL OPENINGS

FILE: CONSTRUCTION STANDARDS MANUAL NO. 3, SECTION 37

TARGET AUDIENCE	**REGIONAL CONSTRUCTION**
NESC REFERENCE	**NONE**

TABLE OF CONTENTS

1.0 PURPOSE

This specification details the procedures to be followed in backfilling all Con Edison street openings for electric, gas and steam facilities.

2.0 APPLICATION

This specification applies to all Con Edison Customer Service Areas.

3.0 REFERENCE SPECIFICATION AND DEFINITIONS

3.1 The term “Engineer” used in this specification refers to the Distribution Tools & Structures Engineer or his authorized representative.

3.2 The term Construction Representative shall mean the Construction Manager, Contract Construction Manager, or his authorized representative.

3.3 The terms “Type 3/8", “Type I” and “Type II” shall be as defined in EO-8085.

3.4 The term "small opening" shall refer to street openings which are 6' x 5' or smaller.

3.5 The term "suitable backfill" shall refer to in-place material excavated from the trench or opening which satisfies the following requirements:

3.5.1 The excavated material shall be free of all broken asphalt pavement, broken concrete, brick, all organic material, and all debris.

3.5.2 The excavated material shall be substantially sandy soil gritty and granular in texture and have a small amount of rocks compared to the total volume of soil. It shall have no rocks greater than 2 inches in size.

3.5.3 The excavated material shall be substantially free of clay like or clayey soil. Clayey soil shall be determined as soil that is powder like in texture when dry and capable of being molded when wet.

3.5.4 Frozen backfill material shall either be removed or broken into small particles before being compacted. Excessively wet material shall be mixed with dry material to reduce moisture content before backfilling.

3.5.5 Fill materials, known as “Stone Dust”, or “Pond Fill”, containing crystalline silica shall not be used as backfill material.

3.5.6 If there are any questions as to suitability of the excavated material, the Engineer shall be consulted.

3.6 The term "mechanical compaction" shall mean the use of equipment, either impact or plate vibratory, which is designed specifically for soil compaction. The term "hand tamping" shall mean compaction of backfill by means of a plate tamper, which will impart sufficient force to compact the backfill material.

3.7 The term "wetted backfill" shall mean backfill material containing sufficient moisture so that when molded by hand it will form a firm shape. If the specimen crumbles it lacks sufficient moisture. If water is squeezed from the specimen it contains too much moisture.

4.0 REQUIREMENTS

4.1 Compaction

4.1.1 The term "compacted", for both "mechanical compaction" and "hand tamping", shall mean a minimum level of compaction of 95% of the maximum dry density of the backfill material used as determined by a Standard Proctor Test (ASTM D-698). In lieu of a Standard Proctor Test a "one point" test shall be done by taking a sample of the soil and compacting it using a Standard Proctor mold procedure and determining the maximum in field density that can be obtained and 95% of this value should be used as a comparison to the actual compaction achieved.

4.1.2 In lieu of the above, when using "suitable backfill", compaction will be considered adequate if density readings of the compacted fill equal 95% of the readings of the in-place material (i.e. density readings must be taken at the time of excavation to use as reference for compaction). For this type of "before and after" comparison, devices such as the nuclear density tester may be used.

4.2 Density Testing

4.2.1 The sand-cone test, ASTM D1556 or nuclear density tester may be used for all in place density tests. Other methods may be used upon approval of the Engineer.

4.2.2 The Construction Representative or Engineer may order as many in-place density tests as he deems necessary to insure proper compaction. If an in-place density test indicates insufficient compaction, the Contractor shall re-compact the area in question until the backfill is compacted to the requirements set forth in paragraph 4.1.1. The Contractor may elect to take additional tests 5 feet on both sides of the test which failed, and average the values of the three readings. If the average value of the three tests meets the compaction requirements, the area in question will be considered sufficiently compacted and no additional compaction will be required. If the average value does not meet the compaction requirements, the Contractor will be required to pay for the two additional in-place density tests and to re-compact the area, which has been determined to be insufficiently compacted. Test after recompaction.

4.3 Procedure For Electric Duct Backfill

4.3.1 The following backfill procedure shall be used for concrete duct, asbestos cement, and plastic and fibre conduit.

4.3.2 Where the ducts are in a rock area, a minimum 4" bed of Type 3/8" backfill shall be placed. It shall be wetted and mechanically compacted to form a firm base for the support of the ducts. Suitable backfill shall be free of stones larger than 2 inches.

4.3.3 For concrete conduit, asbestos cement conduit, plastic and fibre conduit encased in concrete, the trench shall be filled with suitable backfill as defined in paragraph 3.5 or Type II material (EO-8085) in 12 inch wetted lifts. Each lift shall be mechanically compacted.

4.3.4 For direct buried asbestos cement, plastic and fibre conduit, the trench shall be filled with Type 3/8 material to a level of 12 inches above the ducts. It shall be compacted by hand in a no more than 12 inch wetted lifts. The remaining trench shall be backfilled with suitable backfill or Type II material (EO-8085) in 12 inch wetted lifts mechanically compacted.

4.4 Procedure For 138kv Cable Pipe Installation

4.4.1 All installation of l38KV and 345KV cable pipe type feeders shall comply with the requirements set forth in CE-TS-3352.

4.4.2 The requirement for the use of excavated material as "suitable backfill" shall follow the requirements of paragraph 3.5.

4.5 Procedure For Backfilling Gas Trenches & Small Openings

4.5.1 Coated Steel & Plastic Gas Pipe Trenches

a. A smooth surface shall be excavated in the bottom of the trench and the pipes laid to grade. Where the trench is in a rock area, a minimum of 4 inches of Type 3/8 material shall be placed, wetted and mechanically compacted to form a firm base for the gas pipes.

b. The trench shall be backfilled with Type 3/8 material to a height of 12 inches above the pipe in a maximum of 12 inch wetted lifts which shall be hand compacted.

c. The remaining trench shall be backfilled with Type 3/8, Type I, Type II or suitable existing backfill in a maximum of 12 inch wetted lifts, which shall be mechanically compacted.

d. The density of the compacted backfill shall be tested and accepted or rejected in accordance with paragraph 4.2.2.

4.5.2 Cast Iron, Plastic & Steel Gas Pipe In Small Openings

a. Backfill material shall be Type 3/8, or suitable existing backfill, which has been segregated to remove all rocks, which may damage the pipe coating.

b. Openings shall be backfilled to a height of 12 inches above the pipe in a maximum of 12 inch wetted lifts, which shall be hand, compacted. The remainder of the openings shall be backfilled in 12 inch wetted lifts with Type I or Type II or "suitable backfilled" as per paragraph 7 which shall be mechanically compacted.

c. The density of the compacted backfill shall be tested and

accepted or rejected in accordance with paragraph 4.2.2.

4.6 Backfilling Concrete Coated & Steel Jacketed Steam Main Trenches

4.6.1 A smooth surface shall be established in the bottom of the trench and the pipes leveled and laid on a firm base. Where the trench is in a rock area, a minimum of 4 inches of Type I material shall be placed, wetted and mechanically compacted to form a firm base.

4.6.2 The trench shall be backfilled with Type I, or Type II or suitable backfill material in 12 inch wetted lifts, which shall be mechanically compacted.

4.6.3 The backfill shall be tested and accepted or rejected in accordance with paragraph 4.2.2.

5.0 PRECAUTIONS

If a work site is found to contain existing fill material that contains or comprised of "Stone Dust" or "pond Fill", the contractor shall cover the material with a 3" layer of sand. If this material is found to be stockpiled at a work site, it shall be covered with a tarpaulin or removed from the work site.

Joseph R. Martin (Signature on File)
Joseph R. Martin
Manager
Tools and Structures
Distribution Engineering

Marco Meza

REVISION No. 5	**FILE:**
Revised section 4.4 (added installation spec.). Due to be reviewed 05/2015	Construction Standards Manual 3 Section 237 - Subway

This Page Intentionally Left Blank