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SPECIFICATION: **IP-20-10b**

TITLE: **INSTALLATION OF MECHANICAL FITTINGS FOR POLYETHYLENE (PE) PLASTIC PIPE AND TUBING**

VOLUME: **2 (Section 4.0), 10 and Yellow Book**

COURSE ID: **GAS0099**

CORE GROUP: **Gas Construction**

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

REV 10a (1/17/2020)
Section 6.1: Revised section to clarify intent that applicability is limited to Gas Operations company employees.

REV 10b (1/22/2020)
Section 2: Added 16 NYCRR Part 255.273 and 49 CFR Part 192.273.

REVISIONS: (See ★)

1)	Section 6.1	New section. Renumbered subsequent sections
2)	Section 6.2	Added requirements for only Category 1 couplings
3)	Section 6.3	Added reference to G-8205.
4)	Section 7.2	Added Note
5)	Section 7.6	Updated reduced electrofusion times
6)	Section 10.0	Added G-8205

Gas Operations Standards

TITLE: INSTALLATION OF MECHANICAL FITTINGS FOR POLYETHYLENE (PE) PLASTIC PIPE AND TUBING

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1.0 SCOPE

This specification details the requirements for the installation of approved mechanical fittings on polyethylene (PE) plastic pipe and tubing.

2.0 LEGAL REQUIREMENTS

Federal: 49 CFR Part 192, Sections 273, 281, 283, 285, and Sub Part N (Operator Qualification)

State: 16 NYCRR Part 255, Sections 273, 281, 283, 284, and 604

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 with mechanical fittings, heat fusion (butt fusion and branch saddle fusion) and electrofusion shall 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."

C) All mechanical joints shall be installed in accordance with the installation procedures outlined in this specification and the manufacturer's installation procedures.

D) All heat fusion joints must be fabricated in accordance with the fusion procedures outlined in Gas Specification G-8123, "Heat Fusion Joining of Polyethylene (PE) Plastic Pipe/Tubing and Fittings for Gas Mains and Services."

3.0 **OPERATOR QUALIFICATION** (Continued)

E) All electrofusion joints must be installed in accordance with the electrofusion procedures outlined in Gas Specification IP-27, "Installation of Electofusion Fittings on PE Plastic Pipe/Tubing and Molded Fittings Using a Universal Electrofusion Processor."

3.2 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 (Covered Task 52H.E or equivalent) **and** current with 3 year requalification.

B) The second inspector shall be a non-crew based member (i.e. not part of the crew that joins plastic pipe/tubing and fittings).

4.0 **REQUIREMENTS FOR INSTALLERS AND SECOND INSPECTORS**

4.1 All installers (Company, Contractor, Per Diem) who join PE plastic pipe or tubing with mechanical fittings shall identify the installer by marking the mechanical fitting or plastic pipe/tubing adjacent to the mechanical fitting 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 installing the mechanical fitting, the Operator Qualified installer **AND** the Operator Qualified second inspector shall visually inspect the mechanical joint (except for service head adapters and basement tees) around the entire circumference of the fitting and compare against manufacturers' recommended appearance guidelines.

Mechanical fittings shall have the same appearance as a joint or photographs of a joint that is acceptable per Section 7.0 of this specification and the manufacturer's installation guidelines.

4.0 **REQUIREMENTS FOR INSTALLERS AND SECOND INSPECTORS** (Continued)

4.3 All second inspectors (Company, Contractor, Per Diem) of mechanical joints on PE plastic pipe and tubing shall identify the inspector by marking the mechanical fitting or plastic pipe/tubing adjacent to the mechanical fitting 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.

4.4 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 **QUALIFICATIONS OF MECHANICAL JOINING PROCEDURES**

- NGA Plastic Pipe Joining Manual
- GT-14-048-2 Procedure for Qualifying Mechanical Plastic Pipe Joints

★ 6.0 **GENERAL REQUIREMENTS**

★ 6.1 Prior to starting a task, the Job Safety Analysis (JSA) library shall be reviewed to determine if there is a JSA for this task. Any relevant JSA found in the library shall be used in conjunction with the job briefing. This is applicable to Gas Operations Company employees only.

★ 6.2 The preferred methods to join PE plastic pipe and tubing are butt fusion and electrofusion. (See Gas Specifications IP-27 and G-8123)

Only Category 1 mechanical fittings shall be installed when:

- butt fusion or electrofusion are not practical or available,
- butt fusion is not permitted due to existing reduced PE plastic pipe wall thickness (e.g. SDR 23.5). (See Section 7.6,Table 1)

★ 6.0 **GENERAL REQUIREMENTS** (Continued)

Note: Category 1 mechanical fittings include:

- Met Fit Couplings up to and including 2 inches in diameter Dresser Universal Style 90 Couplings listed below.

Restraining Type - Conductive			
Size	Approx. Length	Cl/Stk	Dresser Part #
¾”	5”	337-8833	0090-5001-286
1”	5”	337-8841	0090-5002-286
1-1/4”	5”	337-8098	0090-5003-286
1-1/2	5”	337-8858	0090-5004-286
2”	5”	337-8106	0090-5005-286

★ 6.3 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” and G-8205 “Corrosion Control of Buried Steel Gas Distribution Mains and Services”.

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.

6.4 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 **INSTALLATION REQUIREMENTS**

7.1 Each individual manufacturer’s installation procedure is to be completely and thoroughly followed. All mechanical fittings are required to be “individually packaged” with the fitting’s proper installation procedure included.

★ 7.2 With the exception of MetFit fittings, mechanical fittings **cannot** be installed **directly** onto a plastic molded fitting without pup lengths of PE plastic pipe or tubing.

7.0 **INSTALLATION REQUIREMENTS** (Continued)

Install and inspect MetFit mechanical fittings as per manufacturer's procedures. Molded fittings shall **not** be altered in order to utilize MetFit fittings.
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, "Polyethylene Pipe, Tubing and Fittings for Gas Mains and Services" for approved fittings with pup lengths of PE plastic pipe or tubing). (See G-100,285 for approved MetFit fittings).

Note: MetFit couplings shall not be installed within sleeves or casings.

7.3 Inspect PE plastic pipe, tubing, and fittings prior to installation to verify:

- The sealing area of the PE plastic pipe/tubing and the fittings is free of any deep scratches, gouges, grooves, dirt, debris, or other defects.
- New PE plastic material is high density polyethylene (HDPE), PE3408/4710, and manufactured per ASTM D2513.
- New 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")

7.4 For PE plastic tubing in CTS sizes, verify that the stiffener(s) is marked 0.090" WT (wall thickness). Verify that the fitting is properly sized by checking that the label or markings on the fitting is for the same dimensions (OD = outside diameter, WT, or SDR = standard dimension ratio) found on the print line of the PE plastic pipe. See Gas Specification G-100,291, "Adapters and Stiffeners" for approved rigid internal tubular stiffeners.

7.5 For PE plastic pipe in IPS sizes, verify that the SDR marked on the print line of the PE plastic pipe(s) corresponds to the SDR marking on the stiffener(s). See Gas Specification G-100,291 for approved rigid internal tubular stiffeners.

7.0 **INSTALLATION REQUIREMENTS** (Continued)

★ 7.6 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, 16" 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)[1]	LP	***NO***	NO	***NO***
6" IPS[2]	23.5	1970's	LP, IP, MP	***NO***	YES, reduce electrofusion cycle time by 25%, except IPEX Friatec which has no time reduction.	YES, stiffener = orange
6" IPS[2]	26	1970's	LP, IP, MP	***NO***	YES, reduce electrofusion cycle time by 25%, except IPEX Friatec which has no time reduction.	***NO***
6" IPS[2]	26	ONLY as sleeve for Trenchless Technology	LP, IP, MP, HP	YES	YES, reduce electrofusion cycle time by 25%, except IPEX Friatec which has no time reduction.	***NO***
6" IPS[2]	32.5	1970's	LP, IP, MP	***NO***	YES, reduce electrofusion cycle time by 25%, except IPEX Friatec which has no time reduction.	***NO***
22.5" IPS Subline	23.5	2000's	HP	***NO***	Contact the Gas Development Lab	***NO***

***** LP = low pressure, IP = intermediate pressure, MP = medium pressure, HP = high pressure

Notes:
1) There are no methods to join to Subcoil pipe.
2) Do not use Plasson electrofusion couplings on 6" PE with an SDR greater than 15.5.
3) For other pipes not listed above, contact Gas Distribution Engineering.

7.0 **INSTALLATION REQUIREMENTS** (Continued)

7.7 Check pipe for out-of-round. Use a re-rounding clamp or other devise to bring the pipe back to round.

7.8 "Measure and mark" for proper stab depth must be performed when required by the manufacturer's installation procedure.

7.9 The proper chamfer tool must be used for mechanical fittings that require the PE plastic pipe/tubing to be chamfered so the internal seals are not affected when the pipe/tubing is stabbed into the fitting.

7.10 A torque wrench must be used when the manufacturer's installation procedure requires a specific torque (ft-lbs) to tighten the fitting.

7.11 See Gas 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.

7.12 PE plastic pipe, tubing, and fittings shall be installed so as to minimize shear or tensile stresses. Care shall be taken to prevent kinking and buckling.

8.0 **APPROVED MECHANICAL FITTINGS FOR PE PLASTIC PIPE AND TUBING**

8.1 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 PE plastic pipe, tubing, and fittings with pup lengths of PE plastic pipe or 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"

9.0 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.

★ 10.0 REFERENCES

DOJT GAS6006	Documentation and Inspection of Polyethylene (PE) Plastic Joints on Gas Mains and Services
G-8100	General Specification for the Installation of Gas Distribution Services
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-8123	Heat Fusion Joining of PE Plastic Pipe/Tubing and Fittings for Gas Mains and Services
G-8153	Reinforcing Compression Fittings
G-8209	Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures
★ G-8205	Corrosion Control of Buried Steel Gas Distribution Mains and Services
G-100,285	Compression End Coupling, Tees, Elbows, Line Caps, and Riser Tees for Gas Pipe & Tubing
G-100,291	Adapters and Stiffeners
IP-27	Installation of Electrofusion Fittings on PE Plastic Pipe/Tubing and Molded Fittings Using a Universal Electrofusion Processor

Northeast Gas Association (NGA) Plastic Pipe Joining Manual

GT-14-048-2 Procedure for Qualifying Mechanical Plastic Pipe Joints