

	LAST REVIEW DATE: 11/18/2022	REVIEW CYCLE:
	EFFECTIVE DATE: 02/13/2023	5 Years

SPECIFICATION: G-8121-19

★ **TITLE: QUALIFICATION OF JOINERS AND INSPECTORS OF POLYETHYLENE (PE) PLASTIC PIPE/TUBING AND FITTINGS FOR GAS MAINS AND SERVICES**

VOLUME: 2 (Section 7.0), 10, & [Yellow Book](#)

COURSE ID: [GAS0268](#)

★ **REQUIRED TRAINING GROUPS: Gas Construction, Emergency Response Force (ERF), Gas Development Lab, Per Diem, Gas Contractors, Gas Quality Control, TLC, Gas Ops Training, Construction Management-Gas, Construction Services**

Each group listed is responsible for its own training which may be specific to a title/individual and not to the group in its entirety. Please check with your local training coordinator/department.

SUBSTANTIVE REVISIONS: (See ★)

- 1) Cover Page - Title Change to include “Qualification of Joiners and Inspectors”
- 2) Cover Page - **Removed** Core and Target Audience and **replaced** with “Required Training Groups”
- 3) Section 3.1 - **Reworded** sub-section to include language in regards to Span of Control
- 4) Section 3.2 - **Included** “Operator”, removed “trained” and replace with “approved”
- 5) Section 3.3 - **Included** “or disqualification”

SUBSTANTIVE REVISIONS: (Continued)

- 6) Section 3.4(C) - **Replaced** “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” **with** “per joint type”
- 7) Section 3.4 (D) new - New Section **added** regarding “Abnormal Operating Conditions (AOCs)”
- 8) Section 3.5 - **Deleted** “or experience” from first bulletin point
- 9) Section 3.6 (B) - **Deleted** former section 3.6(B) in regard to annual skill and ability evaluation and renumbered subsequent sections
- 10) Section 3.6
 - Subsection (B)(2)
 - 1. **Replaced** “another” with “a” for clarity
 - 2. **Defined** Second Inspector for clarity
 - Subsection (B) (3)
Replaced “by heat fusion (butt fusion or branch saddle fusion), electrofusion, or with mechanical fittings” **with** “under the applicable joining procedure” and **deleted** “OR”
- 11) Section 3.7 - Subsection (B) second bullet point, **added** “and skill”
- 12) Section 3.8
 - Subsection (A) **added** “and skill” and **replaced** “at periods of one (1) year, not to exceed 15 months” **with** “annually”
 - Subsection (B) 1. **Deleted** “(i.e. Qualified management employee, Construction Representative (CR), Construction Inspector (CI), or independent 3rd party inspection).”
- 13) Section 7.1 - **Deleted** former section 7.1 in regard to remediation after disqualification and renumbered subsequent sections
- 14) Section 7.5 - **Replaced** “made by heat fusion (butt fusion or branch saddle fusion), electrofusion, or with mechanical fittings” **with** “made under the applicable procedure”

SUBSTANTIVE REVISIONS: (Continued)

- 15) Section 7.6
 - **Added** “applicable” and “(including the not to exceed timeframes) and **removed** “(Skill and Ability Evaluation)” **and** “(Knowledge Evaluation)”
- 16) Section 8.1
 - **Deleted** former section 8.1 in regard to disqualification of second inspectors section and renumbered subsequent sections
- 17) Section 8.2
 - **Reworded** for clarity to define Second Inspector



Gas Operations Standards

QUALIFICATION OF JOINERS AND INSPECTORS OF TITLE: POLYETHYLENE (PE) PLASTIC PIPE/TUBING AND FITTINGS FOR GAS MAINS AND SERVICES

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	AUTHOR:	APPROVED BY:	DATE APPROVED:	VOLUME: 2 (Section 7.0), 10, & Yellow Book	PAGE 1 OF
	David Heron	Nickolas Hellen Chief Engineer Gas Distribution Engineering	11/18/2022	Construction Standards and O&M Manual	16 PAGES
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TITLE: POLYETHYLENE (PE) PLASTIC PIPE/TUBING AND FITTINGS
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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 Span of Control means the ratio of nonqualified to qualified individuals allowed for a covered task to be performed. Nonqualified individual(s) may be directed and observed by a qualified individual when performing a single covered task.

The qualified individual must be able to effectively respond to errors or abnormal operating conditions that may occur during the performance of the task by the non-qualified individuals.

Tapping a pipeline, welding steel, and joining plastic pipe have a span of control of zero. Meaning, the Operator Qualified individual must perform the entire task. Certain other covered tasks also have a span of control of zero, and those are detailed in their applicable specifications and the OQ Written Plan.

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3.0 **OPERATOR QUALIFICATION** (Continued)

All other covered tasks shall be completed by either Operator Qualified individuals or individuals under the direct observation of someone 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 single covered task.

Both the nonqualified and qualified individuals should be identified on the applicable records being generated, for the work performed under span of control.

- ★ 3.2 Operator 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) approved evaluators.
- ★ 3.3 Disqualification of joiners and second inspectors will be documented in Industrial Training Services (ITS) as a suspension or disqualification 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 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 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](#).

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3.0 **OPERATOR QUALIFICATION** (Continued)

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 individual can correctly demonstrate the joining of PE plastic pipe by fabricating specimen joints per joint type.

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3.0 **OPERATOR QUALIFICATION** (Continued)

3.4 (Continued)

★ D) Abnormal Operating Conditions (AOCs)

An AOC is a condition that may indicate a malfunction of a component or deviation from normal operations that may indicate a condition exceeding design limits or result in a hazard(s) to persons, property, or the environment. Successful recognition of and reaction to AOCs.

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 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.

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3.0 **OPERATOR QUALIFICATION** (Continued)

3.6 **Requalification of Joiners** (Continued)

- B) 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,
 - ★ 2. Any production joint made under the applicable joining procedure that had been inspected by the qualified joiner is found visually unacceptable by a qualified second inspector (i.e **Second Inspector is a third-party Company Qualified Contractor, or a non- crew based Qualified Company Management employee, (See Section 7.4)**
 - ★ 3. Any production joint made under applicable joining procedure is found unacceptable after pressure testing. (See Gas Specification [G-8204](#), “Pressure Testing Requirements for Gas Mains and Services”
 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 and skill(written) evaluation.

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3.0 OPERATOR QUALIFICATION (Continued)

3.8 Regualification of Second Inspectors

- A) Following initial qualification, second inspectors shall be requalified by meeting the requirements of:
- ★ • Knowledge and skill (written) evaluation annually
- B) At any time, second inspectors shall also be requalified, if either:
- ★ 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. (See Section 8.0)
 - 2. Company management recommends that the second inspector be requalified.

4.0 SKILL AND ABILITY EVALUATION TO JOIN PE PLASTIC BY HEAT FUSIONS

- 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.

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4.0 SKILL AND ABILITY EVALUATION TO JOIN PE PLASTIC BY HEAT FUSIONS
(Continued)

4.1 (Continued)

A) (Continued)

- 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:

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.

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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 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.

7.2 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.

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7.0 DISQUALIFICATION FROM JOINING PE PLASTIC (Continued)

7.2 Skill and Ability Evaluation (Continued)

A) Butt Fusion Using Manual or Hydraulic Machine (Continued)

- 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))

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.

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7.0 DISQUALIFICATION FROM JOINING PE PLASTIC (Continued)

7.2 Skill and Ability Evaluation (Continued)

B) Branch Saddle Fusion Using Hydraulic Machine (Continued)

- 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))

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.

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7.0 DISQUALIFICATION FROM JOINING PE PLASTIC (Continued)

7.2 Skill and Ability Evaluation (Continued)

C) Electrofusion Coupling Joint (Continued)

- 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
- 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.

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7.0 DISQUALIFICATION FROM JOINING PE PLASTIC (Continued)

7.2 Skill and Ability Evaluation (Continued)

D) Electrofusion Saddle Joint (Continued)

- 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](#)

7.3 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

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7.0 **DISQUALIFICATION FROM JOINING PE PLASTIC** (Continued)

7.4 **Poor Work Performance** (Continued)

A) (Continued)

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 under the applicable procedure is found unacceptable after pressure testing. (See Gas Specification G-8204, "Pressure Testing Requirements for Gas Mains and Services")

NOTE 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 applicable expiration dates (including the not to exceed timeframes) of either the annual requalification or the three-year requalification shall **immediately disqualify** the joiner from performing that type of PE plastic pipe joining. The disqualified installer must then be requalified.

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8.0 **DISQUALIFICATION FROM INSPECTING PE PLASTIC JOINTS**

8.1 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.

★ 8.2 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 (**Second Inspector is a third-party Company Qualified Contractor, or a non- crew based Qualified Company Management employee**). 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.

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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

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