SPECIFICATION: G-8205-12b

TITLE: CORROSION CONTROL OF BURIED STEEL GAS MAINS AND SERVICES

VOLUMES: 2 (Section 1.0), 10, & Yellow Book

COURSE ID: GAS0282

CORE GROUPS: Gas Construction, Corrosion Control, and Emergency Response Force Lead Mechanic


REV 12a (5/21/18):
- Reformatted cover page and footers to align with current specification standards and format. Changed “Registration No.” to “Course ID”, “Gas Target Training Groups” to “Target Audience”; and added Core Groups on Cover Page. Added Yellow Book to “Volumes” and Gas Emergency Response Force Lead Mechanic to “Target Audience”.
- Section 7.0: Added new section “Records & Records Retention”, and renumbered subsequent sections.
- Section 8.0: Added CI-870-1 to “References”.

REV 12b (12/17/18):
Section 9.0: Revised Appendix D.
REVISIONS: (See ★)

Specification has been revised to incorporate comments made by GTI’s technical experts and Con Edison’s subject matter experts.

1) Section 5.2 - Added additional requirement for coating repairs.
2) Section 5.3 - Added reference to Section 6.8.
3) Section 6.2 - Added reference to EO-14134-C.
4) Section 6.3 (B) - Deleted the requirement for the name of coating inspector to be documented on the “as constructed” for mains 100 feet or more. Revised the coating inspection requirements for mains less than 100 feet.
5) Section 6.4 (B) - Clarified precautions to prevent arcing.
6) Section 6.5 (C) - Clarified wording for test stations.
7) Section 6.8 (E) - Clarified trenchless technologies.
8) Section 6.9 (C) - Deleted section covering services other than branch services feeding multiple buildings.
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**Effective Date:** 1/21/16

**Environmental, Health, & Safety Review by:** J. Fox

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1.0 **SCOPE**

This specification provides guidelines to be used during the installation, repair, or replacement of buried steel gas mains, services, metallic fittings and steel gas piping after the meter.

2.0 **LEGAL REQUIREMENTS**

This specification complies with the Department of Transportation, 49 CFR Part 192, Sections 451 through 491; and the New York State Public Service Commission, 16 NYCRR Part 255, Sections 451 through 491.

3.0 **ORGANIZATIONS APPLICABLE**

All organizations involved with the construction, inspection or maintenance of underground gas piping.

4.0 **OPERATOR QUALIFICATION**

All Corrosion Control covered tasks shall be performed by Operator Qualified individuals, or if an individual is not Operator Qualified, the individual may perform the task under the direct observation of one who is Operator Qualified.

5.0 **EXISTING STEEL MAINS AND SERVICES**

5.1 When an unprotected steel gas pipe is exposed for any reason, a 32 lb. "hot spot" magnesium anode shall be installed (if the gas pipe is scheduled for replacement, no anode shall be installed). The anode wire shall be attached directly to the pipe with no test station. All anodes shall be shown on the "As Constructed."

  ★ 5.2 Repair damaged coating as per Section 6.3 within the limits of the excavation on all coated mains and services. If there is reason to believe that damaged coating extends beyond the limits of the excavation, the pipe shall be exposed to make the repairs.

  ★ 5.3 Backfill the excavation with sand, acceptable reprocessed backfill, or the soil from the excavation as per Section 6.8. If using the excavated soil, any rocks greater than 2 inches in diameter, as well as any clay, organic matter, or other debris shall be removed.
5.0 **EXISTING STEEL MAINS AND SERVICES** (Continued)

5.4 Cathodic Protection and Testing

Testing on all existing mains and services shall comply with Specification G-11830, "Corrosion Testing on Steel Gas Mains and Services."

6.0 **INSTALLATION OF NEW STEEL MAINS AND SERVICES**

6.1 Cathodic Protection of Services

All new steel services shall be separately protected.

★ 6.2 Anodes

Only magnesium anodes shall be installed on all new and existing steel mains and separately protected services including underground piping after the meter. (See Appendix A)

Anode wires, and wires used for bonding and testing shall be installed on the body of the pipe by use of thermit welding as per EO-14134-C.

6.3 Coating

A) Repair all damaged coating and coat all bare fittings and pipe as follows:

1) Use Cold Applied Primerless Tapes on straight pipes and welded elbows (smooth surfaces) as per Specification G-8209, "Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures."

2) Use Cold Applied Mastic on all irregular surface fittings as per Specification G-8209.

**NOTE:** Any removal and handling of coal tar coated pipe requires an asbestos handling license or at a minimum 8 hour coal tar removal class training.

★ B) For any length transmission main operating at ≥125 psig and any distribution main 100 feet or more in length, the coating shall be electrically inspected using a Holiday Detector prior to backfilling the pipe in the excavation.
6.0 INSTALLATION OF NEW STEEL MAINS AND SERVICES (Continued)

6.3 Coating (Continued)

On mains less than 100 feet in length and services, the piping shall be electrically inspected using a Holiday Detector prior to backfilling where practical.

6.4 Insulating Joints

A) Insulating joints (IJ$s) shall be installed at the following locations:

1) Between a new steel pipe and all other existing metallic pipes.

2) On a new steel pipe between the service head valve and the meter.

3) Between a new steel main and a new steel service.

4) At the aboveground ends of any underground steel pipe after the meter.

The following are two examples:

a) If a steel pipe goes underground immediately after an outdoor meter, an insulating joint (IJ) should be installed after the meter before the pipe goes underground. Another IJ should be installed at the other above ground end where the pipe enters a building or comes above ground.

b) If a steel pipe exits a building and goes to another building underground, IJs should be installed just inside both buildings on the above ground pipe.

5) Where a gas main or gas service is located in close proximity to electrical transmission tower footings, ground cables or counterpoise, or in areas where fault currents or unusual risk of lightning may be anticipated, contact Corrosion Control to design and review the cathodic protection so that protective measures may also be taken at the IJs to protect the gas main or gas service against damage due to fault currents or lightning.
6.4 Insulating Joints (Continued)

6) Gas mains and gas services constructed after November 1993 that are located parallel and in close proximity to or crosses underneath an overhead high-voltage (69-kV or higher) electric transmission facility must be buried or located where access is limited by use of fences or barriers to personnel that are trained in safe practices regarding step and touch voltages. Contact Corrosion Control to design and review the cathodic protection on such gas mains and gas services so that protective measures in the presence of step and touch voltages are ensured.

★ B) Restrictions

An IJ may not be installed in an area where a combustible atmosphere is anticipated unless precautions are taken to prevent arcing. If a combustible atmosphere is anticipated, contact Corrosion Control to design and review the necessary precautions to prevent arcing.

6.5 Test Stations

A) Install one test station on all new steel mains less than 100 feet in length and on separately protected services. (See Appendix B)

B) A minimum of two test stations is required on mains 100 feet or longer at their extremities.

★ C) Call Corrosion Control for test station locations for mains greater than 1,000 feet in length.

6.6 Compression End Fittings

Bond all metallic compression end fittings including valves. (See Appendix C)
6.0 INSTALLATION OF NEW STEEL MAINS AND SERVICES

(Continued)

6.7 Pipe In Casings and Through Wall Sleeves

A) The steel carrier pipe shall be electrically isolated from the casing or wall sleeve. Should a casing exist, establish electrical isolation by using approved insulating skids between the casing pipe and the carrier pipe. See G-100,280 "Pipeline Casing Insulating Skids."

B) The ends of the casing/wall sleeve shall be sealed in accordance with Company Specification G-8096, "Sealing the Annular Space Between a Gas Pipe and a Wall, Casing Pipe, or Sleeve" and Specification G-100,237, "Link Seals for Sealing the Annular Space Between pipe and Casing."

C) The steel carrier pipe in a sleeve or casing shall be coated in accordance with Section 6.3. The sleeve/casing does not require coating.

D) For mains, at each end of the casing, install test leads on the steel carrier pipe and metallic casing pipe as per EO-14134-C. Route the test leads into a test station at each end of the casing. The steel carrier pipe shall have a white #10 test lead, and the metallic casing pipe shall have a red #10 test lead. The test stations shall be shown on the "as constructed" sketch after the test stations have been installed. Contact Corrosion Control to perform tests using the new test leads. (See Appendix B)

6.8 Backfilling

A) A smooth surface shall be established along the bottom of the trench by placing a bed of sand under the pipe. Sandbags may be placed under the pipe at regular intervals in place of a sand bed. These bags must be able to be temporarily moved to electrically inspect the pipe’s coating for damage.

B) A minimum of 4 inches of wetted and compacted sand shall be used in a rock area to form a firm base.

C) The pipe in the trench shall be backfilled with 12 inches of sand and it shall be hand compacted. The remaining trench shall be backfilled with sand that shall be mechanically compacted in 12 inch lifts. Care shall be taken when backfilling to prevent damage to the coating.
6.0 INSTALLATION OF NEW STEEL MAINS AND SERVICES (Continued)

6.8 Backfilling (Continued)

D) Wooden blocks may be installed under the pipe in the trench on a temporary basis in order to facilitate pipe line-up or route. The blocks must be removed before backfilling and replaced with the proper supports as per Section 6.8A. The coating shall be checked for holidays (voids or discontinuities) in these areas and repaired in accordance with Section 6.3.

E) For excavations using trenchless technologies (e.g. boring, horizontal directional drilling, driving), the applicable Company job specification that details precautions with coatings and specific installation guidelines to minimize holidays and coating damage will supersede this specification.

6.9 Cathodic Protection Testing

A) Mains Less Than 100 Feet, in Length; or Separately Protected Services

Operating Areas or Energy Services shall perform the following and document on form Appendix D:

1) Verify the effectiveness of all insulating joint(s).
2) Verify that the pipe is electrically continuous.
3) Measure the Pipe to Soil Potential to ensure that it is -0.85 volts or more negative.
4) Enter the new structure into GIS including the pipe-to-soil-reading, in accordance with Specification G-11830.
5) The Operating Areas shall retain the original copy of the completed Appendix D for 5 years.

B) Mains 100 Feet or More in Length and Transmission Mains

Operating Areas or Construction shall notify Corrosion Control regarding the installation of these new steel structures. Notification shall comply with Specification G-11830. Additionally, notify Corrosion Control prior to installation and after tie-in to enable Corrosion Control to test these structures pre- and post-installation.
6.0 INSTALLATION OF NEW STEEL MAINS AND SERVICES (Continued)

6.9 Cathodic Protection Testing (Continued)

C) Underground Piping After the Meter

Corrosion Control shall perform the initial testing to meet all Company requirements. The piping shall be shown on mains & services (M & S) plates for future leakage surveys. (If the initial testing results are unsatisfactory, the installer shall make repairs and Corrosion Control shall retest. Repairs and retesting shall be performed until satisfactory results are obtained.)

★ 7.0 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.

8.0 REFERENCES

CI-870-1 Records Management

EO-4890-A - Service Pipe/Tubing and Service Sleeve Through Vault, Open Areaway, Open Area Under Stair, Under Enclosed Area and Into Vaulted Basement

EO-14134-C Thermit Weld Process for Attaching Wire to Pipe or Fitting

G-8096 - Sealing the Annular Space Between a Gas Pipe and a Wall, Casing Pipe, or Sleeve

G-8209 - Field Coating of Steel Pipe and Fittings Installed Underground and in Subsurface Structures

G-11830 - Corrosion Testing on Steel Gas Mains and Services
8.0 REFERENCES (Continued)

G-100,237 - Link Seals for Sealing the Annular Space Between pipe and Casing

G-100,280 - Pipeline Casing Insulating Skids

9.0 ATTACHMENTS

Appendix A - Magnesium Anodes for New Steel Gas Mains and Separately Protected Services and Metallic Fittings

Appendix B - Test Stations for New Gas Mains and Services

Appendix C - Bonding of Compression Couplings and Valves on New Steel Mains and Services

Appendix D - New Steel Gas Pipe Corrosion Record
APPENDIX A

MAGNESIUM ANODES FOR NEW STEEL GAS MAINS AND SEPARATELY PROTECTED SERVICES AND METALLIC FITTINGS

1.0  SEPARATELY PROTECTED SERVICES AND MAINS

1.1  3/4" to 1 1/2" diameter

- Install one 17 lb. magnesium anode for every 100 feet or less in length.

1.2  2" to 4" diameter

- Install one 32 lb. magnesium anode for every 100 feet or less in length.

1.3  6" to 12" diameter

- Install two 32 lb. magnesium anodes for every 100 feet or less in length

For example, an 8-inch main that is 150 feet long requires four 32-lb magnesium anodes (two 32-lb magnesium anodes for the first 100 feet and two 32-lb magnesium anodes for the remaining 50 feet). The total number of magnesium anodes (four) should be evenly distributed at each test station (two magnesium anodes at each of the two test stations). Similarly, an 8-inch main that is 280 feet long requires six 32-lb magnesium anodes that are evenly distributed among the test stations.

1.4  Diameters greater than 12"

- Call Corrosion Control.

1.5  Anode Design

- A maximum of four 32 lb. magnesium anodes shall be installed at any anode test station and eight 32-lb. magnesium anodes at any IJ test station. If there is protected steel on both sides of the IJ, then install four 32-lb magnesium anodes on each side of the IJ.

- Magnesium anodes should be installed horizontally; however, angular or vertical installation is also acceptable.
MAGNESIUM ANODES FOR NEW STEEL GAS MAINS AND SEPARATELY PROTECTED SERVICES AND METALLIC FITTINGS

2.0 METALLIC FITTINGS

Metallic fittings include transition fittings, posi-lock tees, restraining couplings, or insulated Dresser end caps. These metallic fittings have been designed for adequate corrosion control, including coatings and anodes where applicable, to prevent leakage caused by localized corrosion pitting. One 3 lb. magnesium anode shall be installed on all metallic fittings that are 6-inches in diameter or smaller. For diameters greater than 6-inches, use one 17 lb. magnesium anode. Exceptions to this practice are:

2.1 Metallic fittings that are installed on strap saddles shall only have a 3 lb. magnesium anode attached to the saddle. For diameters greater than 6 inches, use one 17 lb. magnesium anode.

A) Plastic brass-based tees that are installed on insulated strap saddles around protected steel, cast iron (6" and smaller), or wrought iron mains shall have a 3-lb. magnesium anode attached to the 6" and smaller saddle. For 8" and larger insulated strap saddles, attach a 17-lb. magnesium anode. See Specification G-8100, Appendix H-2.

B) Plastic brass-based tees that are installed on insulated strap saddles around unprotected steel mains shall have a 3-lb. magnesium anode attached to the 6" and smaller saddle. For 8" and larger insulated strap saddles, attach a 17-lb. magnesium anode. Attach a 32-lb. "Hot Spot" magnesium anode to the steel main. See Specification G-8100, Appendix H-2.

2.2 Metallic fittings that are directly attached (threaded, welded) to a protected steel main require no separate anode.

2.3 Metallic fittings that are directly attached (threaded, welded) to an unprotected steel main shall have one 32 lb. "Hot Spot" magnesium anode attached to the steel main.

2.4 Metallic fittings that are directly attached (threaded) to a cast iron or wrought iron main shall have one 3 lb. magnesium anode attached to the fitting for diameters 6 inches and smaller. For diameters greater than 6 inches, use one 17 lb. magnesium anode. NOTE: Plastic brass-based tees that are directly attached (threaded) to a cast iron main do not require an anode. See Specification G-8100, Appendix H-2.

3.0 CORROSION WORK ORDER (CWO) REPAIRS

Spike anodes are acceptable for use as a CWO repair on separately protected services that have a small diameter and are short in length.
APPENDIX B

TEST STATIONS FOR NEW GAS MAINS AND SERVICES

SEPARATELY PROTECTED SERVICE — STEEL

New Steel Service

Curb Valve

White

Black

Existing Unprotected Steel Main

Anode *

Anode *

Plastic Service

Plastic Curb Valve

Property Line (PL)

White

Black

Steel

Anode

Anode

Transition Fitting

Existing Unprotected Steel Main

MAIN LESS THAN 100 FT. IN LENGTH

GREEN

Black

Red

CAST IRON

IN

IN

Existing Unprotected Steel

Anode *

Anode *

MAIN 100 FT. OR MORE IN LENGTH

Black

Green

Red

Green

Red

Green

Red

Anode *

Anode *

Anode *

Anode *

CAST IRON

IN

IN

Existing Unprotected Steel Main

*Install this anode if a corrosion repair is made and the pipe is not scheduled for replacement.

Mains – Color Code

Black: Anode

Red: North or East Side IJ.

White: Pipe at Anode

Green: South or West Side IJ.

Test Station.

NEW STEEL GAS MAIN IN METALLIC CASING PIPE

White

Red

New Steel Gas Main
**NOTES:**

1) On Company installed steel services 2" diameter and smaller, bonding is not required as long as the continuity of the service is checked and verified.

2) Crimp-on connectors are welded to the barrel of the coupling so that the coupling may be bonded to the pipe.
New Steel Gas Pipe Corrosion Record

ECS TICKET # ___________________________
(Created by Installer)

OPERATING AREA
Indicate One:
□ M - Manhattan
□ X - Bronx
□ Q - Queens
□ W - Westchester

MUNICIPALITY
(Westchester)

LAYOUT # ________________

STRUCTURE IDENTIFICATION
District

GIS TICKET # ___________________________
(Created by Corrosion)

M&S Plate

PIPE TYPE
Indicate One:
□ N - Main Less than 100 ft.
□ S - Steel Service

Location of lowest P/S Reading (Type N Pipe), House Address (Type S Pipe)

Length of Pipe (Feet) __________

Size Pipe (Inches) __________

Date Installed (Month) (Year) __________

Pressure Indicate One
□ H - High
□ M - Medium
□ L - Low

Test Information (Required)

P/S POTENTIAL

TEST DATE
Month Day Year

Employee Name: __________________________

Employee Number: __________________________

IJ Installed at Proper Location & Tested - OK?
□ YES □ NO □ N/A

Is the service electrically isolated from the main?
□ YES □ NO □ N/A

Is the pipe electrically continuous?
□ YES □ NO

Holiday detection test passed?
□ YES □ N/A

Split sleeve test station installed? YES □ N/A

Anodes installed? How many? __________ Size (lbs): __________

Location: __________________________

Location: C/V □ MATS □ IJTS

(Energy Services Representative or the Operating Area)

Remarks:
________________________________________________________
________________________________________________________
________________________________________________________

As required by Specification G-8205

Form Revised December, 2018