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LAST REVIEW DATE:	REVIEW CYCLE:
10/22/12	5 Years

SPECIFICATION: **G-8209-4**

TITLE: **FIELD COATING OF STEEL PIPE AND FITTINGS INSTALLED UNDERGROUND AND IN SUBSURFACE STRUCTURES**

VOLUME: **2 (Section 1.0), 10, Gas Blue Book, Volume 3 (Section 21) Electric Construction Standards**

REGISTRATION NO.: **GAS0351**

GAS TARGET TRAINING GROUPS: **Gas Construction, Corrosion Control, Pressure Control, Tunnels, LNG, Major Projects, Gas QA, Gas EH&S, Per Diem Contractors, Other Gas Contractors**

OTHER TARGET TRAINING GROUPS: **Transmission Operations (Electric), Construction, Energy Services**

REVISIONS: (See ★)

1) Section 2.2 - Updated designations to GEHSI and CEHSP.

2) Section 2.3 - Added new section covering air quality regulations in New York City and Westchester County. Renumbered subsequent sections.

3) Section 5.1 (A) - Updated designations to GEHSI and CEHSP.

4) Section 5.2 - Updated designations to GEHSI and CEHSP.

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Gas Operations Standards

TITLE: FIELD COATING OF STEEL PIPE AND FITTINGS INSTALLED UNDERGROUND AND IN SUBSURFACE STRUCTURES

EFFECTIVE DATE: November 21, 2012

TABLE OF CONTENTS

ENVIRONMENTAL REVIEW BY: A. Liguori		SAFETY REVIEW BY: A. Liguori		
PREPARED BY:	**APPROVED BY:**	**DATE:**	**VOLUME: 2 (Section 1.0), 10 and Gas Blue Book, Electric Vol 3 (Section 21)**	**PAGE 1 OF**
P. Carnevale	**Liliana Gonzalez General Manager Technical Operations**	**10/22/12**	**Construction Standards, O&M Manual, Gas Blue Book, Electric Construction Standards**	**12 PAGES**

1.0 SCOPE

1.1 This specification covers the field coating of all steel gas, electric feeder and related equipment, cooling water, gasoline, and diesel pipe and fittings installed underground and in subsurface structures:

A) System A: Mastic
B) System B: Cold Applied Tape
C) System C: Hot Coal Tar Enamel (See Section 1.2)

1.2 Hot Coal Tar Enamel may only be used with approval from Corrosion Control.

2.0 ENVIRONMENTAL AND SAFETY IMPACT

2.1 Effective coatings will result in minimizing product leaks due to corrosion on portions of piping systems and related equipment installed underground and/or in subsurface structures.

★ 2.2 All operations that are performed (i.e. coal tar removal, disposal, installation, etc.) must be in compliance with all applicable specifications, Corporate Environmental Health and Safety Procedures (CEHSPs), and General Environmental Health and Safety Instructions (GEHSIs).

★ 2.3 Applicators of coatings, such as hot coal tar enamel, shall follow all regulatory requirements that apply to their coating operations. Therefore, applicators are responsible for having engineering controls in place to meet applicable air quality regulations. This means that applicators working within the five boroughs of New York City shall comply with NYC Administrative Code Title 24, Subchapter 6 Emissions Standards, Subpart 24-141, and applicators working in Westchester County shall comply with all state, county, and local air regulations. It is each applicator's responsibility to obtain required air permits.

2.4 All employees should be given updated, product specific Hazardous Communication Training for the products/materials used in this specification.

2.5 Where employees are required to work around hot liquids, adequate ventilation and PPE must be used, including respiratory protection if necessary.

2.0 **ENVIRONMENTAL AND SAFETY IMPACT** (Continued)

2.6 If employees enter a manhole, proper manhole entry procedures, including atmosphere testing, must be followed.

3.0 **MATERIAL**

System	Material	Unit	Stock No.	Product	Manufacturer
A	Mastic	Gallon	631-1211	Roskote R-28 CE Mastic	Royston Labs Inc.
				or	
				Thick'n Quick	Royston Labs Inc.
	Felt	Roll	000-0067	15# Roofing Paper (Asphalt)	
B	Cold Applied Tape 2" Width	Roll	631-3324	Tapecoat H35 Gray (Primerless)	Tapecoat Company
				or	
	4" Width	Roll	631-3316	T/R Green (Primerless)	Royston Labs Inc.
				or	
				Gator Butyl 601-HP	Pipe Gator Corporation
C	Enamel	-	-	Hot Service Enamel	Reilly
	Primer	-	-	Black Magic Primer	Reilly
	Felt	-	-	Duramat	Power Marketing Group, Inc.
A, B, C	Degreaser	Quart	634-1853	Envirosolv 655	Fine Organics Corp.

4.0 COATING SELECTION

Unless otherwise specified, Table 1 shall be used in selecting the proper coating system.

TABLE 1: COATING SELECTION

ITEMS TO BE COATED	PREFERRED METHOD	ALTERNATE
Welded joints, elbows, offsets, sleeves, damaged coating on pipe, pipe in manholes, straight pipe, etc.	System B	System C
Irregular surface fittings, all bolted fittings, valves, reinforcements, weldolets, non-bolted compression couplings, posi-hold type couplings, irregular pipe surfaces in manholes, etc.	System A	System C

5.0 SURFACE PREPARATION – ALL SYSTEMS

5.1 Coal Tar Mill/Field Coating

★ A) Coal tar wrap may contain asbestos and/or PCBs. If a painted surface is encountered, lead, cadmium, and chromium may be present. Refer to CEHSP S10.00, "Lead Management Program." See applicable GEHSIs or CEHSPs for Personal Protective Equipment (PPE), handling, training, and disposal requirements.

B) All existing loose/disbonded coal tar coating shall be removed from the area to be coated in accordance with AMM 6.04. Remaining edges shall be cut on a taper.

★ 5.2 Other Mill/Field Coatings

These coatings may contain asbestos and/or PCBs. If a painted surface is encountered, lead, PCBs or other hazardous constituents may be present; refer to CEHSP S10.00, "Lead Management Program." All handling and/or removal of mill/field coatings shall comply with procedures specified in applicable GEHSIs and CEHSPs. All mill coating adhesive should be removed from the pipe surface to be coated.

5.0 **SURFACE PREPARATION – ALL SYSTEMS** (Continued)

5.3 Power tool clean the bare pipe surface to be coated to a bright, shiny metal surface (to remove rust, mill scale, weld splatter or sharp edges). When approved by Con Edison's Field Representative, hand tool cleaning is acceptable in areas not accessible to power tool cleaning. Sandblasting of the pipe surface to a commercial gray metal finish is an acceptable alternate to power tool cleaning.

5.4 Wash the surface to be coated (to remove oil, grease, dirt, etc.) using only the degreaser listed in Section 3.0. This washing shall be done by wiping the surface to be coated with clean rags soaked with the degreaser. A final wipe with a white, clean rag shall be done; the white rag shall be free of dust, dirt, etc. Chemical resistant gloves, such as, neoprene or nitrile and coveralls such as, Tyvek should be worn. The coating shall not be applied until all of the degreaser has evaporated from the surface being coated.

5.5 Ambient temperatures at or below 45 °F may cause moisture in the air or on the pipe to "freeze". To enhance the immediate bond or remove the frozen moisture and ice on the pipe surface in colder temperatures, the mastic or tape or coal tar enamel primer shall be stored in a heated area, and the pipe shall be heated with an appropriate heat source. After heating pipe surface, wipe pipe with a clean, white rag; white rag shall be free of dirt, dust, etc. The coating shall not be applied until pipe surface is clean and dry.

6.0 **APPLICATION OF PRIMER**

6.1 There is no primer required with System A – **Mastic** or System B – **Cold Applied Tape**.

6.2 System C – **Hot Coal Tar Enamel** requires primer. The approved primer shall be stirred thoroughly. Apply the primer to a clean dry pipe surface by brushing, leaving a uniform coating completely covering the surface of the pipe or fitting and overlapping the mill coating on each side by at least four inches. Allow the primer to dry. The hot coal tar enamel shall be applied immediately after the primer has dried.

7.0 COATING APPLICATION

7.1 System A – Mastic

A) The mastic is furnished properly formulated for application. Normal appearance is thicker than most coatings, but it can be brushed evenly. Stir mastic thoroughly prior to use. Apply mastic by **brush**, keeping generous amounts of mastic on the brush; however apply by brushing on **thin** coats. Use only clean brushes that are not caked or hard due to prolonged use.

B) Apply a first thin coat of mastic and let dry for approximately 15 minutes; then apply a second coat. It takes approximately 45 minutes for the second coat to dry. Each coat of mastic shall overlap any adjacent coating.

NOTE: The drying times mentioned here are variable and dependent upon ambient temperature and relative humidity. Drying times longer than those indicated are possible.

C) Do not backfill until the mastic is completely **dry**. If emergency backfilling is required, as authorized by Con Edison's Field Representative, pipeline felt shall be wrapped loosely around the coating to protect it against abrasion.

D) For touch-ups of factory (mill) coated fittings with mastic, follow surface preparation steps as in Section 5.0 for exposed metal and 1/2" of adjacent mill coating. Apply mastic as in Section 7.1 overlapping mill coating by 1/2". Only one coat of mastic shall be applied for touch-ups.

NOTE: All bolt threads, heads, and nuts shall be given one coat of mastic regardless of the condition of the factory coating.

7.2 System B – Cold Applied Tape

A) Field coating of welded joints, elbows, offsets, etc. using cold applied tape shall be done as follows:

7.0 **COATING APPLICATION** (Continued)

1) We recommend using 2" wide tape for pipe 8" diameter and smaller and 4" wide tape for larger diameters.

2) Remove paper separator from side of tape which will be in contact with pipe.

3) The tape shall be applied by the "spiral wrap" method. Overlap each adjacent tape layer 1/2". Wrap first and last turn of tape 1 1/4 times around pipe, overlapping mill coating by 4".

4) For pipe, sleeves, barrels, couplings, etc., 16" in diameter and larger, a second layer of tape shall be applied following steps "1" through "3". This second layer of tape shall be started at the opposite end, and the application angle reversed.

NOTE: Application of tape with a minimum 50% overlap is equivalent to two layers of tape.

5) For pipe, sleeves, barrels, couplings, etc., 16" diameter and larger, a "cigarette wrap" application is acceptable using wider tape as long as there are no wrinkles, bubbles, or voids in the tape. Wrap shall be 1 1/4 turns with 1/2" overlap between adjacent tape wraps and 4" on the mill coating. Two layers of tape shall be applied.

7.3 System C – Hot Coal Tar Enamel(See Section 1.2)

A) An alternate for System A or B is System C – Hot Coal Tar Enamel. Pipe and fittings shall be coated with the coal tar enamel specified herein. The enamel shall be heated in kettles equipped with accurate and easily read thermometers. Upon removal from its container, the enamel shall be broken into small pieces before it is placed in the heating kettle. Overheating the enamel results in green-yellow acrid smoke and will carbonize the enamel rendering it useless.

7.0 **COATING APPLICATION** (Continued)

Continued stirring is essential to obtain uniform heating. The heating and pouring temperatures are: Maximum Kettle Temp., 525 °F. Minimum Pouring Temp., 485 °F. The enamel shall be kept free flowing and above the minimum pouring temperature both in the kettle and in the pouring buckets.

B) Field coating of welded joints, elbows, offsets, etc., using **Hot Coal Tar Enamel**, shall be done as follows:

1) Strips of felt shall be cut long enough to go around the pipe 1 1/4 times. Using the felt strips as slings, enamel shall be poured onto the surface of the pipe and felt and spread to at least 3/32 inch thickness over the area to be coated. The felt sling shall be discarded and disposed of in an approved manner after the first coat of enamel.

2) The enamel shall be inspected for voids, thin spots, sags, wrinkles, and other defects. Defects shall be corrected before the application of the second coat.

3) A second coat of enamel, at least 1/32 inch thick, shall be applied over the first coat using new strips of felt. The second enamel coat with a felt wrapper shall extend over the area being coated and overlap previously applied mill coatings by at least four inches.

4) Excess enamel shall be evident along all felt edges to get good sealing properties.

5) The inside face of all felt strips shall be sealed with enamel to keep out moisture.

6) Where hot enamel overlaps mill coatings other than coal tar, a transition area forms between the mill and field coatings. After the enamel is applied, this area shall be wrapped with cold applied tape, System "B", 1 1/4 times around the pipe.

7.0 **COATING APPLICATION** (Continued)

C) Field coating of irregular fittings, using Hot Coal Tar Enamel, shall be done using two separate coats of enamel. The first coat of enamel shall be at least 3/32-inch thick. It shall be inspected for voids, thin spots, wrinkles, sags, blisters and other defects which shall be repaired prior to the application of the second coat. The second coat of enamel shall be at least 1/32-inch thick. The working parts of valves shall be coated in accordance with Sections 5.0 and 7.1 of this Specification using System A – **Mastic**.

8.0 **REPAIRS OF DAMAGED COATING**

8.1 Repairs of damaged coating on fittings only using System A – **Mastic** shall be done in accordance with Sections 5.0 and 7.1 of this Specification.

8.2 Repair of damaged coating using:

A) Cold Applied Tape – System "B"

1) Follow all applicable steps in accordance with Sections 5.0 and 7.2.

2) Cut a piece of tape (patch) large enough to cover damaged area, overlapping mill coating by at least 2".

3) Cut a second piece of tape long enough to wrap around the pipe 1 1/4 times.

4) Remove the paper separator from side of tape which will be in contact with pipe.

5) Apply the patch.

6) Wrap the second piece of tape around the pipe 1 1/4 times, covering the patch. Avoid too much handling and stretching of tape, which will result in wrinkles and bubbles in the tape.

8.0 **REPAIRS OF DAMAGED COATING** (Continued)

B) Hot Coal Tar Enamel – System "C" (See Section 1.2)

1) Follow all applicable steps in Sections 5.0, 6.2, and 7.3 with the following exceptions:

a) This coating shall be used only to repair hot coal tar enamel coatings.

b) The loose or disbonded coating shall be removed in accordance with procedures specified in applicable GEIs, CEPs, and variances. The edges of the coating shall be cut on a taper.

c) When the primer has become dry, hot enamel shall be poured on the primed metal, and a first piece of felt shall be carefully applied over the opening.

d) After a second application of hot enamel, a second piece of felt, larger than the first by not less than 4" in any direction, shall be immediately placed over the patched area.

9.0 **INSPECTIONS**

9.1 For System A – **Mastic**, no electrical inspections shall be performed. A thorough visual inspection of the finished coating shall be performed in order to insure that no holidays or voids are present in the coating.

9.2 For System B – **Cold Applied Tape**,

A) Electrical Spark Inspection, using an approved Holiday Detector, shall be made on all coated pipe and fittings just prior to backfilling. Where practical, the coated pipe in manholes shall be electrically spark inspected; where impractical, a visual inspection of the coated pipe will suffice. The peak voltage of the Holiday Detector shall be between 12,000 and 15,000 volts (except electric feeder pipe which shall be 18,000 to 20,000 volts) measured with the electrode in contact with the coated pipe. Additional exceptions to this electrical inspection are natural gas service lines and distribution mains less than 100 feet in length, which only require a thorough visual inspection.

9.0 **INSPECTIONS** (Continued)

B) An "X" test shall be performed periodically to assure proper coating adhesion to the pipe surface. The test shall consist of two cuts, crisscrossing through the tape and adhesive to the pipe surface. The cuts shall be approximately 4 inches in length. The four cut edges of the tape at the center of the "X" shall be pulled up. If a majority of the tape/adhesive is pulled off the pipe surface, the tape/adhesive was applied improperly and must be removed from the entire coated joint or pipe section. New tape/adhesive shall be applied following Sections 5.0 and 7.2. If a majority of the tape/adhesive is not pulled off the pipe surface, the tape/adhesive was applied properly. The damaged tape/adhesive shall be repaired as per Section 8.0

9.3 For System C – **Hot Coal Tar Enamel**, an Electrical Spark Inspection, shall be made on all coated pipe and fittings as per Section 9.2. The peak voltage of the Holiday Detector shall be as in Section 9.2. There are no exceptions to this electrical inspection.

9.4 All coating defects found from the inspections described in Sections 9.1, 9.2, and 9.3 shall be repaired as per Section 8.0 and inspected again.

10.0 **PROTECTION, PRECAUTIONS, QUALITY CONTROL**

10.1 The mastic and primer are flammable materials and must be kept away from open flames, sparks or high temperatures. Avoid breathing vapors and use only with adequate ventilation and/or approved respiratory protection. Keep containers closed when not in use. Contact with the skin shall be avoided.

10.2 The enamel pieces, placed in the heating kettles, shall be kept clean, dry and free of dirt, grass, weeds, or foreign matter.

10.3 All heating kettles, pouring buckets, daubers, etc., shall be cleaned once a day and kept in a workmanlike condition. Enamel left in the kettle overnight or from a previous day will be removed and disposed of in an approved manner.

10.0 **PROTECTION, PRECAUTIONS, QUALITY CONTROL** (Continued)

10.4 Rolls of pipeline felt and cold applied tape shall be stored in sheds or on platforms under suitable cover to keep them dry. All rolls shall be carefully handled to prevent distortion of the rolls and damage to the edges which may interfere with their use.

10.5 When practical do not coat in rain, snow, fog, or windy weather which may cause moisture, dust or dirt to collect on the surface to be coated. Wet or dirty pipe or fittings shall not be coated until properly cleaned as per Section 5.0 and dried.