

## **PROCEDURES**

### **ANODE / TEST STATION INSTALLATION**

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#### **3.0 PURPOSE**

The purpose of this section is to establish safe procedures for the installation of sacrificial anodes.

#### **3.1 SCOPE**

This section covers proper procedures for the installation of:

- A. Anodes Installation
- B. Test Lead and Test Station Installation
- C. Bonding
- D. Braze / Silver Solder / Thermit Weld / Pin Weld

#### **3.2 TYPICAL MAGNESIUM ANODE INSTALLATION**

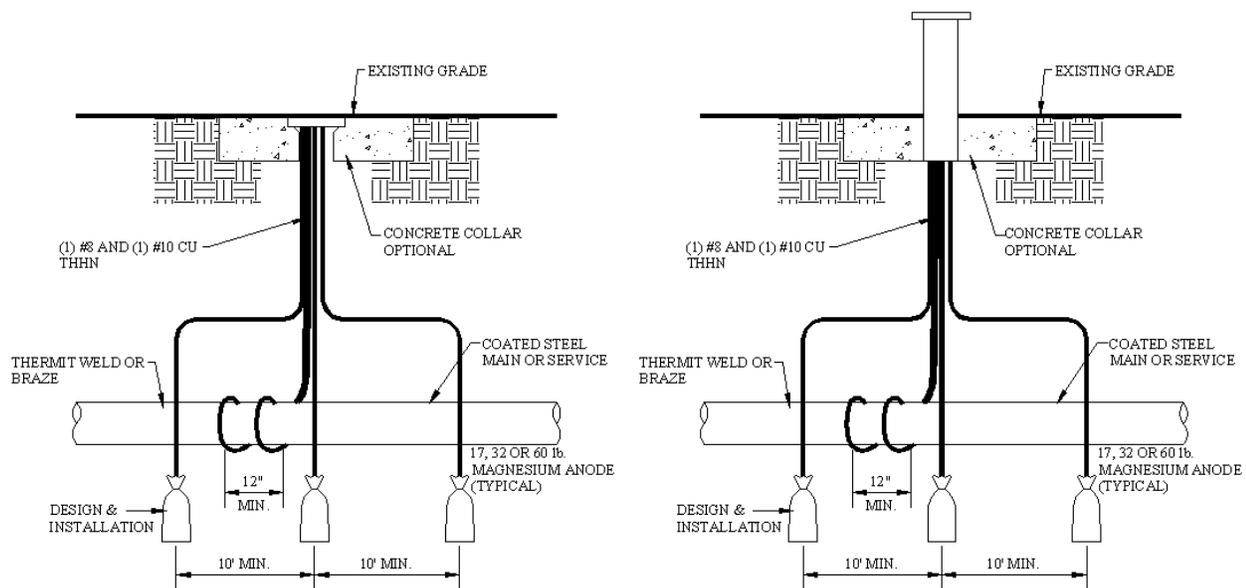
- A. Installation with or without Cathodic Protection Test Station
- B. Remove coating
- C. Clean pipe with file and/or wire brush
- D. Strip insulation from wire
- E. Install copper sleeve on wire (12 gauge or less)
- F. Follow appropriate field wrap procedure when complete

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(Single or Multiple)



#### Procedure:

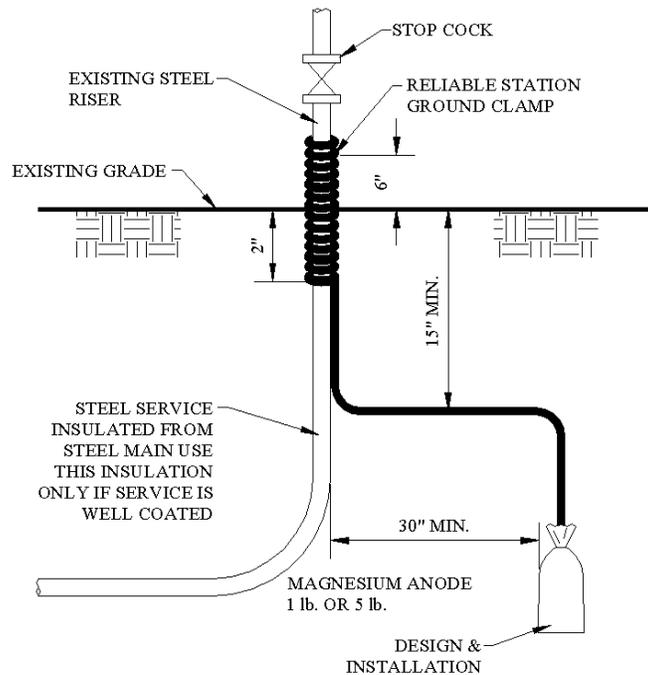
1. Look to place anodes in locations where soil is moist.
2. Place anode(s) in upright position whenever possible.
3. On newly installed or replacement pipe, anodes shall be installed at a minimum of 30" from the pipe (service riser), 5' to 10' (Mains) horizontally from the pipe.
4. Install top of anode at not less than pipe depth.
5. Do not lift or handle anode by its wire as this may damage its connection.
6. If CP test station is used, all wires shall be terminated with sufficient slack (approximately 18").
7. Prior to placing anode, soak hole with water allowing sufficient time for absorption into soil.
8. When back filling anode, cover with native material, rock free. Carefully compact soil, and pour 5 gallons or more of water into the hole after anode is covered by 1 ft or more of native soil then complete backfill per operator standard.
9. If there is no permanent moisture in soil, install a means to water anodes (PVC pipe).

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#### B. Service riser anode installation



#### **Procedure:**

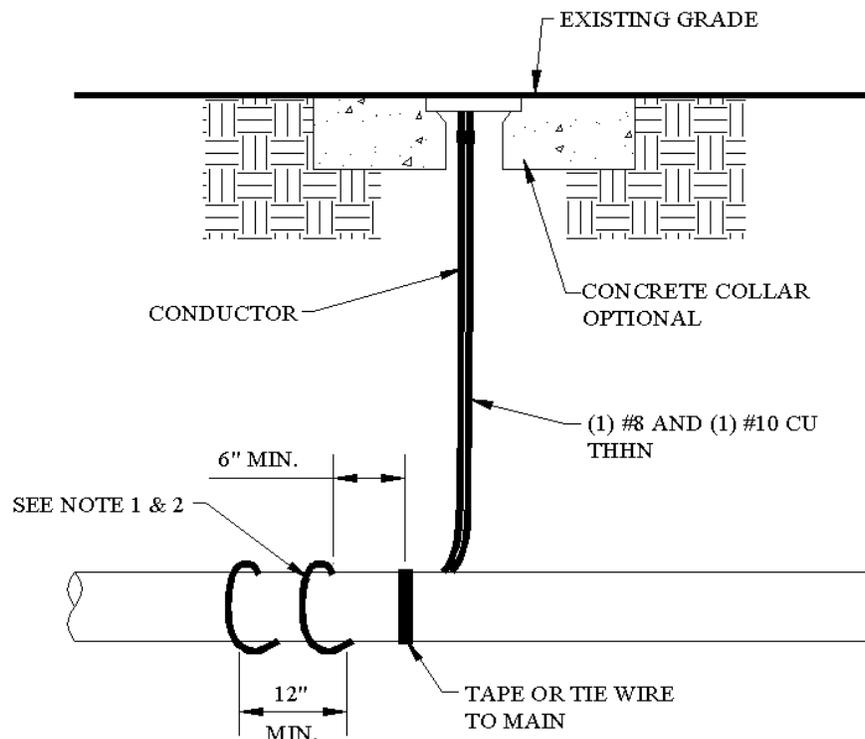
1. Clean a 1" section to bare metal around the entire circumference of the pipe 6" above ground level.
2. Install ground clamp on pipe at cleaned area (6" above ground level) and tighten set screw to secure clamp to pipe.
3. Install anode vertically whenever possible.
4. Install anode and wire a minimum of 15 inches below existing grade.
5. Do not lift or handle anode by its wire.
6. Install anode wire to clamp and tighten nut until wire is secure.
7. Coat clamp with one layer of rubber filler tape.
8. When back filling 1-5 lbs. anode, cover with approximately 6" of native material, rock-free. Carefully compact soil and pour about 5 gallons of water over and around anode and then complete backfill.

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#### 3.3 TYPICAL TEST STATION INSTALLATION



#### Procedure:

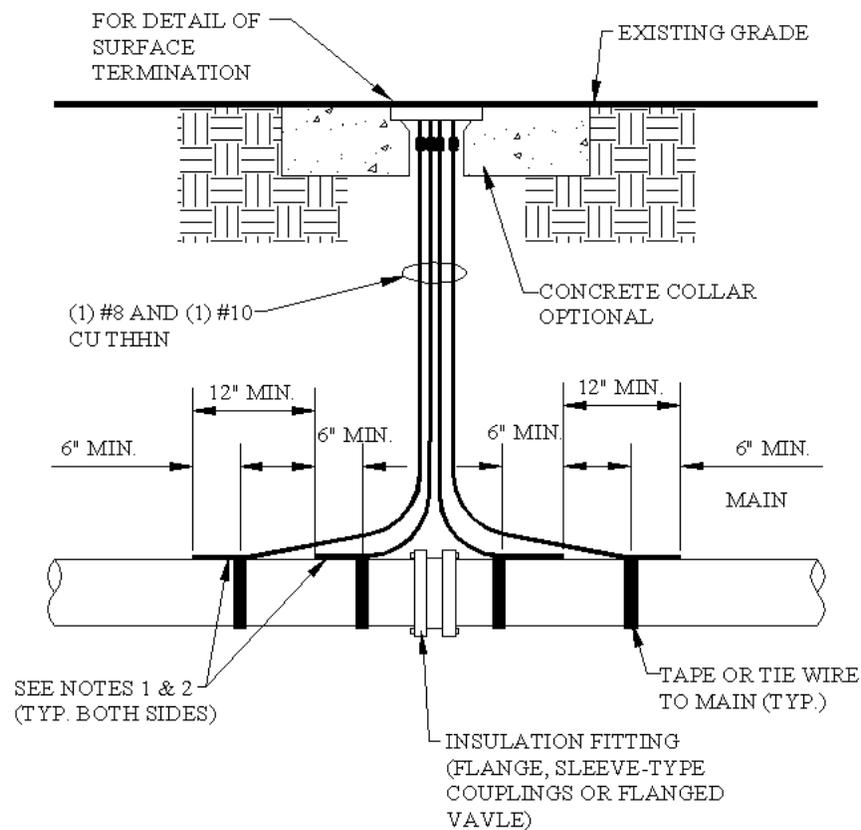
1. Attach wires and cables using Thermit weld, silver solder, brazing or pin brazing.
2. Wrap or coil wire around pipe (Minimum one time and twist) to prevent tugging/pulling from detaching the wire.
3. Minimum distance between Thermit weld or braze is 12".
4. Attach minimum of two wires to the main (one # 10 and one # 8).
5. Field coat main at points of wire attachment using approved primer and wrap.
6. Wires should be long enough to extend a minimum of 18" above ground level if surface level test station and 18" above test station riser height if raised test station installation.
7. Wires may be offset to any convenient location.
8. Backfill per operator standard.

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#### 3.4 TYPICAL CONNECTION / BOND AT AN INSULATING FITTING



#### **Procedure:**

1. Attach wires and cables using Thermit weld, silver solder, brazing or pin brazing.
2. Wrap or coil wire around pipe (Minimum one time and Twist) to prevent tugging/pulling from detaching the wire.
3. Minimum distance between Thermit weld or braze is 12".
4. Attach minimum of two wires to the main on either side of the insulator (# 10 and # 8).
5. Wires should be long enough to extend at least 18" above ground level or top of test station riser.
6. Field coat main at points of wire attachment using proper primer and wrap.
7. Wires may be offset to any convenient location.

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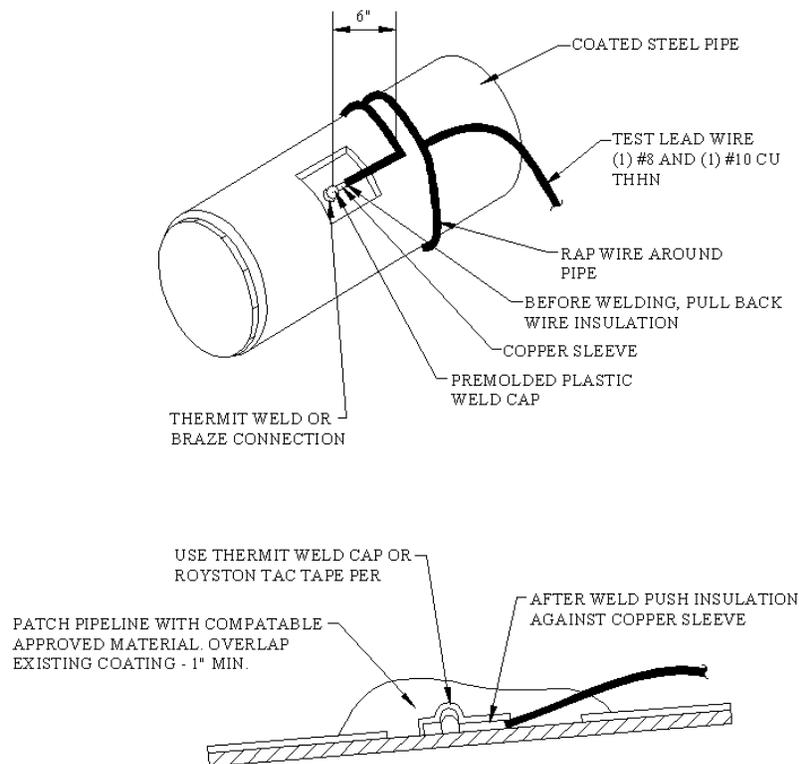
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8. Do not attach wires to valves, fitting or components.
9. Backfill to operator standard.

#### 3.5 BRAZE / SILVER SOLDER / THERMIT WELD / PIN BRAZE

##### METHOD "A"



#### Thermit Weld:

1. Limited to pipe operating at less than 20% SMYS.
2. The Thermit weld cartridge shall not exceed a No. 15 charge (15 grams).
3. Limit to no. 8 and smaller diameter cables.
4. Remove pipe coating and clean pipe surface of all foreign material.
5. Strip wire insulation and install appropriate copper sleeve over wire; crimp lightly.
6. The connection may be made on vertical or horizontal piping.

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7. Make sure correct size weld mold is used for pipe size.
8. Insert charge and ignite with appropriate spark igniter.
9. Hold mold steady until ignition is complete, several seconds.
10. Remove mold.
11. Lightly tap connection to ensure good connection.
12. Chip away excess material and jagged edges using a file to ensure smooth weld surface.
13. Soap test
14. When connection is to be buried, the connection is to be adequately coated with rubber filler and plastic tape.
15. Clean, dry and wrap pipe and connection. If tape is to be used, wrap tape completely around pipe.
16. Minimum of 12" between 2 or more welds.
17. Do not attach wires to valves, fitting or components.
18. Backfill to operator standard.

#### **Braze weld:**

1. The Brazing process may not be used on steel pipe operating at greater than 20% SMYS.
2. Remove coating and clean pipe (should be shiny metal).
3. Strip wire insulation and install appropriate copper sleeve over wire; crimp lightly.
4. The connection may be made on vertical or horizontal piping.
5. Use appropriate flux coated brazing rod.
6. Preheat to dull red.
7. Touch rod to heated pipe and allow flux to melt.
8. Place wire on pipe.
9. Continue to melt rod and flux on wire.
10. Add sufficient rod to build a bead.
11. Allow cooling time of 2 to 3 minutes.
12. Lightly tap connection to ensure good connection.
13. Soap test.
14. Clean, dry and wrap pipe and connection.
15. Do not attach wires to valves, fitting or components.
16. Backfill to operator standard.

#### **Silver Solder:**

1. The silver solder method has no limitations as to % SMYS.
2. Remove coating and clean pipe (should be shiny metal).
3. Strip wire insulation and install appropriate copper sleeve over wire; crimp lightly.
4. Apply thin coat of flux to pipe.
5. Heat pipe, approximately 400<sup>0</sup>F prior to adding solder (use pyrometer or temp stick) **do not**

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#### **contaminate connection.**

6. "Tin" pipe and wire.
7. While pipe is hot, place wire on pipe.
8. Melt sufficient puddle to attach wire.
9. Neutralize flux with baking soda & water.
10. Lightly tap connection.
11. Clean, dry and wrap pipe and connection.
12. Do not attach wires to valves, fitting or components.
13. Backfill to operator standard.

#### **Pin Braze:**

##### Application

1. The pin brazing method may be utilized with no limitations as to % SMYS or pressure due to its low temperature application.

##### Preparation

1. Ensure that the batteries are fully charged.
2. Wear appropriate personal protective equipment.
3. Prepare pipe surface, remove pipe coating and clean pipe of all foreign material (should be shiny metal).
4. Caution should be exercised whenever using approved grinder on metal pipe surface to avoid removing any significant pipe wall thickness.
5. Light rain or snow will not adversely affect the pin braze however heavy rain or snow may cause the pin fuse to burn out prematurely resulting in faulty or no bond.
6. It is possible to pin braze in sub zero weather.

##### Procedure

1. Maintain a minimum 12 inches separation from any weld or fitting on the pipeline.
2. Attach magnetic earth lead to clean surface of pipe.
3. Select appropriate brazing pin and ceramic ferrule (Keep stored in delivery tins and do not mix part numbers).
4. If using wire lug to pin braze wire directly to the pipe, strip wire insulation and install appropriate copper sleeve over wire; crimp lightly. Locate the brazing pin so the pin is in the center of the hole.
5. Load the gun with brazing pin and ferrule ensuring that they are both back fully home and tight. (Do not straighten the kinked end of the pin fuse wire).
6. The legs of the pin holder must be adjusted as necessary to ensure a firm grip of the pin while maintaining concentricity with the ferrule holder.

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7. Apply sustained pressure on the brazing gun so that full contact is made.
8. When ready to braze it is best to look away to one side.
9. Hold the gun firmly and close the circuit by squeezing the trigger (Keep the trigger depressed until the braze is complete).
10. After approximately 2 seconds the fuse wire should rupture disconnecting the circuit. The arc will extinguish and the pin or stud will be shot forward into the molten filler (If this does not occur after the normal time (2 sec) the gun must be removed keeping the trigger depressed. Start the process over).
11. After the fuse has ruptured the gun must be held in place for an additional 3 seconds to allow braze to set.
12. When complete attach wire if necessary (using bolt style pin) and recoat/ rewrap pipe surface using approved coating procedure (**Refer to Section L-6**).

#### Care and handling

1. Unit should be stored in dry room or cabinet with electrical supply and adequate ventilation.
2. After each days use, examine battery to ensure that the electrolyte is 3/16" above plates. Top off with **distilled water** if necessary.
3. Check each battery cell with hydrometer. Specific gravity should be approximately 1.28. If less than 1.20 do not use and replace battery.
4. Replace cell tops and battery box door.
5. Take care to not tilt equipment.
6. Check battery connections for tightness and wipe clean and dry.
7. Unit must be plugged in on charge whenever not in use.
8. Store brazing pins and ceramic ferrules in delivery tins and **do not** mix part numbers.