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Issue Date:	03/01/16
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Prepared By: Engineering Staff 

Approved By: Jerome T. Schmitz 

CORROSION CONTROL MATERIALS

Silicon Cast Iron Anodes

1. SCOPE

This specification covers the tubular and rod type silicon cast iron anodes used in anode bed installations with impressed current cathodic protection stations. Tubular type anodes are generally used for deep well installations and rod type anodes are generally used for surface type installations.

2. APPLICABLE DOCUMENTS

- 2.1 ASTM International (ASTM) A-518M-99 (2003), "Standard Specification for Corrosion-Resistant High-Silicon Iron Castings."
- 2.2 Southwest Gas Material Specification (MS L-10), "Underground Wire and Cable."
- 2.3 United States Department of Transportation (DOT), Code of Federal Regulations, Title 49, Part 192, "Transportation of Natural and Other Gas by Pipelines Minimum Safety Standards."


NOTE: Unless otherwise specified, the editions of the above documents incorporated by DOT 49 CFR 192 are applicable. Documents not incorporated by DOT 49 CFR 192 will be the most recent edition.

3. TERMINOLOGY

3.1 General

- 3.1.1 "Southwest Gas," "Southwest" or "SWG" wherever used in this specification and other related documents will refer exclusively to Southwest Gas Corporation.
- 3.1.2 The terms "approved," "as approved," "satisfactory," "as directed," "or equal" or other similar terms wherever used in this specification and other related documents will mean "as determined by Southwest Gas," unless specifically stated otherwise.
- 3.1.3 "Product Information Package" or "PIP" wherever used in this specification and other related documents will mean the required technical product information that a manufacturer must submit to Southwest to determine if the product is suitable for use by Southwest, unless specifically stated otherwise.



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4. MATERIALS AND MANUFACTURING

4.1 Anode Composition & Dimensions:

4.1.1 The tubular and rod silicon cast iron portion of the anode is to have the following chemical analysis:

Substance	Percent
Silicon	14.0 to 15.0
Chromium	3.25 to 5.0
Carbon	0.7 to 1.1
Manganese	1.5 Max.
Copper	0.50 Max.
Molydenum	0.20 Max
Iron	Balance

TABLE L-19.1

4.1.2 The tubular anode is to conform to the following requirements:

Type No.	Length	I.D. Inches Minimum	O.D. Inches Minimum	Exterior Surface Area Minimum	Weight (Lbs.) Minimum
1	7' – 2"	1.37"	2.18"	4.0 Ft. ²	46
2	7' – 2"	1.84"	2.65"	4.9 Ft. ²	63


TABLE L-19.2

4.1.3 The rod type anode shall be approximately 5 feet long by 2 inches in diameter. The cable connection end shall be 3 inches in diameter per the sketch in Appendix B. The anode shall weigh approximately 60 Lbs.

4.1.4 The cast iron portion of the anode is not to be porous. It is to be constructed so that water will not permeate though or into the cable connection point of the silicon iron anode casting.



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4. MATERIALS AND MANUFACTURING (Cont'd)

4.2 Cable:

4.2.1 Each anode is to have single continuous length of cable attached by the anode supplier. The cable will be No. 6 AWG or No. 8 AWG size single conductor, stranded copper with splice free high molecular weight polyethylene (HMWPE) insulation suitable for direct burial and should meet the requirements of M.S. L-10.

4.2.2 The size of anode lead cable attached to the anode shall be based on the length of cable required. The following is provided:

- No. 8 AWG HMWPE: 350 ft. or less
- No. 6 AWG HMWPE: 351 ft. or more


4.3 Cable Connection:

4.3.1 The internal cable connection to the tubular anode is to be positioned and assembled as shown in Appendix A. This is to be wedge type fit between the cable connector assembly and the tubular portion of the anode.

4.3.2 The cable connection point for tubular anodes shall be filled mastic and will be Ozite "B" or equal. The Durcon epoxy is to be Durco D164 or equal.

4.3.3 The cable connection for the rod type anode shall be in accordance with the sketch as shown in Appendix B. A polyethylene heat shrink cap shall be placed over the connection to prevent water egress into the connection.



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5. PERFORMANCE REQUIREMENTS

- 5.1 The resistance of the anode-cable construction is not to exceed 0.004 Ohm excluding the cable resistance which is approximately 0.007 Ohm/ft.
- 5.2 The mastic and epoxy materials are to be non-soluble in water, adhere to the internal surface of the anode and to the polyethylene insulation of the cable preventing migration of water (moisture) into the cable-anode connection.
- 5.3 The connection of the anode lead cable to the anode shall be able to withstand a 100Lb. pull force.

6. INSPECTION

- 6.1 Successful review of the Product Information Package (PIP) as well as any future reference by SWG to the seller's part number or internal code number in any future contract or purchase, will mean only that no conflict with the specification was found and will not relieve the seller from meeting all the requirements of this specification.
- 6.2 SWG retains the option to inspect the manufacture and testing of any and all materials, products or systems supplied to this specification at the manufacturer's facility.
- 6.3 SWG will have the right, at their option, to reject any material, which fails to conform to this specification. Any such rejection may take place at the manufacturer's facility; the supplier's warehouse or any subsequent delivery location, before or after SWG assumes possession. Notice of the rejection will be made by promptly to the supplier by SWG. The defective product will be replaced or returned for credit at the manufacturer's expense.
- 6.4 Any changes in manufacturing of previously approved materials, products or systems described in this material specification for sale to SWG must be approved by SWG's Engineering Staff. **Failure to obtain Southwest approval may be cause for rejection and disqualification as an approved supplier.**



SOUTHWEST GAS CORPORATION

ENGINEERING STAFF

MATERIAL SPECIFICATION

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7. CERTIFICATION

The manufacturer's or supplier's certification shall be furnished to Southwest. This certification shall state that samples representing each lot have been manufactured, tested and inspected in accordance with this specification and that requirements have been met. When requested or specified in the purchase order or contract, a report of test results will be provided.

Upon the request of Southwest, the certification of an independent third party indicating conformance to the specification may be considered at Southwest's expense.

8. SAFETY DATA SHEETS

In accordance with law, the seller shall supply Safety Data Sheets for all applicable items supplied under this specification to the following:

- 1) The Receiving Location
- 2) Engineering Staff
- 3) Southwest Gas Corporation
Corporate Safety
Mail Station LVA-120
P.O. Box 98510
Las Vegas, NV 89193-8510

9. PACKAGING AND PRODUCT MARKING

9.1 All products covered in this specification will be packaged in a manner to prevent damage during transportation and storage.

9.2 Length will be indicated in the purchase order.

10. STOCK CLASSIFICATION DESCRIPTION

ANODE, TUBULAR, ____ FT. X ____ IN"., ____ LBS.

ANODE, SCI TUBULAR, ____ LBS., ____ INCH Ø X ____ FT. LONG W/ ____ FT. OF NO. ____ AWG HMWPE LEAD CABLE.

ANODE, SCI ROD, ____ LBS., ____ INCH DIAMETER X ____ INCH LONG, SINGLE CONDUCTOR WITH ____ FEET OF NO. ____ AWG HMWPE LEAD WIRE, STRANDED.