

# Ferroline Anodes Brochure

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# Ferroline Anodes

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## 1 Introduction

Ferroline anodes are designed for the effective protection of steel structures and pipelines from corrosion by the impressed current method. They are manufactured from high silicon cast iron alloy, one of the most important anode materials used by the corrosion engineer to protect steel in a variety of situations.

The highly quality of ferroline anodes is achieved through manufacture by semi-automated plant using induction electric melting which ensures that there is no contamination of the metal and that the critical constituents are well mixed in the finished component. Anodes are manufactured either by chill casting or by conventional sand casting methods according to specification. The excellent corrosion resistance and other desirable properties resulting from these production methods have led to the acceptance of ferroline anodes internationally for cathodic protection systems.

## 2 Specification

### 2.1 Composition

The manufacture of ferroline anodes is based on the following internationally recognized standards for corrosion resistant silicon iron castings:

- BS 1591 1975
- ASTM A518-80

Typical analysis of ferroline is:

	Ferroline	Ferroline C
<b>Silicon</b>	14.50%	14.50%
<b>Manganese</b>	0.75%	0.75%
<b>Carbon</b>	0.85%	0.95%
<b>Chromium</b>	-	4.50%
<b>Iron</b>	Balance	Balance

## 2.2 Mechanical and Electrical Properties

Ferroline materials are dense and homogenous ensuring that the anodes properties are uniform throughout their length.

The finished product has inherently low ductility, requiring careful handling and the avoidance of mechanical or thermal shock.

<b>Tensile strength</b>	<b>103</b>	<b>N/mm<sup>2</sup></b>
<b>Compressive strength</b>	<b>689</b>	<b>N/ mm<sup>2</sup></b>
<b>Brinell hardness</b>	<b>520</b>	<b>HB</b>
<b>Density</b>	<b>7.0</b>	<b>g/cm<sup>2</sup></b>
<b>Melting point</b>	<b>1300</b>	<b>°C</b>
<b>Specific resistance</b>	<b>72</b>	<b>Microhms/cm<sup>3</sup> at 20°C</b>
<b>Coefficient of linear expansion</b>	<b>1.86 × 10<sup>-5</sup></b>	<b>Per °C (0-100°C)</b>

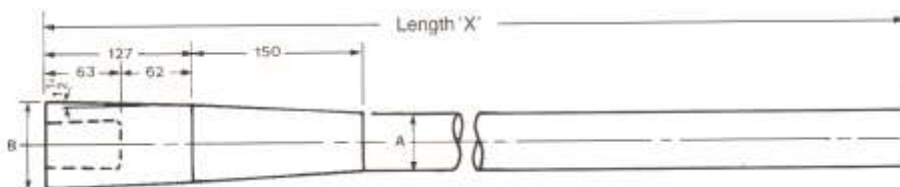
## 2.3 Corrosion Resistance

The cast surface of ferroline anodes is readily and continually oxidized with a thin film of silica, which adheres to the passive surface, retarding the rate of corrosion of the material.

The exception to this situation occurs when chlorine and other gases in the halogen family can be generated in contact with the anode material such as in seawater applications. In such cases, ferroline C is utilized, the chromium content counteracting the action of the chlorine on the anode surface and providing a more passive.

## 3 Anode Types

Ferroline anodes are cast in several shapes and sizes to meet a variety of requirements, the most common and used type of anode is the **Single-Headed Anode**.

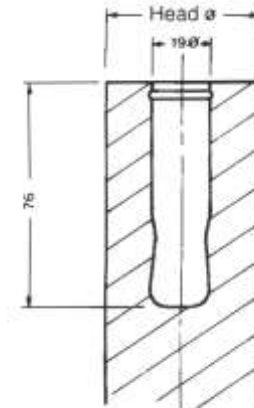


Anode Dia. 'A'	Head Dia. 'B'	Overall Length 'X'	Weight
mm	mm	mm	Kg
75	100	900	32
75	100	1200	41
75	100	1500	50
75	100	1524	51
65	90	900	23
65	90	1200	30
65	90	1500	36.5
50	75	900	13
50	75	1200	18
50	75	1500	21
40	65	900	11
40	65	1200	13
40	65	1500	14
25	50	300	2
25	50	600	3

## 4 Anode Cable Connections

### 4.1 Cable Connections

Several choices for cable connection are available as standard with ferrolite anodes but the most common used type of cable connection is the **Lead Caulked Connection**.



### 4.2 Cables

Ferrolite anodes can be supplied complete with cables connected to the castings. Various sizes and types of cables can be supplied, standard sizes are 6, 10, 16 and 25 mm<sup>2</sup> with insulation to suit all environments. Examples of insulation materials available are:

- Polyvinyl Chloride (PVC)
- Cross Linked Polyethylene (XLPE)

## 5 Anode Caps

Ferroline anode caps may be factory fitted to cabled anodes. They are designed to counteract 'end effect' when single end anode connections are specified. The caps have a highly protective polymeric lining capable of withstanding corrosive environmental conditions including chlorine and sulphate attack. They are manufactured from cross-linked polyethylene and shrink fitted over the end of the anode.

## 6 Applications

Cathodic protection has been used successfully on many types of structure in contact with soils and liquids. The following are examples of structures protected with ferroline anodes.

## 7 Buried Structures

Pipelines (gas, oil, water, drainage)  
Underground cable conduits  
Underground tanks  
Piling structures and foundations

## 8 Non- Buried Structures

Jetties  
Interior of tanks and vessels  
Fresh water and sea water tanks

## 9 Water and Sewage Treatment Plants

Internal surfaces of water and chemical pipeline  
Water tanks  
Water condensers and heat exchangers  
Outfall pipelines

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