

MMO Linear Anode (Sock Anode)

Jennings Anodes MMO Linear or Sock Anode, is an Impressed Current Anode suited to underground environments. MMO Linear Anodes can be installed to provide an ICCP system to protect newly constructed structures or to provide an economic ICCP system for existing structures. Common uses are to protect buried pipelines, the bottom of the above ground storage tanks, and buried metal structures in confined or congested spaces.

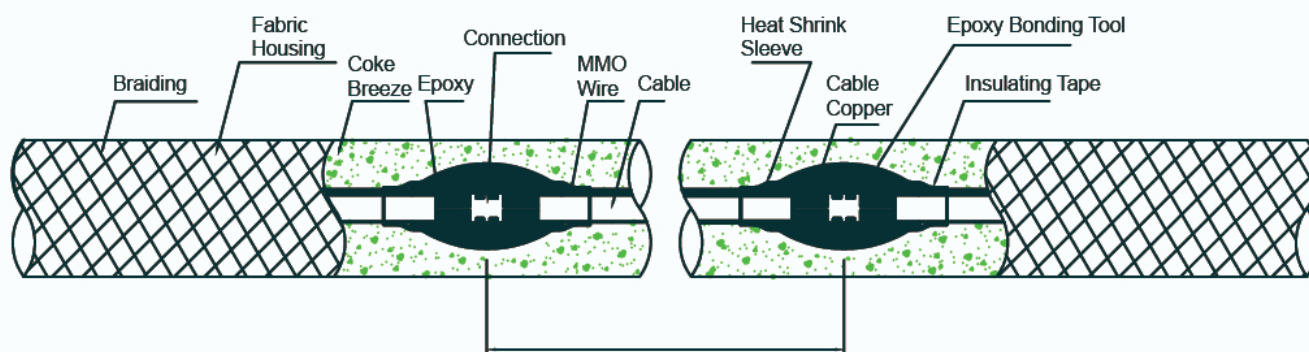
Advantages

Customized Anode Output and Life Expectancy.
Life expectancy can be up to 50 Years.
Lightweight packing reels ensure easy transportation & handling in the field.
Easily cut to appropriate lengths or spliced to other lead cables or Linear Segments (Manual provided)
Cost Effective ICCP solution

Linear Anode Components

MMO Linear Anode consists of a high grade Titanium Wire (coated in Ir, Ta, Ru Mixed metal oxide) running in parallel with an insulated copper cable. The choice of the copper cable can be made from HMWPE, XLPE/PVC, Kynar/HMWPE or as per specification. The MMO Wire and the copper conductor are crimped together, sealed with epoxy resin & encapsulated in a Heat Shrink cap to ensure protection from water ingress. Connections are nominally made at 5M Intervals to ensure uniform current distribution along the length of the anode. Different connection intervals can be accommodated as required.

The MMO Wire / Cable assembly is centrally packed in a continuous Non Woven fabric housing filled with conductive coke breeze backfill. The fabric housing is braided using a high tensile strength heavy duty compact braid assuring product integrity.



Chemical Composition

Anode	MMO Linear Anode (Sock Anode)
Substrate of MMO Wire	ASTM B348 Grade I/II
	Solid Titanium
Coating	Ir-Ta Mixed Metal Oxide Catalyst
Anode Backfill	Calcium Petroleum Coke
Cable Connector Material	Copper
Sock Jacket Material	Porous non-woven fabric Housing
Sock Diameter	1.5" (38 mm)

Electrochemical Properties

Property	Testing Standard	Testing Result
1.Cable Copper Conductor		
Dimension	ASTM B - 263	#6 AWG (Standard)
Connection Resistance	ASTM B - 193	3.08 × 10 ⁻³ Ohm.m
2.MMO Wire		
Dimension	ASTM B - 348	PASS
Volume Resistivity	ASTM B - 193	9 - 11 mOhm.cm
3.Coke Breeze Backfill		
Fixed Carbon	ASTM D - 172	98.5% Min.
Resistivity	G.L.C.-C-12A, 10 bar (145psi) @23°C (73°F)	0.1 Ohm.cm
4.Cable Joint		
Resistivity	ASTM B - 193	1.0 mOhm Max.
5.Fabric Jacket		
Weight	80g/mv Min.	80g/m ²
Bursting Strength	ISO 3303	500N Min.
Abrasion Resistance	ASTM D - 4157	100 Cycles to Failure
Fluid Resistance	6 months Immersion Test	PASS
Chlorine Resistance	6 months Immersion Test	PASS
UV Resistance	ASTM G-53: 8 hours @60°C (140°F) 4 hours @50 °C (122°F)	55% Tear Strength Loss

Mixed Metal Oxide Anodes

MMO Linear Anode

Specification

Anode Model	MMO Wire Diameter	Cable Specification	Current Output Rating	Life Expectancy
MMO - Linear100	1.5mm	#6 KYNAR/HMWPE	100mA/ft (327mA/m)	≥25 yrs.
MMO - Linear300	3.0mm		300mA/ft (983mA/m)	

All weights and dimensions are nominal and subject to variation in material compositions and Jennings Anodes Foundry tolerance.

Quality Assurance & Testing

Jennings Anodes Quality Assurance and Manufacturing Quality Control procedures are strictly adhered to guarantee the ultimate performance and life of the linear anode.

Testing	Chemical Composition	Anode Performance	Physical Appearance
Standards & Methods	ISO 9001:2015 Quality Management System and Foundry Internal Standards of MMO Anodes Manufacture		
	ASTM E120	NACE TM0180; NACE TM0294;ASTM D3359	Foundry ITP
Items	Chemical Analysis of Titanium Substrate	Structure and Thickness of the coating; Uniformity of coating thickness; Adhesion	Size and Weight, Permissible Variations; Anode Finish and Appearance

Packing

Jennings Anodes MMO Linear Sock anode is normally packed on lightweight reels of 500ft. (152m). Bespoke lengths can be ordered.

Anode Model	Packing Details					
	Unit of Measurement	Reel Length	Reel Dimension	Net Weight	Gross Weight	Number of Reels
Jennings Anodes Linear Anode	Metre	500ft. (152m)	Ø36" x 30" (Ø900 x 760mm)	473lbs (215kg)	540lbs (245kg)	24 Reels / 20ft. Container 48 Reels / 40ft. Container

Shipping Documents

Invoice, Packing List, Full Chemical, Physical & Performance Test Reports