



MIXED METAL OXIDE ANODE

MMO anodes have the advantage of low consumption rate and high current capacity, the consumption rate of the MMO anode is counted only milligrams per ampere year, and also as a result of this low consumption rate, the metal dimensions remain nearly constant during the design life of the anode, therefore providing a consistently low resistance performance. So this type of anodes became widely used for the impressed current CP in groundbed and marine structures.

Yuxi manufacture all range of MMO anodes used for Cathodic Protection, including rods, tubes, ribbons, plates and meshes. The anodes are made using titanium substrates which are coated with a mixed metal oxide catalyst, the catalyst is applied by multiple thermal process to form an extremely chemical resistant bond, this MMO coating can enhance the conductive properties of the anode and while the titanium is inherently stable, therefore brings superior performance.

Anode types:

- > Solid rod anode
- > Tubular anode
- > Ribbon anode
- > Mesh anode
- > Piggyback wire anode
- > Plate/Disc anode

MMO anode can be used effectively in all types of environments, such as directly buried in soil, fresh water and salt water. There are two types of catalyst, one is iridium-tantalum system which typically used for soil and fresh water, and the other adding ruthenium into iridium-tantalum formulation for salt water application. The recommended current density in soil, coke breeze, fresh water is 100Amps/m² and in salt water is 600Amps/m².

■ Solid Rod Anode:

The rod anodes always assembled with junction box with a mounting thread to protect the tanks or vessels.

Part No.	Diameter	Length
YX-MM0-R1	6 mm	Up to 1500mm
YX-MM0-R2	12 mm	Up to 1500mm
YX-MM0-R3	16 mm	Up to 1500mm
YX-MM0-R4	20 mm	Up to 1500mm



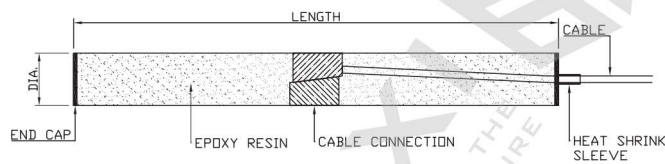
■ Tubular Anode:

Tubular type is the most common MMO anodes used in cathodic protection, the titanium hollow tubes conforms to ASTM B338 grade I standard. This type of anodes always made in strings consisting several pieces of MMO tubes used for deep well cathodic protection system. The cable type and size can be XLPE/PVC, HMWPE, Kynar/HMWPE, etc. from 6sqmm (10AWG) to 35sqmm (2AWG).

Part No.	Dimension	Current Density	Current Output	Design Life
YX-MM0-T1	16mm dia. X 500mm	100Amps/m ²	2.5 Amps in soil	20 Years
		600Amps/m ²	15 Amps in seawater	20 Years
YX-MM0-T2	16mm dia. X 1000mm	100Amps/m ²	5 Amps in soil	20 Years
		600Amps/m ²	30 Amps in seawater	20 Years
YX-MM0-T3	19mm dia. X 500mm	100Amps/m ²	3 Amps in soil	20 Years
		600Amps/m ²	15 Amps in seawater	20 Years
YX-MM0-T4	19mm dia. X 1000mm	100Amps/m ²	6 Amps in soil	20 Years
		600Amps/m ²	32.5 Amps in seawater	20 Years
YX-MM0-T5	25mm dia. X 500mm	100Amps/m ²	4 Amps in soil	20 Years
		600Amps/m ²	23.5 Amps in seawater	20 Years
YX-MM0-T6	25mm dia. X 1000mm	100Amps/m ²	8 Amps in soil	20 Years
		600Amps/m ²	48Amps in seawater	20 Years
YX-MM0-T7	32mm dia. X 500mm	100Amps/m ²	5 Amps in soil	20 Years
		600Amps/m ²	30 Amps in seawater	20 Years
YX-MM0-T8	32mm dia. X 1000mm	100Amps/m ²	10 Amps in soil	20 Years
		600Amps/m ²	60 Amps in seawater	20 Years
YX-MM0-T19	32mm dia. X 1220mm	100Amps/m ²	12 Amps in soil	20 Years
		600Amps/m ²	74 Amps in seawater	20 Years

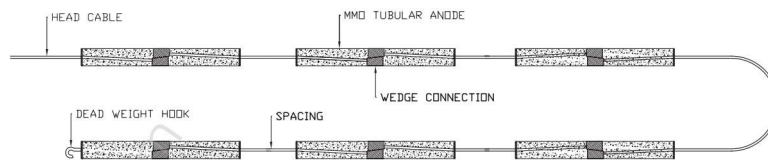


Cable Connection:



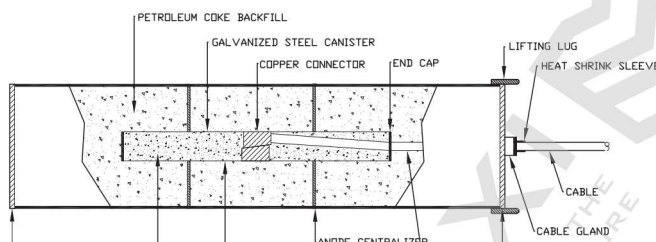
String anode for deep well application:

Anode Dimension	Application	Number of anode	Spacing	Head cable	Cable	Centrilizer
e.g. 25mm x 1000mm	e.g. soil	e.g. 6nos.	e.g. 1000mm	e.g. 15meters	e.g. Kynar/HMWPE	e.g. 150mm



Canister MMO Anode:

Anode Dimension	Application	Head cable	Cable	Centrilizer
e.g. 25mm x 1000mm	e.g. soil	e.g. 15meters	e.g. Kynar/HMWPE	e.g. 150mm x





■ Ribbon Anode:

Yuxi's MMO ribbon anodes are manufactured using titanium substrate which meets ASTM B265 Grade 1 Standard and coated with Mixed Metal Oxide (Ir/Ta).

Nominal Specification:

Width	Thickness	Std coil length	Std coil weight	Current output in fine sand	Design life
6.35mm	0.635mm	152.4meters	2.7kgs	42mA/meter	50 Years

Titanium Conductor Bar:

Width	Thickness	Std coil length	Std coil weight	Substrate	Design life
12.7mm	0.9mm	152.4meters	7.8kgs	ASTM B265 Grade I	50 Years

■ Mesh Anode:

MMO anode ribbon mesh Anode is a key component for Cathodic Protection systems in reinforced concrete structures. Yuxi's ribbon mesh products are based on ASTM B265 Grade 1 titanium and have been tested by CC Technologies / DNV in accordance with NACE TM0294 standard with all specification passed.

Part No.	Width	Coil Length	Expanded thickness	Diamond dimensions	Current Output 110mA/m ²	Design life
YX-MMO-M1	10mm	76meter	1.3mm	2.5x4.6mm	2.8mA/m	100 Years
YX-MMO-M2	12.7mm	76meter	1.3mm	2.5x4.6mm	3.5mA/m	100 Years
YX-MMO-M3	19mm	76meter	1.3mm	2.5x4.6mm	5.3mA/m	100 Years
YX-MMO-M4	25mm	76meter	1.3mm	2.5x4.6mm	7mA/m	100 Years
YX-MMO-M5	1.22m	76meter	2.0mm	34x76mm	25mA/m	100 Years



■ TITANIUM ANODE:

Titanium anode is an ideal cathodic protection product to replace the conventional anodes used to protect tank bottom, underground vessel, pipeline. YUXI's linear anode are made from high grade titanium wire with Mixed Metal Oxide catalyst, and can last for more than 50 years.

Application:

- > Tank bottom
- > Underground vessels
- > Pipelines

Material Specification:

- > Substrate: Titanium ASTM B348 Grade I / II
- > Catalyst: Mixed Metal Oxide
- > Cable: HMWPE, XLPE/PVC, Kynar/HMWPE, etc.
- > MMO wire to cable connection: Crimp
- > Connection: 5meters to 10meters each

Advantages:

- > Easy handling and installation
- > Cost effective
- > Up to 50 years life time
- > Customized anode output and life



General Specification:

MMO wire diameter	1.0 mm	1.5 mm	3.0 mm
Titanium substrate	ASTM B348 Grade I / II		
Mixed Metal Oxide Catalyst	Ir-Ta		
Current output for 20 years life	67mA/m	89mA/m	195mA/m
Current output for 30 years life	45mA/m	65mA/m	130mA/m
Current output for 50 years life	28mA/m	41mA/m	78mA/m
Backfill	Calcium Petroleum Coke		
Sock Material	Porous non-woven fabrics		
Sock Dimension	38 mm Diameter		
Length per reel	150 Meters (Customized length at request)		

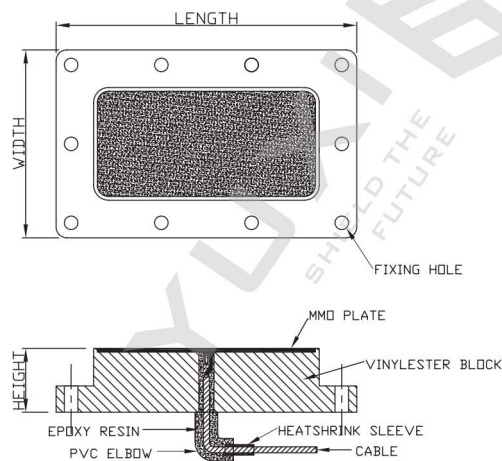
Customized roll length and output is available at request

■ MMO Plate/Disc Anode:

Yuxi supplies several kinds of plate/disc anode, and they are mainly used on ships or vessels. The anode contains a rectangular or circular MMO plate embedded in a FRP housing, and the junction box on the other side provides the protection of the cable connection.



■ Rectangular Plate Anode:



■ Circular Disc Anode:

