MMO Ribbon, MMO Mesh & Ti Conductor Bar

Cathodic Protection
JENNINGS ANODES

MMO Ribbon & Ti Conductor Bar

MMO Ribbon consists of a solid ribbon of titanium substrate to ASTM 265 Gr. 1 coated with precious mixed metal oxides (Iridium /Tantallum).

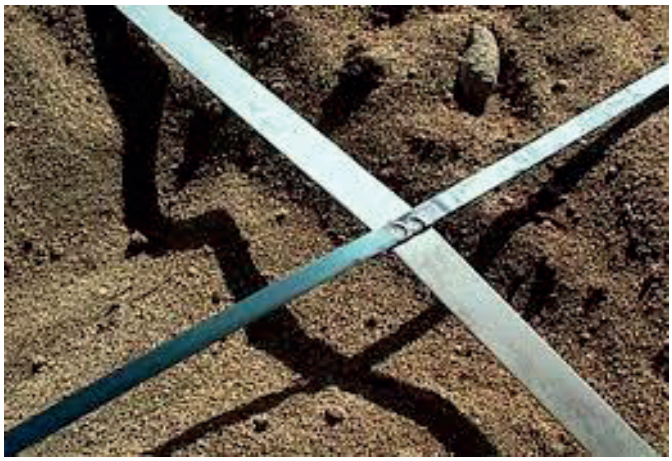
Jennings Anodes manufactures MMO ribbon using a bespoke automated production line with unique thermal sintering technology, enabling us to produce a homogeneous coating with superior adhesion properties whilst maintaining a production capacity up to 1,000,000 meters per year.

Our MMO coating is highly conductive and the anodes have a very low consumption rate. This combination of characteristics results in a long-life expectancy even when the anode is subjected to a high current density rating. For example, MMO Ribbon life can exceed 50 yrs. with a 3A/m2 Current Density.

Applications

MMO ribbon is commly used for ICCP system of above ground storage tanks.

MMO ribbon can be also used for new and old structures and steel reinforced concrete structures.



Product Advantages

- Long Lifetime and Durable (Over 50 years)
- Light Weight (Easy transportation and handling)
- Flexible (Quick Installation)
- Reliable, Dimensional Stability
- Excellent Resistance in Acidic Medium

Chemical Composition

Anode	MMO Ribbon / Ti Conductor Bar
Substrate	ASTM B265 Titanium Grade I
Coating	Ir-Ta Mixed Metal Oxide Catalyst

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Mechanical Properties of Titanium Substrate

Substrate	ASTM B265 Titanium Grade I
Coefficient of Thermal Expansion	8.7 × 10-5/ K (0.0000048/in/in/K).
Thermal Conductivity @ 20°C	15.6 W/m·K (9.0 BTU/hr/ft2/°F/ft)
Electrical Resistivity @ 20°C	0.000056 Ohm-cm (0.000022 Ohm-in)
Modules of Elasticity	105 Gpa Min. (14,900,000 PSI Min.)
Tensile Strength	245 Gpa Min. (35,000 PSI Min.)
Yield Strength（0.2% offset）	175 Gpa Min. (25,000 PSI Min.)
Elongation	24% Min

Electrochemical Properties

Anode Model	**MMO Ribbon Anode**	**Ti Conductor Bar**
	JA - MMO - R01	**JA - MMO - TCB**
Dimension	6.35 × 0.635mm (1/4" × 0.025")	12.7mm × 0.9mm(1/2" × 0.035")
Lengthwise Electrical Resistance	0.138Ohm/m (0.45Ohm/ft.)	0.081Ohm/m (0.26Ohm/ft.)
Current Density (Soil Application)	185mA/ft.)3A/m2 (0.278A/sq.ft.)	185mA/ft.)3A/m2 (0.278A/sq.ft.)
Current Output	17mA/m (5.185mA/ft.) **	/
Life Expectancy	50 Years	/
Note	Mixed metal oxide surface is susceptible to abrasion damage. Careful handling is required. ** A Higher Current rating of 42mA/M (12.8mA/FT) is available upon request	

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MMO Mesh Ribbon

MMO Mesh in Ribbon form is commonly used in concrete protecting the steel rebar, other uses are under tanks or for special applications in the water industry.

The MMO Mesh is made from ASTM B265 Grade 1 titanium coated with MMO (Ir/Ta) and tested in accordance with NACE TM0294 Standards.

Part No	Width	Coil Length	Expanded Thickness	Diamond Dimension	Current Output	Design Life
JA-MMO-M1	10mm	76M	1.3mm	2.5 x 4.6mm	2.8mA/M2	100 Yrs
JA-MMO-M2	12.7mm	76M	1.3mm	2.5 x 4.6mm	3.5mA/M2	100 Yrs
JA-MMO-M3	19mm	76M	1.3mm	2.5 x 4.6mm	5.3mA/M2	100 Yrs
JA-MMO-M4	25mm	76M	1.3mm	2.5 x 4.6mm	7mA/M	100 Yrs
JA-MMO-M5	1.22M	76M	2.0mm	34 x 76mm	25mA/M	100 Yrs

MMO Can be supplied as sheet, plate or tube.
Bespoke formations are available upon request

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Quality Assurance & Testing

Jennings Anodes Manufacturing Quality Control Procedures are employed and strictly adhered to guaranting the ultimate performance & life of the anodes. Our internal testing standards, ASTM and Nace Standards are performed to guarantee the quality of the anodes.

Testing	Chemical Composition	Anode Performance	Physical Appearance
Standards & Methods	9001:2015 Quality Management System and Foundry Internal Standards of MMO Anodes		
	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	Weight, Dimensions & Physical Appearance
Equipment & Devices	Spectrometer	JCM-6000 Plus Scanning Electron Microscope; DWW-K-100 Galvanostat; VCC101A Multimeter; Calomel Reference Electrode	Calibrated Digital Measuring Devices & Microscope.

Anode Model	Packing Detail				
	Unit	Coil Length	Coil Dimension	Net Weight	Gross Weight
JA - MMO - R01	Metre	152m (500FT)	15.5" × 15.5" × 1.0" 390 × 390 × 24mm	1.17lbs 0.35kg	1.76lbs 0.80kg
JA - MMO - TCB	Metre	152m (500FT)	19.0" × 19.0" × 1.0" 480 × 480 × 24mm	2.75lbs 1.25kg	3.40lbs 1.55kg

Shipping Documents

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