

MIXED METAL OXIDE COATED TITANIUM TUBULAR ANODE

ECOANODE's MMO coated titanium tubular anode is engineered for superior adaptability and performance in cathodic protection systems. Its slender, tubular profile is a key feature, allowing for effortless installation in confined and complex spaces that are inaccessible to conventional anodes. Beyond its spatial versatility, the tubular design offers exceptional modularity. These anodes can be efficiently connected in series or parallel configurations to form extensive, custom-tailored anode arrays. This capability is indispensable for generating a uniform, continuous protective current field along extensive linear infrastructures. It is therefore the preferred solution for safeguarding long-distance assets such as oil and gas transmission pipelines, urban water supply networks, and other buried or submerged metallic structures. The robust construction, featuring a titanium substrate with a highly durable MMO coating, ensures an extremely low consumption rate and a service life spanning decades, delivering a reliable and cost-effective defense against corrosion.

TITANIUM SUBSTRATE CHEMICAL COMPOSITION

Element	Grade I	Grade II
Iron (Fe)	0.20% max.	0.30% max.
Carbon (C)	0.08% max.	0.08% max.
Nitrogen (N)	0.03% max.	0.03% max.
Hydrogen (H)	0.015% max.	0.015% max.
Oxygen (O)	0.18% max.	0.25% max.
Single Impurity (Each)	0.10% max.	0.10% max.
Other Impurities (Total)	0.40% max.	0.40% max.
Titanium (Ti)	Remainder	Remainder

SURFACE COATING CHEMICAL COMPOSITION

Technical Measurement	Ir-Ta Mixed Metal Oxide Catalyst	Ir-Ru Mixed Metal Oxide Catalyst
Coating Element	IrO ₂ , Ta ₂ O ₅	IrO ₂ , RuO ₂
Coating Thickness	2~3 μm	4~5 μm
Coating Uniformity	85% min.	85% min.
Working Environment	Fine sand, Coke Breeze, Freshwater	Mud, Concrete, Seawater

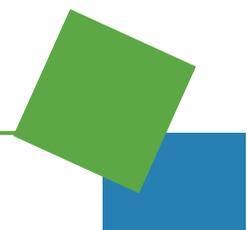


ECOANODE SOLUTIONS SDN. BHD

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ELECTROCHEMICAL PROPERTIES

In Soil / Coke Breeze / Freshwater

Anode Dimensions	Current Density	Current Output	Lifetime
Φ16x1000 mm (5/8" x 39.4")	100 A/m ²	5.0 A	25 yrs.
Φ19x1000 mm (3/4" x 9.4")	100 A/m ²	6.0 A	25 yrs.
Φ25x500 mm (1" x 19.7")	100 A/m ²	4.0 A	25 yrs.
Φ25x1000 mm (1" x 39.4")	100 A/m ²	8.0 A	25 yrs.
Φ25x1524 mm (1" x 60")	100 A/m ²	12.0 A	25 yrs.
Φ32x1220 mm (1-1/4" x 48")	100 A/m ²	12.0 A	25 yrs.
Φ50x1200 mm (2" x 47.2")	100 A/m ²	19.0 A	25 yrs.

In Seawater

Anode Dimensions	Current Density	Current Output	Lifetime
Φ16x1000 mm (5/8" x 39.4")	600 A/m ²	30.0 A	25 yrs.
Φ19x1000 mm (3/4" x 9.4")	600 A/m ²	36.0 A	25 yrs.
Φ25x500 mm (1" x 19.7")	600 A/m ²	24.0 A	25 yrs.
Φ25x1000 mm (1" x 39.4")	600 A/m ²	48.0 A	25 yrs.
Φ25x1524 mm (1" x 60")	600 A/m ²	72.0 A	25 yrs.
Φ32x1220 mm (1-1/4" x 48")	600 A/m ²	72.0 A	25 yrs.
Φ50x1200 mm (2" x 47.2")	600 A/m ²	114.0 A	25 yrs.

SPECIFICATIONS

MMO Tubular Anode Coated with Ir-Ta Mixed Metal Oxide Catalyst

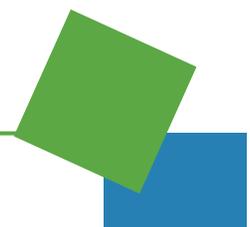
Item No.	Diameter	Length	Lifetime
EA-MMO-CT160	16 mm (5/8")	1000 mm (39.4")	25 yrs.
EA-MMO-CT190	19 mm (3/4")	1000 mm (39.4")	25 yrs.
EA-MMO-CT250S	25 mm (1")	500 mm (19.7")	25 yrs.
EA-MMO-CT250	25 mm (1")	1000 mm (39.4")	25 yrs.
EA-MMO-CT250L	25 mm (1")	1524 mm (60.0")	25 yrs.
EA-MMO-CT320	32 mm (1-1/4")	1220 mm (48.0")	25 yrs.
EA-MMO-CT500	50 mm (2")	1200 mm (47.2")	25 yrs.

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MMO Tubular Anode Coated with Ir–Ru Mixed Metal Oxide Catalyst

Item No.	Diameter	Length	Lifetime
EA-MMO-ST160	16 mm (5/8")	1000 mm (39.4")	25 yrs.
EA-MMO-ST190	19 mm (3/4")	1000 mm (39.4")	25 yrs.
EA-MMO-ST250S	25 mm (1")	500 mm (19.7")	25 yrs.
EA-MMO-ST250	25 mm (1")	1000 mm (39.4")	25 yrs.
EA-MMO-ST250L	25 mm (1")	1524 mm (60.0")	25 yrs.
EA-MMO-ST320	32 mm (1-1/4")	1220 mm (48.0")	25 yrs.
EA-MMO-ST500	50 mm (2")	1200 mm (47.2")	25 yrs.

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