



## **INCORR ENGINEERING & TRADING**

\* Cathodic Protection Materials Manufacturer/Stockist

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# INCORR MIXED METAL OXIDE ANODES

**INCORR** Mixed Metal Oxide Anodes are dimensionally stable in all environments. To obtain the highest level of protection from an impressed current cathodic protection system you need an anode with a very low consumption rate and high current capacity. With Incorr's tubular mixed metal oxide line of anodes you get powerful protection and unsurpassed stability. The anodes are made using tubular titanium substrates which are coated with a mixed metal oxide catalyst. The catalyst is thermally applied to the titanium to form an extremely chemical resistant bond. This special chemical composition brings together the stability of titanium with the conductive properties of the mixed metal oxide catalyst to achieve superior performance. In soil and fresh water applications the anodes have a recommended current density of approximately 100 A/m<sup>2</sup>, and can be operated over 600 A/m<sup>2</sup> in seawater environments. Even at these relatively high discharge levels the anodes will be consumed at less than 1.0 mg/Amp-yr.

The tubular design of these anodes also allows for numerous performance benefits. The tubular configuration provides a larger surface area, which in turn permits greater current output and lower anode to earth resistance. The tubular style also means lead wire connections can be made in the centre of the anode. With Incorr's tubular anodes this connection consists of two half bracelet lead slabs which grip firmly to the internal circumference of the anode and copper conductor. This connection is protected from moisture intrusion by epoxy which fills the entire anode tube. The ends of the anode are then covered with shrink tubing for a completely sealed electrical connection.

## **TYPICAL APPLICATIONS**

Mixed metal oxide anodes have proven to operate effectively in all types of environments, including areas with extremely low pH levels (under 1), and high chloride concentrations. While Incorr's tubular anodes can be used singularly, their unique configuration also makes them ideal for use in strings on offshore platforms or in deep groundbeds. In addition, the string anodes can be installed parallel to transmission pipelines, or used for other special applications.

## **TECHNICAL SPECIFICATIONS**

Incorr MMO coatings are generally offered on titanium substrates to ASTM B265 Grade 1 or 2 for sheet, strip and mesh; ASTM B348 Grade 1 or 2 for rod and wire products; and ASTM B338 Grade 1 or 2 for tubular products.



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Incorr Type 1 Coating	
Coating	IrO <sub>2</sub> /RuO <sub>2</sub> /TiO <sub>2</sub> .
Application	Seawater where Cl <sub>2</sub> is the principal anode product.
Current Density	600 A/m <sup>2</sup> maximum.
Lifetime*	20 years at 600 A/m <sup>2</sup> in above specified seawater for standard coating loading.
*Coating loading can be increased or decreased depending on particular lifetime / current density requirements.	

Incorr Type 2 Coating		
Coating	IrO <sub>2</sub> /Ta <sub>2</sub> O <sub>5</sub> .	
Application	Suitable for use in soils, backfill, fresh and brackish waters and seawater where O <sub>2</sub> , Cl <sub>2</sub> or a combination of both are discharged at the anode.	
The operating characteristics for standard coating loadings are given below:		
Environment	Current Density	Lifetime*
Soil	50 A/m <sup>2</sup>	20 years
Carbonaceous Backfill	100 A/m <sup>2</sup>	20 years
Fresh Water	100 A/m <sup>2</sup>	20 years
Brackish Water**	100 - 300 A/m <sup>2</sup>	20 years
Sea Water	600 A/m <sup>2</sup>	20 years
* Coating loading can be increased or decreased depending on particular lifetime / current density requirements.		
** Current density should be determined in accordance with brackish water resistivity.		

MMO tubular anodes ex-stock sizes are as follows:

- a) 19.05 mm (<sup>3</sup>/<sub>4</sub>" ) diameter x 1524 mm (60") long
- b) 25.40 mm (1") diameter x 1524 mm (60") long
- c) 31.75 mm (1 <sup>1</sup>/<sub>4</sub>" ) diameter x 1524 mm (60") long

We are able to cut the above MMO anodes to length in order to suit your requirements.