

CerAnode Wire

ANODE
CABLE
 LOOP
TO
ATTACH
ROPE

CerAnode

CerAnode
Wire

WEIGHT

CerAnode

CerAnode

Expandable-Spring-Anode

FOR
WATER TANKS
LOCK GATES
INTAKE SCREENS
PIPELINES
TANK BOTTOMS
ETC.

TYPICAL

CerAnode Assemblies
using

CerAnode Wire
or
Expand-A-Rod
or
Expand-A-Spring

Anodes

with

FACTORY MOLDED
CABLE CONNECTIONS
and CONNECTORS

CerAnode Technologies

ANODE WIRE SPECIFICATIONS¹

Ampere Rating/Linear Foot for 20 Year Life

SIZE	TYPE	CURRENT	COKE ⁴ OR FRESH WATER ² AMPS/FT	BRACKISH WATER ³ AMPS/FT	SEA WATER ³ AMPS/FT	METALLIC OHMS/FT	PART #
1/16"	STI	Ultra LOW	0.012	0.018	0.031	0.088	CPW-STI-062UL
1/16"	STI	Xtra LOW	0.025	0.038	0.062	0.088	CPW-STI-062XL
1/16"	STI	LOW	0.050	0.075	0.125	0.088	CPW-STI-062L
1/16"	STI	REG	0.100	0.150	0.250	0.088	CPW-STI-062R
1/16"	STI	HIGH	0.200	0.300	0.500	0.088	CPW-STI-062H
1/16"	CTC	Ultra LOW	0.012	0.018	0.031	0.0053	CPW-CTC-062UL
1/16"	CTC	Xtra LOW	0.025	0.038	0.062	0.0053	CPW-CTC-062XL
1/16"	CTC	LOW	0.050	0.075	0.125	0.0053	CPW-CTC-062L
1/16"	CTC	REG	0.100	0.150	0.250	0.0053	CPW-CTC-062R
1/16"	CTC	HIGH	0.200	0.300	0.500	0.0053	CPW-CTC-062H
1/16"	CNC	Ultra LOW	0.012	0.018	0.031	0.0053	CPW-CNC-062UL
1/16"	CNC	Xtra LOW	0.025	0.038	0.062	0.0053	CPW-CNC-062XL
1/16"	CNC	LOW	0.050	0.075	0.125	0.0053	CPW-CNC-062L
1/16"	CNC	REG	0.100	0.150	0.250	0.0053	CPW-CNC-062R
1/16"	CNC	HIGH	0.200	0.300	0.500	0.0053	CPW-CNC-062H
1/8"	STI	Ultra LOW	0.025	0.038	0.062	0.022	CPW-STI-125UL
1/8"	STI	Xtra LOW	0.050	0.075	0.125	0.022	CPW-STI-125XL
1/8"	STI	LOW	0.100	0.150	0.250	0.022	CPW-STI-125L
1/8"	STI	REG	0.200	0.300	0.500	0.022	CPW-STI-125R
1/8"	STI	HIGH	0.400	0.600	1.000	0.022	CPW-STI-125H
1/8"	CTC	Ultra LOW	0.025	0.038	0.062	0.00095	CPW-CTC-125UL
1/8"	CTC	Xtra LOW	0.050	0.075	0.125	0.00095	CPW-CTC-125XL
1/8"	CTC	LOW	0.100	0.150	0.250	0.00095	CPW-CTC-125L
1/8"	CTC	REG	0.200	0.300	0.500	0.00095	CPW-CTC-125R
1/8"	CTC	HIGH	0.400	0.600	1.000	0.00095	CPW-CTC-125H
1/8"	CNC	Ultra LOW	0.025	0.038	0.062	0.00095	CPW-CNC-125UL
1/8"	CNC	Xtra LOW	0.050	0.075	0.125	0.00095	CPW-CNC-125XL
1/8"	CNC	LOW	0.100	0.150	0.250	0.00095	CPW-CNC-125L
1/8"	CNC	REG	0.200	0.300	0.500	0.00095	CPW-CNC-125R
1/8"	CNC	HIGH	0.400	0.600	1.000	0.00095	CPW-CNC-125H

Anode specifications may change without notice. Consult CerAnode for current information.

- When using a long slender anode, design must not allow excessive voltage attenuation over the anode length. For voltage attenuation of <10% at the rod end opposite from the connection, the ratio of ROD METALLIC RESISTANCE to ANODE-ELECTROLYTIC RESISTANCE must be <0.22.
- Total immersion in water. Reduce current 50% for operation below 5 degrees C. Electrolyte impurities may also affect rating.
- Total immersion in water. Reduce current 50% for operation below 10 degrees C. Electrolyte impurities may also affect anode life.
- For optimal anode-to-earth interface use Loresco[®] DW-1, SC-2, SC-3, FlexFill or equal. The industry accepted current density at the coke to earth interface is 100 - 200 mA/ft². For best results do not exceed 9.29 - 13 amp/ft² at the anode-to-coke interface.

CERANODE WIRE ANODE MATERIAL

CerAnode Cathodic Protection Anode Wire (CPW) is available in a variety of configurations for optimization of specific CP requirements. It is a ceramic-metal multi-layer composite that is ductile, rugged and easy to use. It consists of an ultra thin layer of an iridium-tantalum-titanium, mixed metal oxide ceramic deposited onto either a solid titanium core (STI version), a copper cored titanium interface (CTC) or a copper cored niobium-titanium interface (CNC version). The latter has a niobium interface for CP applications requiring the added assurance of niobium voltage breakdown characteristics. However, the unique characteristics of the CerAnode chemical bond interface effectively reduce the interface voltage rarely making the niobium interface necessary. The wire is available in nominal standard diameter sizes of 1/16" (1.5mm) or 1/8" (3mm). Semi-stack sizes are also available. CerAnode CP Wire is most often supplied in Anode Assembly configurations similar to those illustrated.

CERANODE WIRE ANODE ASSEMBLIES

1) **HIGH POWERED ACTIVATED TITANIUM ANODE WIRE.**

CerAnode's very thin anode coating is exceptionally durable in combination with its solid ductile commercially pure titanium substrate. It consists primarily of precious metal and refractory metal oxides in sufficient quantities and ratios to provide a life expectancy beyond its cataloged value. This provides the conservatism in anode design needed to assure a long life even in harsh environments. Because of its low wear rate it is dimensionally stable. Since this anode will support the evolution of both oxygen and chlorine, it is the choice for fresh water, sea water, mud, brackish water and coke environments. You will probably want to avail yourself of CerAnode's unique high quality cable to anode connection described below, but if not, the wire is available without cable attachment.

2) **STANDARD OR SPECIAL LEAD WIRE CABLE.**

The CRA uses cable that has been an industry standard for many decades proving itself to be a reliable choice. The cable choices have withstood the test of time. A wide choice of cables is available in order to provide the most economical anode assembly for the application. HMWPE is the most popular but Kynar^R/HMWPE, or Halar^R/HMWPE are available for more demanding applications where chlorides, oil or other harsh environments are involved. Other cable choices

such as EPR/CPE (ethylene propylene rubber/chlorinated polyethylene) are available when suitable for the application. It is important that the appropriate cable be engineered for the environment. Free chlorine gas is generated at the anode in a chloride environment and oxygen in a fresh water environment. Chlorine gas is very aggressive.

3) **MOISTURE PROOF CORROSION RESISTANT CONNECTION.**

The CerAnode MultiSealtm, consisting of 3 distinct seals assures a moisture proof electrical connection. The "CXP" & "CXF" options provide excellent resistance against acids and oil. Choose "CXF" for chloride environments. The MultiSealtm also provides "water block" integrity so that the CP cable jacket cannot act as a siphon from the groundbed to the terminal box. In addition, the MultiSealtm maintains the moisture proof seal if the cable should accidentally be stretched at the connection area.

4) **ULTRA LOW ELECTRICAL CONNECTION RESISTANCE.**

The special APSconnecttm arc-plasma spray processing and the SWGconnecttm have resulted in an ultra low resistance electrical connection. The electrical connection resistance is so low that it is equivalent to the theoretical resistance of the copper cable. No cable-to-titanium connection resistance is

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detectable when measured with a 4-wire Kelvin type resistance bridge capable of resolving 10^{-3} ohms.

5) MECHANICAL STRENGTH. The cable-to-anode connection is either swaged by a 200 ton circumferential precision connector adapter called SWGconnecttm or soldered by means of a proprietary copper cable-to-valve metal soldering process called APSconnecttm. Either process results in high tensile strength such that the cable breaks before the connection is disturbed.

6) ASSEMBLIES -- PERFORATED PIPE & STABILIZATION WEIGHTS. For applications where protection of the anode element or electronic isolation from surrounding structures is desired, CerAnode offers the CPW mounted in a perforated pipe housing. The CPW element is centralized and anchored in a perforated PVC or FRP pipe as

specified. It is essentially transparent to the current. Materials are chosen to be compatible with the electrolyte environment as requested.

With or without the perforated pipe a Stabilizing Weight molded to the end of the CPW is available when hanging the anode assembly in tanks or reservoirs. The weight is molded to one end and a cable to the other so that the anode can be suspended by its cable in tanks or reservoirs for simple and easy installation. The assembly arrives on site ready to unroll and hang in place.

7) ANODE SPECIFICATIONS¹. The table above shows 20-year Ampere Ratings per linear foot in various electrolytes. Anode specifications may change without notice. Consult CerAnode for custom sizes & coatings. Maximum standard length is about 1000 feet.