Aqueous Anodes

Typical Applications:

· Condenser waterboxes, waterfront structures, pump housings, sewage treatment tanks

Featuring:

· Platinum or mixed metal oxide surface coatings

· Titanium or niobium substrates

· Full resilient mount in glass reinforced epoxy or polyurethane

Design Considerations:

Sizing - To determine proper anode size it is necessary to know both the required current distribution and service life. Current distribution will dictate the length of the rod (probe anode) or strip (low profile anode). Once that has been decided and the intended service life is known, the proper amount of active surface coating can be selected. Although the coating material is the most expensive part of the anode, it is most efficient to design with as thick an active surface as possible. Doubling the coating thickness does not double the cost!

Style - EDI manufactures aqueous anodes in a variety of styles to meet the requirements of the intended application. The two most common anode designs are probe and low profile. Probe anodes are typically 3/8" or 1/2" diameter with 2-9" active and 1-9" standoffs. They are best where throwing power to a remote location is required. Low profile anodes consist of strips that are typically 2-3" wide and 6-16" long. They are mounted on the surface and are less likely to cause personnel hazards during maintenance. Platinum or mixed metal oxide coatings can be applied that provide 20 or more years' service life. EDI also designs and builds custom anodes for special applications.

Design Parameters	Probe Anode	Low Profile Anode
Max. Flow Rate	15 ft/sec	40 ft/sec
Pressure Rating	150 psi	50 psi
Max. Operating Temp.	160 F	140 F
Max. Excursion Temp.	200 F for 1 hr	200 F for 1 hr

Substrate Selection - Titanium should be chosen when the anode surface voltage will be less than 10V such as in high conductivity waters like seawater. A niobium substrate should be used where the anode surface voltage may exceed 10V.

Surface Coating Selection - EDI's aqueous anodes are available with either platinum or mixed metal oxide active surfaces. Platinum is usually the best choice when current densities are below 10 A/ft^2 in brackish or fresh water environments. It is also the preferred coating in all seawater applications where chlorine is generated at the anode surface. Mixed metal oxide coatings are the best option where oxygen evolution is expected at the anode surface such as in fresh water locations. However, the cost for this coating is somewhat higher than for platinum.

electrochemical devices, inc.
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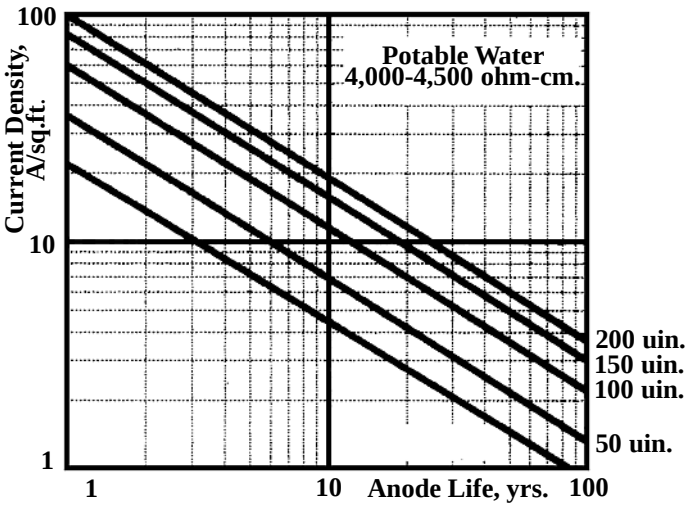
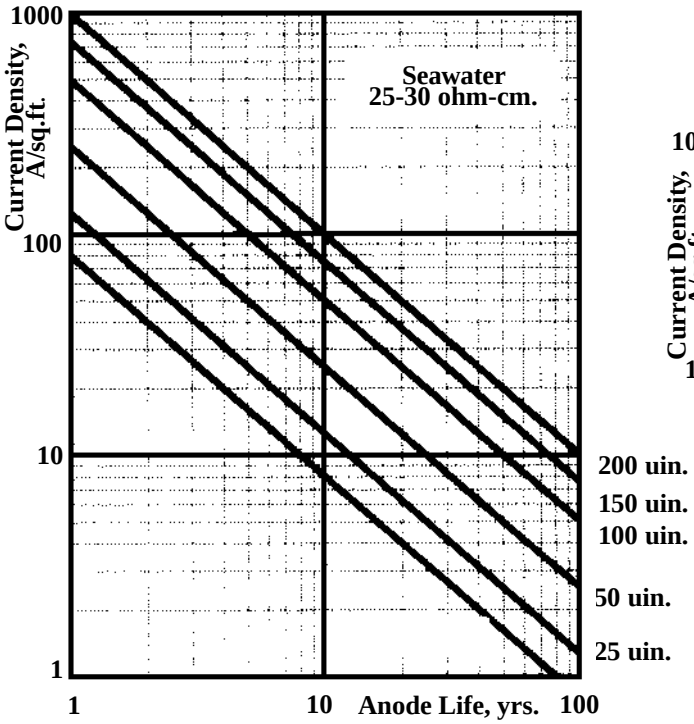
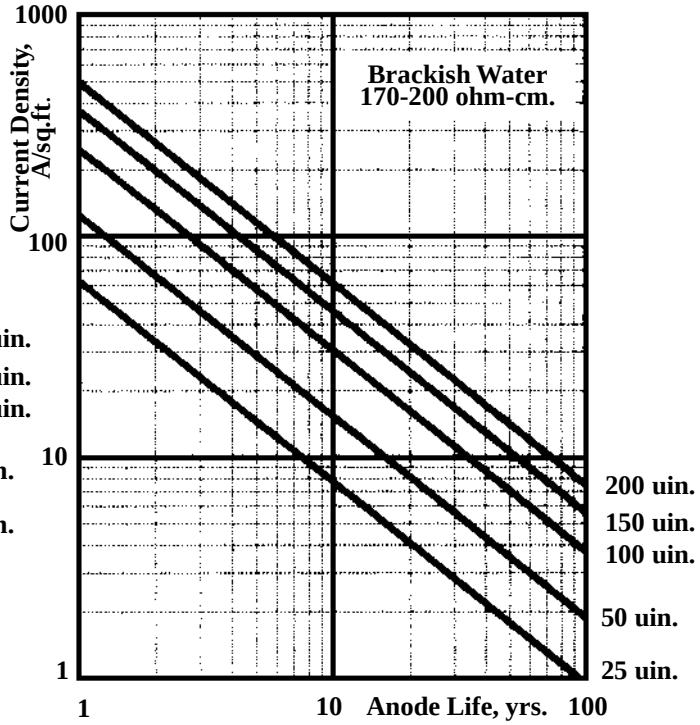
Platinum Consumption Rates:

Coating thickness, operating current density and anode design life are interrelated as shown here. Please note that while there is no published data for anode life with mixed metal oxide coatings, they have been used at the same current densities as platinum.







Recycling:

EDI will refurbish aqueous anodes whose active surfaces have been consumed and/or standoffs or mounting nipples have been damaged. In most cases an anode can be restored for less than half the cost of a new one. Contact the company for information on this service.

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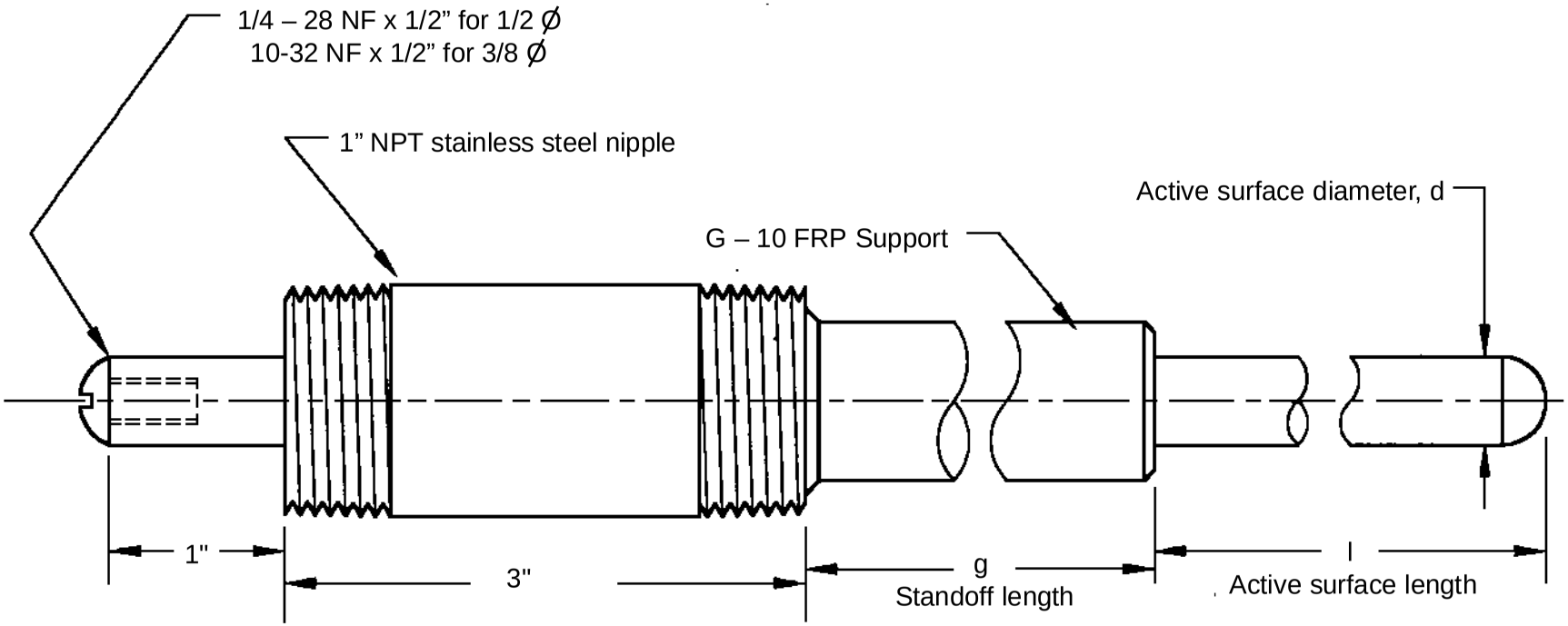

Model Designation

Specify as EDI Model AR – asd – g.l.ttt where
a = active surface: M for mixed metal oxide or P for platinum
s = substrate: T for titanium or N for niobium
d = rod diameter, inches: 3 for .375, 5 for .50, 7 for .75
g = standoff length, inches: 1 to 9 in 1 inch increments
l = active length, inches: 1 to 9 in 1 inch increments
ttt = micro-inches platinum: 100, 150, 200, 250, or 300; or
electrolyte for mixed metal oxide: F, B or S for
Fresh, Brackish or Salt water

Note: A resilient mount is used between anode rod and support to minimize fatigue loading on anode rod.

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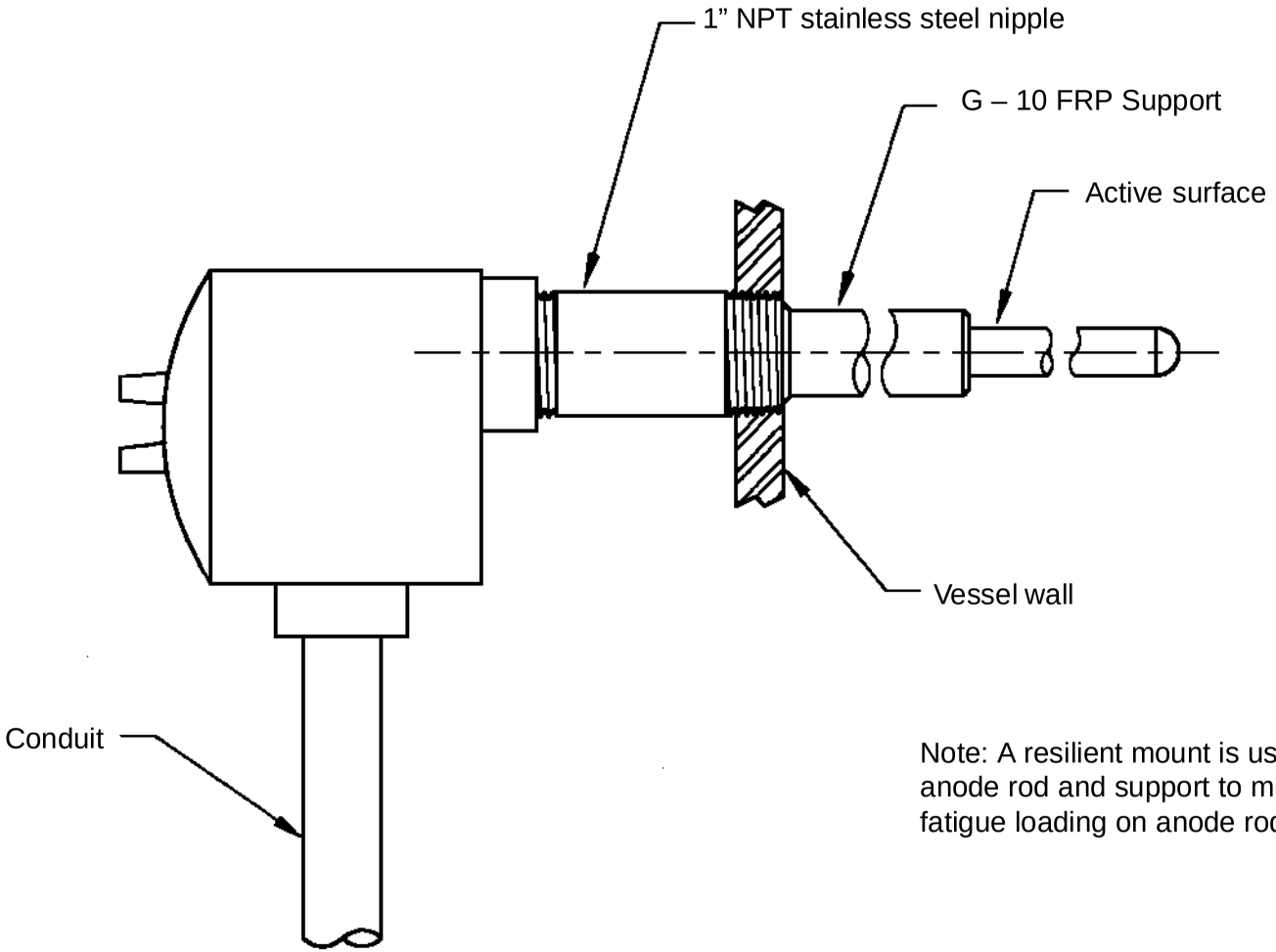
Probe Anode Assembly - Round Fitting

SCALE	DRAWN BY	DATE	DRAWING NO.
FULL	FJA	01/28/97	ARASY



Note: A resilient mount is used between anode rod and support to minimize fatigue loading on anode rod.

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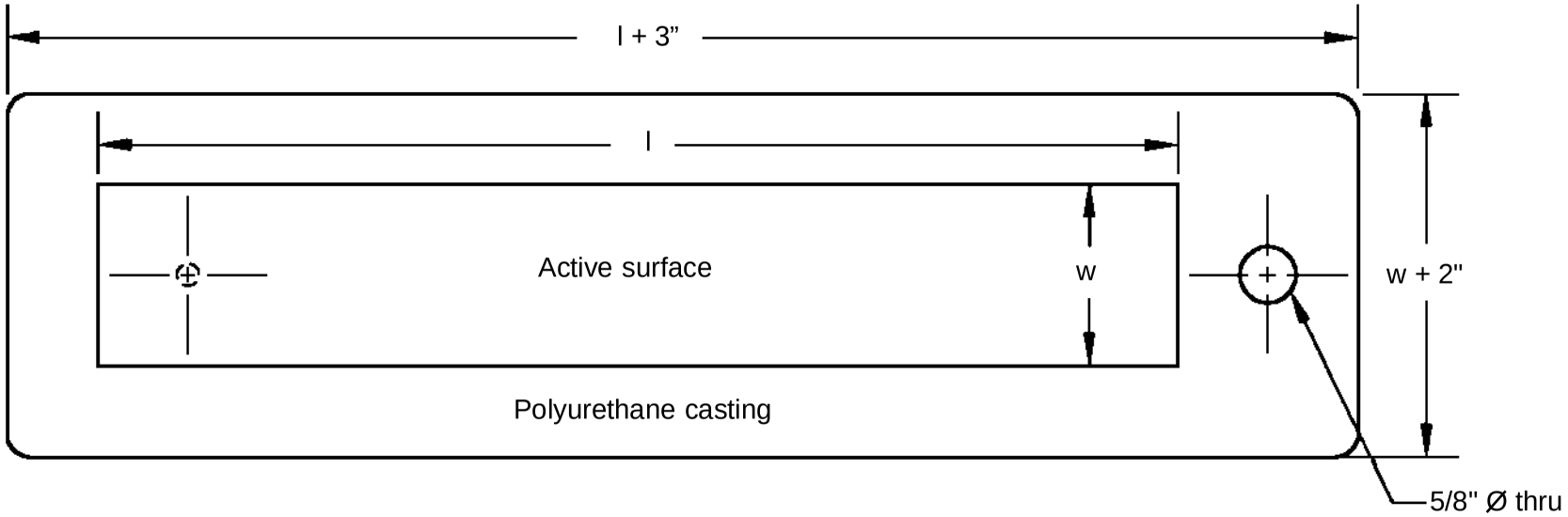
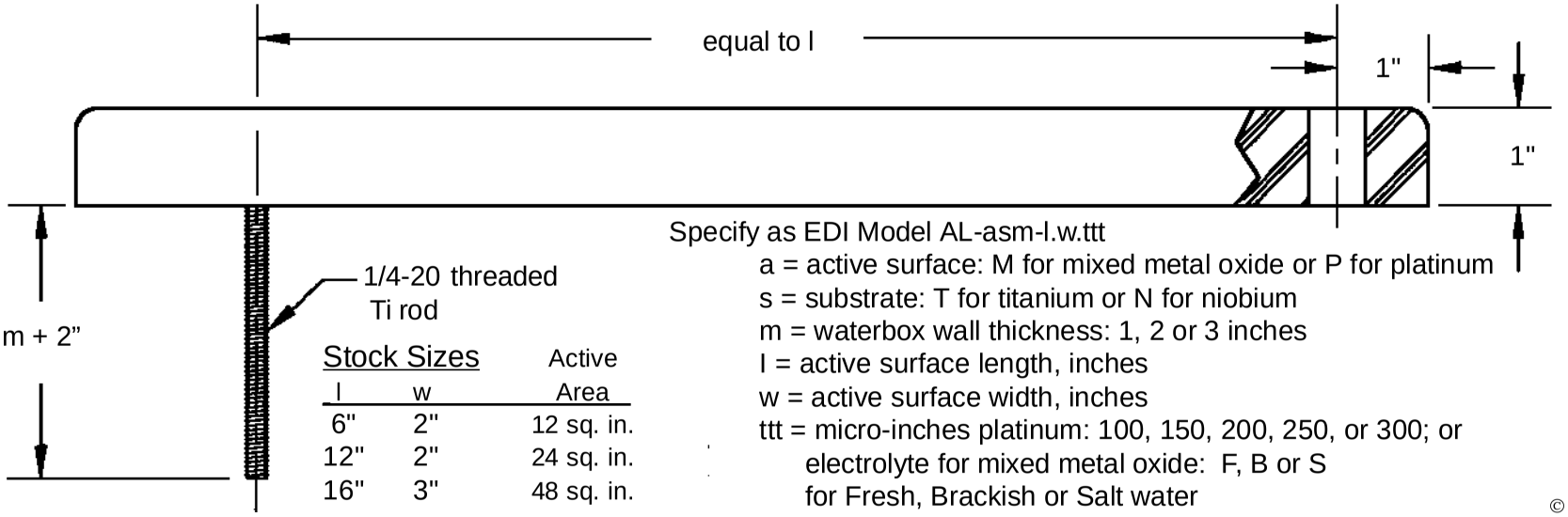
Probe Anode Installation (Typ.)

SCALE	DRAWN BY	DATE	DRAWING NO.
FULL	FJA	04/22/97	ARAPP1





Specify as EDI Model AL-asm-l.w.ttt

a = active surface: M for mixed metal oxide or P for platinum
s = substrate: T for titanium or N for niobium
m = waterbox wall thickness: 1, 2 or 3 inches
l = active surface length, inches
w = active surface width, inches
ttt = micro-inches platinum: 100, 150, 200, 250, or 300; or
electrolyte for mixed metal oxide: F, B or S
for Fresh, Brackish or Salt water

Stock Sizes

l	w	Active Area
6"	2"	12 sq. in.
12"	2"	24 sq. in.
16"	3"	48 sq. in.

Low profile anodes can be made in any custom size subject to the limits shown in the table.

Dimensional Limits

	l	w
Min.	6"	1"
Max.	20"	10"

(l=3) x (w=2) must be less than 200.

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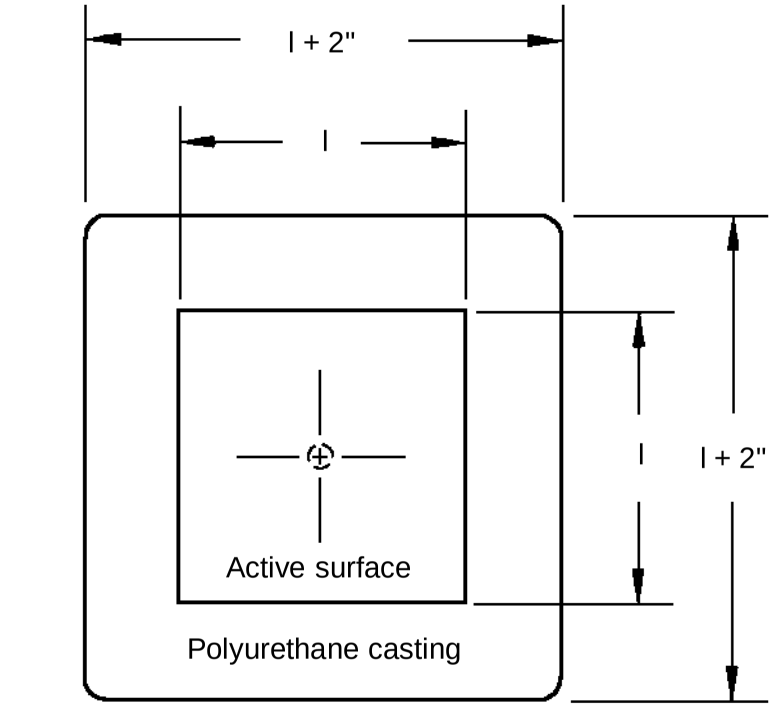
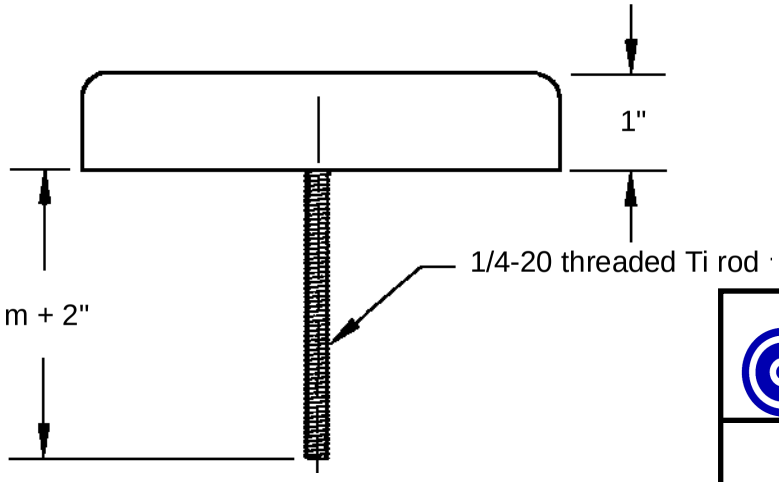
Low Profile Anode Assembly

SCALE	DRAWN BY	DATE	DRAWING NO.
HALF	FJA	01/28/97	ALASY





Specify as EDI Model AP-asm—l.l.ttt where

a = active surface: M for mixed metal oxide or P for platinum
s = substrate: T for titanium or N for niobium
m = waterbox wall thickness: 1, 2 or 3 inches
l = active surface length, inches
ttt = micro-inches platinum: 100, 150, 200, 250, or 300
electrolyte for mixed metal oxide: F, B or S for ; or
Fresh, Brackish or Salt water

Stock Sizes l	Active Area
3"	9 sq. in.
4 1/2"	20 sq. in.
6"	36 sq. in.

Custom Sizes

l can be varied in 1/2" increments from 1" through 6". For rectangular active surfaces, use EDI Model AL Low Profile Anodes.

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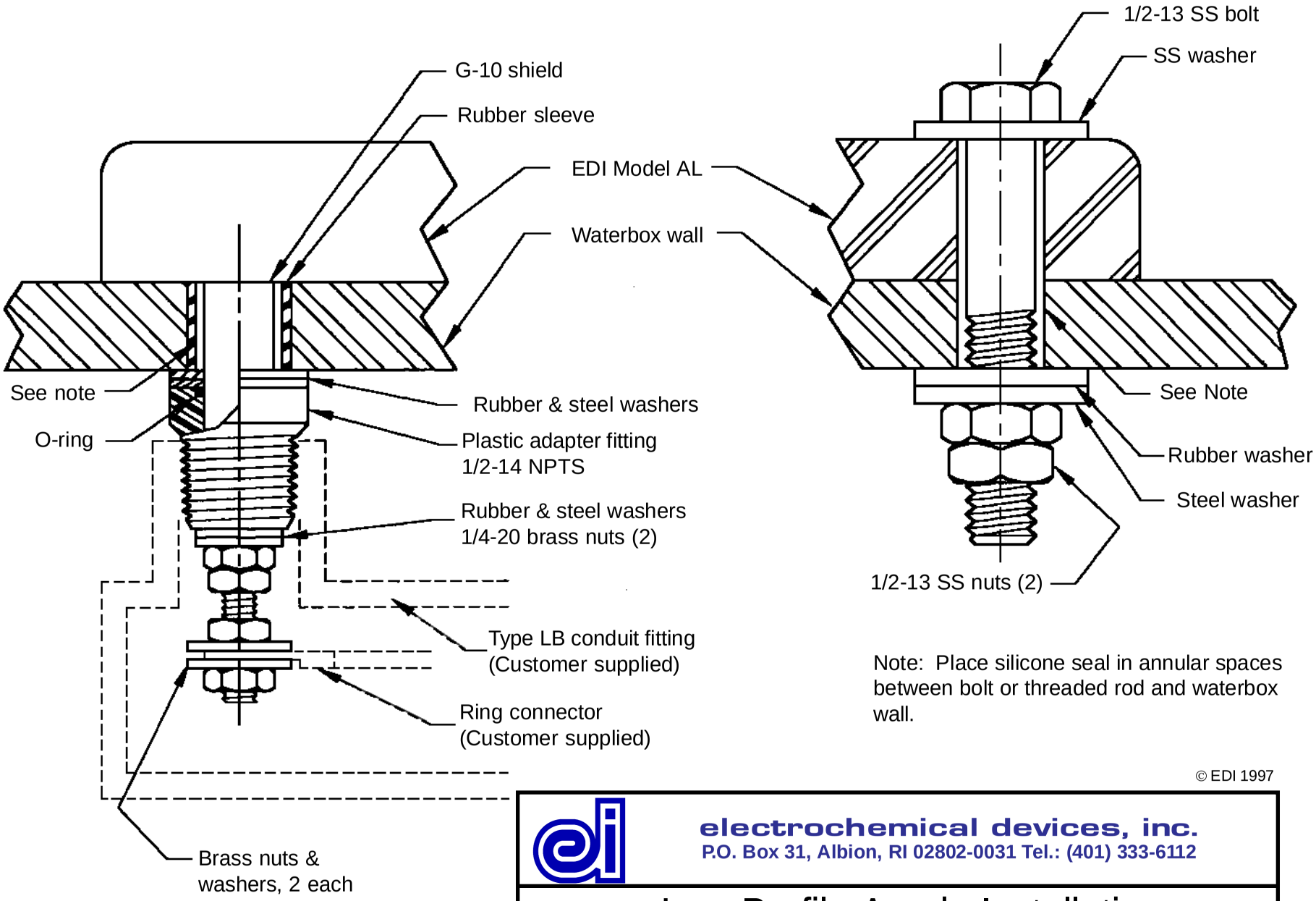
Plate Anode Assembly

SCALE	DRAWN BY	DATE	DRAWING NO.
HALF	FJA	01/28/97	APASY



Note: Place silicone seal in annular spaces between bolt or threaded rod and waterbox wall.

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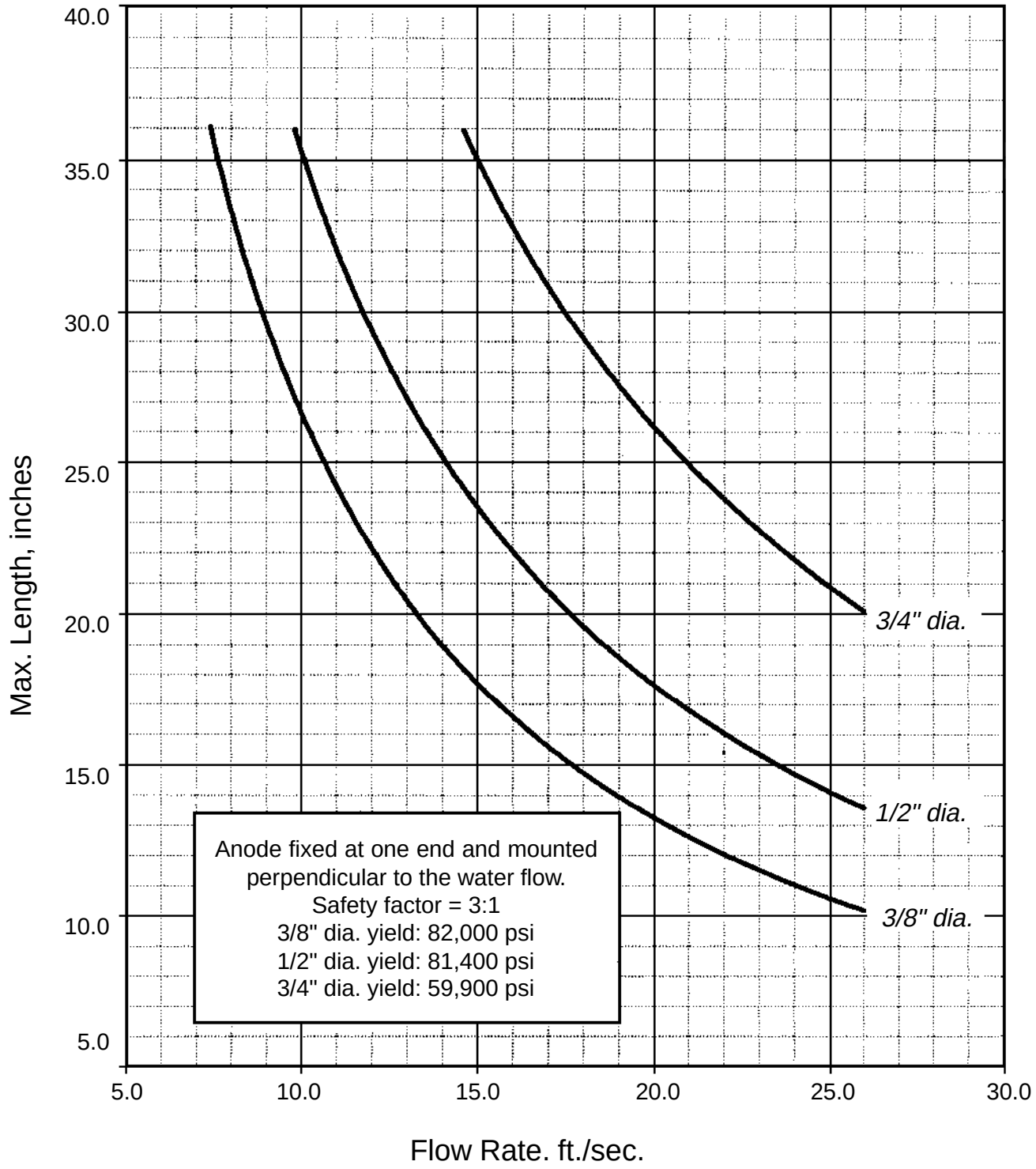
Low Profile Anode Installation

SCALE NONE	DRAWN BY FJA	DATE 01/28/97	DRAWING NO. ALAPP1

Maximum Anode Length vs. Flow Rate



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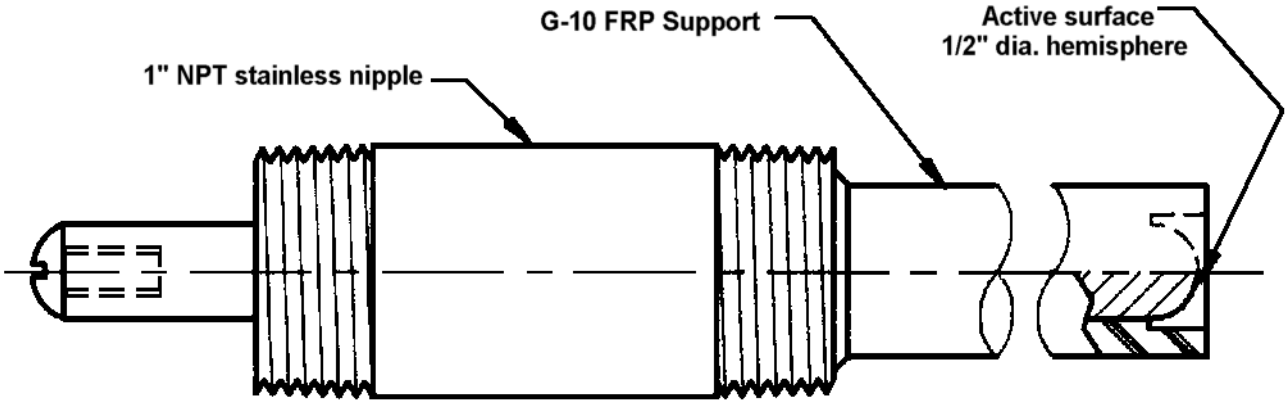
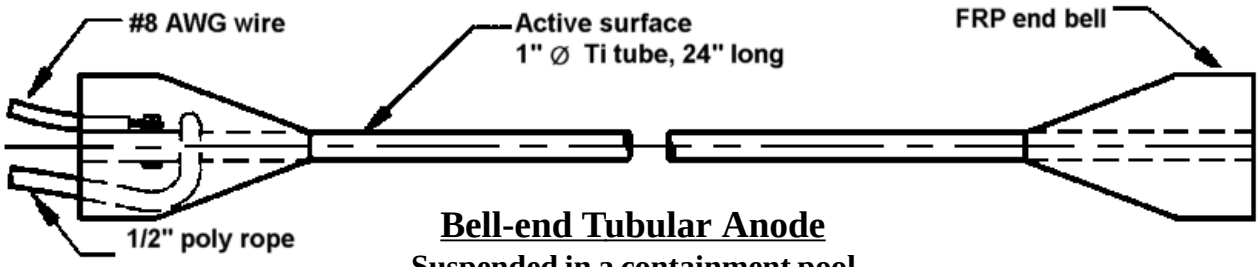
Custom Anodes

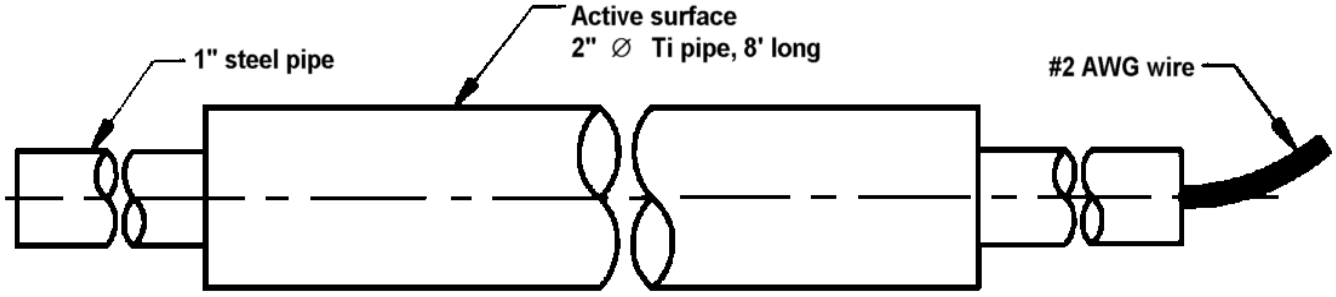
A Series anodes are available with platinum or mixed metal oxide surfaces on titanium or niobium substrates, either solid or copper-cored. EDI designs and builds custom anodes to fulfill special requirements. Sketches of some of these are shown below.



Button Head Anode — **Used to protect large standby pump**



Bell-end Tubular Anode
Suspended in a containment pool



Pipe-type Anode — **Spanned accross waterbox**

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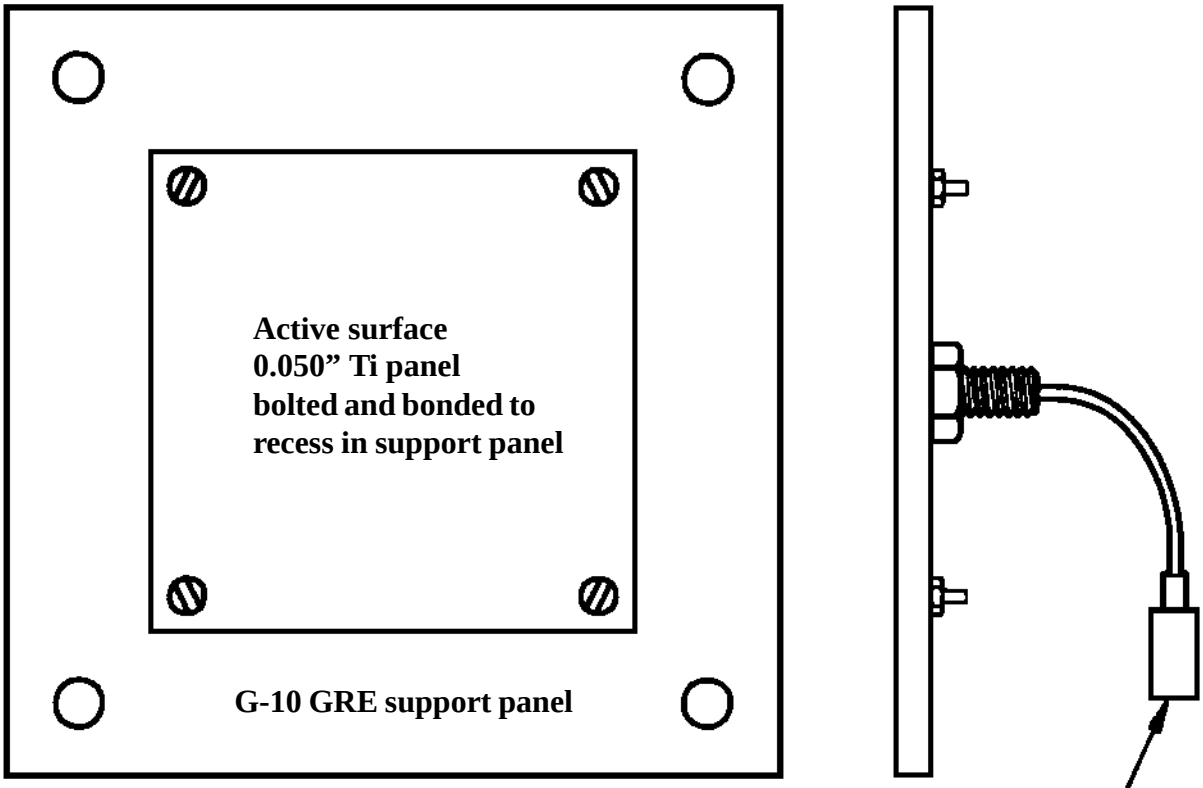
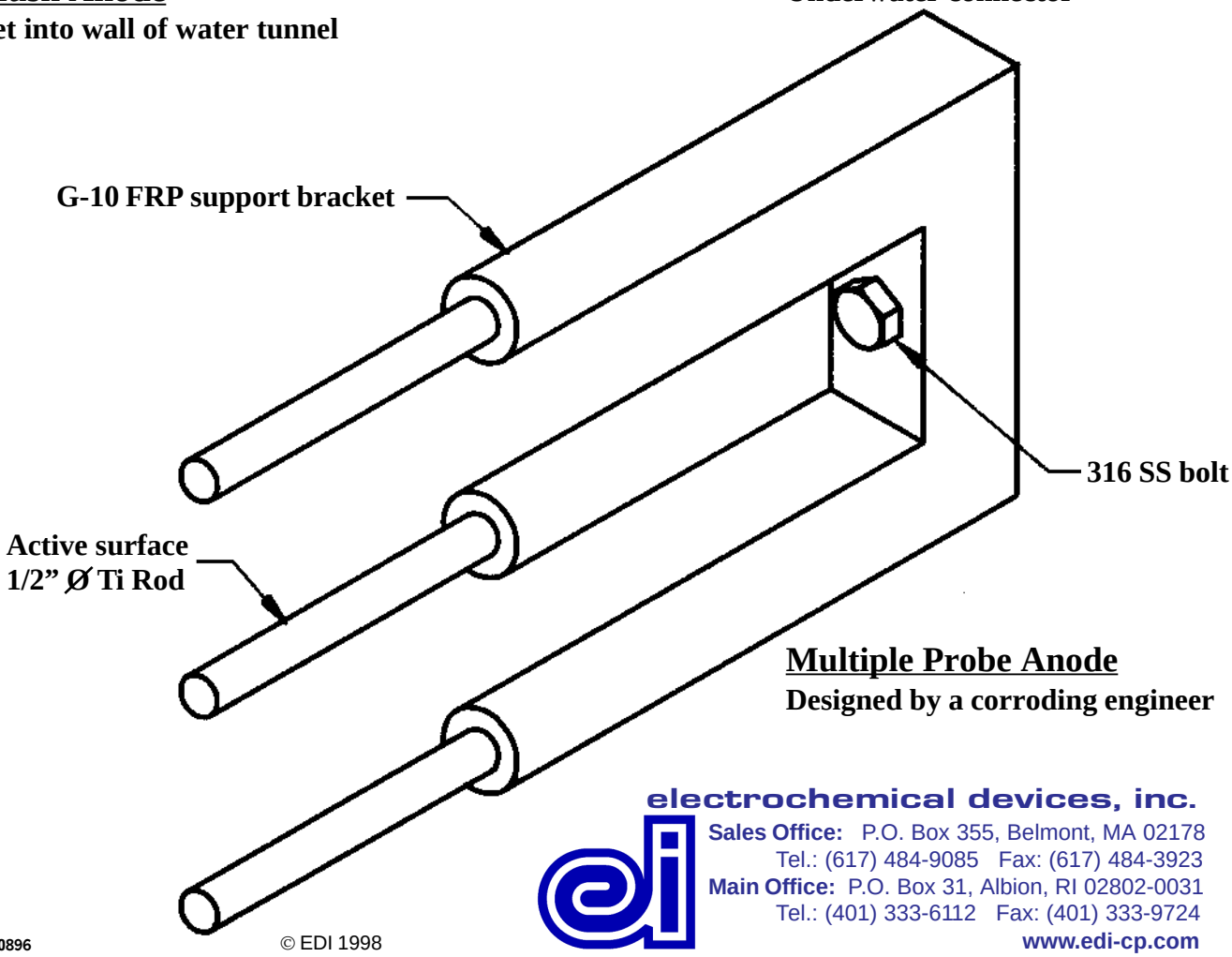


Flush Anode

Set into wall of water tunnel



Multiple Probe Anode

Designed by a corroding engineer

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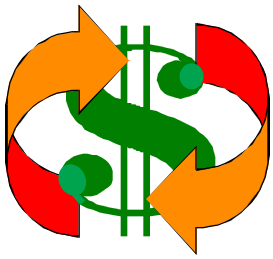
DOUBLE THE LIFE OF YOUR ANODES FOR HALF THE COST!



Almost all anodes can be restored to new specifications. Whether they're used waterboxes, circulating pipes, heawter treaters, tanks or pressure vessels. And Electrochemical Devices can do it for about half the cost of buying new ones.

Our thorough restorations can include replatinizing, rebuilding the standoff and/or replacing the mounting nipple - depending on the condition of the anode. What's more, because we're the experts, our rebuilding time is only four weeks. This is usually less time than it takes to get new anodes. If you're experiencing any of these problems: low current output, damaged standoffs, leaking seals or damaged mounting threads, consider rebuilding. Not only is it quicker, it's less expensive as well.

The process is simple. First fill out the form below and fax us a copy at 617-484-3923. Then, just ship the anodes along with a copy of the form to us at:

Electrochemical Devices, Inc.
15567 Main Market, Unit 58B
Parkman, OH 44080

Within 3 days of receiving the anodes, we'll get back to you with a firm quote on price and delivery. If you wish us to proceed, give us a purchase order. If not, we'll dispose of the anodes or, at your request, return them to you freight collect.

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Request for Quotation - Anode Refurbishing

Contact Information
Name _____
Company _____
Tel. _____
Fax _____

Shipping Information
Name _____
Company _____
Address _____
_____
City, State, Zip _____
Tel. _____
Tag _____

Number of anodes sent _____
Style: Probe _____ **Strip** _____
Substrate: Ti ___ **Nb** _____

Active area length _____
Dia. or width _____
Desired Pt thickness _____ **µin.**

Is the operating temperature over 100F? No___**Y**___ **F**

Is the operating pressure over 50 psi? No___**Y**___ **psi**