

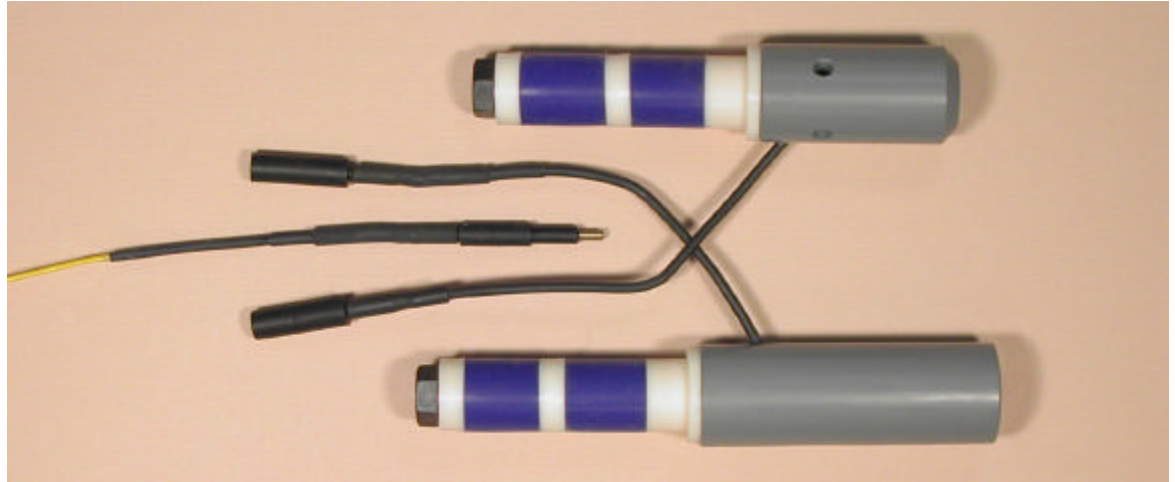
# Model T - Tube Sheet Reference\*

## Typical Applications:

- Condenser tube sheets

## Featuring:

- Ability to place a reference electrode in selected locations on the tube sheet
- In-line underwater connector for easy removal
- CPVC housing rated to 180F (82C)
- All non-metallic double tube plug for attachment



## Electrode Housings

- Gelled Element - 1 1/16" dia. x 3" long  
(2.7 cm dia x 7.5 cm long)
- Dry element - 1" dia. x 2" long  
(2.6 cm dia x 5 cm long)

## Element Types

- AGG - Saturated gelled Ag/AgCl
- CUG - Saturated gelled Cu/CuSO<sub>4</sub>
- AGD - Dry-type Ag/AgCl
- ZIN - 99.99% zinc

## Electrode Termination

Female underwater connector on  
6 inch (15 cm) (nominal) lead wire

Cathodic protection applied to a waterbox can cause a non-uniform potential distribution to exist over the face of the tube sheet. A remotely mounted reference electrode cannot detect these potential gradients. Excessively electronegative potentials can result in hydrogen damage on titanium and ferritic stainless steel tubes while excessively electropositive potentials mean inadequate protection of the tube sheet. **Model T** references are the only means to verify that the actual potential at the tube sheet surface is within the acceptable range.

\* U. S. Patent 4,957,616

## Lead Wires

Male underwater connector attached to #22 AWG Teflon insulated lead wires in the following colors: red, orange, yellow, green, blue, purple, brown, black, white, gray

## Model Designation - Electrode

Specify as EDI Model TE-xxx-SW  
where xxx = element type

## Model Designation - Wire

Specify as EDI Model TW-col-LWnnn  
where col = color code and  
nnn = wire length in feet: 025 or 050

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***T Series  
Tube Sheet  
Mounted  
References***

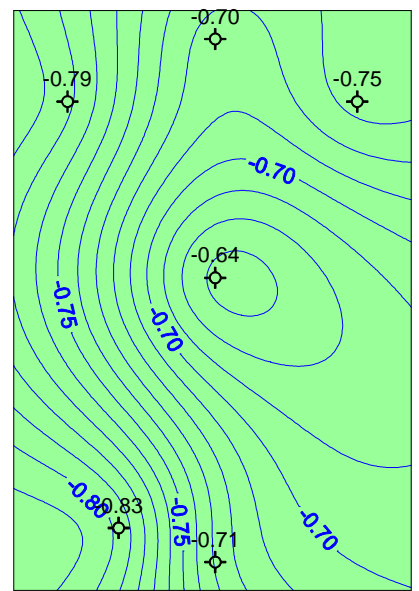
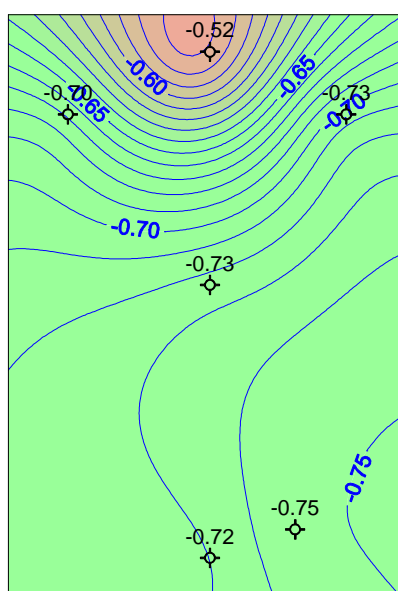
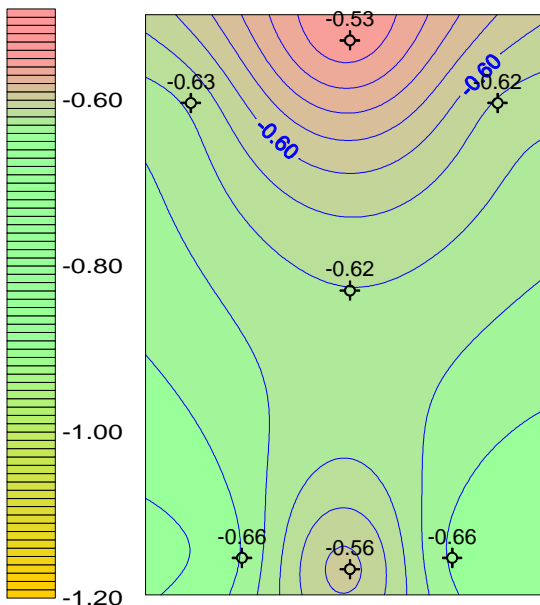
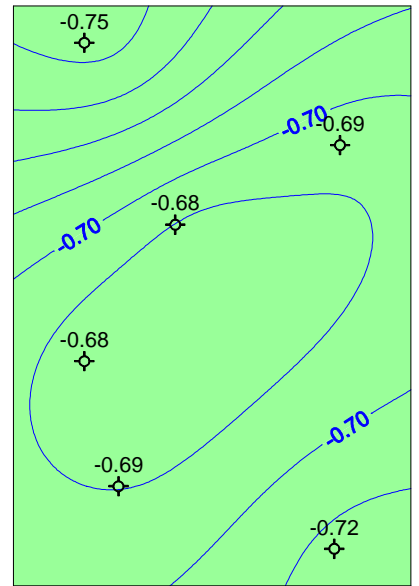
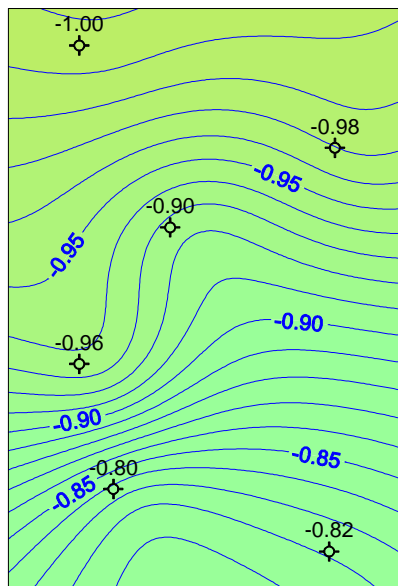
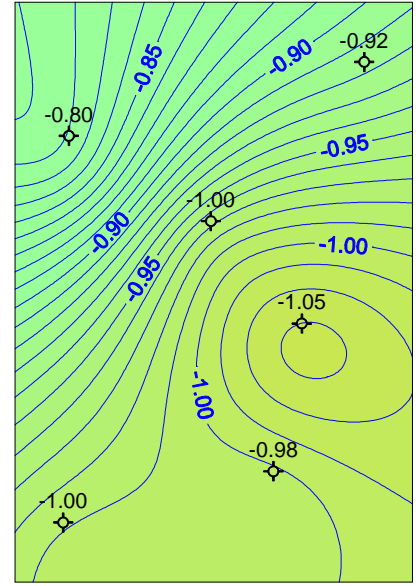
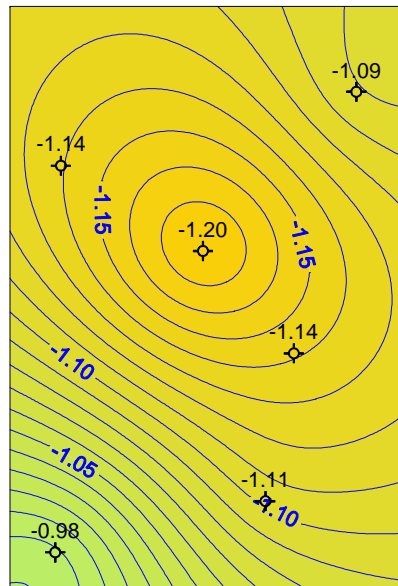


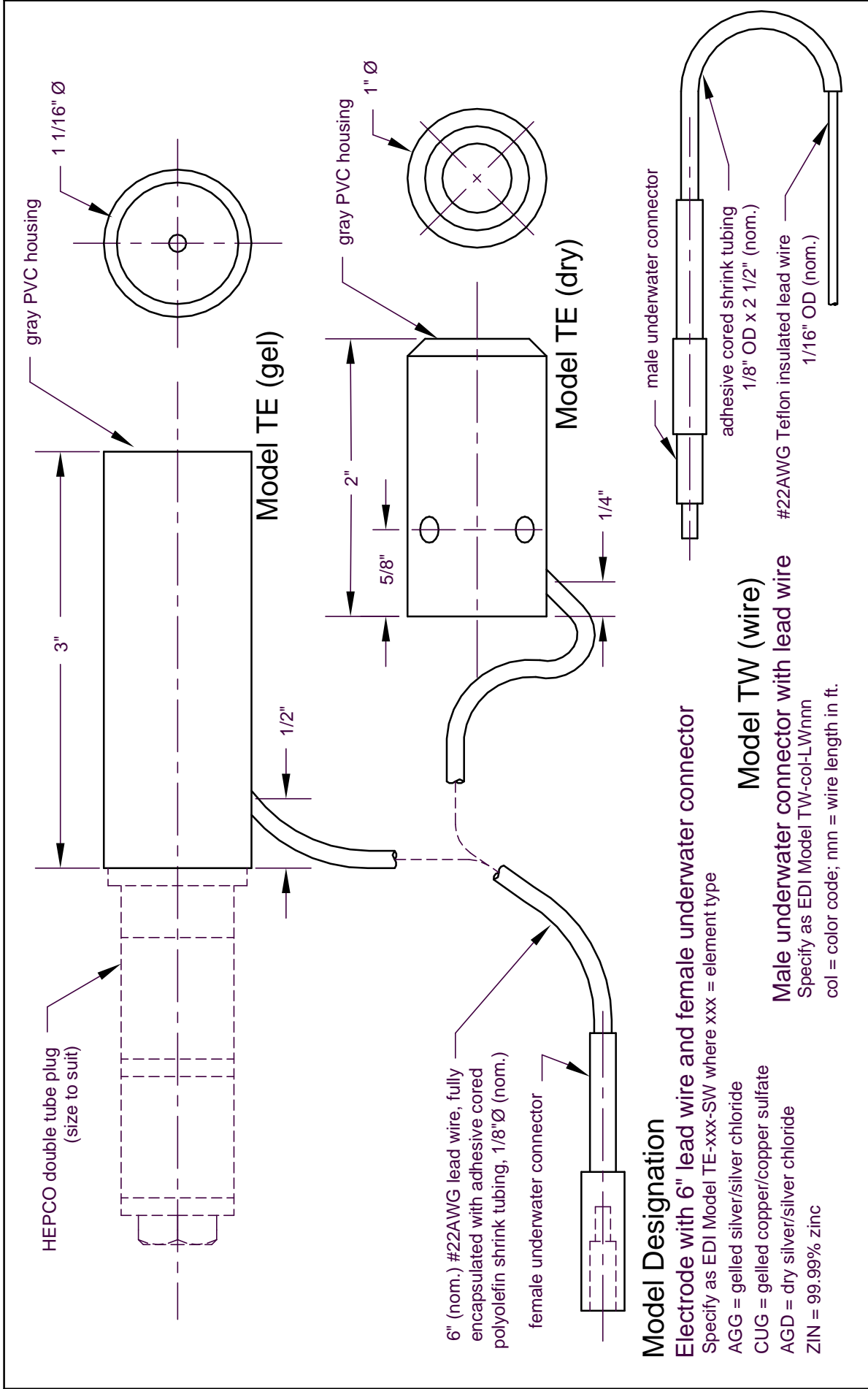
## Typical Data

The potential across a tube sheet under cathodic protection can show large variations from one location to another. A smaller variation will also occur with time. Different waterboxes of the same apparent design can produce different potential distributions.

Data from several EDI Model TE reference electrodes spotted at strategic locations on the tube sheet can be used to construct iso-potential diagrams that clearly show the potential distributions. EDI can construct these diagrams from a customer's data. Experience has shown that iso-potential diagrams constructed from 30 day average data correlate very closely with inspection reports listing tubes with hydrogen damage.

The accuracy of these diagrams depends upon the number of reference electrodes used and their distribution. Six to twelve reference electrodes on each tube sheet will provide sufficient data for construction an accurate diagram.





**Model Designation**

**Electrode with 6" lead wire and female underwater connector**

Specify as EDI Model TE-xxx-SW where xxx = element type

AGG = gelled silver/silver chloride

CUG = gelled copper/copper sulfate

AGD = dry silver/silver chloride

ZIN = 99.99% zinc

**Model TW (wire)**

**Male underwater connector with lead wire**

Specify as EDI Model TW-col-LWnmm

col = color code; nmm = wire length in ft.

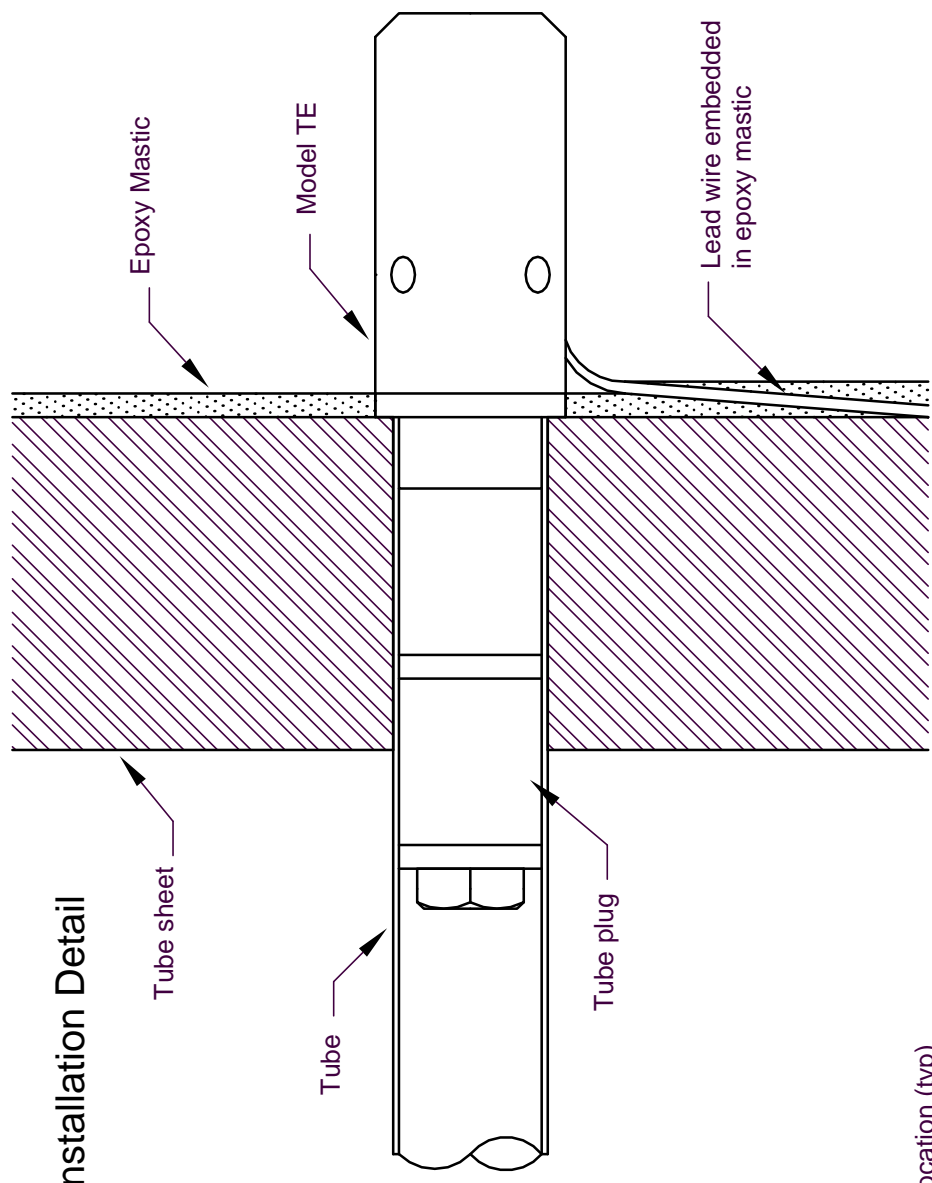
**Lead wire colors available**

Color	Code	Color	Code	Color	Code
Red	RED	Blue	BLU	Black	BLK
Orange	ORN	Purple	PUR	Gray	GRY
Yellow	YEL	Brown	BRN	White	WHI
Green	GRN				

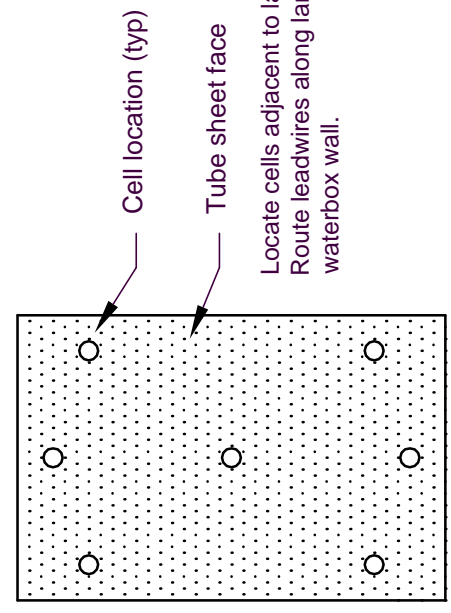
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**Tubesheet Mounted Reference**

### Installation Detail



### A Typical Cell Array



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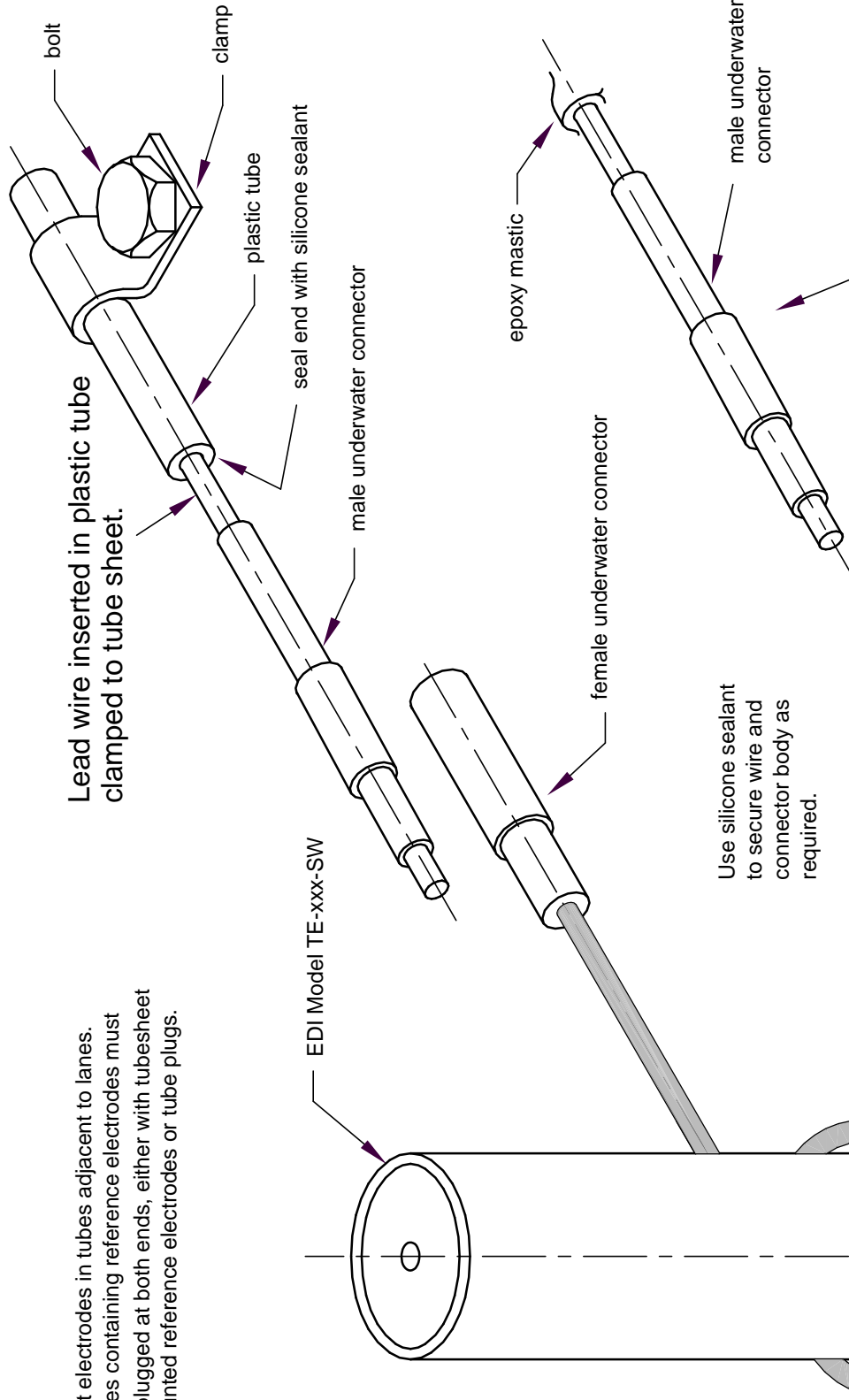
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## Typical Installation on Tube Sheet

SCALE	FULL	DATE	04/29/03	DRAWN BY	FJA	DRAWING NUMBER	TEAPP1
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Spot electrodes in tubes adjacent to lanes.  
 Tubes containing reference electrodes must  
 be plugged at both ends, either with tubesheet  
 mounted reference electrodes or tube plugs.

EDI Model TE-xxx-SW



Lead wire embedded in epoxy mastic.

Lead wires can be passed through waterbox wall via a  
 Conax MHC-062 or MHM-062 sealing gland or equivalent.

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## Suggested Installation Techniques

SCALE	FULL	DATE	04/29/03	DRAWN BY	FJA	DRAWING NUMBER	TEAPP2
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Looping the wire around the base of  
 the electrode in a clockwise direction  
 will prevent the electrode from  
 unscrewing and keep the tube plug  
 grip from loosening. Secure in place  
 with silicone sealant or other mastic.