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 $Cu/CuSO_4$
AGD - Dry-type Ag/AgCl
ZIN - 99.99% zinc

Electrode Termination

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

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

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**

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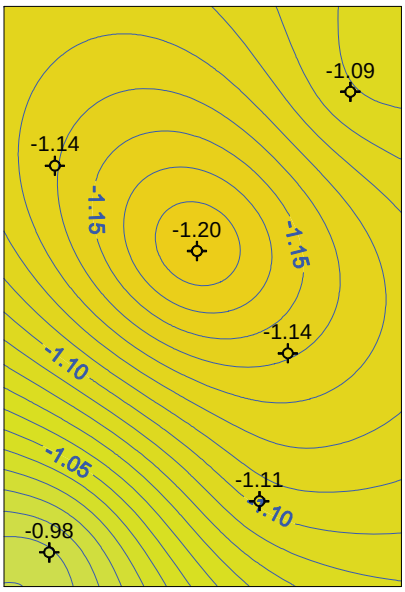
T Series Tube Sheet Mounted References

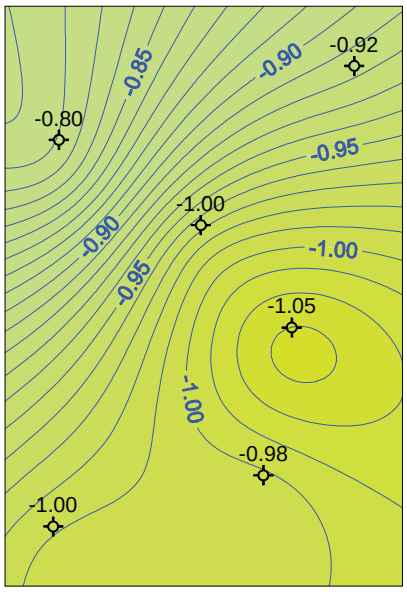
Typical Data

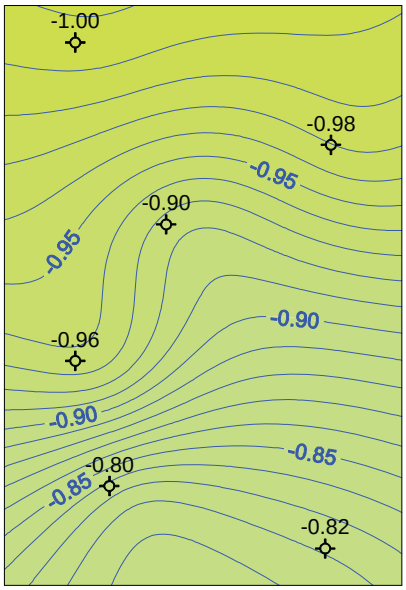
The potential across a tube sheet under cathodic protection can show large variations from one location to another. A smaller variation will also occur with time. Different waterboxes of the same apparent design can produce different potential distributions.

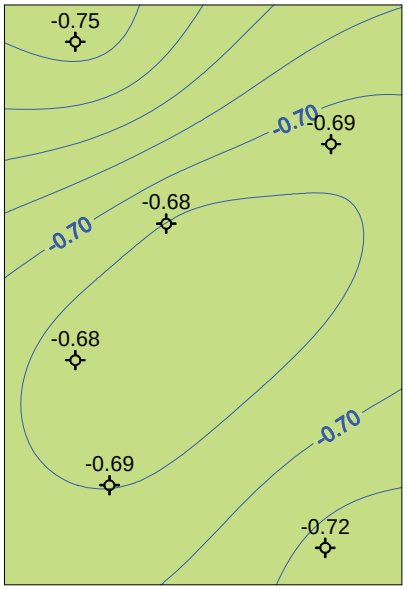
Data from several EDI Model TE reference electrodes spotted at strategic locations on the tube sheet can be used to construct iso-potential diagrams that clearly show the potential distributions. EDI can construct these diagrams from a customer's data. Experience has shown that iso-potential diagrams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

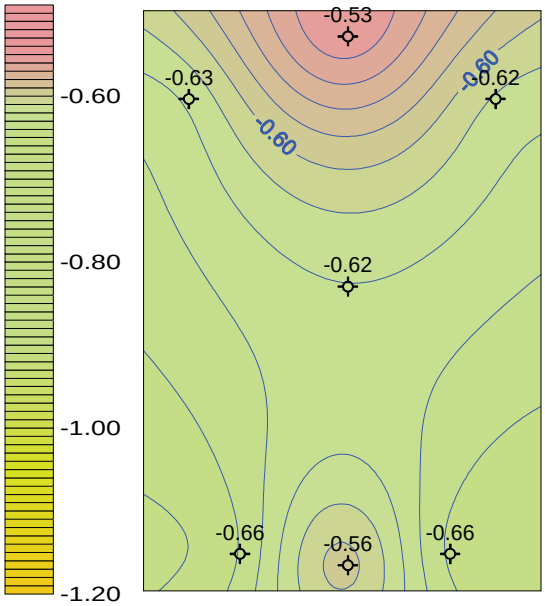
The accuracy of these diagrams depends upon the number of reference electrodes used and their distribution. Six to twelve reference electrodes on each tube sheet will provide sufficient data for construction an accurate diagram.

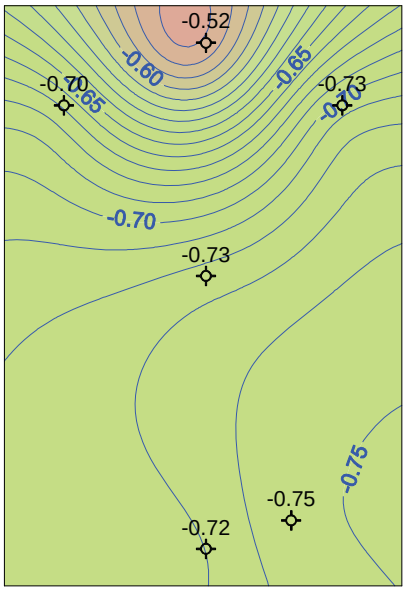


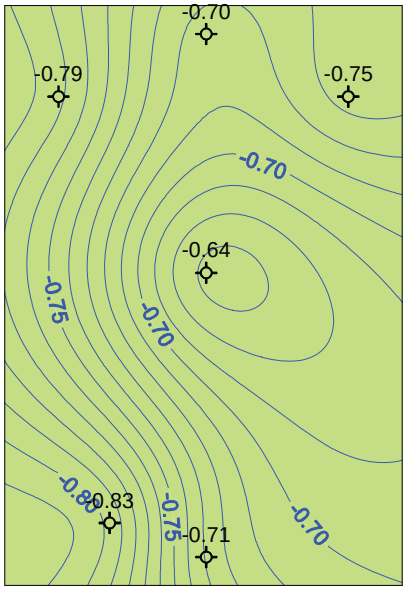


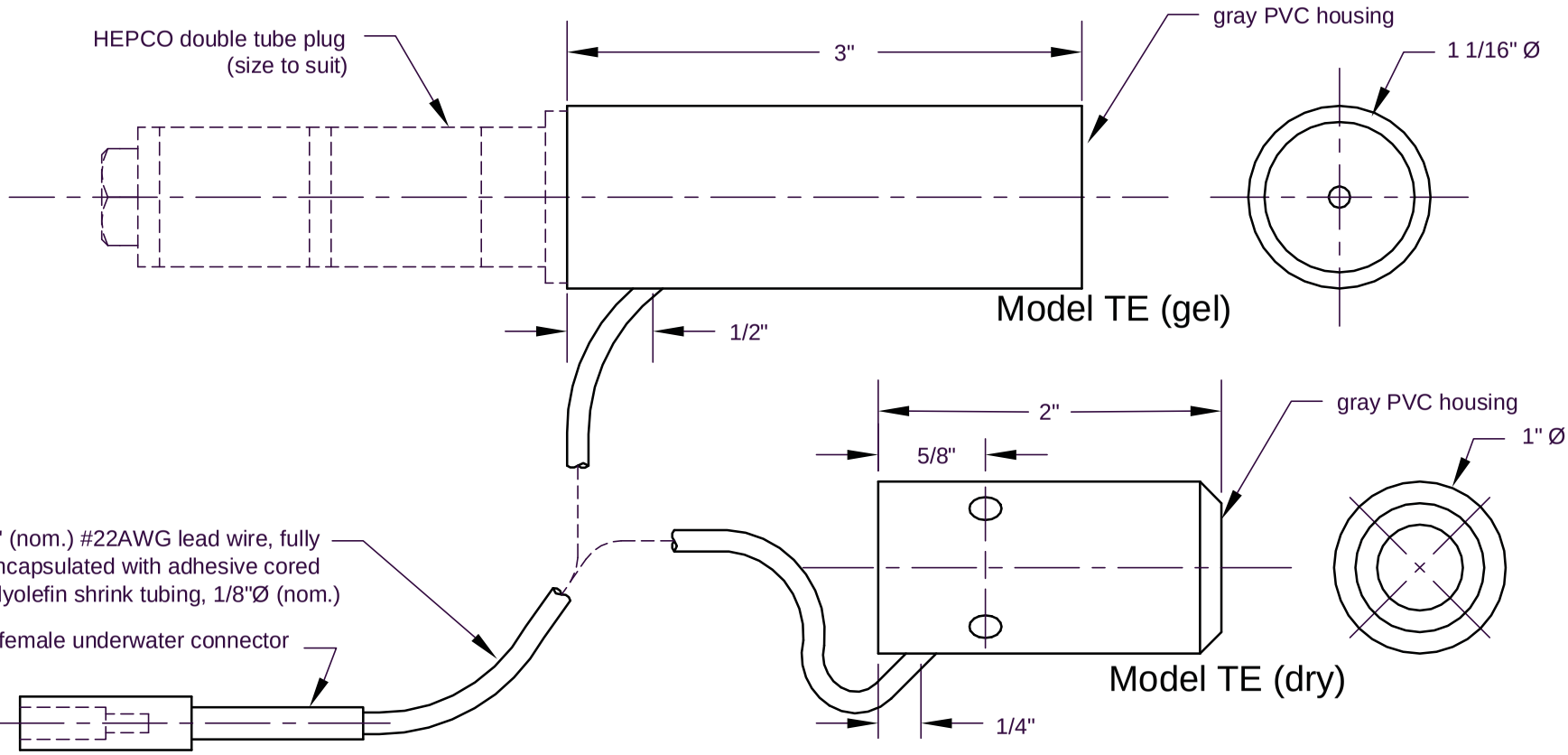












Model Designation

Electrode with 6" lead wire and female underwater connector

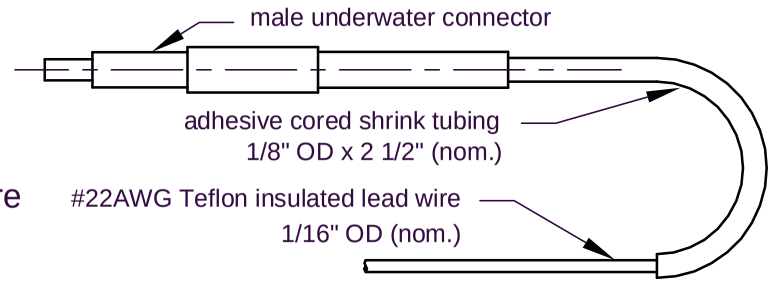
Specify as EDI Model TE-xxx-SW where xxx = element type

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-LWnnn

col = color code; nnn = 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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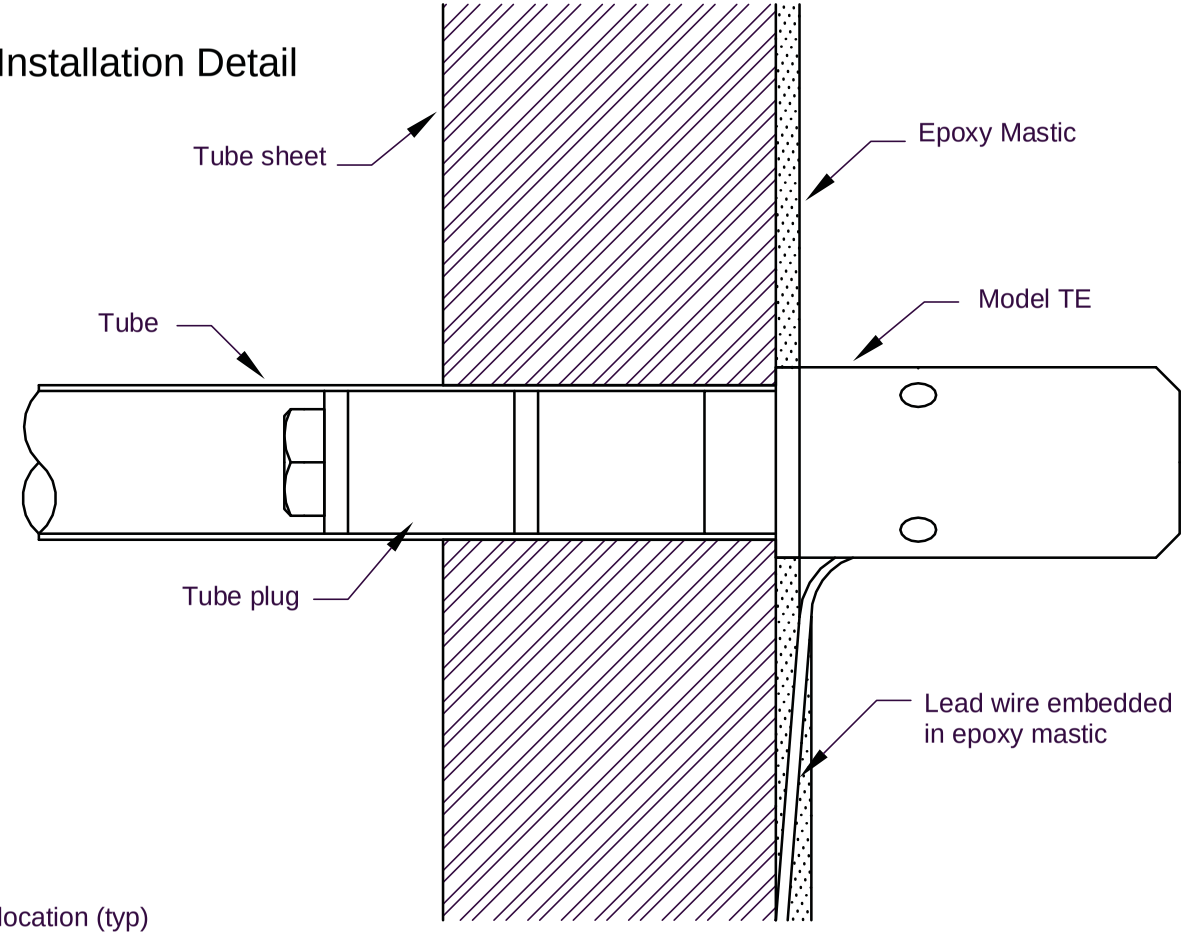
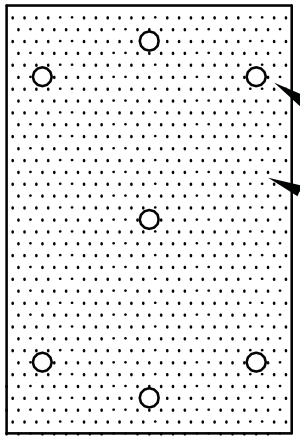
Tubesheet Mounted Reference

SCALE	DATE	DRAWN BY	DRAWING NUMBER
FULL	04/29/03	FJA	TEASY

Installation Detail



A Typical Cell Array



Locate cells adjacent to lanes.
Route leadwires along lanes to
waterbox wall.

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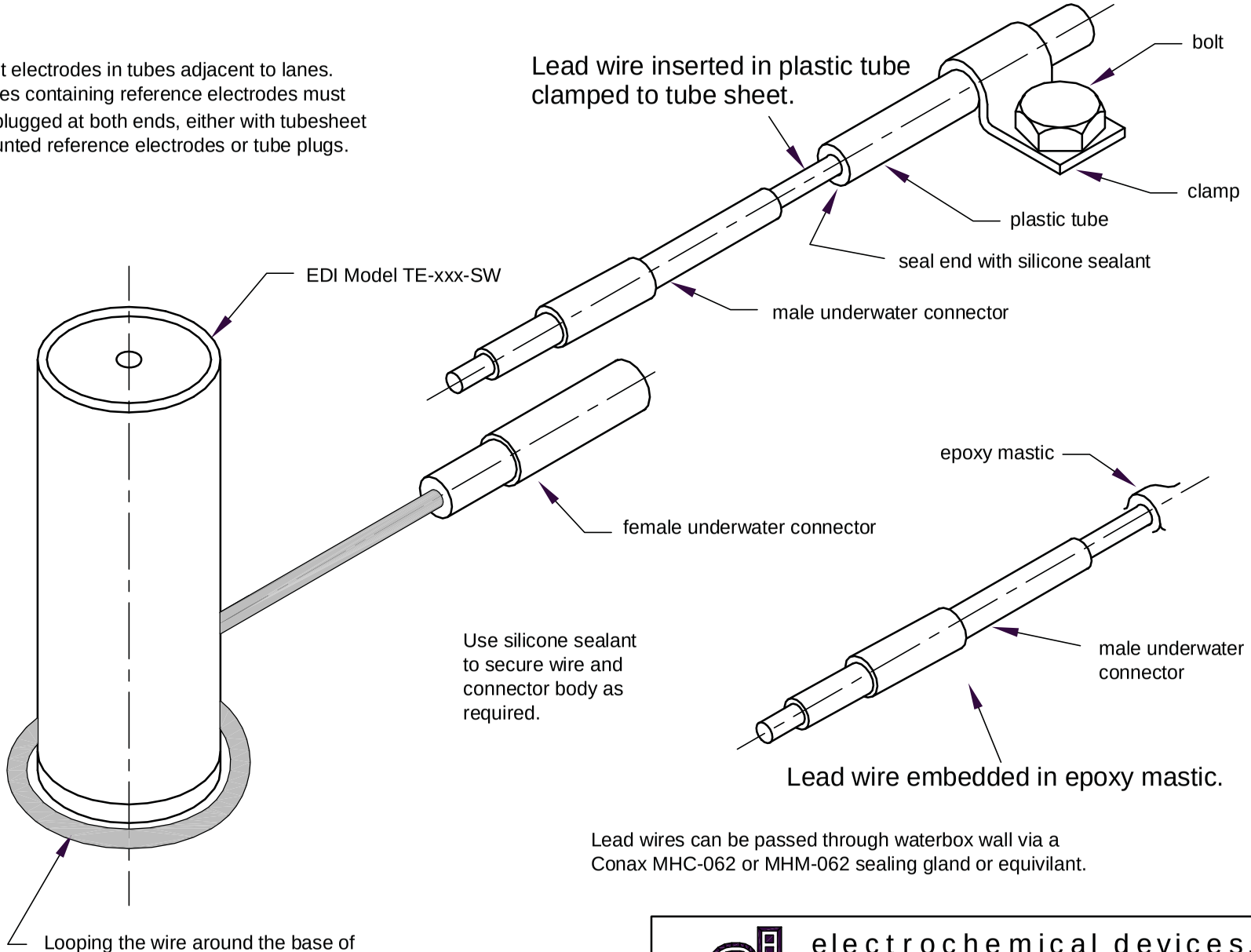
Typical Installation on Tube Sheet

SCALE	DATE	DRAWN BY	DRAWING NUMBER
FULL	04/29/03	FJA	TEAPP1

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.



Use silicone sealant to secure wire and connector body as required.

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

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.

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Suggested Installation Techniques

SCALE	DATE	DRAWN BY	DRAWING NUMBER
FULL	04/29/03	FJA	TEAPP2