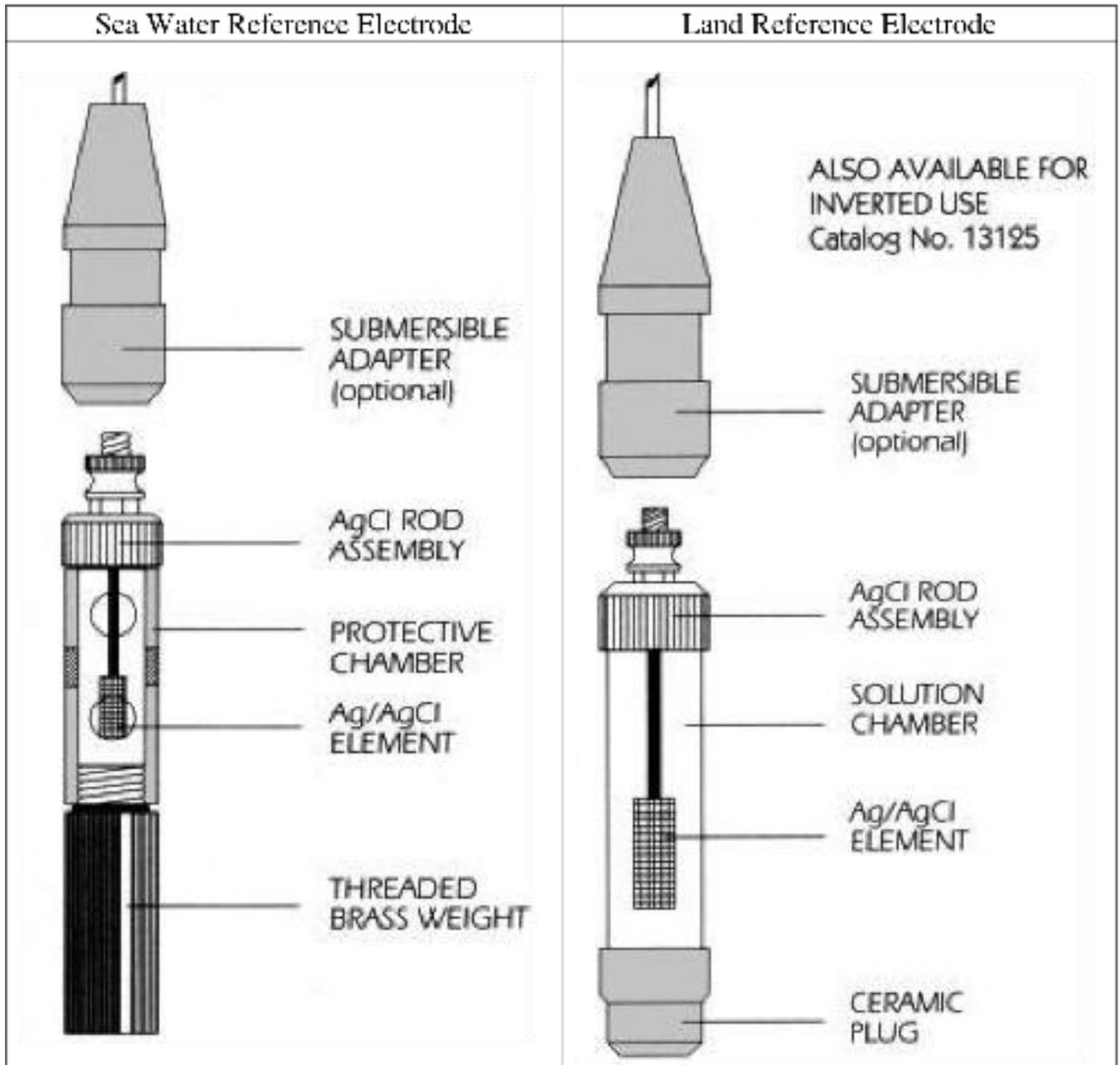


This manual contains instruction sets for the following products:

- Ag/AgCl Seawater Electrode Kit – Cat. # 13100
- Ag/AgCl Land-Based Electrode Kit – Cat. # 13150
- Ag/AgCl Combined Land-Based & Seawater Electrode Kit – Cat. # 13175





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## **Part 1: Ag/AgCl Seawater Electrode Kit – Catalog # 13100**

### Steps for Electrode Preparation and Use:

1. Unscrew the brass weight from the bottom of the red Lexan tube and then unscrew the rod assembly from the top of the Lexan tube.
2. Fill the second Lexan tube (the tube without the holes) up to the bottom of the threads (making sure that the white plastic plug is in place, with seawater, or with the liquid into which the electrode will be immersed for readings (brackish water, fresh water etc.).
3. Screw the rod assembly onto the Lexan tube (without the holes) and let the Ag/AgCl element remain immersed in the solution for at least 1 hour in order for the element to acclimate to the electrolyte (after being dry during shipping).
4. After the element soaking phase, remove the rod assembly from the tube and re-attach it to the original red Lexan tube (the tube with the holes)
5. Re-attach the brass weight making sure that the o-ring is properly seated
6. Finally, remove the thumb nut from the top of the electrode, exposing the  $\frac{1}{4}$  x20 threads and screw a submersible adapter (which can be purchased separately) onto the top of the electrode.
7. Immerse the assembly into the electrolyte for a structure-to-electrolyte reading. When immersing the electrode into seawater, avoid oil films as these can result in the Ag/AgCl element becoming coated, leading to erroneous readings. Allow the reading to stabilize before recording the data.

### Interpretation of Readings:

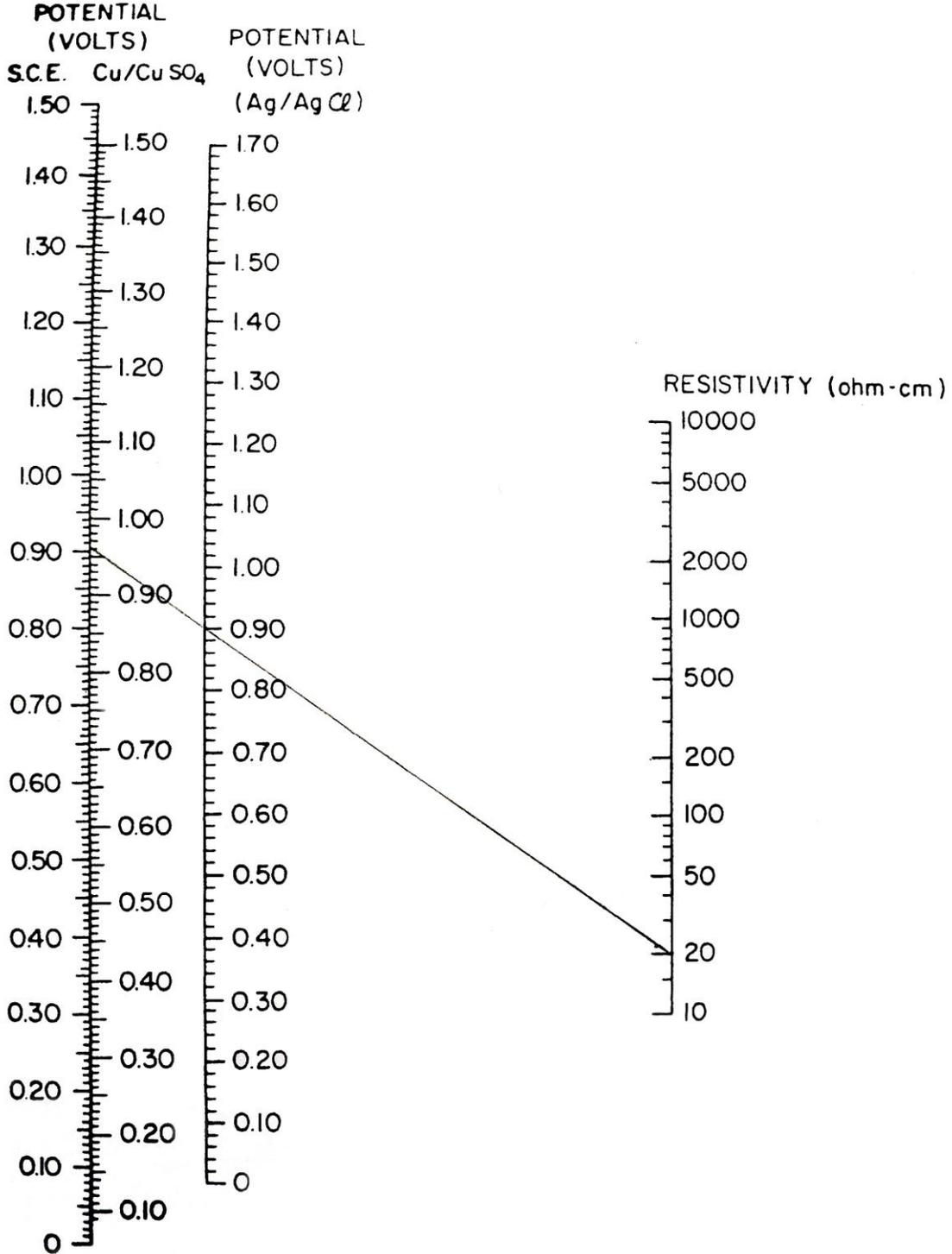
Since the Ag/AgCl element, in the case of the Seawater electrode, is directly exposed to the electrolyte (seawater, brackish water etc.), the Ag/AgCl electrode potential is a function of the nature of the electrolyte and, hence, a structure-to-electrolyte reading is a function of the nature of the electrolyte. In the case of seawater or diluted seawater, the electrode potential is a function of the salinity of the electrolyte, which translates to the structure-to-electrolyte potential being a function of the resistivity of the electrolyte.

If the resistivity of the electrolyte is measured (in ohms.cm), the nomogram shown below can be used to convert a structure-to-electrolyte reading versus a Ag/AgCl Seawater electrode to what the reading would have been versus a copper/copper sulfate electrode or versus a Calomel electrode.



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The above nomogram was published in an article by Peterson and Groover in NACE's Materials Performance journal (May 1972 issue).

Once the resistivity of the electrolyte is determined, a line can be drawn on the nomogram from that point on the resistivity scale to the copper/copper sulfate scale, for example, passing through the reading value on the Ag/AgCl scale.

For example, for the case of a 0.90Volt reading versus an Ag/AgCl seawater electrode immersed in a 20Ω.cm electrolyte, the reading versus a copper/copper sulfate electrode would have been 0.96Volts, as indicated by the line drawn on the above nomogram.

#### Storage of the Electrode:

##### Short-Term Storage:

Use the Lexan tube without the holes, filled with seawater, in which to store the Ag/AgCl element between a series of daily readings, for example, in order to prevent the element from drying out.

##### Long-Term Storage:

Unscrew the rod assembly from the Lexan tube and rinse (using distilled water) or brush away (with a soft brush) any foreign deposits from the Ag/AgCl element. Also, remove the brass weight and rinse off the weight and the tube itself. After allowing all three components to dry, re-assembly the electrode and store it in the kit box. When it's time to use the electrode again, the procedures outlined above should be followed.

#### Specifications:

Operating Temperature Range: 0 to 90° C

Length, excluding cap: 5.15 inches

Diameter (max.): 1.15 inches.

Thread: ¼ -20

## **Part 2: Ag/AgCl Land-Based Electrode Kit – Catalog # 13150**

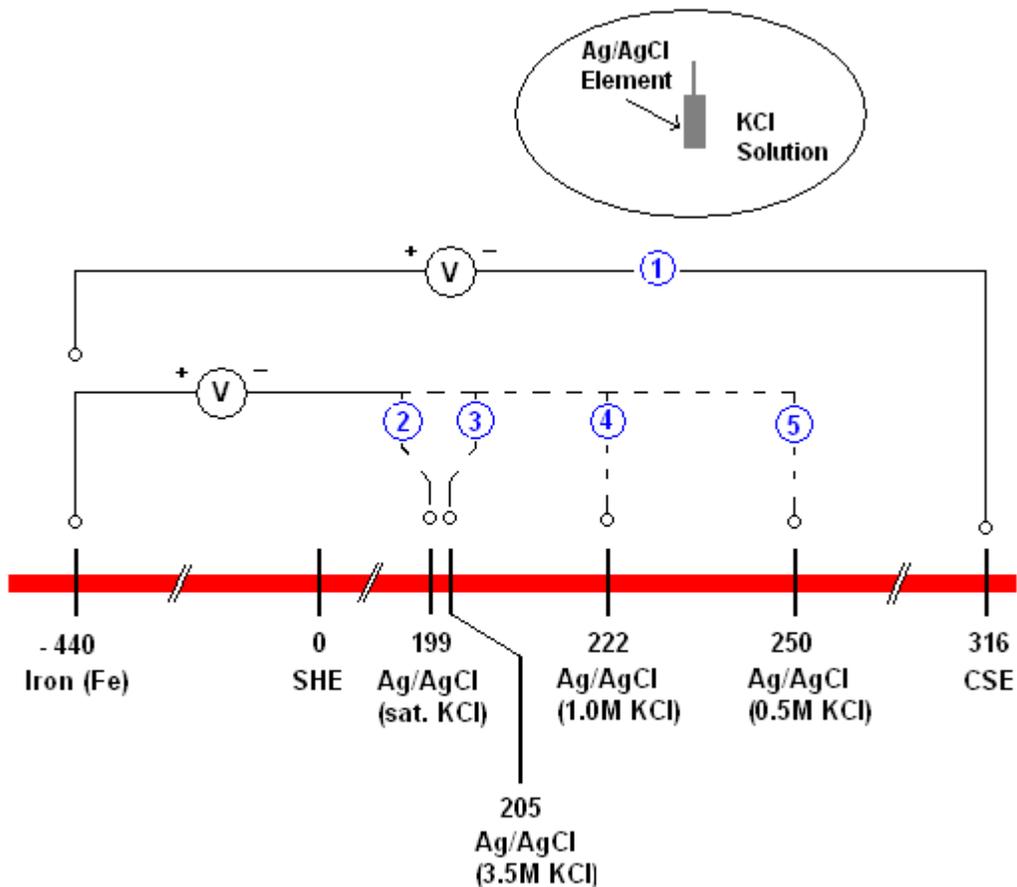
#### Steps for Electrode Preparation and Use:

1. Unscrew the Ag/AgCl rod assembly from the red Lexan tube
2. Fill the tube up to the bottom of the threads with the 3.5 Molar Potassium Chloride (3.5M KCl) filling solution supplied with the kit and re-install the rod assembly.
3. Allow at least 1 hour for the Ag/AgCl element to soak in the KCl filling solution prior to taking the first reading. This time period also allows the KCl solution to soak into the pores of the porous ceramic plug which is necessary for the provision of electrical contact to an external electrolyte such as soil or water.

4. Unscrew the thumb nut from the top of the electrode, exposing the ¼ x20 threads and screw the electrode onto a telescopic cane (purchased separately) or to another compatible electrode extension for ease of taking structure-to-soil readings.
5. Remove the orange plastic plug cover.

Interpretation of Readings:

The electrode potential of a Land-Based Ag/AgCl electrode is independent of the nature of the electrolyte with which the electrode comes in contact, such as soil, for example. Consequently, a structure-to-electrolyte potential reading should only be a function of the potential of the structure (and the filling solution temperature) and the molarity of the KCl filling solution. As indicated in the figure shown below, an Ag/AgCl electrode having a 3.5M KCl filling solution has a potential, relative to SHE, of 205mV (at a filling solution temperature of 25°C).





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Since a copper/copper sulfate (CSE) electrode has a 316mV potential relative to SHE, 111mV should be added to a structure-to-electrolyte reading recorded using an Ag/AgCl Land-Based electrode if comparison is to be made to readings versus a copper/copper sulfate electrode.

#### Storage of the Electrode:

##### Short-Term Storage:

The only requirements regarding short-term storage between a series of daily readings, for example, are to rinse off any soil deposits from the ceramic plug (using distilled water) and to apply the plastic plug cover to help prevent evaporation of the filling solution.

##### Long-Term Storage:

Unscrew the rod assembly from the Lexan tube and empty out the KCl filling solution. Rinse off the Ag/AgCl element using distilled water. Also, unscrew the ceramic plug from the Lexan tube and rinse off (using distilled water) the ceramic plug and the tube itself. After allowing all three components to dry, re-assembly the electrode and store it in the kit box. When it's time to use the electrode again, the procedures outlined above should be followed.

### **Part 3: Ag/AgCl Combined Land-Based & Seawater Electrode Kit – Catalog # 13175**

This kit comprises the various components necessary to assemble either the Seawater electrode or the Land-Based electrode.

#### Steps for Seawater Electrode Preparation and Use:

1. Screw the white plastic cap (located in the submersible adapter compartment) onto the red Lexan tube without the holes and fill the tube up to the bottom of the threads with seawater, or with the liquid into which the electrode will be immersed for readings (brackish water, fresh water etc.).
2. Screw the Ag/AgCl rod assembly onto the Lexan tube and let the Ag/AgCl element remain immersed in the solution for at least 1 hour in order for the element to acclimate to the electrolyte (after being dry during shipping).
3. After the element soaking phase, remove the rod assembly from the tube and attach it to the other red Lexan tube, the one with the holes.
4. Attach one (or both) of the brass weights to the Lexan tube, making sure that the o-ring is properly seated
5. Finally, remove the thumb nut from the top of the electrode, exposing the ¼ x20 threads and screw the submersible adapter onto the top of the electrode.
6. Immerse the assembly into the electrolyte for a structure-to-electrolyte reading. When immersing the electrode into seawater, avoid oil films as these can result in the Ag/AgCl element becoming coated, leading to erroneous readings. Allow the reading to stabilize before recording the data.

#### Steps for Land-Based Electrode Preparation and Use:

1. Screw the ceramic plug (plus plastic cover) onto the red Lexan tube without holes.



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2. Fill the tube up to the bottom of the threads with the 3.5 Molar Potassium Chloride (3.5M KCl) filling solution supplied with the kit and re-install the rod assembly.
3. Allow at least 1 hour for the Ag/AgCl element to soak in the KCl filling solution prior to taking the first reading. This time period also allows the KCl solution to soak into the pores of the porous ceramic plug which is necessary for the provision of electrical contact to an external electrolyte such as soil or water.
4. Unscrew the thumb nut from the top of the electrode, exposing the  $\frac{1}{4}$  x20 threads and screw the electrode onto a telescopic cane (purchased separately) or to another compatible electrode extension for ease of taking structure-to-soil readings.
5. Remove the orange plastic plug cover.

Please consult Parts 1 and 2 of the manual for electrode storage information and for information on reading interpretation for the Seawater electrode and the Land-Based electrode, respectively.