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## **Ag-AgCl pellet holders (types ESP, ERP, E45P, etc.)**

Holders with an internal pellet must be filled with a chloride electrolyte (typically 3 M KCl) before insertion of a filled pipette. Fill a syringe with the electrolyte and insert the tip of the syringe into the holder bore as far as possible. Inject the electrolyte while slowly withdrawing the tip. If done properly, the holder will be filled completely with no trapped air bubbles. The pipette is then inserted and the holder end cap is finger tightened to make a good seal around the glass. Inspect for air bubbles which must be removed to insure electrical conductivity. The holder should then be wiped dry before attachment to the headstage.

## **Ag wire holders (types ESW, ERW, E45W, QSW, QAW, Q45W, etc.)**

With this type holder, the silver wire is inserted into the filled pipette to make contact with the electrolyte. The holder itself is not filled, but must be kept dry. The portion of the wire that is to be in contact with the solution must first be chloride plated to reduce junction potentials. Care must be taken to avoid scraping or nicking the chlorided wire when inserting the wire into the pipette. Fire polishing the pipette end will minimize this problem and will also extend the life of the rubber seal. Tightening the end cap provides mechanical stability.

### **Chloriding Silver Wire**

The wire should be clean (wiped with alcohol). Chloriding the wire is achieved by making it positive, relative to a solution containing NaCl (0.9%) or KCl (3 M) and passing a current at a rate of 1 mA/cm<sup>2</sup> of surface area for a minute, or until adequately plated (a 2 cm length of the 0.25 mm wire used in the holders would require 0.15 mA). The color of a well plated wire should be a light gray. Reversal of the polarity for several seconds while plating the electrode tends to yield a more stable electrode.

An alternate method of chloriding is to immerse the wire in Clorox until a light gray color is observed (typically 15 seconds to a minute).

## **Hybrid holders (types ESH & QSH)**

The electrical coupling in these holders is a 1 mm diameter Ag-AgCl pellet on the end of an insulated silver wire approximately 70 mm long. This type holder is used the same as a wire type holder except that the pellet is ready for insertion into the pipette and requires no chloriding. This type holder can only be used with glass capillaries with ID greater than 1 mm.

## **Reference cells**

Ag-AgCl reference cells are generally used for the bath ground return, particularly when a pellet type electrode holder is employed. They require no preparation before use. However, equilibrium can be achieved prior to use by placing the working end of two reference cells (or one reference cell and a pellet type holder) in electrolyte and shorting the connector ends together for approximately 15-20 minutes before using in an experiment. After use, the exposed surface of the pellet should be rinsed with distilled water and air dried. If the pellet face becomes contaminated, it can be renewed by a light sanding with light grit sandpaper (do not use emery cloth).

## **Cleaning and storage**

Any parts exposed to salt solution should be rinsed with distilled water and dried before storage. Holders with an internal pellet should be thoroughly flushed with distilled using a hypodermic syringe and air dried internally with a clean dry hypodermic syringe or other source of clean warm air. Completely dry the outside and store in a dry environment.

**CAUTION: Never use alcohol or solvents to clean the plastic holder parts.**

## **PART REPLACEMENT**

### **Pipette seals**

Repeated insertions of the glass pipette can damage or enlarge the rubber pipette seal requiring its replacement. This can be minimized by fire polishing the glass to remove the sharp edge. To replace the seal, unscrew the threaded end cap and remove the seal with a forcep. Replace the seal with a new one (see below for ordering info). Be sure the seal sits squarely in the holder before replacing the end cap.

### **Pellets or wires**

Unscrew the connector end cap or threaded insert to remove the pellet or wire coupling. Use a forcep to grab the pellet or wire. For pellet holders with a straight body, a pin or wire with a blunt end can be inserted in the glass end to push the pellet out. Replace the pellet or wire and reassemble the holder. Tighten the insert only enough to force the rubber seal into the small bore approximately 1mm. Holders with the BNC type and 1mm pin connector are supplied with a tool for removal and insertion of the threaded insert. Newer models with the PTFE cap require no tools.

**NOTE: Pellet holders supplied beginning in 1995 use a molded pellet assembly (replacement part SP-1 M). These are notable by the black color of the molded rubber seal. The older types (red color seal) are replaced with the pellet and WS-1 or WS-2 wire seal.**

### **Holder conversion**

Holders constructed with the SP-1M molded pellet (E, EH and ME Series) are easily converted to wire type holders by replacing the molded pellet with a WS-1 wire seal and a length of silver wire. Simply remove the pellet from the holder and install the wire seal and wire. Cut a 7 cm length of 0.25 mm diameter silver wire (AGW10-W). Insert the wire in the seal and make a right angle bend (2 – 3 mm in length) where the wire comes through the seal. Install the wire/seal assembly in the holder and replace the threaded connector.

**NOTE: The wire must be chlorided before use.**

### **Replacement parts list**

<b>Description</b>	<b>p/n</b>	<b>Pkg. Qty.</b>
Molded Ag-AgCl pellet used with E and ME Series	SP-1M	3
Pellet/wire assembly for hybrid holders QSH and ESH	HP-205	1
Ag Wire, un-insulated, 0.25 mm dia. x 70mm long	AG-25	10
Pipette Seal, for all series holders	PS-XX"	10
Wire Seal for E, MP and ME holders	WS-1	10
Wire Seal for all Q and PE series holders	WS-2	10
Wire Seal for all Q and PE series holders with T connector (Axon)	WS-3	10
Glass Seal Compression Cap for all Series holders	QC-xx	3
*Part numbers containing "xx". These parts are ordered for specific size (CD) glass. When ordering, the "xx" must be replaced with 2 digits to represent the glass OD.		
<b>Glass OD</b>	<b>2 digit code</b>	
1.0 mm	10	
1.2 mm	12	
1.5 mm	15	
1.7 mm	17	
2.0 mm	20	
Pipette seal for 1.2 mm OD glass is PS-12. If an in-between size is desired (e.g., 1.8 mm), then simply insert the digits 18 into the part number.		