**Certification Test Checklist**

**Fitting the subject with the net**

1. **Preparation**

* Make saline solution
* Check the disinfecting solution to make sure it is not expired (expired means >14 days old).
* Remove your watch, bracelets, or rings you may be wearing
* Have the following items ready in the EEG chamber:
  + Saline solution
  + Two pipettes
  + Three towels
  + Paper towels
  + Timer
  + Tape measure
  + China markers (red and black) or washable marker
  + Sterile tape or band-aids

1. **Measure the head size**

* Measure the circumference of the head at its widest point (in cm):
* Ask ALL participants to comb their hair. Ask them to make a part down the middle.
* Have the subject remove hairpins, earrings or any other jewelry on their head that may get caught in the net
* Choose a net of the appropriate size. If the circumference is directly on a boundary between sizes, take the smaller size).
* Bring the net back into the EEG room, and lower it into the saline solution so every electrode is submerged, and let it soak for five (5) minutes (use the timer).
  + As soon as you retrieve the net, wrap a towel around the connector and keep it there until you plug it into the arm.
  + NEVER allow the connector or the wrapping around the wires (the “snakeskin”) to get wet. This will destroy the net.
* Ask subject if they need to use the restroom – this is their last chance before you apply the net!

1. **Measure and mark the vertex**

* Front to Back: Measure the distance from the nasion to the inion
* Find the midpoint (i.e. half the distance) and use the china marker to draw a line perpendicular to the tape measure about an inch long
  + tell the subject you are using a marker that will wash out easily
  + when using the marker, hold it at a shallow angle and be gentle to minimize subject discomfort
  + be sure the mark is on the scalp, not the hair, and is easily visible
* Side to Side: Measure the distance between the two preauricular points
  + this is the indentation where the jaw meets the skul
  + ask subject to open and close jaw, and locate the junction between the moving jaw and the still skull
  + align the tape on the mark made in the previous step
* Find the midpoint and draw another perpendicular line with the marker.
* The point where the lines cross is the vertex. Highlight this intersection prominently (the red china pencil helps) so it will still be identifiable when it’s covered by the electrode

**Applying the net**

* Give subject a towel for their shoulders
* Remove the net from the saline solution, allow excessive solution to drain off, and dab the net on paper towels so it is no longer dripping
* Hand the connector (wrapped in towel) to participant to hold in their lap
* Position your hands in net for placement. Your forearms and wrists should be pointing down throughout this step, with the net hanging off them
  + Place your hands into the Net, so the chin strap rests on your wrist
  + Make sure the chin straps are fully loosened and are not tangled
  + Position your thumbs: On either side of the nasion electrode, count two electrodes out (between electrodes 1 & 8, and electrodes 25 & 32) and place your thumbs underneath the double-band elastomer of the perimeter. Let the net hang loosely *only* from your thumbs and visually check the structure for any tangling.
  + Place your little fingers in the perimeter band at the back of the Net. The tips of the fingers should be approximately two electrodes away from the center,
* Open the Net using your thumbs and little fingers so the perimeter forms a circle. Expand the perimeter only enough to fit it over the subject’s head. Do not over-stretch the net!!!
  + Use the back of your hands to support the net but not to stretch it.
  + To make it easier to place the net correctly, it is helpful to point your middle fingers at the vertex electrode.
* Ask participant to close his/her eyes
* Gently flip the Net upright so that you are ready to apply it, holding it straight above the subject’s head.
* Keeping moderate tension on the perimeter band with your thumbs and little fingers, bring the net straight down onto the subject’s head so that the vertex sensor lies on the vertex mark on the head.
  + Stand directly in front of the subject
  + If the vertex electrode is more than 1 cm away from the vertex mark, take the net off and try again
* Continue slowly move your hands straight downward until the *nasion* electrode is aligned with the nasion.
  + Keep sensors, straps, and your fingers away from the subject’s eyes
  + Continue to work the net downward so it is not slack in the back.
* Check the placement of vertex and position of midline sensors before removing hands
  + if vertex is not within 1 cm, take the net off and try again
  + the nasion electrode centered just above the nose
  + Line from nasion to vertex reference should go straight along the midline of the skull
  + As you progress, use the chin strap to take up slack so the net does not slide back up the subject’s head.
* Plug the connector into the arm

**Adjusting the net**

* The initial adjustments usually involve adjusting sensors so that the ears and eyes are comfortable, righting overturned sensors to sit perpendicular to the scalp, and using the chin and face straps to adjust the ear and eye electrodes, so of the tension of the geodesic structure is equally distributed around the head.
* Check for frontal alignment by standing directly in front of the subject
* By gradually grasping and lifting large areas of the net, bring the ear opening down and forward so it surrounds the ear.
* Review the positioning of the sensors along the brow.
* Next, adjust the orbital sensors.
* At the base of the skull in the back, ensure that all electrodes are making contact.
  + Check lateral symmetry by confirming that the mastoid sensors fall at the same location behind each ear.
* As you proceed, ensure good contact between the sponges and the scalp by using moderate pressure to move each sensor on the scalp in a side-to-side, swiping motion.
* Visually verify that each sensor sponge is sitting on the scalp, not on hair.

Continually check the overall positioning:

* The Net is positioned symmetrically on the head and that the midline is straight.
* The reference sensor is positioned on the vertex.
* The ears are sitting correctly in the ear holes.
* The mastoid sensors are positioned on the mastoids.
* The nasion sensor is positioned on the nasion.
* The infraorbital sensors are positioned directly below pupils and the facial sensors are evenly spaced.
* **Impedence Testing**
* **Waveform Demo**

**Removing the Net**

* Unplug the net, wrap connector in same towel used previously, and have the subject hold it in their lap
* Ask the subject to close his or her eyes and to keep them closed until told otherwise.
* Loosen the chin strap by pinching the cord lock under the chin and sliding it down the chin strap. Loosen other straps
* Loosen pedestals around the ears.
* With your palms toward the subject’s face, carefully pick up the chin strap up with your thumbs. Carefully raise your hands (holding the straps away from the face) until you can slide the pad of your thumbs under the perimeter band at the approximately the same location they were in when you put the net on (between electrode 1 & 8, and 25 & 32).
* Gently use your thumbs to lift the Net up off the subject’s face and forehead.
* Lightly drop your fingertips onto the head and roll the perimeter band over them then begin rolling your hands. At this point the electrodes will be pulling away from the hair.
* Place the net in the (dry) transport bucket
* The subject can now open his or her eyes.
* Remove any tape, and offer the subject a towel to dry their hair. Have them put all their jewelry etc. back on and let them go to the rest room to restore their appearance if they wish. Be sure that no personal property is left behind.

**Cleaning the Net**

* Throughout the cleaning process, keep the connector wrapped and do not allow the snakeskin to get wet. Beware of splashes and always make sure the countertop is dry.
* Rinse net, pipettes, and comb in about 3 inches of lukewarm tap water in the dirty nets bucket, 4 times
  + Agitate for about 20 seconds for each rinse. Grab a broad section of the elastomer when agitating; do not use the wire bundle to pull the net, as the individual wires will weaken and break
* After 4 rinses, switch to the bucket with the disinfecting solution. Set the timer for 10 minutes; gently agitate the net for the first 2 minutes then soak for the remainder. Ensure that every electrode is fully submerged (briefly soak pipettes and comb). Don’t soak for longer then prescribed.
* Now using a Clean Nets bucket, rinse the net, pipettes, and comb again 3 times in lukewarm tap water. Agitate for about 20 seconds for each rinse.
* Do one final rinse using distilled water
* Hang net to dry, let fully dry before re-use
* Towels go in the dirty towels hamper in the EEG control room