TG-51 Elekta Solid Water Photon Calibration

# Purpose

This procedure details the steps involved in performing a solid water calibration of photons CRMC’s Elekta Infinity machines. A spreadsheet performs necessary calculations, including the dose at Dmax in water, but these formulas and other information are provided in the Appendix.

# Steps

## In Hot Lab

1. A few hours before you perform the calibration, insert the thermometer into the solid water. The thermometer and solid water are on the Elekta cart in the hot lab. The hot lab key is in the cabinet to the right of Kaley’s desk.

## In Physics

1. Read the pressure using the barometer by the door. Fill in three less than the reading on the spreadsheet.

## At Elekta console

1. Attach the electrometer to the white triax cable. Turn on electrometer to allow to warm up.

## In Elekta treatment room

1. Bring the Elekta cart from the hot lab into the treatment room. Remove the thermometer from the solid water and note temperature.
2. Insert the 10×10 cone into the machine and the cutout into the cone.
3. Place the indexing bar at position 2 on table.
4. Put 10 cm of solid water on the table. The easiest way to make 10 cm is with a 6 cm and a 4 cm block.
5. Add the solid water block with the hole for the ion chamber.
6. Insert the cylindrical ion chamber into the solid water. Be sure to remove cap first!
7. Use the tape on the ion chamber box to secure the ion chamber inside the hole. Scoot the box toward the solid water to help secure as well.
8. Attach the ion chamber to the white triax cable that leads into the Engineers Room. Secure the cable on the table using tape.
9. Locate Dmax on the spreadsheet for the energy you are testing. Add that much solid water. For photons, do not count any depth on the solid water with the hole, toward Dmax.
10. Align the x and y lasers to the marks on the sides of the solid water.
11. Align the z lasers to edge of top of solid water phantom. When the z laser is properly aligned, you should see dust on top of the phantom.

## At Elekta console

1. On the rightmost computer at the Elekta console, make a copy of the TG-51 Elekta Solid Water Photon Cal spreadsheet. Enter the temperature and pressure in the spreadsheet.
2. Zero the electrometer by pressing the ZERO/MODE button.
3. Set the electrometer bias to -300V.
   1. Press the ZERO/MODE button until *Bias* is the bottom setting on the electrometer.
   2. Use the down arrow to set the bias to -300. Ensure that -300 is inside the parentheses as well.
4. Put the middle computer into Service Mode.
   1. Click *Exit*.
   2. Click the Mode icon.
   3. Log in with username and password *service*.
5. Perform the following steps for each 6X, 10X, and 18X:
   1. Click the wrench icon and then the Deliver Quick Beam icon.
   2. On Radiation tab, set the following:
      1. Modality: x-rays
      2. Energy: 6X, 10X, or 18X
      3. MLC1: 100 (MLC2 will automatically set to 2 percent more than MLC1)
   3. Click *Load* and then *Confirm*.
   4. Press the ZERO/MODE button on the electrometer.
   5. Press the MV button on the Elekta console to deliver the beam.
   6. On the spreadsheet, record the electrometer reading in the *Charge* table for V(-), V(+), and 1/2V(-). (For the monthly calibrations, we use V(-) to approximate V(+) and 1/2V(-), since the yearly calibration is with V(-).) Ensure that your readings is close to the reading already on the spreadsheet.
   7. Click *Next Beam*.
   8. Repeat steps (c)–(f) for the second reading.
   9. If the first and second readings are not the same, take a third reading.
   10. Note the value in pink at the bottom of the spreadsheet. Record this value in the *Calibration Results* table.
6. Turn off *then* unplug electrometer.
7. Log out of Service Mode.
8. Remove ion chamber from solid water and unplug triax cable.
9. Put solid water back on cart.
10. Remove cone from machine.
11. Roll cart back into the E-1 Engineers Room.

# Appendix

* *TP CORRECTION* refers to TPCF.
* *ND,W from K&S* refers to .
* Dose at Dmax in H2O refers to .