

Klarity Attenuation Correction Factor Measurements

Department of Radiation Oncology, Arthur G. James Cancer Hospital
Oct 13, 2009

Purpose:

To determine, for all photon energies used in the department, the amount of radiation which is attenuated by a new type of low temperature thermoplastic produced by Larson Medical Products, the Klarity-G (green), compared with the currently used product, Klarity (white), and to calculate the corresponding correction factors.

Methods:

Measurements were taken on a Siemens ONCOR Impression Linear Accelerator, for both 6 and 18 MV photons. All measurements were performed separately for both energies.

Our baseline is as follows. Setup was performed 100cm SAD, using an ion chamber at 10cm depth of solid water, and 10cm of solid water underneath. A 10x10cm field size was used, and 100 monitor units (MUs) were delivered. Readings were taken using an electrometer.

Both Klarity and Klarity-G were in the form of thin uniform sheets, approximately 3.2mm thick, which were at least large enough to cover a 10x10cm field at 90cm SSD. The same previously stated setup was followed, except that a sample of the Klarity sheet was placed on top of the solid water so that the field was entirely contained. The Klarity sheets were laid flat on top of the solid water. Like before, 100 MUs were delivered.

For each measurement, two readings were recorded and averaged. All calculations performed used the average reading.

A correction factor, CF, was calculated for each Klarity sheet for each energy using the following equation:

$$CF = \frac{Rdg_{aquaplast}(FS, depth, SAD)}{Rdg_o(FS, depth, SAD)}$$

where $Rdg_{aquaplast}(FS, depth, SAD)$ is the reading with the Klarity sheet on top of the solid water, and $Rdg_o(FS, depth, SAD)$ is the baseline reading, without any Klarity sheet. Each is for a given Field Size (FS) and depth. SAD is assumed to be 100cm. As mentioned before, FS is 10x10cm², and depth is 10cm.

Results:

The results can be seen in Table 1.

6MV							
Baseline	Rdg:	17.100	17.099	Ave	17.100		
Klarity	Rdg:	16.896	16.897	Ave	16.897	CF	0.988
Klarity-G	Rdg:	16.898	16.892	Ave	16.895	CF	0.988

18MV							
Baseline	Rdg:	19.574	19.585	Ave	19.580		
Klarity	Rdg:	19.429	19.415	Ave	19.422	CF	0.992
Klarity-G	Rdg:	19.453	19.445	Ave	19.449	CF	0.993

Table 1: Raw measurements, averages and correction factors for both 6MV and 18MV, for both Klarity and Klarity-G.

We can see that for 6MV, both sheets give the same correction factor, 0.988. For 18MV, Klarity-G seems to attenuate the radiation beam slightly less, with a correction factor of 0.993, compared to 0.992 for Klarity.

Discussion/Conclusion:

It can be seen that under standard setup conditions, Klarity-G attenuates both 6MV and 18MV the same or less than Klarity under standard beam setup.

Prepared Oct 13, 2009



**Michael Weldon
 Medical Physicist
 Department of Radiation Oncology
 James Cancer Hospital
 Columbus, OH**