TG-51 Worksheet D: Electron Beams using Plane-Parallel Chambers

1. Site data

Institution: _____

Physicist: _____

Date: _____

Accel Mfr: _____

Model & serial number: _____

Nominal electron energy/beam identifier: _____ MeV

2. Instrumentation

a. Chamber model: _____

Serial number: _____

Waterproof: yes ☐ no ☐

If no, is waterproofing ≤ 1 mm PMMA or thin latex?: yes ☐ no ☐

b. Electrometer model: _____

Serial number: _____

i.P_{elec}, electrom. corr factor (Sec. VII. B): takes a 1.0 if using cross-calibration.

P_{elec}: _____ C/C or C/rdg

3. Measurement Conditions (point of measurement at d_{ref})

a. Distance SSD: _____ cm

b. Field Size on surface: _____ cm^2

c. Number of monitor units: _____ MU

4. Beam Quality (Sec. VIII. C)

Measure I_{50} by measuring depth-ionization curve and, for cylindrical chambers only, shifting curve upstream by 0.5 r_{cav}

I_{50}

a.i. If $2 \le I_{50} \le 10$ cm: _____ cm

$R_{50} = 1.029 I_{50} - 0.06$: _____ cm

ii. If $I_{50} > 10$ cm: _____ cm

$R_{50} = 1.059 I_{50} - 0.37$: _____ cm

b. Reference depth $d_{ref} = 0.6 R_{50} - 0.1$ _____ cm

5. Determination of $k_{ecal} N_{D,w}^{^{60}Co}$ and $k'_{R_{50}}$ (Sec. X.C)

a. $k_{ecal} N_{D,w}^{^{60}Co}$ Worksheet C - A:8 or B:3): _____ Gy/C

b. **i**. $k'_{R_{50}}$ from figures _____ [Fig 6 or 8]

or **ii**. $k'_{R_{50}}$ from analytic expression for well-guarded plane-parallel chamber

$k'_{R_{50}} = 1.2239 - 0.145 (R_{50})^{0.214}$ _____ [Eq.(20) $2 \le R_{50} \le 20$ cm

TG-51 Worksheet D: Electron Beams using Plane-Parallel Chambers (cont).

6. Temperature /Pressure Correction a(Sec. VII. C)

a. Temperature: _____ °C

b. Pressure: _____ kPa $\left[= \text{mmHg} \cdot \frac{101.33}{760.} \right]$

c. P_{TP}: _____ $\left[\text{Eq.}(10) = \left(\frac{273.2 + 6a}{295.2} \right) \left(\frac{101.33}{6b} \right) \right]$

7. Polarity Correction (Sec. VII. A)

M^{+}_{raw}: _____ C or rdg

M^{-}_{raw}: _____ C or rdg

a. M_{raw} (for polarity of calibration): _____ C or rdg

b. P_{pol}: _____ $\left[\text{Eq.}(9) = \left| \frac{\left(M^{+}_{raw} - M^{-}_{raw} \right)}{2M_{raw}} \right| \right]$

8. P_{ion} measurements (Sec. VII. D. 2)

Operating voltage= V_H: _____ V

Lower voltage V_L: _____ V

M^{H}_{raw}: _____ C or rdg

M^{L}_{raw}: _____ C or rdg

P_{ion} (V_H): _____ $\left[\left(1. - \frac{V_H}{V_L} \right) \Big/ \left(\frac{M^{H}_{raw}}{M^{L}_{raw}} - \frac{V_H}{V_L} \right) \right]$

If P_{ion} > 1.05, another ion chamber should be used.

9. Corrected ion. c. rdg M (Sec. VIII)

$$M = P_{ion} P_{TP} P_{elec} P_{pol} M_{raw} = [8 \cdot 6c \cdot 2bi \cdot 7b \cdot 7a]$$

Fully corrected M (Eq (8)): _____ C

10. **Dose water at reference depth, d_{ref}**

$$D^{Q}_{w} = M k'_{R_{50}} k_{ecal} N^{^{60}Co}_{D,w} = [9 \cdot 5b \cdot 5a] \text{Eq.}(6)$$

a. Dose to water at d_{ref} = _____ Gy

b. Dose/MU at d_{ref} = [10*a*/3*c*] _____ = | Gy/MU |

11. Dose to water / MU at d_{max} (if relevant locally)

a. %dd(d_{ref}) as used clinically: _____

b. Dose / MU at d_{max}= _____ Gy/MU[10*b*/(11*a*/100)]

_____