Worksheet for the determination of the absorbed dose to water in an electron-beam

User: **CLINICA AUNA CHICLAYO** Date: **31-Mar-25**

1. Radiation treatment unit and reference conditions for $D_{w,Q}$ determination

Accelerator: **INFINITY CHICLAYO**

Nominal energy: **9.000** MeV

Nominal dose rate: **600.0** MU min^{-1} Measured R_{50} : **3.746** g cm^{-2}

Reference phantom: obtained from

Reference field size: **10X10** cm x cm Reference SSD: **100** cm

Beam quality, Q ($R_{50,w}$) **3.795** g cm^{-2} Ref. depth $z_{ref,w}$ = 0.6 R_{50} - 0.1: **2.2** g cm^{-2}

2. Ionization chamber and electrometer

Ion. chamber model Serial No.: **268895004**

Chamber wall / window material: **PMMA** thickness: **0.1180** g cm^{-2}

Waterproof sleeve material: thickness: g cm^{-2}

Phantom window material: thickness: g cm^{-2}

Abs. dose-to-water calibration factor [a] **0.083**

Calibration quality Q_0: Calibration depth: **5.0** g cm^{-2}

If Q_0 is electron beam, give $R_{50,w}$: g cm^{-2}

Reference conditions for calibration

P_0: **101.3** kPa T_0: **20.0** °C Rel. humidity: **50** %

Pol. potential V_1: V Calib. polarity:

User polarity:

Calibration laboratory: **LSCD IPEN** Date: **26-Jun-24**

Electrometer model: **PC ELECTROMETER** Serial no.: **270267006**

Calib. separately from chamber: Range setting:

If yes Calibration laboratory: Date:

3. Phantom

Water phantom window material: thickness: g cm^{-2}

Plastic phantom phantom material: density: g cm^{-3}

depth scaling factor c_{pl}: reference depth $z_{ref,pl} = z_{ref} / c_{pl}$: g cm^{-2}

fluence scaling factor : h_{pl} =

4. Dosimetry reading [b] and correction for influence quantities

Uncorrected dosimeter reading at V_1 and user polarity: **12.718**

Corresponding accelerator monitor units: **100** MU

Ratio of dosimeter reading and monitor units: M_1 = **0.1272**

(i) P: **100.6** kPa T: **23.5** °C Rel. humidity: **50** %

1.0189

(ii) Electrometer calibration factor k_{elec} =

(iii) Polarity correction [c] rdg at $+V_1$ M_+ = **12.718** rdg at $-V_1$: M_- = **-12.722**

1.0002

(iv) Recombination correction (two-voltage method)

Polarizing voltages: V_1 (normal) = **-300** V V_2 (reduced) = **-150** V

Readings at each V: M_1 = **12.718** M_2 = **12.671**

Voltage ratio V_1 / V_2 = **2.0000** Read. ratio M_1 / M_2 = **1.0037**

Beam type:

a_0 = 2.3370 a_1 = -3.6360 a_2 = 2.2990

1.0036 [d]

Corrected dosimeter reading at the voltage V_1:

1.3008E-01

5. Absorbed dose to water at the reference depth, z_{ref}

Beam quality correction factor for user quality Q:

If Q_0 is ^{60}Co Table 18 gives **0.922**

If Q_0 is electron beam Table 19 gives

Use derived from

If is derived from series of electron beam calibrations

Calibration laboratory: Date:

9.9549E-03 Gy / MU

6. Absorbed dose rate to water at the depth of dose maximum, z_{max}

Depth of dose maximum: z_{max} = **2.00** g cm^{-2}

Percentage depth-dose at z_{ref} for a 10X10 cm x cm field size:

$PDD(z_{ref}$ = 2.2 g cm^{-2}) = **99.41** %

Absorbed-dose calibration of monitor at z_{max} :

1.0014E-02 Gy / MU

Notes:

300	*-150*	*-300*	***Voltaje nC***
-12.711	*12.665*	*12.717*	
-12.723	*12.673*	*12.718*	
-12.732	*12.674*	*12.719*	

-12.722 *12.671* *12.718*

[a] Note that if Q_0 is ^{60}Co, is denoted $N_{D,w}$

[b] All readings should be checked for leakage and corrected if necessary

[c] M in the denominator of k_{pol} denotes reading at the user polarity. Preferably, each reading in the equation should be the average of the ratios of M (or M_+ or M_-) to the reading of an external monitor, M_{em}.

[d] Check that

0.004
0.004