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: **12.000** MeV

Nominal dose rate: **600.0** MU min^{-1} Measured R_{50} : **4.740** g cm^{-2}

Reference phantom: obtained from

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

Beam quality, Q ($R_{50,w}$) **4.817** g cm^{-2} Ref. depth $z_{ref,w}$ = 0.6 R_{50} - 0.1: **2.8** 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: **12.788**

Corresponding accelerator monitor units: **100** MU

Ratio of dosimeter reading and monitor units: M_1 = **0.1279**

(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_+ = **12.788** rdg at $-V_1$: M_- = **-12.794**

1.0002

Clínicas auna | Sede Chiclayo
JOSÉ VIDAL VALLADOLID SALAZAR
FÍSICO MÉDICO
LIC. IND. IPEN/OTAN N° 0922-22

Clínicas auna/Sede Chiclayo
LUIS ENRIQUE QUISPE AYME
Dosimetrista en Teleterapia.
Lic. IPEN : 0268-20

Clínicas auna | Sede Chiclayo
RICARDO PALMA ESPARZA
FÍSICO MÉDICO
LIC. IND. IPEN/OTAN N° 8970-22

(iv) Recombination correction (two-voltage method)

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

Readings at each V: M_1 = **12.788** M_2 = **12.746**

Voltage ratio V_1 / V_2 = **2.0000** Read. ratio M_1 / M_2 = **1.0033**

Beam type:

a_0 = 2.3370 a_1 = -3.6360 a_2 = 2.2990

1.0032 d

Corrected dosimeter reading at the voltage V_1 :

1.3075E-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 **0.913**

If Q_0 is electron beam Table 19 gives

Use derived from

If is derived from series of electron beam calibrations

Calibration laboratory: Date:

9.9134E-03 Gy / MU

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

Depth of dose maximum: z_{max} = **2.40** g cm^{-2}

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

$PDD(z_{ref}$ = 2.8 g cm^{-2}) = **99.24** %

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

9.9893E-03 Gy / MU

Notes:

300	*-150*	*-300*	***Voltaje nC***
-12.783	*12.738*	*12.776*	
-12.8	*12.748*	*12.792*	
-12.8	*12.751*	*12.797*	

-12.794 *12.746* *12.788*

Clínicas auna | Sede Chiclayo
JOSÉ VIDAL VALLADOLID SALAZAR
FÍSICO MÉDICO
LIC. IND. IPEN/OTAN N° 0922-22

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LUIS ENRIQUE QUISPE AYME
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RICARDO PALMA ESPARZA
FÍSICO MÉDICO
LIC. IND. IPEN/OTAN N° 8970-22

[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

0.003
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Clínicas auna | Sede Chiclayo
JOSÉ VIDAL VALLADOLID SALAZAR
FÍSICO MÉDICO
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