Worksheet for the determination of the absorbed dose to water in a high-energy photon-beam

User: **CLINICA AUNA CHICLAYO** Date: **31/03/2025**

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

Accelerator: **Infinity Chiclayo**

Nominal Acc Potential: **6** MV

Nominal dose rate: **600.0** MU min^{-1} Beam quality, Q ($TPR_{20,10}$) **0.6825**

Reference phantom: **water** Set up:

Reference field size: **10** cm x cm Reference distance: **100** cm

Reference depth z_{ref} : **10.0** g cm^{-2}

2. Ionization chamber and electrometer

Ion. chamber model Serial No.: **270315003**

Chamber wall material: **PMMA** thickness: **0.078** g cm^{-2}

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

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

Abs. dose-to-water calibration factor [a] **0.286**

Calibration quality Q_0: Calibration depth: **5** g cm^{-2}

If Q_0 is photons, give $TPR_{20,10}$:

Reference conditions for calibration

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

Polarizing potential V_1: V

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

Uncorrected dosimeter reading at V_1 and user polarity: **2.344**

Corresponding accelerator monitor units: **100** MU

Ratio of dosimeter reading and monitor units: M_1 = **0.0234**

(i) P: **100.7** kPa T: **23.5** °C Rel. humidity: **50** %

1.018

(ii) Electrometer calibration factor k_{elec} :

(iii) Polarity correction [a] rdg at $+V_1$: M_+ = **2.145** rdg at $-V_1$: M_- = **2.162**

1.004

(iv) Recombination correction (two-voltage method)

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

Readings at each [e] V: M_1 = **2.145** M_2 = **2.137**

Beam type:

Voltage ratio V_1 / V_2 = **2.0000** Ratio of read. M_1 / M_2 = **1.004**

a_0 = 2.3370 a_1 = -3.6360 a_2 = 2.2990

1.004 [f,g]

6

Corrected dosimeter reading at the voltage V_1:

2.4047E-02

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

Beam quality corr. factor for user quality Q: **0.9898**

taken from

6.8069E-03 Gy / MU

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

Depth of dose maximum: z_{max} = **14.50** g cm^{-2}

(i) SSD set-up

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

$PDD(z_{ref}$ = 10.0 g cm^{-2}) = **67.43** %

Absorbed-dose rate at z_{max} :

1.0095E-02 Gy / MU

(ii) SAD set-up

TMR at z_{ref} for a 10 cm x 10 cm field size:

$TMR(z_{ref}$ = 10.0 g cm^{-2}) =

Absorbed-dose rate at z_{max} :

Gy / MU

Notes:

300	-150	-300
-2.163	2.136	2.145
-2.16	2.137	2.146
-2.162	2.138	2.144

VOLTAJES (nC)

-2.162	2.137	2.145

[a] Note that if Q_0 is ^{60}Co, $N_{D,w,Qo}$ is denoted $N_{D,w}$
[b] All readings should be checked for leakage and corrected if necessary
[d] 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}.
[e] Strictly, readings should be corrected for polarity effect (average with both polarities). Preferably, each reading in the equation should be the average of the ratios of M_1 or M_2 to the reading of an external monitor, M_{em}.
[f] It is assumed that the calibration laboratory has performed a recombination correction. Otherwise the factor should be used instead of k_s. When Q_0 is ^{60}Co, $k_{s,Qo}$ (at the calibration laboratory) will normally be close to unity and the effect of not using this equation will be negligible in most cases.

[g] Check that

0.004

0.004