

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: **100** cm
 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 ^d rdg at $+V_1$: $M_+ =$ **2.145** rdg at $-V_1$: $M_- =$ **2.162**

1.004


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(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

$PDD(z_{ref} = 10.0 \text{ g cm}^{-2})$ = **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:

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

Absorbed-dose rate at z_{max} :

Gy / MU

Notes:

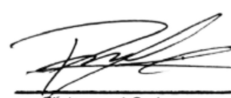
300	-150	-300
-2.163	2.136	2.145
-2.16	2.137	2.146
-2.162	2.138	2.144

VOLTAJES (nC)

-2.162 2.137 2.145


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- ^a Note that if Q_0 is ^{60}Co , N_{D,w,Q_0} 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,Q_0} (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


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