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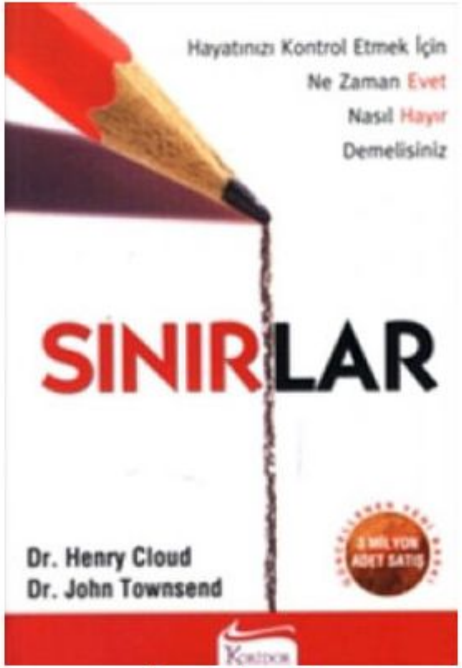

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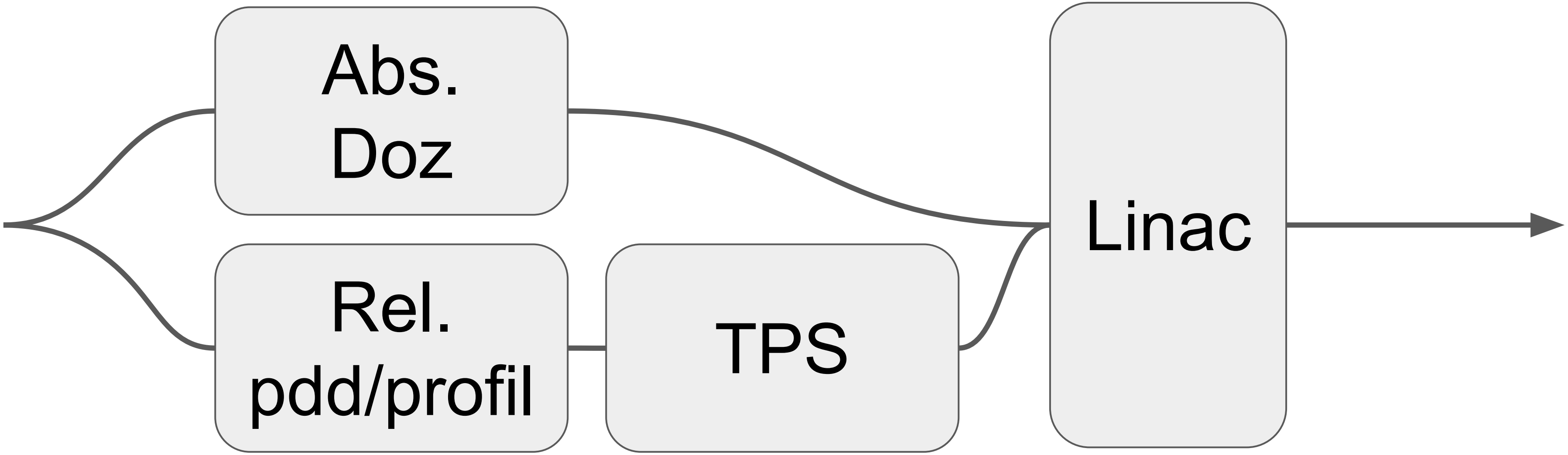

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iaea trs 398

Tümü Haberler Görseller Haritalar Videolar Daha fazla Ayarlar Araçlar

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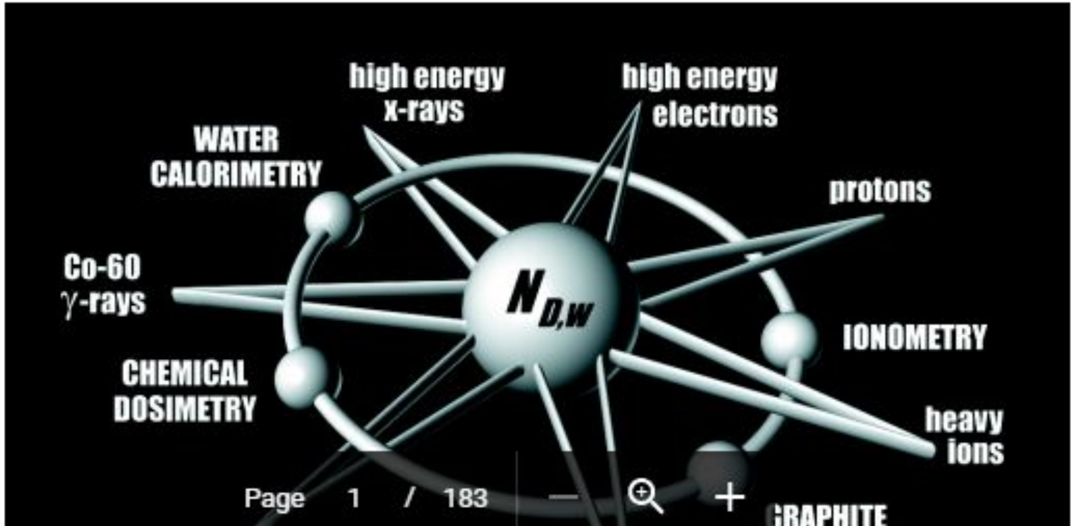
[PDF] IAEA TRS-398 Absorbed Dose Determination in External Beam ...
www-naweb.iaea.org/nahu/DMRP/documents/CoP_V12_2006-06-05.pdf
5 Haz 2006 - **IAEA TRS-398**. Absorbed Dose Determination in. External Beam Radiotherapy: An International Code of Practice for Dosimetry based on Standards of Absorbed Dose to Water. Pedro Andreo, Dosimetry and Medical Radiation Physics Section, IAEA. David T Burns, Bureau International des Poids et ...

[PDF] AAPM's TG-51 protocol for clinical reference dosimetry of high-energ...
https://aapm.org/pubs/reports/RPT_67.pdf ▾ Bu sayfanın çevirisini yap
yazan: PR Almond - 1999 - Alıntılanma sayısı: 1104 - İlgili makaleler
A protocol is prescribed for clinical reference dosimetry of external beam radiation therapy using photon beams with nominal energies between 60Co and 50 MV and electron beams with nominal energies between 4 and 50 MeV. The protocol was written by **Task Group 51 TG-51** of the. Radiation Therapy Committee of the ...

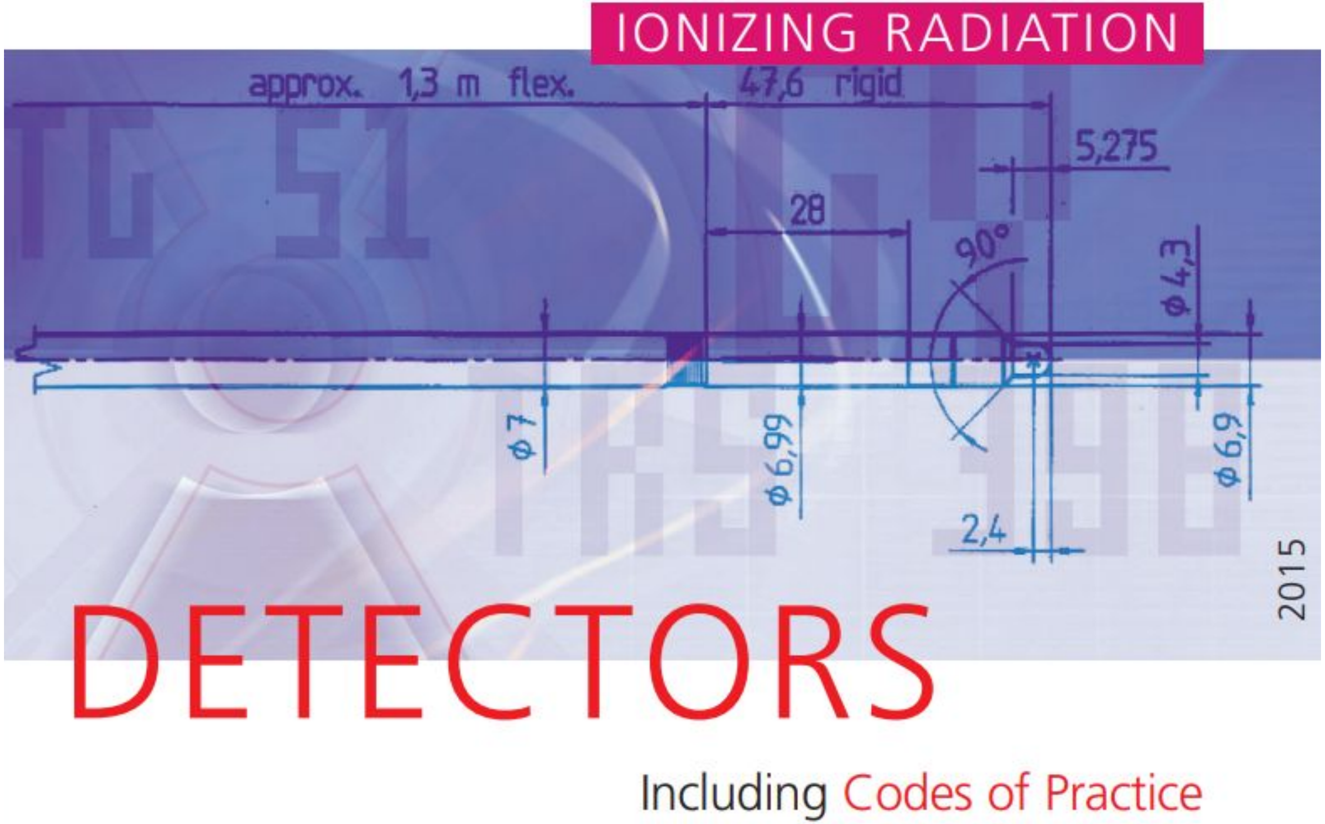
Reference Dosimetry according to the New German Protocol DIN ...
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3265153/ ▾ Bu sayfanın çevirisini yap
yazan: A Zakaria - 2011 - Alıntılanma sayısı: 3 - İlgili makaleler
1 Nis 2011 - The preceding **DIN** 6800-2 (1997) **protocol** has been revised by a **German** task group and its latest version was published in March 2008 as the national standard dosimetry **protocol DIN** 6800-2 (2008 March). Since then, in **Germany** the determination of absorbed dose to water for high-energy photon and ...
Abstract · INTRODUCTION · MATERIALS AND METHODS

IAEA TRS-398

Absorbed Dose Determination in External Beam Radiotherapy: An International Code of Practice for Dosimetry based on Standards of Absorbed Dose to Water



Diger Kaynaklar - PTW



4 High Energy Photon Beams

4.1 IAEA TRS 398

$$D_w = k_Q \cdot N_w \cdot M \qquad (4\text{-}1)$$

D_w = absorbed dose to water

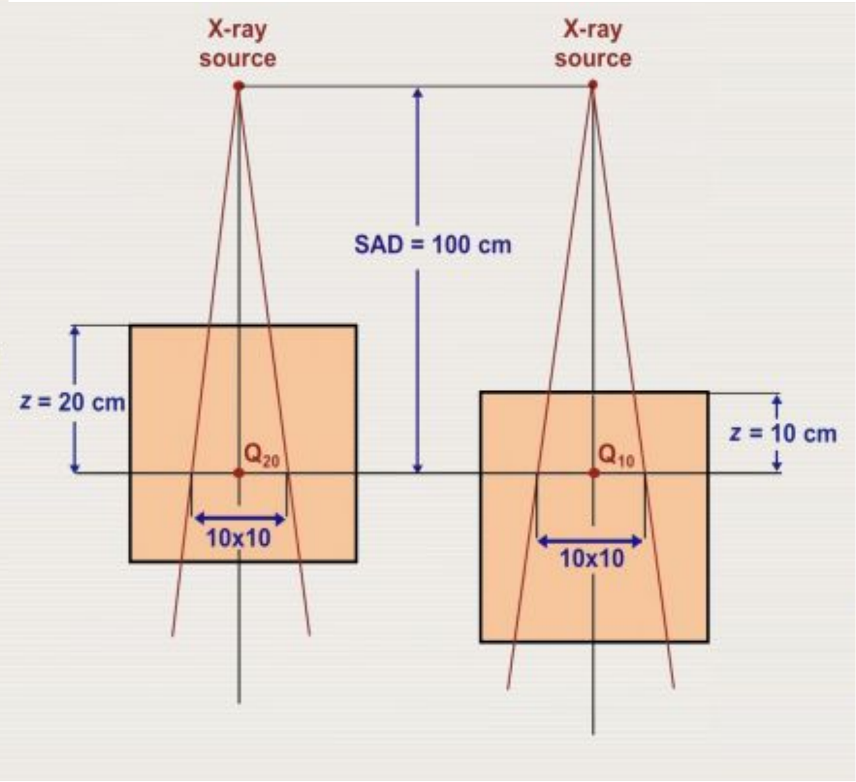
k_Q = energy dependent correction factor, see Table 4

N_w = calibration factor for absorbed dose to water for ^{60}Co

M = corrected reading of the dosemeter, see chapter 2.1

Influence Quantity	**Reference Condition**
Phantom material	water
Chamber	cylindrical
Depth	10 cm (or 5 cm) for $TPR_{20,10} < 0.7$ 10 cm for $TPR_{20,10} \geq 0.7$
Chamber positioning	chamber axis
SSD / SDD	100 cm
Field size	10 cm x 10 cm SSD setup: field size defined at surface SDD setup: field size defined in detector plane

4 High Energy Photon Beams



NOTE

In case $TPR_{20,10}$ values are not available, they can be determined from [IAEA 398]

$$TPR_{20,10} = 1.2661 \cdot PDD_{20,10} - 0.0595$$

where $PDD_{20,10}$ is the ratio of the percent depth doses at 20 cm and 10 cm depth, respectively. The PDD values must be measured at $SSD = 100$ cm with a field size of 10 cm x 10 cm at the phantom surface.

For beam quality specification measurements with a cylindrical chamber, the chamber axis should be positioned at the measuring depth. It is allowed to use a plane-parallel chamber to determine beam quality.

2.1 Corrected reading *M*

All formulae in this document used for the determination of absorbed dose to water D_w refer to a dosemeter reading M which is corrected for the influence quantities given in chapters 2.4 - 2.7. The reader must compute the corrected reading M from the uncorrected reading M_{uncorr} and the reading without irradiation M_0 by

$$M = (M_{uncorr} - M_0) \cdot k_{elec} \cdot k_{TP} \cdot k_S \cdot k_{pol} \cdot k_h \qquad (2\text{-}1)$$

The correction factor k_{elec} corresponds to the calibration factor of the electrometer if the electrometer readout is in terms of charge or current [IAEA 398, AAPM 51]. If the electrometer and the ionization chamber are calibrated together and the readout is in terms of Gy or Gy/s, a value of unity is to be used for k_{elec} .

2.4 Air density

2.4.1 The *T&P* method

Open (vented) ionization chambers must be corrected for air density according to [IAEA 398]

$$k_{TP} = \frac{P_0 \cdot (273.2 + T)}{P \cdot (273.2 + T_0)} \qquad (2\text{-}3)$$

T and P are the temperature and pressure in the measuring environment, the reference values are $P_0 = 101.3\,\text{kPa}$ and $T_0 = 20\,^\circ\text{C}$. Note that in some countries the reference temperature given in the calibration certificate is $22\,^\circ\text{C}$ instead of $20\,^\circ\text{C}$. AAPM TG-51 uses a value of $22\,^\circ\text{C}$ as reference and a value of $P_0 = 101.33\,\text{kPa}$ for the reference pressure.

2.5 Ion recombination

2.5.1 The two-voltage method

Correction factors for insufficient charge collection in the measuring volume of the ionization chamber can be measured using the two-voltage method [IAEA 398, AAPM 51]. They depend on the geometry of the ionization chamber and on the dose rate or dose per pulse, respectively.

For pulsed or pulsed-scanned radiation the correction factor k_S can be determined from [IAEA 398]

$$k_S = \frac{M_1 / M_2 - 1}{V_1 / V_2 - 1} + 1 \qquad (2\text{-}5)$$

where M_1 and M_2 are the readings at two voltages V_1 and V_2. V_1 is the normally used voltage, and V_2 is a voltage reduced by a factor of at least 3. Formula (2-5) is valid for $k_S < 1.03$. If $k_S \geq 1.03$ refer to chapter 2.5.2.

2.6 Polarity effect

The polarity effect depends on the radiation beam quality Q. The correction factor can be determined by [IAEA 398, DIN 6800-2]

$$k_{pol} = \frac{\left[(M_{+} + M_{-})/M_{+}\right]_{Q}}{\left[(M_{+} + M_{-})/M_{+}\right]_{Co}} \quad (2\text{-}8)$$

M_{+} = positive reading obtained with the usual polarity

M_{-} = positive reading obtained with the opposite polarity

The index Co refers to the readings obtained in a ^{60}Co beam during calibration. This value is normally not given in the calibration certificate. If ^{60}Co is available the user should measure this value, if not, this value should be requested from the calibration laboratory [IAEA 398, AAPM 51] or should be measured with the lowest available photon energy [DIN 6800-2]. If the effect of this value is smaller than 0.3 % for 6 MV photon beams (or lower energy), the denominator in formula 2-8 can be set to 2, otherwise it must be taken into account [AAPM 51].

2.7 Humidity

Usually the ^{60}Co calibration factor refers to a relative humidity of 50 %; in this case k_h is taken as 1.000.

Diger Kaynaklar - iBA

Dosimetry

Table of Contents

Absolute Dose Measurements in External Beam Radiotherapy

Application of Codes of Practice Based on Standards of Absorbed Dose to Water

2.1. IAEA TRS 398

2.1.1. General

This code of practice applies to clinical photon beams generated by electrons with energies in the range from 1 MeV to 50 MeV.

The water phantom should extend to at least 5 cm beyond all four sides of the field measured, at the plane of the chamber, and to at least 5 $g \cdot cm^{-2}$ beyond the maximum measurement depth.

Cylindrical ionization chambers are recommended for absolute dosimetry in high-energy photon beams. The use of plane-parallel chambers is limited to those that are calibrated in beams of the same quality as the quality measured, in reference conditions.

Either SSD or SAD setup may be used, with the field size of 10 cm × 10 cm.

2.1.2. Beam quality determination

The beam quality is specified by tissue-phantom ratio $TPR_{20,10}$, which is the ratio of the absorbed doses at depths of 20 cm and 10 cm, both measured in source-to-chamber distance of 100 cm and a field of 10 cm × 10 cm at the plane of the chamber. If $TPR_{20,10}$ values are not available, they can be determined from:

$$TPR_{20,10} = 1.2661\, PDD_{20,10} - 0.0595 \qquad \textit{Equation 1}$$

where $PDD_{20,10}$ is the ratio of the percentage depth doses at 20 cm and at 10 cm. The *PDD* values must be measured at *SSD* = 100 cm with a field size of 10 cm × 10 cm at the phantom surface.

2.1.3. Chamber positioning

Reference point (for cylindrical chambers on the chamber axis at the centre of the cavity volume, for plane-parallel chambers on the inner surface of the entrance window, at its centre) should be positioned at the reference depth $z_{ref} = 10\ \mathrm{g \cdot cm^{-2}}$.

2.1.4. Ionization chamber reading

The dosimeter reading M_Q at beam quality Q is corrected for influence quantities: temperature and pressure, electrometer calibration, polarity effect and ion recombination:

$$M_Q = (M_{un} - M_0) \cdot k_{TP} \cdot k_{elec} \cdot k_{pol} \cdot k_s, \qquad \textit{Equation 2}$$

where M_{un} and M_0 are the uncorrected readings with and without radiation and k_{TP}, k_{elec}, k_{pol}, and k_s are correction factors described in chapters 2.1.5 - 2.1.8.

2.1.5. Pressure, temperature and humidity correction

$$k_{TP} = \frac{273.2 + T}{273.2 + T_0} \cdot \frac{P_0}{P}. \qquad \text{Equation 3}$$

P is the chamber cavity air pressure (i.e. ambient pressure not corrected to sea level) and T is the chamber cavity temperature (water temperature near the chamber) at the time of measurement, in °C; P_0 and T_0 are the reference values given in the chamber calibration certificate (typically 101.3 kPa and 20 °C).

Typically, the calibration coefficient is referred to a relative humidity of 50 %. In such case, and if ambient humidity at the time of measurement is between 20 % and 80 %, no correction must be applied. If the calibration factor is referred to dry air, an additional correction factor of $k_h = 0.997$ should be applied.

2.1.6. Electrometer calibration

If the ionization chamber is calibrated together with the electrometer, a combined calibration coefficient (typically in $Gy \cdot nC^{-1}$ or in $Gy \cdot rdg^{-1}$) is given and the electrometer calibration factor equals unity: $k_{elec} = 1$.

If the electrometer is calibrated separately, either a calibration coefficient in units of $nC \cdot rdg^{-1}$, or (if the electrometer readout is in terms of charge) a dimensionless electrometer factor k_{elec} is given.

2.1.7. Polarity effect

Although in most high-energy photon beams the polarity effect is negligible, it should be checked for each beam quality–chamber combination in use. k_{pol} corrects for unequal chamber reading when using chamber operating potential of opposite polarities.

$$k_{pol} = \frac{|M_+| + |M_-|}{2M}, \qquad \textit{Equation 4}$$

where M_+ and M_- are the uncorrected readings obtained at positive and at negative polarity, and M is the reading obtained at the polarity used routinely (i.e. either M_+ or M_-). It is important to allow enough time for chamber-electrometer chain stabilization after any polarity change.

2.1.7. Polarity effect

If there is a significant polarity effect at the chamber calibration, the calibration beam polarity correction (either stated by the calibration laboratory or measured in a beam of the same quality) must be considered in the polarity effect correction calculation:

$$k'_{\mathrm{pol}} = \frac{\left(k_{\mathrm{pol}}\right)_{Q}}{\left(k_{\mathrm{pol}}\right)_{Q_0}}, \qquad \textit{Equation 5}$$

where $\left(k_{\mathrm{pol}}\right)_{Q}$ is the polarity effect correction measured at the beam quality Q and $\left(k_{\mathrm{pol}}\right)_{Q_0}$ is the polarity effect correction at calibration beam quality.

2.1.8. Ion recombination

In pulsed beams, the ion recombination effect is usually significant. The correction factor at operating potential V_1 can be obtained from

$$k_s = a_0 + a_1 \frac{M_1}{M_2} + a_2 \left(\frac{M_1}{M_2} \right)^2, \qquad \textit{Equation 6}$$

where a_0, a_1, a_2 are constants given in Table 1, and M_1, M_2 are the chamber readings at operating potentials V_1 and V_2, respectively. M_1 and M_2 values should be corrected for polarity effect.

Table 1. Quadratic coefficients for the calculation of k_s [TRS398].

	Pulsed			Pulsed scanned		
V_1 / V_2	a_0	a_1	a_2	a_0	a_1	a_2
2.0	2.337	-3.636	2.299	4.711	-8.242	4.533
2.5	1.474	-1.587	1.114	2.719	-3.977	2.261
3.0	1.198	-0.875	0.677	2.001	-2.402	1.404
3.5	1.080	-0.542	0.463	1.665	-1.647	0.984
4.0	1.022	-0.363	0.341	1.468	-1.200	0.734
5.0	0.975	-0.188	0.214	1.279	-0.750	0.474

2.1.8. Ion recombination

If the ion recombination effect in the calibration beam has been significant and the calibration coefficient has not been corrected for it, this correction has to be applied by user when calculating ion recombination correction:

$$k_s' = \frac{(k_s)_Q}{(k_s)_{Q_0}}, \qquad \textit{Equation 7}$$

where $(k_s)_Q$ is the ion recombination correction measured at the beam quality Q and $(k_s)_{Q_0}$ is the ion recombination correction at the calibration.

2.1.9. Beam quality correction

Beam quality correction factor k_{Q,Q_0} must be applied if the calibration has been performed in a beam quality Q_0 that differs from the beam quality measured. When the calibration quality is Co-60, which is the most typical case, the correction factor is denoted as k_Q. k_Q factors, as a function of $TPR_{20,10}$ (see chapter 2.1.2), for cylindrical chambers, are listed in Table 2.

2.1.10. Absorbed dose determination

Under reference conditions (see chapters 2.1.1 and 2.1.3), the absorbed dose to water $D_{w,Q}$ in a high-energy photon beam of quality Q is given by

$$D_{w,Q} = M_Q \cdot N_{D,w,Q_0} \cdot k_{Q,Q_0}, \qquad \textit{Equation 8}$$

where M_Q is the dosimeter reading corrected for influence quantities (see chapter 2.1.4), N_{D,w,Q_0} is the calibration coefficient in terms of absorbed dose to water at the reference quality Q_0, and k_{Q,Q_0} is the beam quality correction factor (see chapter 2.1.9).

trs 398 sunum

Tümü Görseller Videolar Haritalar Haberler Daha fazla Ayarlar Araçlar

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[PDF] TRS 398 ve Yuksek Enerjili Fotonlarda Doz ... - medikal fizik derneği

medikalfizik.org/.../TRS_398_ve_Yuksek_Enerjili_Fotonlarda_Doz_Kalibrasyonu%2...

TRS 277 no'lu protokoldeki belirsizlikler elektronlar için % 3.7, yüksek enerjili X ışınları için % 3.2,. Co-60 için ise % 2.5'dir.Radyoterapi geliştikçe bu belirsizlikleri minimuma indirilerek daha büyük bir kesinlikle soğrulan dozu bulmanın yolları araştırılmaya başlanmış, böylece 2000 yılında. **TRS 398** numaralı protokol.

[PDF] TRS 398 ve Elektron Enerjilerinde Doz ... - medikal fizik derneği

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TRS 398 ve Elektron. Enerjilerinde Doz Kalibrasyonu. Alper ÖZSEVEN, M.Sc. Süleyman Demirel Üniversitesi Tıp Fakültesi. Radyasyon Onkolojisi Ana Bilim Dalı. XIV. Medikal Fizik Kongresi, Kasım 2013, Antalya. 1 ...

[PDF] Slayt 1

https://www.trod.org.tr/sunumlar/yuksek_enerjili_fotonlar_icin_trs_398_ek1.pdf

Bu yüzden olayları daha elektrometre ve iyon odasına özgü yaparak belirsizliği azaltan **TRS-398** nolu protokol IAEA tarafından geliştirilmiştir. Bu protokolde iyon odaları suda soğrulan doz cinsinden kalibre edilmektedir. Kısaca, bütün dozimetre protokolleri sudaki soğrulan dozun belirlenmesini amaçlar. Bu nedenle bu tip ...

Katı - Su Fantomları

Derinlik

= 10 g/cm2

= 10 cm x 1.000 g/cm3 (su)

= 9.6 cm x 1.045 g/cm3 (rw3)

Katı - Su Fantomları

Absorbed dose to water reference dosimetry using solid phantoms in the context of absorbed-dose protocols

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(Received 1 February 2005; revised 9 July 2005; accepted for publication 11 July 2005; published 26 August 2005)

For reasons of phantom material reproducibility, the absorbed dose protocols of the American Association of Physicists in Medicine (AAPM) (TG-51) and the International Atomic Energy Agency (IAEA) (TRS-398) have made the use of liquid water as a phantom material for reference dosimetry mandatory. In this work we provide a formal framework for the measurement of absorbed dose to water using ionization chambers calibrated in terms of absorbed dose to water but irradiated in solid phantoms. Such a framework is useful when there is a desire to put dose measurements using solid phantoms on an absolute basis. Putting solid phantom measurements on an absolute basis has distinct advantages in verification measurements and quality assurance. We introduce a phantom dose conversion factor that converts a measurement made in a solid phantom and analyzed using an absorbed dose calibration protocol into absorbed dose to water under reference conditions. We provide techniques to measure and calculate the dose transfer from solid

Katı - Su Fantomları

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TECHNICAL PAPER

Determination of RW3-to-water mass-energy absorption coefficient ratio for absolute dosimetry

Katrina Y. T. Seet · Peta M. Hanlon ·
Paul H. Charles

Teşekkürler

emin