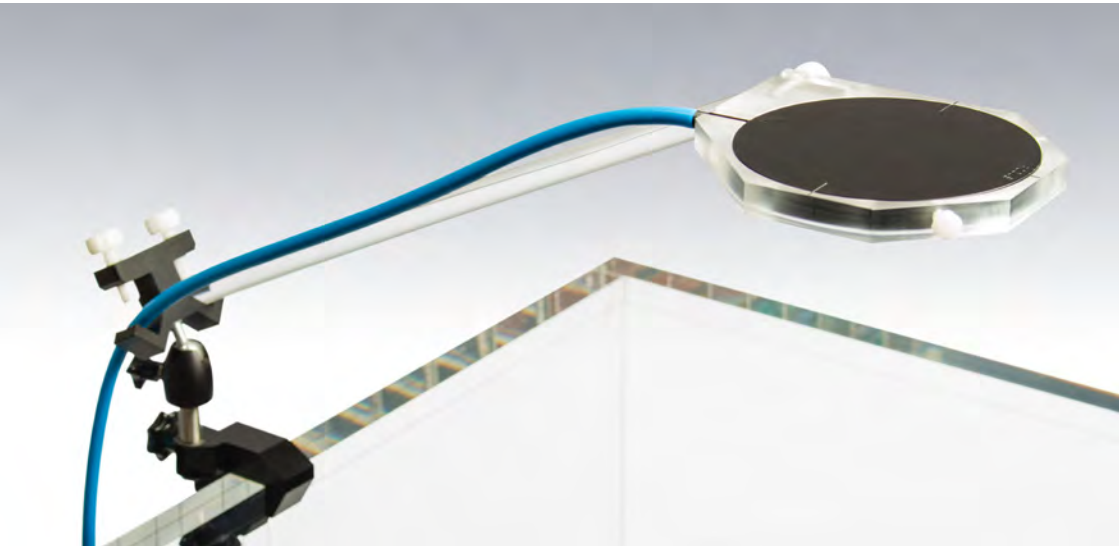
Simply faster. Simply more reliable.



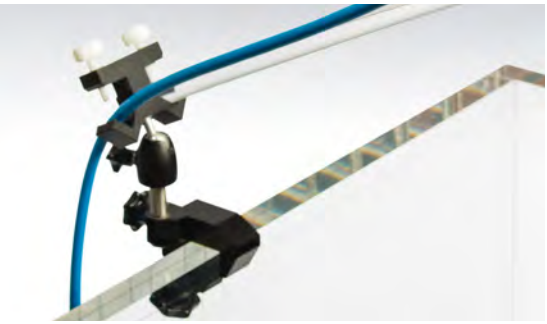
T-REF Chamber

Reference Detector for Small Fields

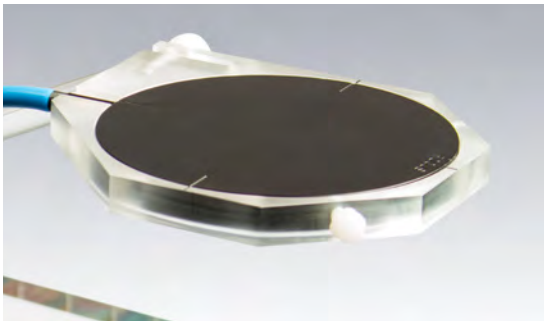
PTW

T-REF Chamber

The New Reference Detector for Small Field Relative Dosimetry



Easy to mount on edge of water tank



Large diameter to avoid positioning problems

When measurement time and accuracy matter, T-REF is the answer.

With the new T-REF chamber, small field PDD and profile measurements can be performed much faster and more reliably.

As a thin, plane-parallel transmission chamber that shows a high nominal response and causes no measurable perturbation of the beam, the new T-REF chamber has been designed to avoid positioning problems encountered when using a reference detector for small field dosimetry.

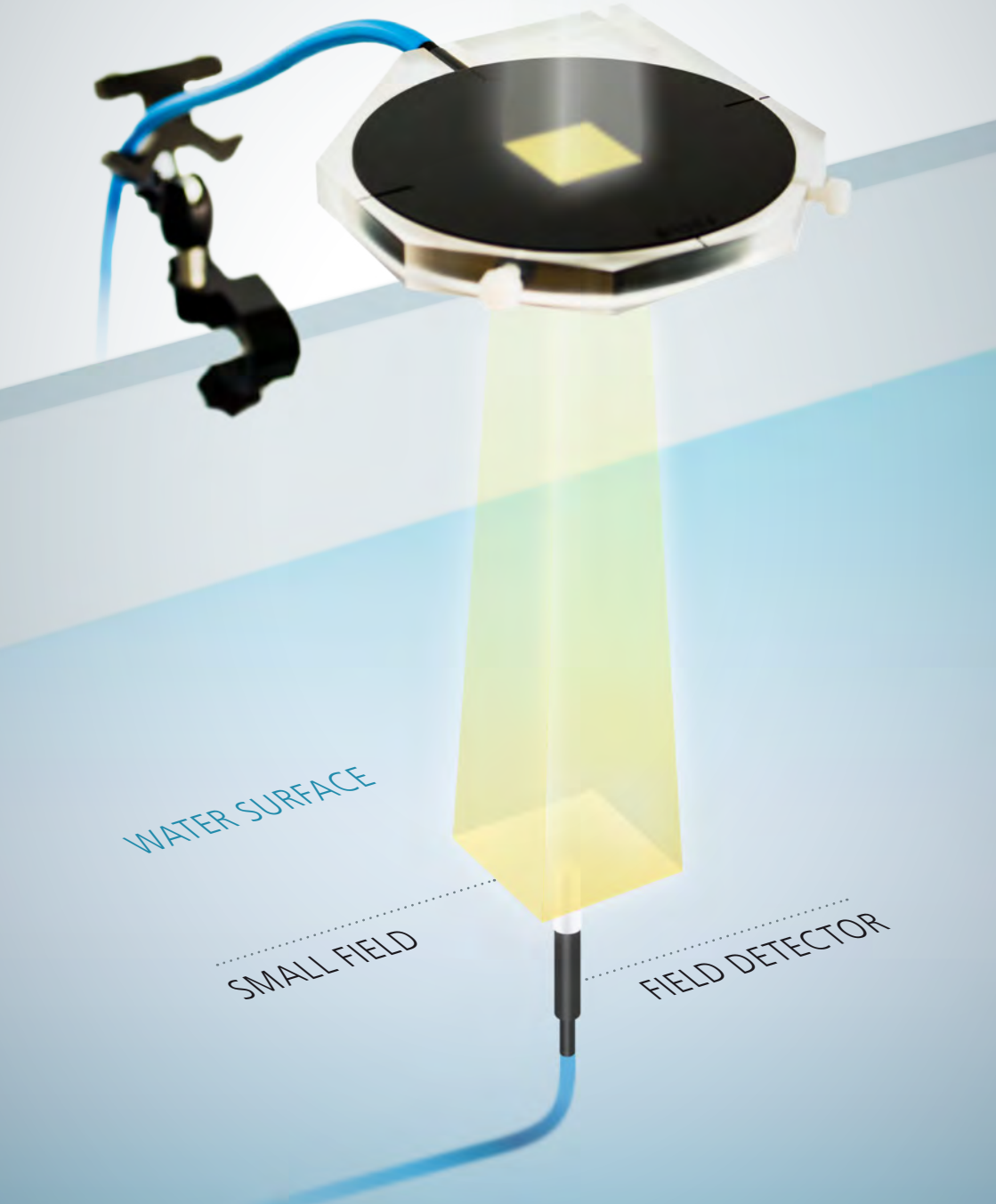
Mounted on the edge of the water tank rather than on a tray connected to the linac head, it ensures precise alignment of the reference detector at any fixed position above 20 cm detector surface distance without perturbing the radiation field or shadowing the field detector.

Further Information: D. Ceska: Reference detector for small fields – the T-REF chamber, Medical Physics International Journal, published on www.mpijournal.org April 2016

Highlights

- Thin-window transmission chamber with large collecting volume (10.5 cm^3)
- Very low total area density of 206 mg/cm^2
- No measurable perturbation of the beam
- Plug and measure – no repositioning required
- High and very stable signal
- No influence by vibrations
- Excellent signal-to-noise ratio (SNR)
- No contact to linac head – no accessory tray needed, no problems with temperature drifts
- Fast and easy to mount
- Covers entire range of use for small field sizes

Provides reference signal while the beam transmits through the chamber.



Very stable signal

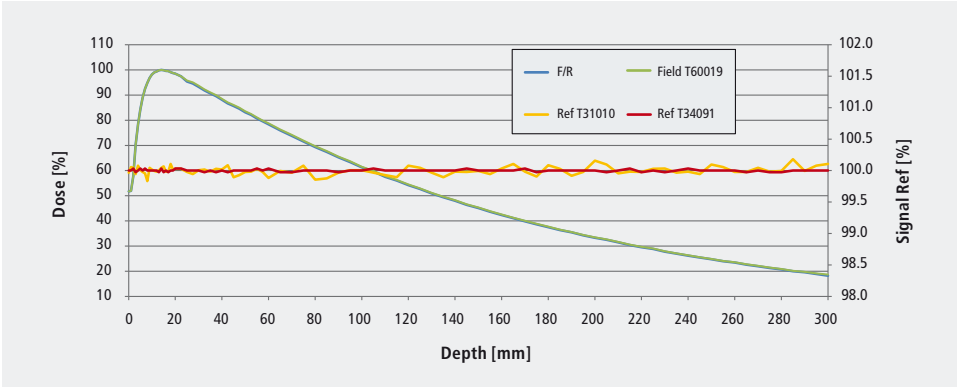


Fig. 1: Reference signal of a 4 cm x 4 cm field, 6 MV Varian Truebeam, measured with a Semiflex 0.125 cm³ (T31010) and the T-REF chamber (T34091).

There are different techniques to measure the reference signal. One is to place a Semiflex 0.125 cm³ in the corner of the field. When comparing this technique with the transmission measurement of the reference signal by the T-REF chamber, the differences can be clearly seen: The signal of the T-REF chamber is more stable (see Fig. 1). Furthermore vibrations would not influence the reference signal.

Perturbation free

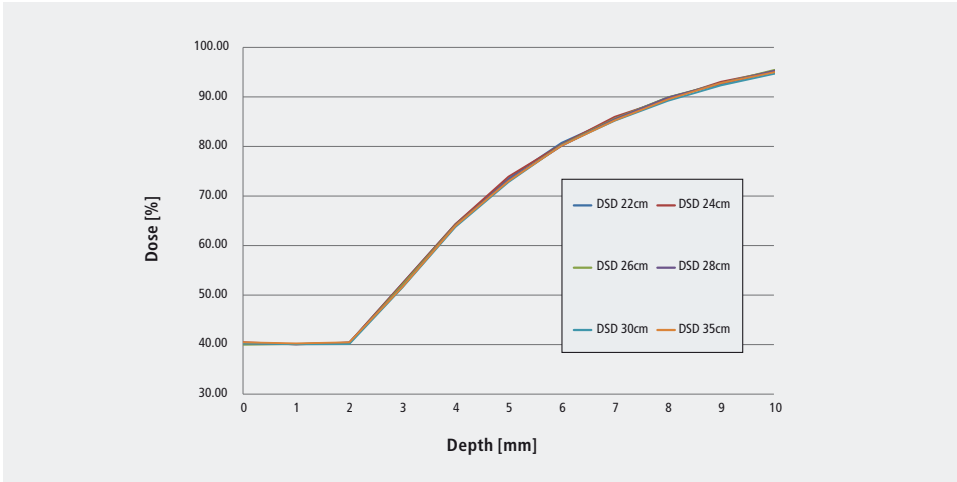


Fig. 2: First few millimeters of percentage depth dose curves of a 2 cm x 2 cm field, 6 MV Elekta Synergy, field detector Diode E (T60017), reference detector T-REF chamber (T34091), different distances from 22 cm to 35 cm.

Above 20 cm detector surface dictance (DSD) no influence like partial build up effect, scattered radiation or beam hardening is observable in the data (see Fig. 2). As a result, the T-REF chamber can be placed at any position above 20 cm DSD.

Specifications

T-REF Chamber Type 34091

Type of product	vented plane-parallel ionization chamber
Application	relative dosimetry in high-energy photon beams
Nominal sensitive volume	10.5 cm^3
Design	waterproof, vented, guarded, perturbation-free
Reference point	inside of entrance window, center
Direction of incidence	perpendicular to the entrance window, see label "Focus"
Nominal response	325 nC/Gy (at ^{60}Co free in air)
Chamber voltage	400 V nominal ± 500 V maximal
Polarity effect	≤ ± 1 %
Leakage current	≤ ± 100 fA
Cable leakage	≤ 1 pC/(Gy·cm)

Materials and measures

Total area density	206 mg/cm^2
Water-equivalent window thickness	2.06 mm for photons
Transmission	> 99 % for energies ≥ 6 MV
Dimension of sensitive volume	radius 40.8 mm, depth 2 mm

Ion collection efficiency at nominal voltage

Ion collection time	67 µs
Max. dose rate for	
≥ 99.5 % saturation	21 Gy/s
≥ 99.0 % saturation	42 Gy/s
Max. dose per pulse for	
≥ 99.5 % saturation	0.9 mGy
≥ 99.0 % saturation	1.8 mGy

Useful ranges

Chamber voltage	± (300 ... 500) V
Radiation quality	^{60}Co ... 25 MV photons
Max. field size in 20 cm distance to water surface	(5 x 5) cm^2
Temperature	(10 ... 40) °C (50 ... 104) °F
Humidity	(10 ... 80) %, max 20 g/m^3
Air pressure	(700 ... 1060) hPa

Ordering Information

TN34091	T-REF chamber, connecting system BNT, including holder
TW34091	T-REF chamber, connecting system TNC, including holder
TM34091	T-REF chamber, connecting system M, including holder

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D954.139.00/01 2017-05

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