

Delta^{4PT}

Plastic Water[®] version



Delta^{4PT} Plastic Water version offers:

- Consistent water equivalent QA from calibration to plan verification
- Immediate plan verification
- Highest accuracy in dose determination
- Water equivalence in diagnostic and therapeutic energies

Water equivalent QA

Pre-treatment verification using phantoms with non-water equivalent material is widely used in clinical practice. However, some dose calculation algorithms require extra attention when using these materials. Special consideration must be taken into account regarding:

- Density scaling artifacts ^[1]
- Non-appropriate scatter from material with density $>1 \text{ g/cm}^3$ ^[2,3]
- Absence of phantom material as a separate entry in the HU-electron density conversion table ^[4]

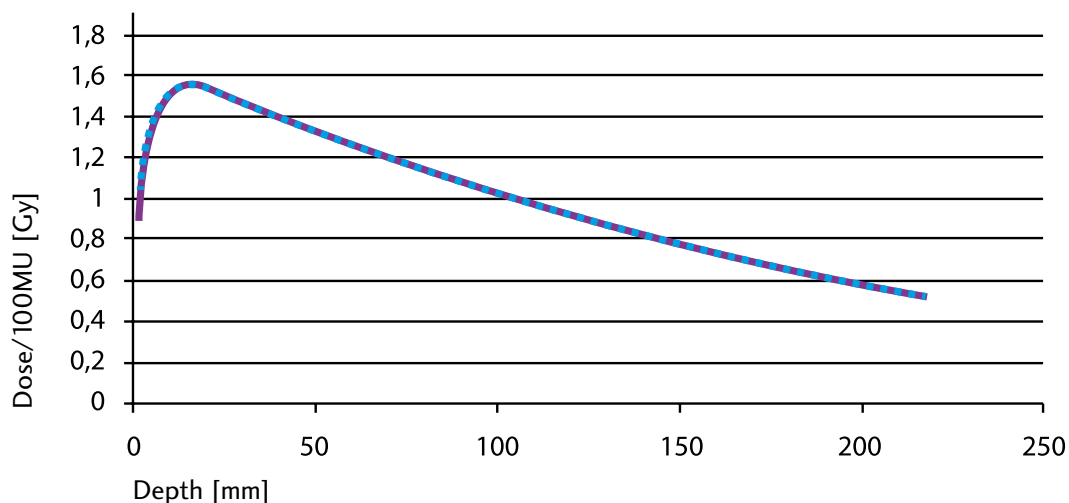
These factors may contribute to reduced accuracy in the dose determination in the phantom. Using a water equivalent phantom material eliminates these uncertainties and also provides consistency maintained in QA from calibration to patient QA.

The Delta^{4PT} phantom is available with Plastic Water[®] DT material. The material has been chosen because of its capability to simulate water within a wide energy range ^[5].

For clinics who base all dosimetry on water and want to stay consistent, the Delta^{4PT} Plastic Water version is the system of choice ^[6].



— Data based on Delta^{4PT} Plastic Water unit
 - - - Data based on HU=0 (water)



Reference

- ¹ Dickof P. Density scaling artifact in dosimetry calculations. Journal of Applied Clinical Medical Physics, vol 6, No. 3, summer 2005
- ² Bedford J L, Hansen V N, Lee Y K, Warrington A P. Accurate verification of IMRT and VMAT in PMMA diode array phantom. Radiotherapy Oncology Vol 96 Suppl 1 (ESTR 2010), 1321 poster 447
- ³ Bedford J L, Childs P J, Hansen V N, Moseleh-Shirazi M A, Verhaegen F, Warrington A P. Commissioning and quality assurance of the Pinnacle3 radiotherapy treatment planning system for external beam photons. The British Journal of Radiology 76 (2003), 163-176
- ⁴ Appendix "Validation of Oncentra Photon Dose using PMMA Phantoms". D192.739ENG-04 Oncentra MasterPlan – Physics and Algorithms
- ⁵ Heaton R et al. Dosimetric Evaluation of Plastic Water-Diagnostic Therapy. Poster PO-T-97, AAPM (2003)
- ⁶ Matzen T, Isacsson U, Medin J. Plastic Water as phantom material during pre-treatment verification. Radiotherapy and Oncol, 99 no 1 (suppl.) (2011) p. 5-5.

Technical specification

Cylindrical phantom material Plastic Water® DT

Calibration phantom material Plastic Water® DT, Back- and sidescatter in PMMA

Detectors:

Type	p-Si
Total number	1069
Maximum deviation of detection point relative to markings on the phantom	0.5 mm
Detection area per plane	20 x 20 cm
Distance between detectors	
Central area (6x6cm)	5 mm
Outer area (20x20cm)	10 mm
Size (radial x axial)	1 x 0.05 mm (0.04 mm ³)
Shape	Disc
Dose range	1mGy to unlimited
Dose resolution	50 nGy
Sensitivity decrease (6MV beam)	0.8% per kGy
SVWT (Temp. dependency)	0.27% /degree

Size and weight Delta^{4PT} unit:

Cylinder diameter	22 cm
Cylinder length	40 cm
Total length	72 cm
Total weight	24 kg

Ordering Information:

Part no.	Description
SDOS102-00	Delta ^{4PT} basic system Plastic Water® DT version including: <ul style="list-style-type: none">• 3D detector arrays embedded in Plastic Water• Plastic Water Measuring phantom• Plastic Water Calibration phantom• Delta⁴ basic software for acquisition of data and analysis
SDOS102-14	Ion chamber slab for Farmer type chamber 2571, Plastic Water
SDOS102-15	Ion chamber slab for Semiflex 0.3 ccm, Plastic Water
SDOS102-16	Ion chamber slab for A1SL, Plastic Water
SDOS102-17	Ion chamber slab for A12, Plastic Water
SDOS120-95	Upgrade to Plastic Water
SDOS101-01	Delta ^{4VMAT} option
SDOS101-03	Delta ^{4DVH} software option
SDOS101-06	Delta ^{4DVH} Professional software option
SDOS101-08	Delta ^{4DVH} Anatomy software option
SDOS101-04	Delta ^{4Tomo} option
SDOS101-05	Delta ^{4MachineQA} software option
SDOS102-01	Delta ^{4PT} Trolley
SDOS102-02	Delta ^{4PT} Extra cable set
SDOS102-03	Delta ^{4PT} Sagittal-Coronal support

"We feel confident with Delta^{4PT} Plastic Water since the dose planning process is straight forward: All calculations and measurements are performed as if the phantom was true water. In addition we can even CT-scan the Delta^{4PT} Plastic Water phantom and thereby extend the verification process to the acquisition of CT data."

Ulf Isacsson, PhD,
Chief physicist, therapy section,
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