

3D scanning water phantom+ Dosimetry Equipment UKR6014	 <b>IAEA</b> International Atomic Energy Agency	IAEA Specification Dated 2023/6/15
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## SPECIFICATION

### 3D Scanning Water Phantom (3DSWPH02) plus additional dosimetry equipment for Linac commissioning and QA

#### 1. Scope

- 1.1. This specification describes the requirements for a 3D scanning water phantom and the dosimetry equipment needed for Linac commissioning and Quality Assurance (hereinafter referred to as "the System) to be installed/delivered at the **Bukovinian Clinical Oncology Center, Chernivtsi, Ukraine** (hereinafter referred to as "the End-User").
- 1.2. The supply and delivery of the System is related to the IAEA Technical Cooperation (TC) project number **UKR6014 "to support Ukraine in strengthening radiation therapy and medical imaging"**.

#### 2. Applicable Documents

The following Core Specification shall be applicable, except where modified by this Specification:

2.1 IAEA Core Specification 3DSWPH02.

#### 3. Country Specific Requirements (variations from IAEA Core Specification 3DSWPH01)

3.1 Treatment unit	TBC (to be informed at the time of ordering)
3.2 Connectors	TNC
3.3 Treatment Planning System (TPS)	TBC (suitable for all commercially available TPS; to be confirmed at the time of ordering)
3.4 Additional holder for detectors	Detectors from the Additional list of Dosimetry Equipment under <ul style="list-style-type: none"> <li>• Farmer type chamber see 4.2</li> <li>• Parallel plate chamber see 4.3</li> <li>• Diode detector see 4.4</li> </ul>
3.5 Languages for markings and operational manuals	English

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#### 4. Additional list of Dosimetry Equipment (variations from IAEA Core Specification 3DSWPH01)

Item	Item description	Quantity
4.1	Single channel electrometer for radiotherapy dosimetry, reference class according to IEC 60731, TNC connector, including carry case	2
4.2	Calibrated 0.6cc cylindrical farmer type waterproof ion chamber With NDw for Co-60	2
4.3	Calibrated parallel plate ionization chamber for electron beam scanning –With NDw for Co-60	2
4.4	Detector for small field dosimetry with TNC connectivity	1
4.5	1D water phantom Manual – for absolute dosimetry and depth dose measurements	1
4.6	Detector holder for Item 4.2, 4.3, and 4.4 for the 1D water phantom in Item 4.5	1
4.7	<b>Heavy duty 20 m TNC cable</b>	2
4.8	Set of solid water plates size 30 cm x 30 cm of consisting of <ul style="list-style-type: none"> <li>i. 1mm plate 2 numbers</li> <li>ii. 2mm thick plate 1</li> <li>iii. 5mm thick plate 1</li> <li>iv. 10 mm thick plate 29numbers</li> </ul>	1set
4.9	solid water adapter plates of size 30 x 30 cm <sup>2</sup> for Farmer chamber in item No 2	1
	solid water adapter plates of size 30 x 30 cm <sup>2</sup> for plane parallel chamber in item No 3	1
4.10	Radiochromic film 8" x 10" for Radiotherapy Quality Assurance	2 boxes

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**4.11** Radiochromic film 10" x 10" for Radiotherapy Quality Assurance 2 boxes

**4.12** Portable Survey meter for Radiotherapy with calibration certificate 1

**4.13** Calibrated Thermometer - Glass thermometer (spirit type) 0° to 50° with scale resolution 0.5° or less 2

**4.14** Digital barometer with calibration certificate 1

**4.15** Constancy meter System for automated measurement on a daily basis of medical linear accelerator beams or a cobalt-60 teletherapy unit beam. Multiple detectors (at least 5) to check beam symmetry as well as beam output are required. The meter shall include software for control and calibration of the linac, as well as long term display and storage of readings. The device shall allow to set tolerance limits for daily readings and the associated software to notify out-of-tolerance readings. The system shall support connectivity with the dosimetry server (4.20) 2

**4.16** Two-dimensional detector array (for dynamic wedge or IMRT). A detector array for radiotherapy dosimetry with more than 700 individual detectors, with centre-to-centre spacing less than or equal to 1 cm and covering at least 20 cm x 20 cm in a 2D array. The system should include the accessories, devices and software required for routine patient and linac QA appropriate for all major radiation therapy techniques available to the hospital. Software shall allow the user to control the collection of data from the detection system, import dose plans from the TPS, provide tools for comparing measured and calculated dose plans as well as provide connectivity with the hospital dosimetry server (4.20). 1

**4.17** Laser alignment phantom (CT simulator); PMMA phantom with 2 mm wide notches for alignment to lateral, ceiling and sagittal lasers 1

**4.18** Electron density calibration and Image Quality phantom; 1

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**4.19** CTDI phantom (16 and 32 cm diameter) and pencil ionisation chamber, calibrated in terms of RQT beam qualities with TNC connectors 1

**4.20** *Dosimetry server:* 1

-Desktop or portable computer including operating system, Microsoft Office and all dosimetry analysis software to enable offline analysis and data manipulation

-Flat bed scanner EPSON 10000 or above and A4 laser printer;

-Planar image/film analysis and calibration software.

-Direct connectivity to the beam acquisition laptop, treatment planning system to allow data transfer TPS, CT scanner , to the external beam treatment unit to allow EPID image transfer and scanner to allow automated 1D or 2D analysis of film.

-Hardware and performance should adequate to accept additional dosimetry software packages, e.g. IMRT verification software.

-External hard drive backup system and 30-minute UPS to allow controlled shut down in the event of a power failure

-The system shall form part of the departmental intranet and should not have access to the internet. Software installation and upgrades/updates should be performed using CD/DVD and all other external data device inputs should be disabled to enhance data protection and minimise virus infection.

**4.21** *In-vivo Dosimetry system software including one (1) licence for the use of EPID* 1

**4.22** *EPID QA phantom and software for automated analysis* 1