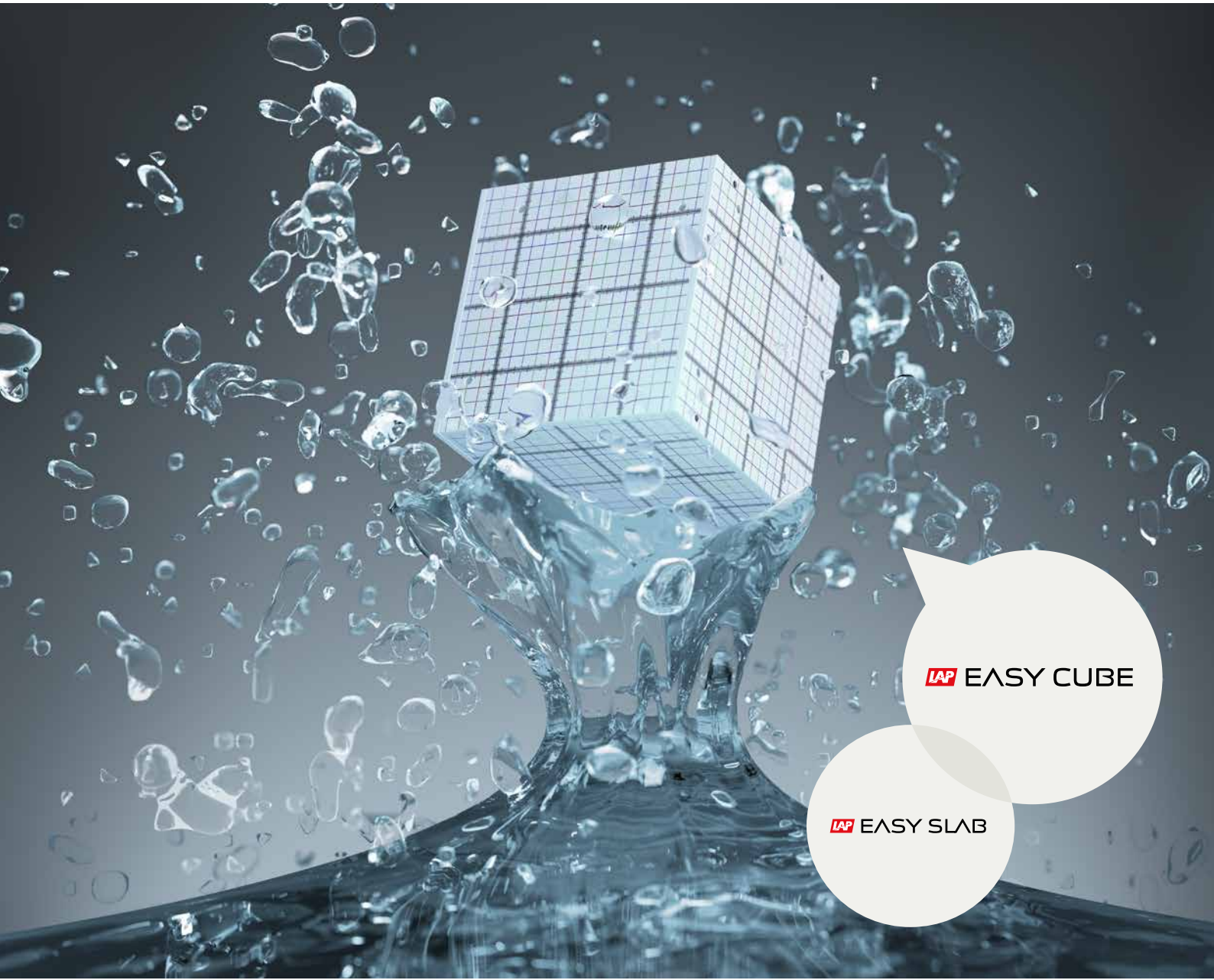


EASY WATER FAMILY

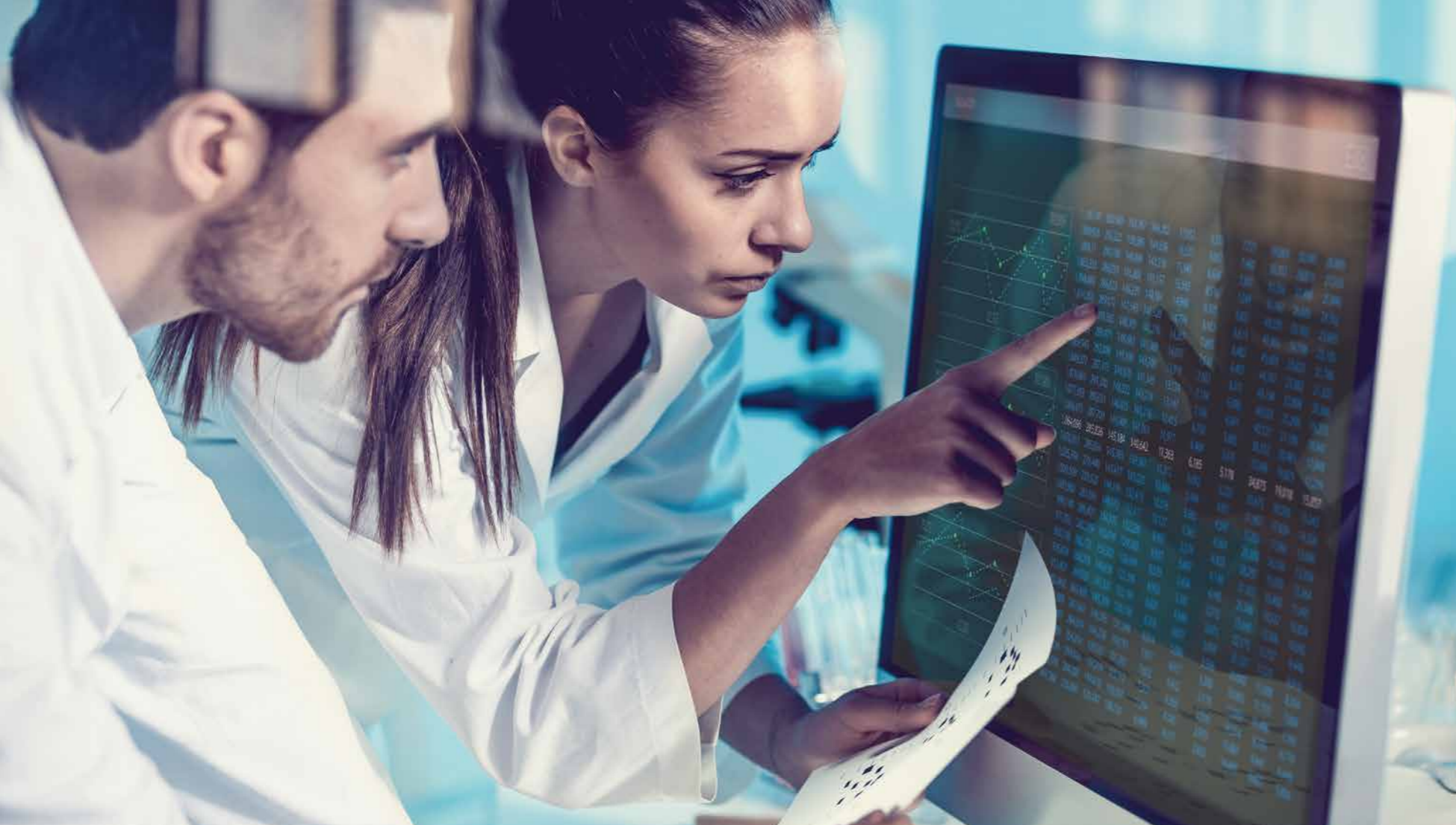
WATER EQUIVALENT PHANTOMS FOR QA IN RT



LAP EASY CUBE

LAP EASY SLAB





LAP IS YOUR IDEAL PARTNER

- Since 1984
- In-house hardware and software development
- Scientific collaborations
- Worldwide service network
- Certified in accordance to ISO 9001 and ISO 13485
- Made in Germany

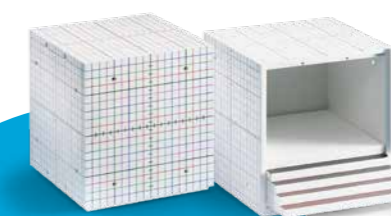
QUALITY ASSURANCE IN RADIOTHERAPY

Water-based and water-equivalent phantoms are qualified to measure dose distribution since the human body consists mainly of water.

Water tank phantoms are used for acceptance, commissioning and annual QA tests. For frequently recurring tasks in quality assurance, water-equivalent RW3 material is an integral and time-efficient tool for every medical physicist.

Our EASY SLAB and EASY CUBE phantoms are made of RW3 and therefore perfectly suited for these requirements.

By its modular design and various extensions, the EASY CUBE phantom can also be used for so-called End-to-End QA tests to verify the whole treatment chain.



LAP EASY CUBE

MULTI-MODULAR
PHANTOM FOR DOSIMETRY
AND BEYOND



LAP EASY SLAB

SLAB PHANTOM FOR
FREQUENT STANDARD
DOSIMETRY

LAP'S EASY WATER FAMILY

- Highly homogenous material
- Easy to handle
- Various extensions and accessories
- Certified medical device



LAP EASY SLAB

EASY SLAB supports frequently recurrent standard dosimetry in the field of radiation oncology.

The phantom is used in combination with irradiation detectors like ionization chambers. Corresponding adapter plates allow the detectors to be positioned as required for the QA task.

QA OF HIGH-ENERGY PHOTONS AND ELECTRONS ON LINACS

- ⇒ *Measurements with a homogeneous, standardized phantom with properties equivalent to water*
- ⇒ *Measurements with irradiation detectors* from all well-known vendors by use of optional adapter plates
- ⇒ *Measurement of dose distributions* which have been computed for the phantom within the framework of radiation therapy planning
- ⇒ *Measurement of dose distributions* which have been computed for the phantom in connection with intensity-modulated fields



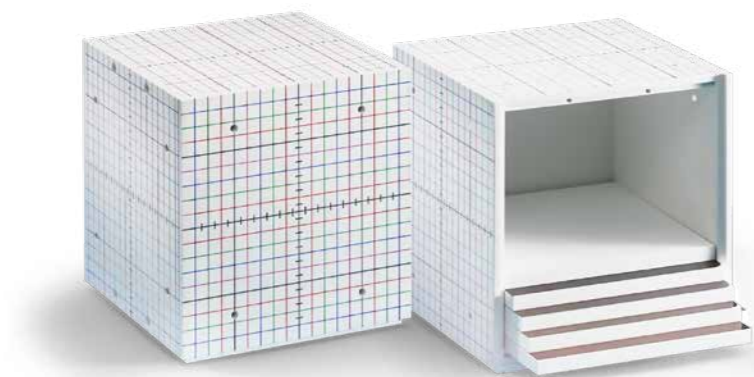
EASY SLAB

- is available as a cube-shaped phantom with an edge length of 300 mm or in a larger version as 400 mm × 400 mm × 300 mm cuboid.
- consists of 1 slab of 1 mm, 2 slabs of 2 mm, 1 slab of 5 mm and 29 slabs of 10 mm thickness.

EASY SLAB can be composed to a block phantom with a base of 300 mm × 300 mm or 400 mm × 400 mm and a maximum height of 300 mm. Detectors can be positioned in various measuring depths in steps of 1 mm using dedicated detector adapter plates. For each of the two phantom sizes, a variety of different detector adapter plates are available.



EASY SLAB WILL BE SUPPLIED WITH A TRANSPORT AND STORAGE CASE.



LAP EASY CUBE

THE UNIQUE MULTI-COLORED GRID EASES INITIAL POSITIONING DURING SET UP AND ORIENTATION DURING QA TASKS AND THEREFORE REDUCES MISALIGNMENT RISKS.

EASY CUBE supports QA measurements in dosimetry and beyond in the field of radiation oncology. The phantom can be used in combination with irradiation detectors like ionization chambers, radiosensitive films and TLDs. The detectors are positioned inside the phantom with appropriate adapters which consist of the same material as the phantom.

QA OF HIGH-ENERGY PHOTONS AND ELECTRONS ON LINACS

THE FOLLOWING APPLICATIONS ARE POSSIBLE:

- ⇒ *Measurements with a homogeneous, standardized phantom with properties equivalent to water*
- ⇒ *Measurements with irradiation detectors* from all well-known vendors by use of optional adapters
- ⇒ *Measurement of dose distributions* which have been computed for the phantom within the frame of radiation therapy planning
- ⇒ *Measurement of dose distributions* which have been computed for the phantom in connection with intensity-modulated fields
- ⇒ *Measurement of dose distributions* which have been computed for the phantom concerning stereotactic irradiation

MEASUREMENTS ON COMPUTER TOMOGRAPHS (CT)

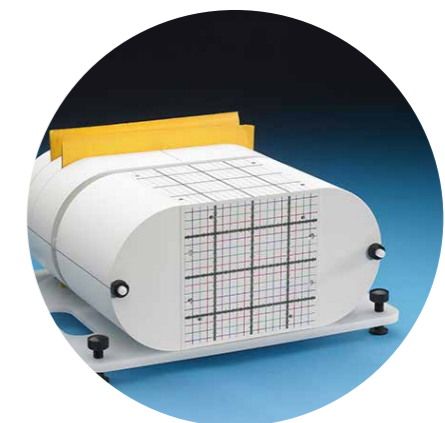
THE FOLLOWING MEASUREMENTS ARE POSSIBLE:

- ⇒ *Cross-checking of Hounsfield values* measured by a CT scanner
- ⇒ *Cross-checking of CT scans* for geometric distortion
- ⇒ *Cross-checking of table coordinates* displayed by a CT scanner
- ⇒ *Cross-checking of coordinate system* of a CT scanner

BY MEANS OF VARIOUS EXTENSION MODULES, EASY CUBE CAN BE SHAPED INTO DIFFERENT PHANTOMS FOR DIFFERENT APPLICATIONS.

FEATURES

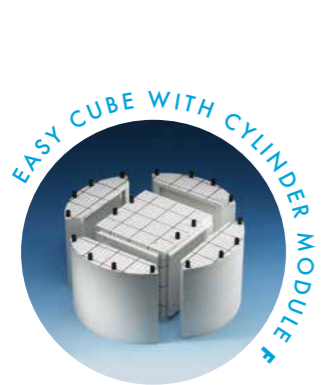
- Multi-modular design
- Different configurations possible
- Robust fixation of plates and inserts
- Reproducible measurement set-up



EASY CUBE WITH BODY MODULE S

EXTENSION MODULES

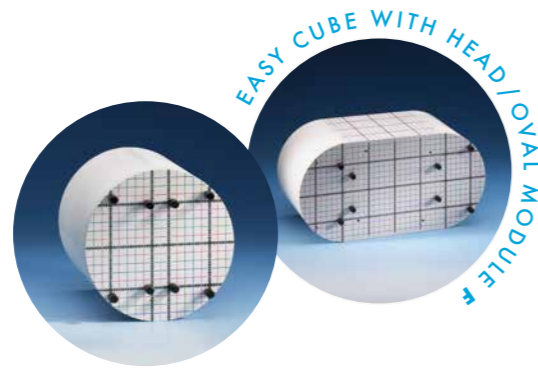
DIFFERENT SHAPES - DIFFERENT POSSIBILITIES



CYLINDER MODULE F OR S

The combination of EASY CUBE with the Cylinder Module **F** or Cylinder Module **S** forms a cylinder phantom with a diameter of 320 mm.

F: FILLABLE
S: SOLID

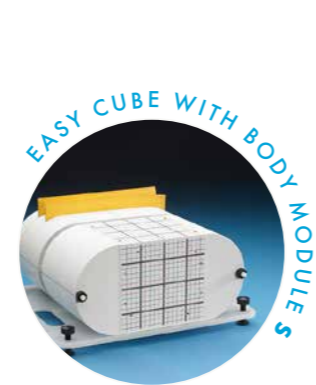


HEAD / OVAL MODULE F

As with EASY CUBE, the Head/Oval Module **F** is hollow and can be filled with detectors and compensation elements.

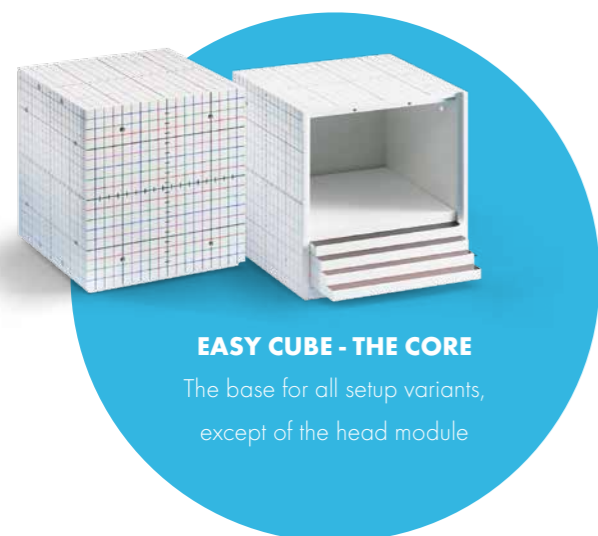
This arrangement is especially suitable if radiation is to hit the phantom from different angles. It serves to prevent artefacts resulting from radiation hitting the edges of the phantom.

The Head/Oval Module **F** can be used to simulate a human head by fixating the two half cylinders to one another with assembly plates. The result is a cylindrical phantom, 180 mm in diameter and 180 mm in height.



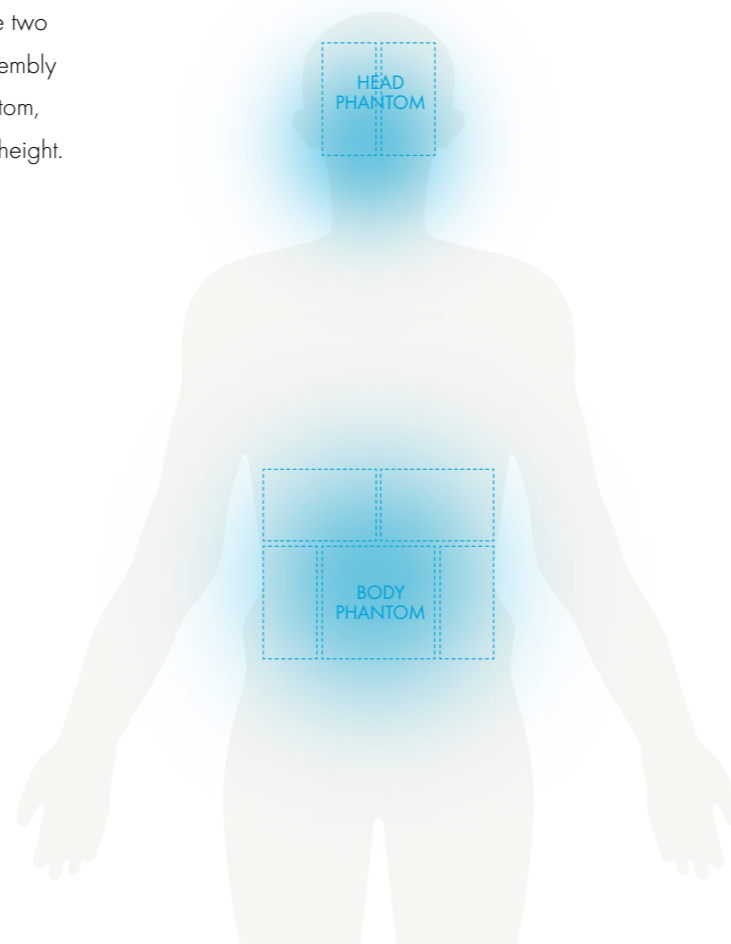
BODY MODULE S

For simulation of the entire human torso (trunk) the Body Module **S** can be combined with the EASY CUBE. The Body Module **S** is comprised of two solid half cylinders and 16 body shaped distance plates with needles for film alignment (15 plates each 10 mm thick, numbered from 1 to 15, one plate 5 mm thick).



EASY CUBE - THE CORE

The base for all setup variants, except of the head module



A MODULAR EQUIPMENT SOLUTION

ACCESSORIES

INHOMOGENEOUS INSERTS

For calibration of Hounsfield values, various inhomogeneous inserts similar to fat, muscle, lung and bone fabrics are available. Artificial inhomogeneities like metal prostheses can be simulated as well.

The inhomogeneous inserts can be freely positioned inside EASY CUBE using the compensation elements.



DETECTOR ADAPTERS



Adapters for different ionization chambers:
One or more detector adapters corresponding to your configuration, e. g. for detectors already in your possession allow positioning at the desired measurement position.



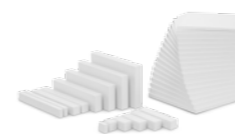
Adapter plates for radiochromic films:
Radiochromic films can be placed inside EASY CUBE using compensation plates with a milled cavity. Closing of EASY CUBE, so it is lightproof, is not necessary.



Adapter plates for TLDs:
Different adapter plates are available for measurements with thermoluminescent dosimeters (TLD). The square adapter plates (160 mm edge length) are 10 mm thick. Depending on the TLD type, the adapter plates are equipped with bore holes, rods, or circular pits, so called "chips".

STEREOTACTIC LOCALIZER PLATES

Stereotactic localizer plates with integrated metal wires are available for the measurement of stereotactic coordinates. The stereotactic localizer plates are fastened with screws to the surface of the EASY CUBE.



COMPENSATION ELEMENTS

- Compensation plates of different thicknesses
- Compensation bars and spacers in different dimensions

LEVELING PLATES

Using the leveling plates, available in two different sizes, EASY CUBE and its extension modules can be fixed and precisely positioned within the application environment.



TRANSPORT AND STORAGE CASE

EASY CUBE together with the different modules of choice will be delivered with a dedicated transport and storage case.

END-TO-END TEST

QA THROUGHOUT THE RADIATION TREATMENT CHAIN

With EASY CUBE we offer efficient QA from imaging to beam delivery which is cost-effective and fast.

EXAMPLES FOR QA WITH EASY CUBE

End-to-End tests need to be developed and coordinated closely to your individual clinical processes.

Here are some options for your quality assurance throughout your treatment chain.

QA OF DATA TRANSFER

- As target volumes and OARs often are contoured at special contouring stations, the CT objects have to be sent to these contouring stations via a specified transfer protocol.
- A correct data transfer is mandatory for further use and can be checked with generated EASY CUBE data.

QA OF TPS

- In case of contouring and treatment planning are processed at different systems, the transferred data including the structure set can be checked again and errors can be evaluated.
- An individual patient treatment plan can be calculated at the TPS under consideration of the individual configured setup of the EASY CUBE.

QA OF TREATMENT POSITIONING

- The EASY CUBE phantom can be aligned by use of imaging devices (e.g. EPID) of the treatment unit.
- Produced images can be checked regarding mentioned image parameters and registered to the treatment planning CT.
- Evaluated shifts can be checked to the realized table and gantry movements.

QA OF DOSE

- Interesting values of dose distribution can be measured in combination with appropriate detectors.
- Planned irradiation can be checked by precise positioning of various detectors.

QA OF CT PARAMETER

- Starting with the alignment as preparation of the treatment planning CT, the EASY CUBE phantom can be specifically configured for your patient case, e.g. using extension modules and accessories like inhomogeneous inserts.
- Measurements of CT parameters like HU values and phantom dimensions can be processed.



LAP LASER APOLLO

Easy and precise alignment of the EASY CUBE by means of cross-hair lasers and grid pattern.

WHY END-TO-END TESTS?

End-to-end testing is a methodology used to test whether the treatment chain is performing as designed from start to finish. With the increasing complexity of external beam therapy, so-called End-to-End tests are intended to cover all steps from therapy planning to follow-up to fulfill the high demands on quality assurance. End-to-end tests are used to measure the overall accuracy of the radiation therapy chain, excluding patient specific factors. An End-to-End test is a prerequisite to the overall success of any IGRT to analyze potential errors accumulated by individual devices and processes in the treatment chain.

TECHNICAL DATA

Material	Water-equivalent white polystyrene "RW3" for high-energy photon and electron radiation
Energy range	Photons ^{60}Co - 25 MV Electrons 4 - 23 MeV
Material composition	Polystyrene (C_8H_8) with admixture of $2.1\% \pm 0.2\% \text{TiO}_2$
Mass density	1.045 g/cm^3
(Z/A) _v value	0.536
Electron density (e/g)	3.386×10^{23}
Electron concentration (e/cm ³)	3.39×10^{23}

LAP EASY SLAB	
300 × 300 × 300 mm	1 slab of 1 mm thickness, 2 slabs of 2 mm, 1 slab of 5 mm, 29 slabs of 10 mm
400 × 400 × 300 mm	1 slab of 1 mm thickness, 2 slabs of 2 mm, 1 slab of 5 mm, 29 slabs of 10 mm

LAP EASY CUBE + Extension Modules	
EASY CUBE	180 × 180 × 180 mm
Cylinder Module	320 mm diameter, 180 mm height
Head / Oval Module	Head: 180 mm diameter, 180 mm height Oval: 360 mm length, 180 mm width, 180 mm height
Body Module	360 mm length, 335 mm width, 180 mm height



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