

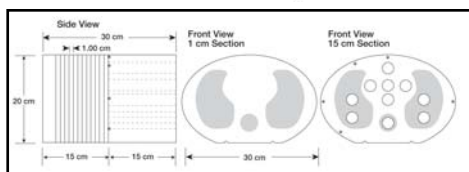
# IMRT DOSE VERIFICATION PHANTOMS AND CUBES

## CIRS IMRT PHANTOMS

The CIRS IMRT Phantoms for Film and Ion Chamber Dosimetry are designed to address the complex issues surrounding commissioning and comparison of treatment planning systems while providing a simple yet reliable method for verification of individual patient plans and delivery.

CIRS IMRT phantoms are manufactured from tissue equivalent materials that mimic within 1% from 50 keV to 15 MeV for accurate simulation from CT planning to treatment delivery. The interchangeable rod design allows the phantom to accommodate a multitude of dose measurement devices such as ion chambers, TLD, diodes and MOSFET's in the same location within the phantom.\* Phantom cross sections accommodate GafChromic® or standard ready-pack films.

## CIRS IMRT THORAX PHANTOM



- Verify heterogeneity corrections
- Correlate CTU to electron density
- Check dose distributions in sensitive areas
- Check depth doses and absolute dose
- 2D and 3D isodoses
- Calibrate film with an ion chamber and other detectors\*
- Verify individual patient treatment plans

The IMRT Thorax Phantom is elliptical in shape and properly represents an average human torso in proportion, density, and two-dimensional structure. It measures 30 cm Long x 30 cm Wide x 20 cm Thick.

Tissue equivalent interchangeable rod inserts accommodate ionization chambers allowing for point dose measurements in multiple planes within the phantom. Hole placement allows verification in the most critical areas of the chest. One half of the phantom is divided into 12 sections, each 1 cm thick, to support radiographic or GafChromic® Film<sup>1</sup>. Additional inserts are available to support a variety of other detectors including TLD's, MOSFET and diodes

Handling, assembly and proper orientation of the phantom is made easy with the use of a unique alignment base and holding device. The surfaces of the phantom are marked for ease of laser alignment. CT markers are included to ensure accurate film to plan registration on the center film.

### 682-510 IMRT Thorax Phantom Includes

- (1) Thorax section drilled to accommodate rod inserts
- (12) 1cm thorax sections
  - (1) 3cm end section
- (5) Water equivalent solid rod inserts
  - (1) Bone equivalent solid rod insert
  - (4) Lung equivalent solid rod inserts
- (1) Set of CT to film fiducial markers
- (1) Alignment base
- (1) Holding Device

### Insert Options

\*Customers are encouraged to complete their order with the purchase of at least one (1) of each insert option listed below. Customer must specify ion chamber and cavity code. Refer to the separate ion chamber and cavity codes chart (see Appendix A).

- 682-533 Water Equivalent Rod Insert with Ion Chamber Cavity
- 682-534 Bone Equivalent Rod Insert with Ion Chamber Cavity
- 682-535 Lung Equivalent Rod Insert with Ion Chamber Cavity

### Specifications

**Overall Dim:** 17" x 15" x 9" (43.2 x 38.1 x 22.9 cm)

**Weight:** 30 lb (11.2 kg)

**Phantom Body Material:** Tissue Equivalent Epoxy Materials

**Insert Material:** CIRS Tissue Equivalent Materials (epoxy resin based)

### References

Vatnitsky S. Commissioning of Radiotherapy Treatment Planning Systems: Testing for Typical External Beam Treatment Techniques. 1583rd ed. (Brunckhorst E, Gershkevitch E, Ibbott G, et al, eds.). IAEA. 2008.

Gershkevitch, Eduard, et al., Dosimetric Verification of Radiotherapy Treatment Planning Systems: Results of IAEA Pilot Study. 2008 Elsevier Ireland Ltd., Radiotherapy and Oncology 89 (2009) 338-346, pgs. 338-346, March 2009.

Zhao, Y. et al., Monte Carlo evaluation of a treatment planning system for helical tomotherapy in an anthropomorphic heterogeneous phantom and for clinical treatment plans. Med. Phys., vol. 35 (12), pgs. 5366-5374, December 2008.

Luo, W., et al., Analysis of image quality for real-time target tracking using simultaneous kV-MV imaging. Med. Phys., vol. 35 (12), pgs. 5501-5509, December 2008.

Brunckhorst E., et al., Commissioning of Radiotherapy Treatment Planning Systems: Testing for Typical External Beam Treatment Techniques. IAEA, International Atomic Energy Agency, IAEA-TECDOC-1583, pgs. 1-67, January 2008

Altman, M., et al., A Novel Phantom for use in 3-dimensional In Vitro Cell Experiments. Med. Phys., vol. 33 (6), pgs. 2058-2059, Poster # SU-FF-T-40, June 2006.

Item #	Description
682-510	IMRT Thorax Phantom
682-533	Water Equiv Rod Insert with Chamber Cavity Specify Chamber and Cavity Code
682-534	Bone Equivalent Insert with Ion Chamber Cavity Specify Chamber and Cavity Code
682-535	Lung Equivalent Insert with Ion Chamber Cavity Specify Chamber and Cavity Code

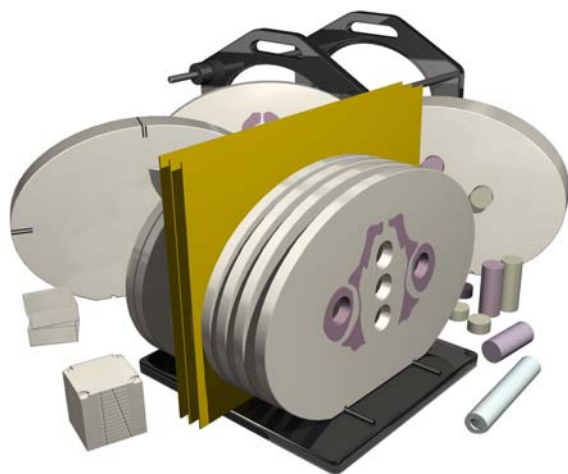
**Ion chamber and cavity codes can be found in Appendix A**

Item #	Optional Accessories
682-525	Water Equivalent Rods for TLD's, Set of 5
682-526	Single Breast Attachment
682-527	Film Stack for Small Volume 3D Image Reconstruction
682-528	Gel Dosimetry Cassette
682-529	Thorax Region Section Accommodates 682-527 or 682-528
682-530	Homogeneous Section Accommodates 682-527 or 682-528
682-532	Set of CT to Film Fiducial Markers
682-537	Electron Density Ref Plugs Set of 4: lung, bone, muscle, adipose
682-540	Thorax Region Spacer Slab (1 cm)
682-545	Case for IMRT Phantoms and Cavity Slab
682-546	Case for IMRT Phantoms

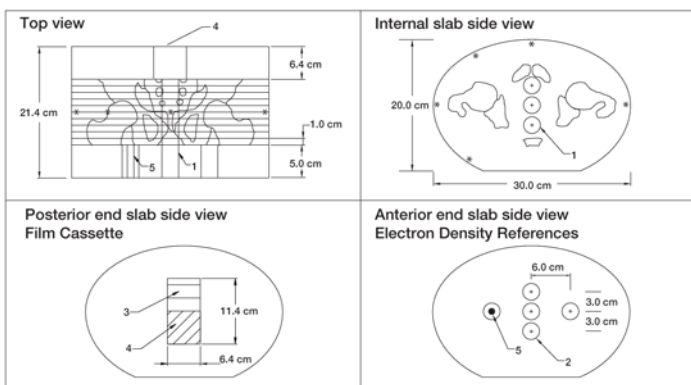
**Ion chamber and cavity codes can be found in Appendix A**

# IMRT DOSE VERIFICATION PHANTOMS AND CUBES

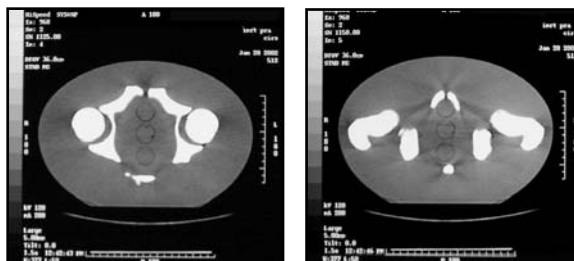
## CIRS IMRT PELVIC 3D PHANTOM



Shown with Optional Accessories



- 1 - Holes plugged with rods (Ø 2.5 cm)
- 2 - Holes for electron density inserts
- 3 - Spacers
- 4 - Film stack (cube 2.5 inches)
- 5 - Bone core (diam. 1 cm in water background)



The IMRT Pelvic 3D Phantom includes four different Electron Density reference plugs which can be interchanged in five separate locations within the phantom. The surface of the phantom is etched with grooves to ensure proper orientation of the CT slices and accurate film to plan registration.

<sup>1</sup> The CIRS line of IMRT phantoms is compatible with the RIT 113 software for film to plan analysis. GafChromic® is a registered trademark of International Specialty Products, Wayne, NJ

### Item 682-515 IMRT Pelvic 3D Phantom includes

- (1) 5 cm tissue equivalent reference section for interchangeable electron density inserts
- (10) 1 cm thick contiguous 3D pelvic sections each drilled to accommodate rod inserts
- (1) Homogeneous section that accommodates 682-527 and 682-528 cassettes
- (1) Film Stack for 3D reconstruction
- (5) Water equivalent rod inserts (2.5 cm dia x 5 cm long)
- (20) Bone equivalent solid disks (2.5 cm dia x 1 cm thick)
- (30) Water equivalent solid disks (2.5 cm dia x 1 cm thick)
- (1) Electron density reference plugs, (set of 4: lung, bone, muscle, adipose)
- (1) Set of CT to film fiducial markers
- (1) Alignment base
- (1) Holding device

### Insert Options

Customers are encouraged to complete their order with the purchase of at least one (1) of each insert option listed below. Customer must specify ion chamber and cavity code. Refer to the separate ion chamber and cavity codes chart (see Appendix A).

682-533 Water Equivalent Rod Insert with Ion Chamber Cavity

682-534 Bone Equivalent Rod Insert with Ion Chamber Cavity

### Specifications

**Overall Dim:** 14" x 15" x 9" (35.6 x 38.1 x 22.9 cm)

**Weight:** 28 lb (10.5 kg)

**Phantom Body Material:** Tissue Equivalent Epoxy Materials

**Insert Material:** CIRS Tissue Equivalent Materials (epoxy resin based)

### References

Gershkevitch, Eduard, et al., Dosimetric Verification of Radiotherapy Treatment Planning Systems: Results of IAEA Pilot Study. 2008 Elsevier Ireland Ltd., Radiotherapy and Oncology 89 (2009) 338-346, pgs. 338-346, March 2009.

Zhao, Y. et al., Monte Carlo evaluation of a treatment planning system for helical tomotherapy in an anthropomorphic heterogeneous phantom and for clinical treatment plans. Med. Phys., vol. 35 (12), pgs. 5366-5374, December 2008.

Luo, W., et al., Analysis of image quality for real-time target tracking using simultaneous kV-MV imaging. Med. Phys., vol. 35 (12), pgs. 5501-5509, December 2008.

Brunchhorst E., et al., Commissioning of Radiotherapy Treatment Planning Systems: Testing for Typical External Beam Treatment Techniques. IAEA, International Atomic Energy Agency, IAEA-TECDOC-1583, pgs. 1-67, January 2008.

Altman, M., et al., A Novel Phantom for use in 3-dimensional In Vitro Cell Experiments. Med. Phys., vol. 33 (6), pgs. 2058-2059, Poster # SU-FF-T-40, June 2006.

Item #	Description
682-515	IMRT Pelvic 3D Phantom
682-533	Water Equiv Rod Insert with Chamber Cavity Specify Chamber and Cavity Code
682-534	Bone Equivalent Insert with Ion Chamber Cavity Specify Chamber and Cavity Code
682-531	Pelvic Region Slab Accommodates 682-527 or 682-528
682-545	Case for IMRT Phantoms and Cavity Slab
682-546	Case for IMRT Phantoms

**Ion chamber and cavity codes can be found in Appendix A**

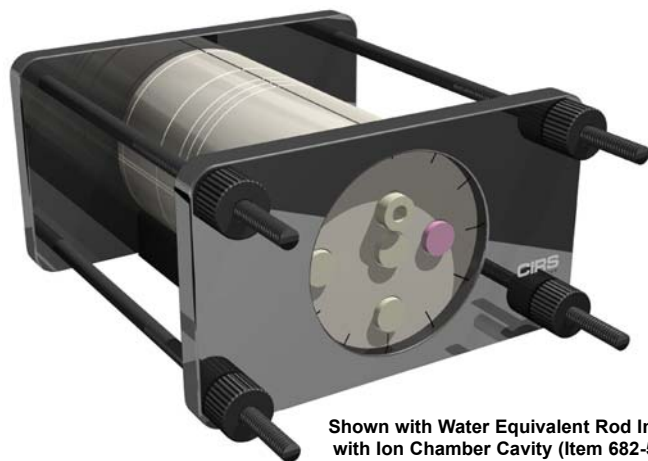
- Verify heterogeneity corrections
- Correlate CTU to electron density
- Check dose distributions insensitive areas
- Check depth doses and absolute dose
- 2D and 3D isodoses
- Calibrate film with an ion chamber
- Verify individual patient treatment plans

The IMRT Pelvic 3D phantom properly represents human pelvic anatomy in shape, proportion and structure as well as density. This enables thorough analysis of both the imaging and dosimetry system.

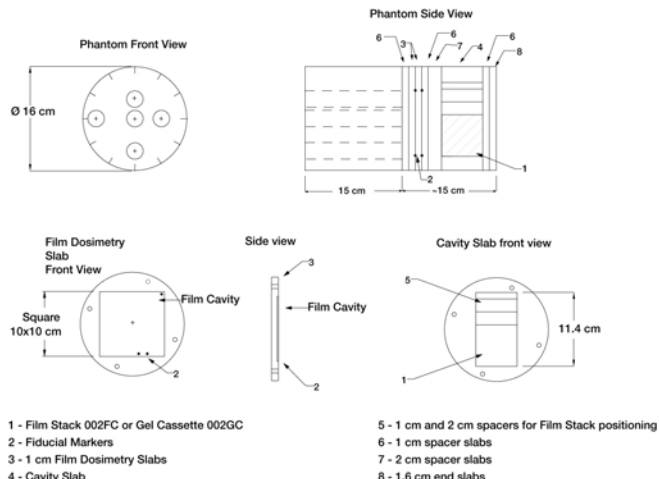
The phantom is elliptical in shape, approximates the size of an average patient, and has a tissue equivalent, three dimensional skeleton. Tissue equivalent interchangeable rod inserts for ionization chambers allow for point dose measurements in multiple planes in the phantom and film calibration.\* The phantom also supports film dosimetry with not only standard radiographic films but also GafChromic® media<sup>1</sup>. Additional inserts are available to support a variety of other detectors including TLD's, MOSFET, and diodes.

# IMRT DOSE VERIFICATION PHANTOMS AND CUBES

## CIRS IMRT HEAD AND NECK PHANTOM



Shown with Water Equivalent Rod Insert with Ion Chamber Cavity (Item 682-533)



- Verify heterogeneity corrections
- Correlate CTU to electron density
- Check dose distributions in sensitive areas
- Check depth doses and absolute dose
- 2D and 3D isodoses
- Calibrate film with an ion chamber
- Verify individual patient treatment plans

The IMRT Head and Neck Phantom is circular in shape and approximates the size of an average patient. Tissue equivalent interchangeable rod inserts for ionization chambers allow for point dose measurements in multiple planes in the phantom, film calibration and isodose normalization.\* The phantom also supports film dosimetry with not only standard radiographic films but also GafChromic® media<sup>1</sup>. Additional inserts are available to support a variety of other detectors including TLD's, MOSFET and diodes.

The IMRT Head and Neck Phantom accommodates one Ready Pack™ 10" x 12" film in transverse orientation, two radiochromic or radiographic 10 x 10 cm films in transverse orientation and a stack of thirteen radiochromic films precut to 63.5 x 63.5 mm in three different orientations.

The IMRT Head and Neck Phantom has an optional four Electron Density reference plugs which can be interchanged in five separate locations within the phantom. The surface of the phantom is etched with grooves to ensure proper orientation of the CT slices and accurate film to plan registration. An optional cranial bone ring is also available.

### Item 682-520 IMRT Phantom Head and Neck Includes

- (1) Water equivalent homogeneous section drilled to accommodate rod inserts (15 cm)
- (2) Film slabs, 1 cm, film cavity 10 x 10 cm with a set of CT to Film Fiducial Markers
  - (1) CT to film fiducial markers in film slabs
- (1) Cavity slab, 6.34 cm, to accommodate Film Stack or Gel Cassette
  - (1) Film Stack for small volume 3D image reconstruction
  - (2) Spacer slabs, 1 cm
  - (2) Spacer slabs, 2 cm
  - (2) End slabs - 1 cm and ~1.6 cm
  - (5) Water equivalent solid rod inserts
    - (1) Bone equivalent solid rod insert
    - (1) Alignment base
    - (1) Holding device

### Insert Options

Customers are encouraged to complete their order with the purchase of at least one (1) of each insert option listed below. Customer must specify ion chamber and cavity code. Refer to the separate ion chamber and cavity codes chart (see Appendix A).

- 682-533 Water Equivalent Rod Insert with Ion Chamber Cavity
- 682-534 Bone Equivalent Rod Insert with Ion Chamber Cavity

### Specifications

**Overall Dim:** 17" x 13" x 8" (43.2 x 33 x 20.3 cm)

**Weight:** 28 lb (10.5 kg)

**Phantom Body Material:** Tissue Equivalent Epoxy Materials

**Insert Material:** CIRS Tissue Equivalent Materials (epoxy resin based)

### References

Gershkevitch, Eduard, et al., Dosimetric Verification of Radiotherapy Treatment Planning Systems: Results of IAEA Pilot Study, 2008 Elsevier Ireland Ltd., Radiotherapy and Oncology 89 (2009) 338-346, pgs. 338-346, March 2009.

Zhao, Y. et al., Monte Carlo evaluation of a treatment planning system for helical tomotherapy in an anthropomorphic heterogeneous phantom and for clinical treatment plans. Med. Phys., vol. 35 (12), pgs. 5366-5374, December 2008.

Luo, W., et al., Analysis of image quality for real-time target tracking using simultaneous kV-MV imaging. Med. Phys., vol. 35 (12), pgs. 5501-5509, December 2008.

Brunckhorst E., et al., Commissioning of Radiotherapy Treatment Planning Systems: Testing for Typical External Beam Treatment Techniques. IAEA, International Atomic Energy Agency, IAEA-TECDOC-1583, pgs. 1-67, January 2008.

Altman, M., et al., A Novel Phantom for use in 3-dimensional In Vitro Cell Experiments. Med. Phys., vol. 33 (6), pgs. 2058-2059, Poster # SU-FF-T-40, June 2006.

Item #	Description
682-520	IMRT Phantom Head and Neck
682-533	Water Equiv Rod Insert with Chamber Cavity Specify Chamber and Cavity Code
682-534	Bone Equivalent Insert with Ion Chamber Cavity Specify Chamber and Cavity Code

**Ion chamber and cavity codes can be found in Appendix A**

Item #	Optional Accessories
682-525	Water Equivalent Rods for TLD's, Set of 5
682-528	Gel Dosimetry Cassette
682-532	Set of CT to Film Fiducial Markers
682-537	Electron Density Ref Plugs Set of 4: lung, bone, muscle, adipose
682-547	Case for IMRT Head and Neck Phantom

**Ion chamber and cavity codes can be found in Appendix A**

# IMRT DOSE VERIFICATION PHANTOMS AND CUBES

## CIRS IMRT HEAD AND TORSO FREEPOINT PHANTOM



Shown with Water Equivalent Rod Insert with Ion Chamber Cavity (Item 682-533)

### Insert Options

Customers are encouraged to complete their order with the purchase of at least one (1) of each insert option listed below. Customer must specify ion chamber and cavity code. Refer to the separate ion chamber and cavity codes chart (see Appendix A).

- 682-533 Water Equivalent Rod Insert with Ion Chamber Cavity
- 682-534 Bone Equivalent Rod Insert with Ion Chamber Cavity

### Specifications

**Overall Dim:** 17" x 15.5" x 10" (43.2 x 39.4 x 25.4 cm)

**Weight:** 47 lb (17.5 kg)

**Phantom Body Material:** Tissue Equivalent Epoxy Materials

**Insert Material:** CIRS Tissue Equivalent Materials (epoxy resin based)

### References

Gershkevitch, Eduard, et al., Dosimetric Verification of Radiotherapy Treatment Planning Systems: Results of IAEA Pilot Study, 2008 Elsevier Ireland Ltd., Radiotherapy and Oncology 89 (2009) 338-346, pgs. 338-346, March 2009.

Zhao, Y. et al., Monte Carlo evaluation of a treatment planning system for helical tomotherapy in an anthropomorphic heterogeneous phantom and for clinical treatment plans. Med. Phys., vol. 35 (12), pgs. 5366-5374, December 2008.

Luo, W., et al., Analysis of image quality for real-time target tracking using simultaneous kV-MV imaging. Med. Phys., vol. 35 (12), pgs. 5501-5509, December 2008.

Brunckhorst E., et al., Commissioning of Radiotherapy Treatment Planning Systems: Testing for Typical External Beam Treatment Techniques. IAEA, International Atomic Energy Agency, IAEA-TECDOC-1583, pgs. 1-67, January 2008.

Altman, M., et al., A Novel Phantom for use in 3-dimensional In Vitro Cell Experiments. Med. Phys., vol. 33 (6), pgs. 2058-2059, Poster # SU-FF-T-40, June 2006.

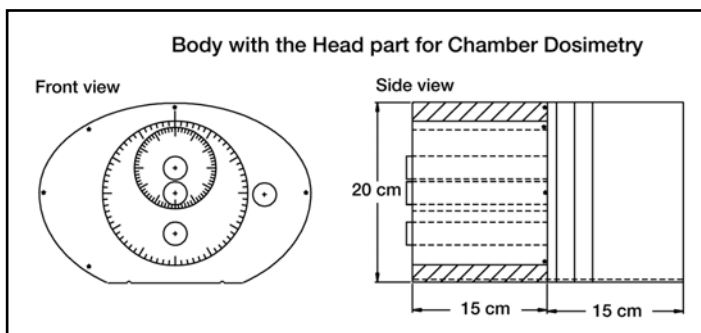
Item #	Description
682-522	IMRT Head and Torso Freepoint Phantom
682-533	Water Equiv Rod Insert with Chamber Cavity Specify Chamber and Cavity Code
682-534	Bone Equivalent Insert with Ion Chamber Cavity Specify Chamber and Cavity Code

**Ion chamber and cavity codes can be found in Appendix A**

Item #	Optional Accessories
682-525	Water Equivalent Rods for TLD's, Set of 5
682-526	Single Breast Attachment
682-527	Film Stack for Small Volume 3D Image Reconstruction
682-528	Gel Dosimetry Cassette
682-529	Thorax Region Section Accommodates 682-527 or 682-528
682-530	Homogeneous Section Accommodates 682-527 or 682-528
682-532	Set of CT to Film Fiducial Markers
682-535	Lung Equivalent Rod Insert with Ion Chamber Cavity Specify Chamber and Cavity Code
682-537	Electron Density Ref Plugs Set of 4: lung, bone, muscle, adipose
682-538	Lung Equivalent Solid Rod Insert
682-545	Case for IMRT Phantoms and Cavity Slab
682-546	Case for IMRT Phantoms

**Ion chamber and cavity codes can be found in Appendix A**

Body with the Head part for Chamber Dosimetry



- Ionization chambers, TLD, MOSFET and Diodes easily positioned using interchangeable rods
- Choose any point dose location by rotating the cylinders
- Use radiographic film dosimetry Ready Pack® and/or Gafchromic® film
- Close placement of detectors to film improves film calibration
- CT - film markers ensure accurate film to plan registration
- Surfaces are etched with indices for precise alignment
- Configure with or without heterogeneities.

The IMRT Head and Torso Freepoint Phantom was designed in collaboration with David D. Loshek PhD. With the Freepoint Phantom choose any point dose location within a circular area with diameter of 11.2 cm by simply adjusting the two rotating cylinders. Lung and bone equivalent rods can be positioned at any location within the circular area for assessment of heterogeneity correction. Remove the center cylinder from the phantom body to simulate head and neck set-ups.

### Item 682-522 IMRT Head and Torso Freepoint Phantom Includes

- (1) Water equivalent homogeneous torso section with cylindrical inserts (15 cm)
- (2) Spacer slabs, 2 cm
  - (1) Spacer slab, 1 cm
  - (1) Spacer slab, 10 cm
- (4) Water equivalent solid rod inserts
  - (1) Bone equivalent solid rod insert
  - (1) Set of CT film fiducial markers
  - (1) Alignment base
  - (1) Holding device

# IMRT DOSE VERIFICATION PHANTOMS AND CUBES

## CIRS IMRT PHANTOM ACCESSORIES

### For Homogenous, Thorax, Pelvis and Head and Neck



**Item 682-525** Short tissue equivalent rods for TLD (set of five). Each rod is 50 mm long by 25.4 mm (1") Outside Diameter and allows the placement of TLDs in the same position as an ion chamber in a multitude of locations along the z-axis. Inside hole  $\varnothing$  5 mm with water-equivalent plugs 25 mm long. Rods are also available in other tissues and length.



**Item 682-526** Single breast attachment 350 cc, 50/50 glandular/adipose ratio with TLD holes  $\varnothing$  5 mm, 20 x 20 mm grid spacing with tissue equivalent plugs.



**Item 682-527** Film stack 2.5" x 2.5" x 2.5" (63.5 x 63.5 x 63.5 mm) for 3D image reconstruction using 13 layers of X-Ray or Gafchromic® film with 4 mm thick tissue equivalent spacers in between each film.



**Item 682-528** Gel dosimetry cassette has the same outside cubic dimensions as the 682-527 film cassette. It receives a disposable Barrex™ cylinder (max  $\varnothing$  50 mm, height 63.5 mm) that can be filled with BANG™ or other dosimetry gel.

**Item 682-529** Thorax Region Section - Accommodates 682-527 or 682-528 cassettes. Thickness of sections 2.5" (63.5 mm). Cavity and three water-equivalent spacers are included to allow use of cassette in six different positions inside the phantom. Spacer's thickness is 20, 20 and 10 mm. Extra solid blocks to replace the cassette are included.

**Item 682-530** Homogeneous Section - Accommodates 682-527 or 682-528 cassettes. Thickness of sections 2.5" (63.5 mm). Cavity and three water-equivalent spacers are included to allow use of cassette in six different positions inside the phantom. Spacer's thickness is 20, 20 and 10 mm. Extra solid blocks to replace the cassette are included.

**Item 682-531** Pelvic Region Slab - Accommodates 682-527 and 528 cassettes.

**Item 682-532** Set of CT to film fiducial markers from stainless steel are visible during the CT simulation. They also imprint small but clearly visible indentations on the film. Five fiducials at each phantom to film interface allow for very precise film to plan registration.

**Item 682-533** Water equivalent insert with ion chamber cavity (Specify ion chamber and cavity code, see Appendix A).

**Item 682-534** Bone equivalent rod with ion chamber cavity (Specify ion chamber and cavity code, see Appendix A).

**Item 682-535** Lung equivalent insert with ion chamber cavity (Specify ion chamber and cavity code, see Appendix A).

**Item 682-537** Electron density reference plugs (set of 4: lung, bone, muscle and adipose)

#### ELECTRON DENSITY REFERENCE INSERT

	Density	Electron Density per cc x 10 <sup>23</sup>	Electron Density Relative to H <sub>2</sub> O
Lung	0.21	0.69	0.207
Bone	1.60	5.03	1.506
Muscle	1.06	3.48	1.042
Adipose	0.96	3.17	0.949

**Item 682-538** Lung equivalent solid rod insert

**Item 682-539** Water Equivalent Spacer Slab

**Item 682-540** Thorax Region Spacer Slab for 682-515

**Item 682-545** Case for IMRT Phantoms when ordered with corresponding Cavity Slab: 682-510, 682-515 and 682-522.

**Item 682-546** Case for IMRT Phantoms 682-510, 682-515 and 682-522.

**Item 682-547** Case for IMRT Head and Neck Phantom, Item 682-520.

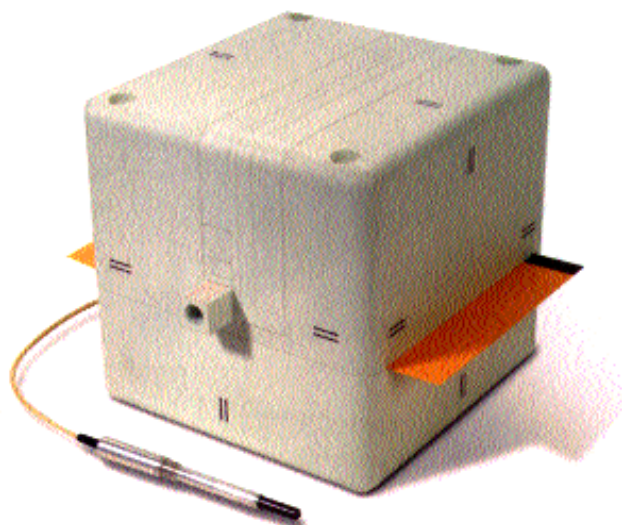
Item #	Optional Accessories
682-525	Water Equivalent Rods for TLD's, Set of 5
682-526	Single Breast Attachment
682-527	Film Stack for Small Volume 3D Image Reconstruction
682-528	Gel Dosimetry Cassette
682-529	Thorax Region Section Accommodates 682-527 or 682-528
682-530	Homogeneous Section Accommodates 682-527 or 682-528
682-531	Pelvic Region Slab Accommodates 682-527 or 682-528
682-532	Set of CT to Film Fiducial Markers
682-533	Water Equiv Rod Insert with Chamber Cavity Specify Chamber and Cavity Code
682-534	Bone Equivalent Rod Insert with Ion Chamber Cavity Specify Chamber and Cavity Code
682-535	Lung Equivalent Rod Insert with Ion Chamber Cavity Specify Chamber and Cavity Code
682-537	Electron Density Ref Plugs Set of 4: lung, bone, muscle, adipose
682-538	Lung Equivalent Solid Rod Insert
682-539	Water Equivalent Spacer Slab (1 cm)
682-540	Thorax Region Spacer Slab (1 cm)
682-545	Case for IMRT Phantoms and Cavity Slab
682-546	Case for IMRT Phantoms
682-547	Case for IMRT Head and Neck Phantom

Ion chamber and cavity codes can be found in Appendix A

# IMRT DOSE VERIFICATION PHANTOMS AND CUBES

## CUBE 20 PHANTOM

The most convenient device for routine QA and IMRT applications



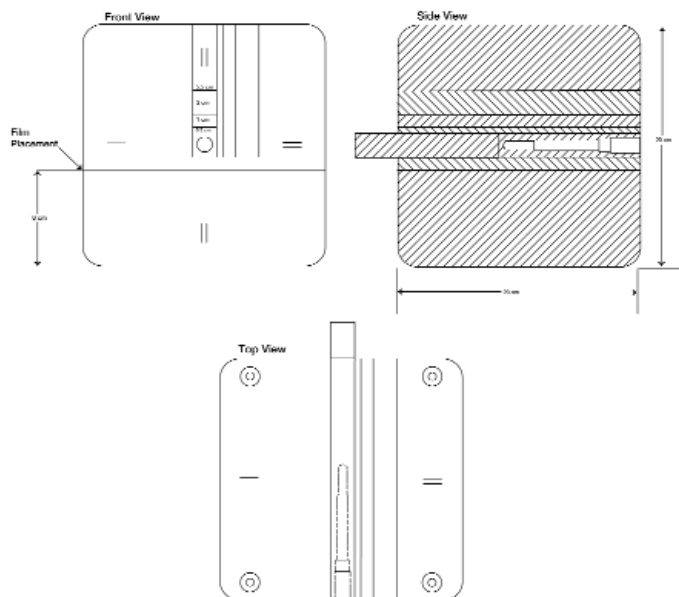
682-400 Shown with Optional Water Equivalent Cavity Block

- Routine patient QA
- Beam constancy checks
- MLC QA
- User friendly set-up and positioning
- Suitable for head/neck and torso treatments
- Mimics water within 1%

The Cube 20 Phantom was designed for routine QA in RT and IMRT applications where ease of use and quick set-up are important. The Cube 20 phantom is manufactured from Plastic Water® DT which faithfully mimics the linear attenuations of water within 1% from 50 keV to 25 MeV. This enables complete QA from CT image acquisitions to therapy dose verifications. The 20 cm cubic dimension was chosen as a suitable approximation for both head/neck and torso treatments. All the edges are rounded to avoid CT artifacts.

Chamber, diode or MOSFET detectors are easily positioned at isocenter of the cube and laser alignment marks on all sides facilitate precise positioning of the phantom. Detector position can be adjusted in 1 mm increments longitudinally and 5 mm increments for lateral and elevational adjustments.

Ready-Pac film can be inserted in the cube. By rotating the cube, the film is easily set in sagittal, coronal or transverse orientations. Stainless steel fiducials are clearly resolvable on CT images and leave small indentations on the film for precise film to plan registration.



### Item 682-400 Cube 20 Phantom Includes

- 1 - Cube 20 Phantom
- 3 - Lateral Spacers - 0.5 cm, 1.0 cm and 2.0 cm
- 3 - Elevational Spacers - 0.5 cm, 1.0 cm and 2.0 cm

### Insert Option

Customers are encouraged to complete their order with the purchase of the insert option listed below. Refer to the separate ion chamber and cavity codes chart (see Appendix A).

682-402 Water Equivalent Ion Chamber Cavity Block

### Specifications

**Size:** 8" x 8" x 8" (20.3 x 20.3 x 20.3 cm)

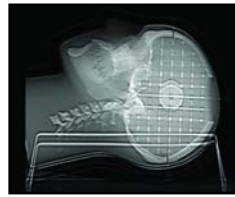
Item	Description
682-400	Cube 20 Phantom
682-402	Cube 20, Water Equivalent Ion Chamber Cavity Block Specify Chamber and Cavity Code

Ion chamber and cavity codes can be found in Appendix A

# IMRT DOSE VERIFICATION PHANTOMS AND CUBES

## MRI DISTORTION PHANTOM FOR SRS

For Assessment of Image Distortion in Treatment Planning Systems



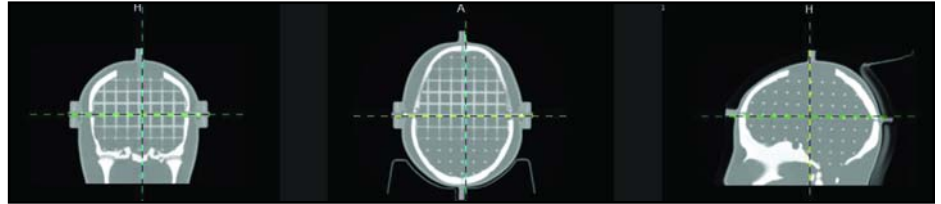
CT



MRI



CT Showing Ear Canals



CT Reconstruction

- Provides a realistic anthropomorphic scenario for CT and MR imaging
- Unique inter-cranial 3D grid design allows assessment of spatial distortion
- Special pads enable use with all fixation frames
- CT/MR markers facilitate positioning and image registration

CIRS Model 603A was designed for assessment of MR image distortion in Stereotactic Radiosurgery Planning. It is also a useful tool for verifying image fusion and deformable image registration algorithms used in various treatment planning systems. The tissue equivalent, anthropomorphic design provides the closest conditions to a clinical imaging scenario. The phantom can be imaged using X-ray, Computed Tomography and Magnetic Resonance. It images well with all MRI sequences tested to date, including T1 weighted, T2 weighted, 3D Time of Flight, MPRAGE and CISS.

The skull is manufactured from a plastic-based bone substitute, and the interstitial and surrounding soft tissues are made from a proprietary signal generating water-based polymer. The entire phantom is encased in a clear plastic shell to protect gel from desiccation. The phantom is supplied with specially designed pads that allow fixation with any stereotactic frame or mounting for end-to-end testing. The phantom is also suitable for frameless SRS QA.

The entire inter-cranial portion of the skull volume is filled with an orthogonal 3D grid of 3 mm diameter rods spaced 15 mm apart. Five extended axis-rods intersect at the reference origin of the grid. The end of each extended axis is fitted with CT/MR markers allowing for accurate positioning with lasers and co-registration of CT and MR image sets.

The phantom includes right and left air voids, 3 mm in diameter by 17 mm long to simulate each ear canal for evaluation of potential distortions commonly found in clinical settings.

### 682-825 Includes

- (1) 3D Anthropomorphic Skull Phantom
- (1) ABS Cradle
- (1) SRS Frame Support Cups (Set of 4)
- (1) Custom Carry Case
- (1) User Guide
- (1) 48-Month Warranty

### Specifications

**Overall Dimensions:** 32 cm x 24 cm x 18 cm

**Weight:** 12 lbs (5.5 kg)

### Materials

**Skull:** Plastic-based bone substitute

**Interstitial/Soft Tissues:** Water-base polymer

**Grid:** Reinforced nylon

Item	Description
682-825	MRI Distortion Phantom for SRS

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