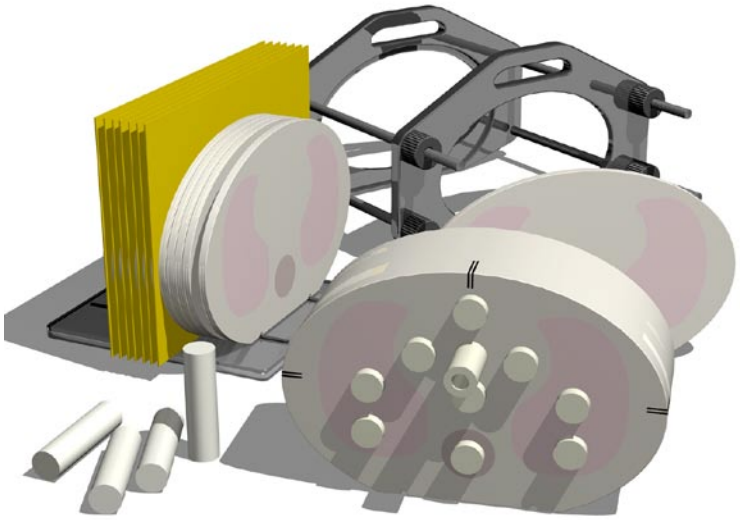
IMRT Thorax Phantom

Complete QA from CT imaging to dose verification

The CIRS Model 002LFC IMRT Thorax Phantom for Film and Ion chamber Dosimetry is 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.

The 002LFC 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. The phantom is manufactured from unique proprietary materials that faithfully mimic water, bone and lung within 1% from 50 keV to 25 MeV.

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. Optional inserts are available to support a variety of other detectors including TLD's, MOSFET, and diodes.



Model 002LFC

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. Optional CT markers are available to ensure accurate film to plan registration.

IMRT Solutions

Features

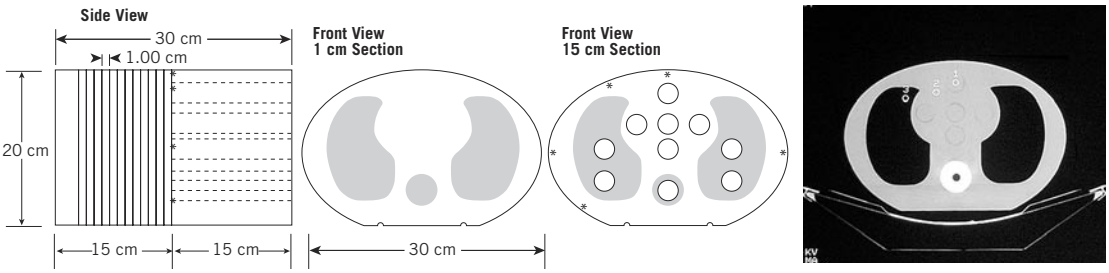
- Verify heterogeneity corrections
- Correlate CTU to electron density
- Check dose distributions in sensitive areas
- Check depth doses and absolute dose
- 2D and 3D isodoses
- Calibrate film with ion chamber
- Verify individual patient treatment plans

Tissue Simulation & Phantom Technology

CIRS

2428 Almeda Avenue • Suite 212 • Norfolk, Virginia 23513 • USA
(800) 617-1177 • (757) 855-2765 • FAX (757) 857-0523
www.cirsinc.com • admin@cirsinc.com

IMRT Phantom Specifications:
Model 002LFC



Model 002LFC Includes

Qty	Model	Description
1		Thorax section drilled to accommodate rod inserts
12		1 cm thorax sections
1		3 cm end section
1	**002AJIG**	Alignment base
1	**002HJIG**	Holding device
1	**002ED**	Electron density reference plugs, set of 4 (lung, bone, muscle, adipose)
1	**002RW CV5XX**	Water equivalent insert with ion chamber cavity
1	**002RB CV5XX**	Bone equivalent insert with ion chamber cavity
1	**002RL CV5XX**	Lung equivalent insert with ion chamber cavity
5	**002RWS**	Water equivalent solid rod inserts
1	**002RBS**	Bone equivalent solid rod inserts
4	**002RLS**	Lung equivalent solid rod inserts
5	**002CTF**	CT to film fiducial markers

Optional Accessories

Model	Description
002BR	Single breast attachment
002FC	Film Stack for small volume 3D image reconstruction
002GC	Gel dosimetry cassette
002HCV	Homogeneous section that accommodates 002FC or 002GC cassettes
002LCV	Thorax region section that accommodates 002FC or 002GC cassettes
002SPH	Tissue equivalent rods for TLD's (set of 5)
002CTF	CT to film fiducial markers
002RW CV5XX	Water equivalent rod inserts with ion chamber cavity
002RB CV5XX	Bone equivalent insert with ion chamber cavity
002RL CV5XX	Lung equivalent insert with ion chamber cavity
002CS	Foam lined carrying case
002CTF	CT to film fiducial markers

IMRT Verification System

CIRS IMRT phantoms are manufactured from tissue equivalent materials that mimic within 1% from 50 keV to 25 MeV for accurate simulation from CT planning to treatment delivery. An 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.[1]

Electron Density Reference Insert

	Density	Electron Density per cc x 10^23	Electron Density Relative to H_2O
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

Ratios of IMRT Phantom Material[2][3]

linear attenuation coefficients to reference tissues.

	Plastic Water-DT to H_2O	Average Bone to Ref[2]	Lung (inhale) to Ref[3]
En, MeV	**Ratio, %**	**Ratio, %**	**Ratio, %**
0.05	100.8	100.00	100.3
0.06	100.5	99.96	101.1
0.08	100.3	99.91	101.9
0.10	100.2	99.88	102.2
0.15	100.1	99.86	102.5
0.20	100.1	99.84	102.5
0.40	100.1	99.84	102.7
0.60	100.1	99.83	102.6
0.80	100.1	99.84	102.7
1.00	100.1	99.83	102.7
1.50	100.1	99.84	102.7
2.00	100.1	99.84	102.6
4.00	100.0	99.87	102.1
6.00	99.8	99.93	101.6
8.00	99.7	99.95	101.2
10.0	99.6	100.03	100.7
15.0	99.2	100.06	100.0
20.0	99.1	100.13	102.7
El. density	100.1	99.83	102.7
Density	1.039 g/cm^3	1.60 g/cm^3	0.21 g/cm^3

1. The CIRS line of IMRT phantoms is compatible with the RIT 113 Software for film to plan analysis.
2. ICRP 23, Report of the Task Group on Reference Man (1975).
3. Woodard, H.Q., White, D.R., The Composition of Body Tissues, The British Journal of Radiology (1986) 59: 1209-1219

042205