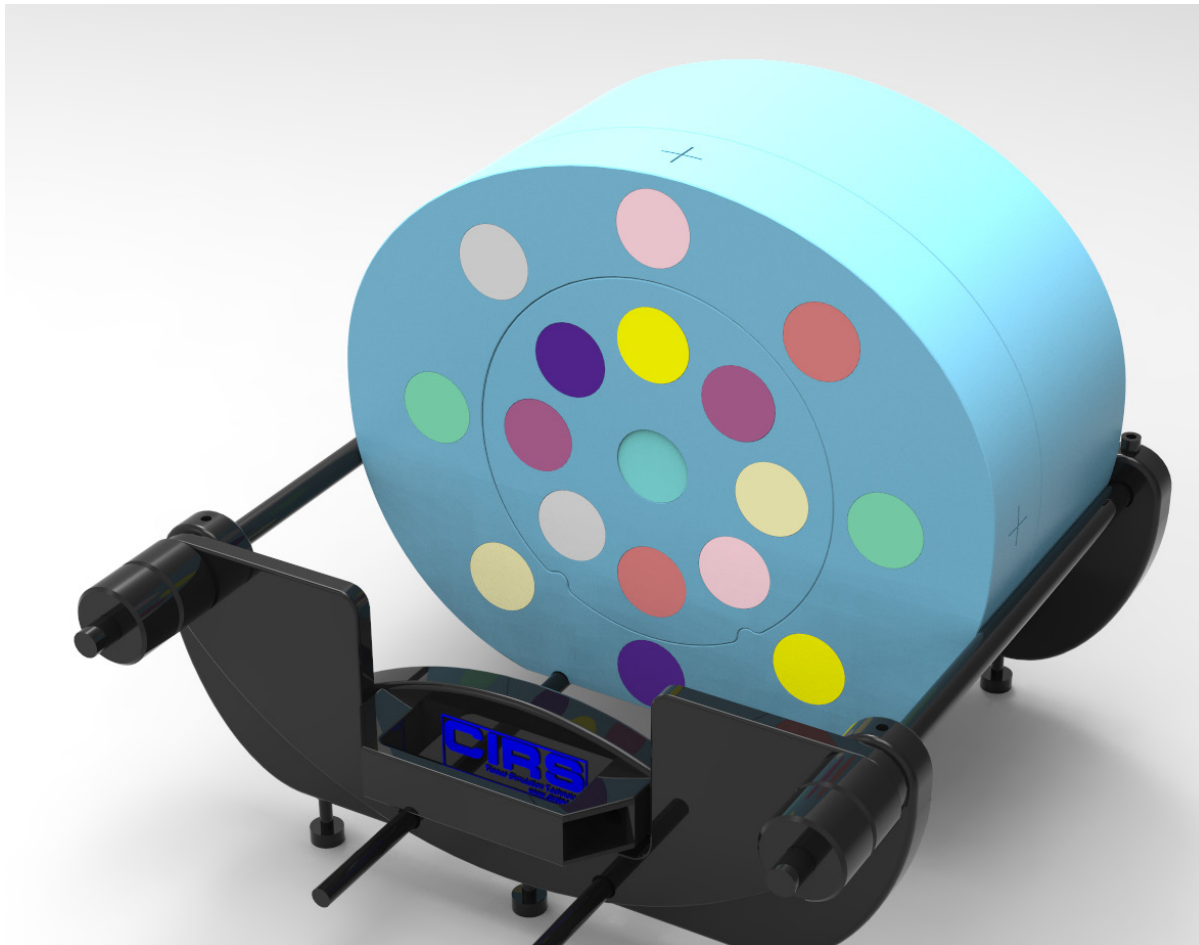


# Multi-Energy CT QA Phantom (MECT)

Model 662



**USER GUIDE**

**CIRS**

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## **TABLE OF CONTENTS & SPECIFICATIONS**

**OVERVIEW & SPECIFICATIONS.....3**

**ASSEMBLY & SET UP.....5**

**DATA COLLECTION AND ANALYSIS.....7**

### **SPECIFICATIONS**

#### **MODEL 662 INCLUDES**

<b>QTY</b>	<b>DESCRIPTION</b>
1	Body (50 mm thick)
1	Head (50 mm thick)
2	Annulus Head Insert (100 mm thick)
2	Annulus Body Insert (100 mm thick)
7	Iodine in Water Plugs ( Ø 10 mm Core)
5	Iodine in Blood Plugs ( Ø 10 mm Core)
6	Calcium Plugs ( Ø 10 mm Core)
1	Blood Equivalent Plug
1	Muscle Equivalent Electron Density Plug
1	Adipose Equivalent Electron Density Plug
1	Water Equivalent Electron Density Plug
1	Water-fillable Plug, Ø 1" removable vial inside (Real water data provided)
1	Holder/Support set
1	Soft Carry Case
1	User Guide
-	60 Month Warranty*

\* Inserts excluded

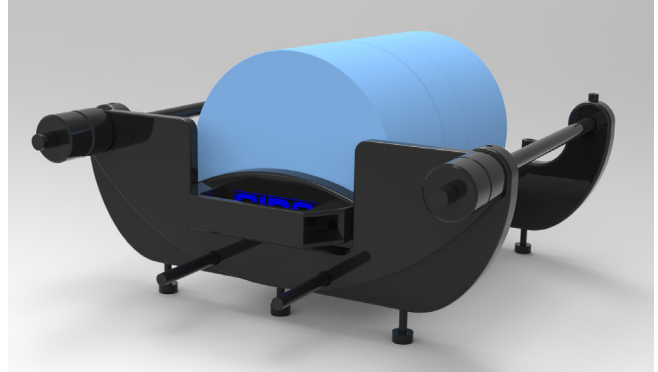
## MULTI-ENERGY CT QA PHANTOM

Multi-Energy CT offers a great improvement in advanced recognition, differentiation, quantification of human tissues and different contrast agents based on their linear attenuation at the different X-Ray energies. A Quality Assurance program that includes appropriate phantoms, is important to ensure accuracy and reproducibility for ME CT scanner performance.

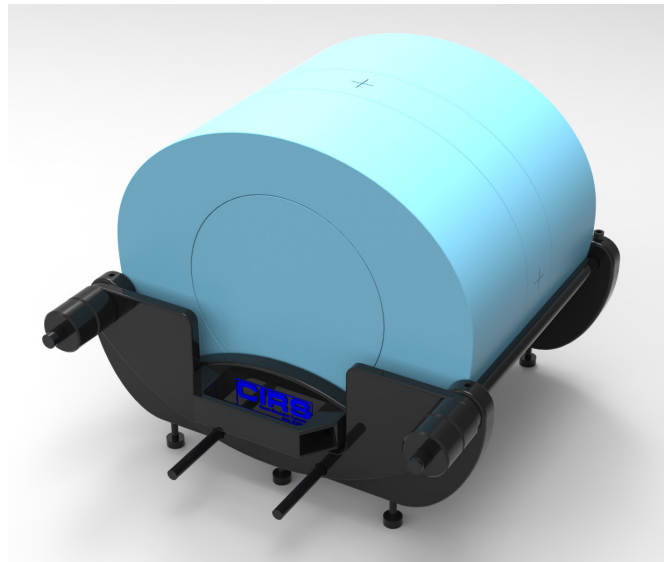
Our Multi-Energy CT (MECT) phantom is designed to assure accurate performance and consistency of Multi-Energy scans. This allows the user to verify the quantitative accuracy of multi-energy scans, check for artifacts in an extended field-of-view and compare the consistency and stability across different scanners.

Our phantom consists of nested disks made from Plastic Water® -LR, which is ideal for Multi-Energy CT. They can represent both head and abdomen configurations. The phantom includes 23 different tissue equivalent plugs with various targets that can be positioned at 17 different locations within the phantom. Also included is a water vial plug that can be filled with any fluid. All inserts with calcium and iodine content contain  $\varnothing$  10 mm targets for minimizing effects of “beam hardening”.

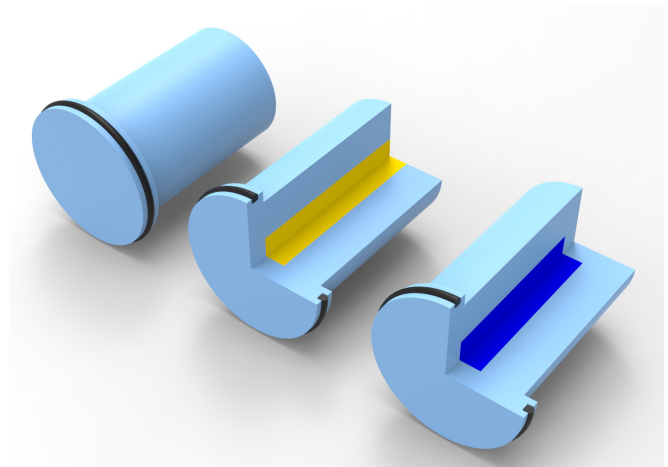
The phantom includes a holder/support stand (062MA-30) that allows for adding additional sections from CIRS model 062 phantom and a soft carry case.



HEAD CONFIGURATION

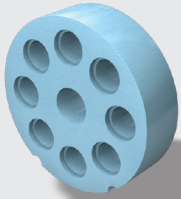


BODY CONFIGURATION

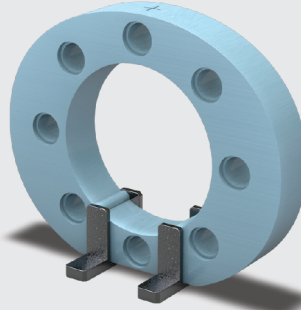


INSERTS

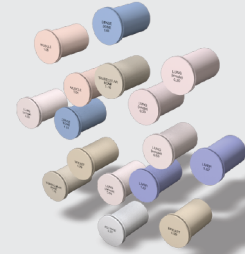
## STANDARD SYSTEM COMPONENTS



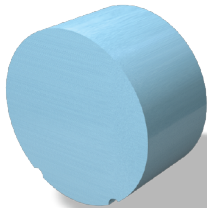
1 Head Insert (50 mm thick)



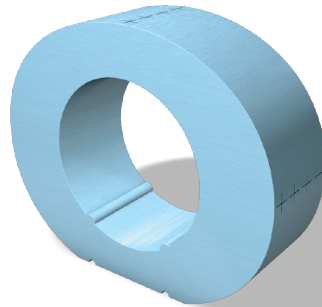
2 Body (50 mm thick)



3 Electron Density Phantom Plugs



4 Annulus Head Insert (100 mm thick)



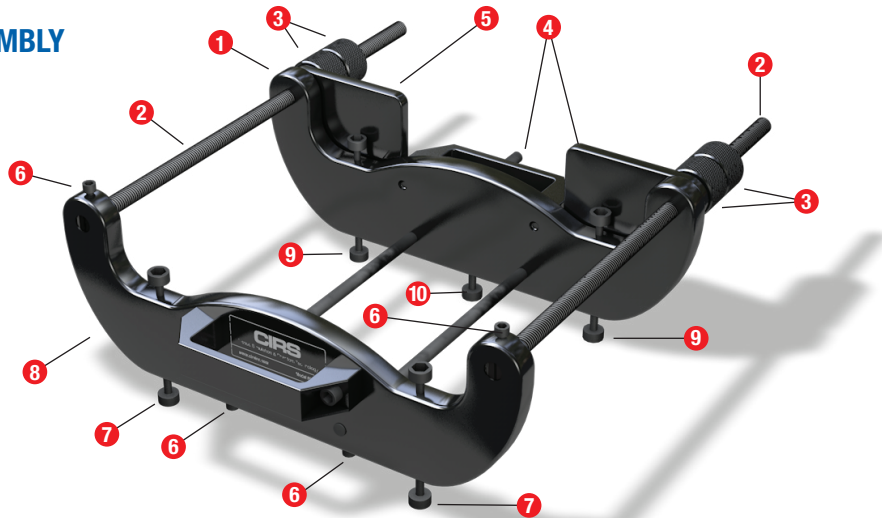
5 Annulus Body (100 mm thick)



10 Holder & Stand

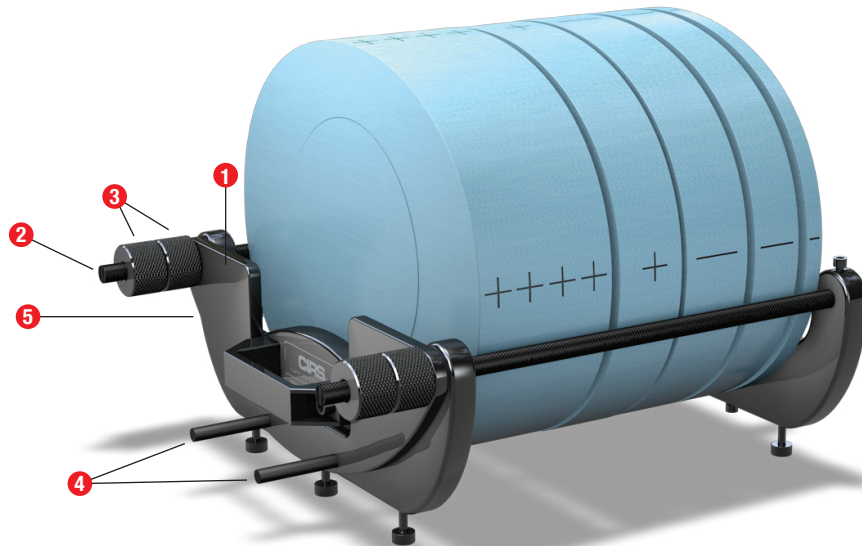
## MECT QA PHANTOM SYSTEM

### SUPPORT BASE ASSEMBLY



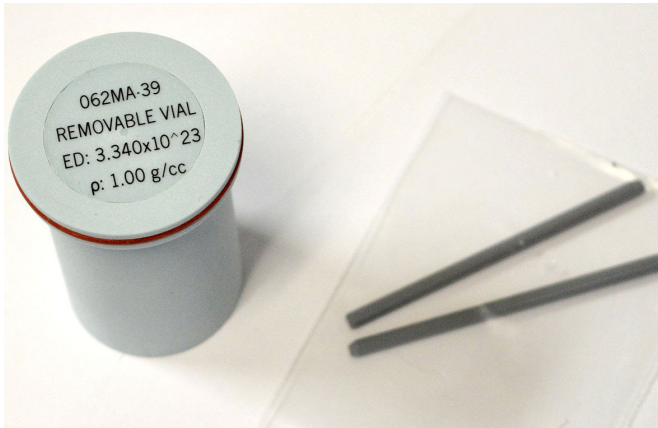
- Identify the front handle plate, **8** which has two adjustable legs. **7**. The front handle plate is shipped with set screws **6** already inserted in proper places
- Attach the two threaded nylon rods **2** to the front handle plate by tightening them in the threaded holes until the ends of rods are flush with the face on which the CIRS label is affixed. Secure in place using provided set screws **6** (1/4-20 x 1/2" long set screws) and provided Allen wrench (do not over tighten the set screws).
- Insert the two carbon fiber rods **4** in the matching holes and secure in place using provided set screws **6** (1/4-20 x 1/2" long set screws) and provided Allen wrench (do not over tighten the set screws).
- Slide the back handle plate **1** (easily identifiable by the presence of three leveling feet) **9 10** through the nylon and carbon fiber rods **4** until it lies on top of the front handle plate. The plate face with the CIRS label affixed should be facing towards the outside.
- Slide the buffer plates **5** through the nylon and carbon fiber rods until it lies on top of the back handle plate.
- Tighten two plastic knurled knobs **3** on each threaded nylon rod.

### SECTION SET UP

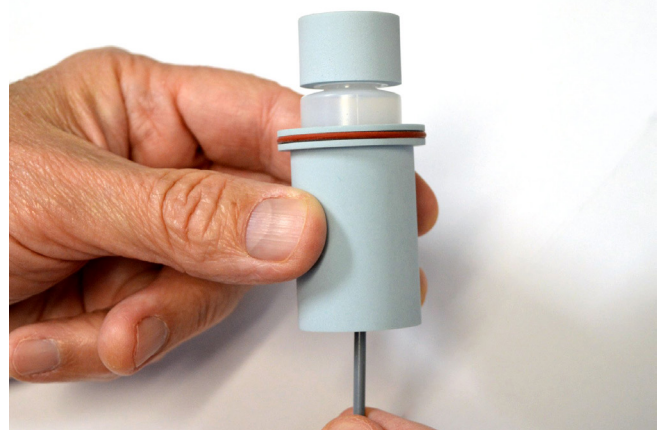
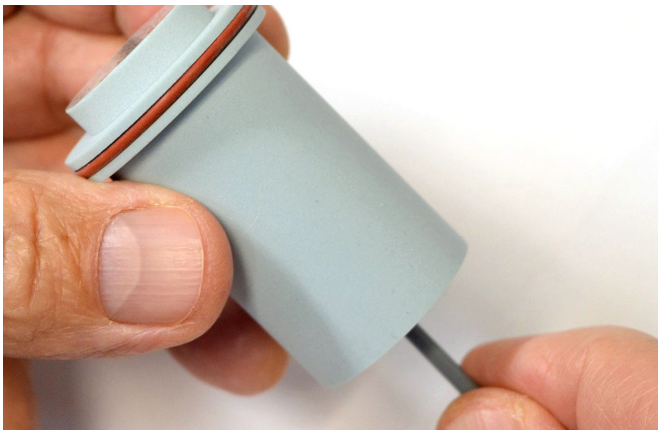


- Set up the phantom by pushing the back handle plate **1** and adjacent buffer plate **5** against the plastic knurled knobs. **3**
- Fully extended the support before adding the phantom sections
- When placed on the support, the phantom sections rest on the two carbon fiber rods, **4** which align the sections with respect to each other and on the two threaded nylon rods. **2**
- Secure sections on the support by tightening the knurled knobs. **3**

## WATER-FILLABLE ELECTRON DENSITY PLUG MODEL 062MA-39



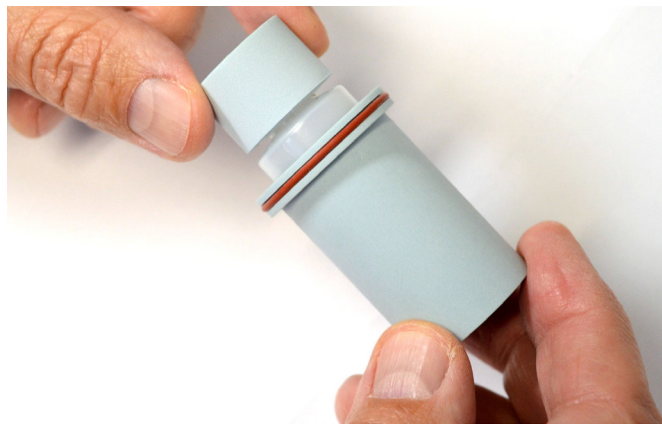
062MA-39 insert with removable vial and Push-Rods



Use Push-Rod provided to push the vial out of insert through the small hole in the bottom of the insert.



Fill vial (middle) with desired liquid and screw the lid onto the vial.



Insert vial back into the insert ensuring the lid is leveled with the insert. Please note that parts are machined with tight tolerances, there will be some friction.

## MECT QA PHANTOM SYSTEM

### QUALITY ASSURANCE TESTING

QA testing can be as thorough as the user may require. Scanner manufacturer's recommendation should be followed in developing a QA plan. Phantom scanning provides a method for learning about the stability of the scanner in question and its ability to image and display various tissues.

- **CTU OF H<sub>2</sub>O**

The Real Water Electron Density Plug (062MA-39), which incorporates a Ø 25.4 mm (1") vial, allows for scanning of regular water at various positions in the scan field with beam hardening effects in existence. A good QA practice involves keeping records over time of the CT value of the H<sub>2</sub>O insert in various locations. Alternatively, the insert can be used for scanning contrast agents.

Filling Instructions: Remove the vial by pushing it out of the plug shell using the provided push rod (there is a hole on the bottom face of the plug shell that matches the size of the push rod.) Do not remove the shell cap that is glued to the vial's top cap. Fill with water or desired contrast agent, and tighten the shell cap so that it is flush with the face of the plug that encapsulates the water vial.

- **CTU OF HOMOGENEOUS SIMULATED TISSUES**

The phantom includes 22 tissue-equivalent plugs and a water vial (encapsulated in a containing plug). Water is recommended to be placed in the middle of the phantom as a reference.

CTU variations can be tested by comparing an exposure of the Multi-Energy CT Phantom (662) facing front, with an exposure of the phantom turned in the opposite direction. Users are free to determine the location of each insert, although configuration options may be limited due to situations where single (optional) inserts are chosen for evaluation.

- **DISTANCE MEASUREMENTS**

An optional distance marker insert (062MA-13) with small longitudinal holes is available. Measure the distance between holes using scanner "caliper" function and compare to actual distance measured on the phantom with a ruler or caliper.

- **IMAGE QUALITY**

Image quality can be assessed by using the optional 062QA-35 phantom. See model 062 for more information.

## MECT QA PHANTOM SYSTEM

### Iodine in PW-LR (Blue label)

IODINE CONCENTRATION MG/CC	TARGET DENSITY G/CC	ELECTRON DENSITY X 10 <sup>23</sup> CM-1	Z <sub>EFF</sub>
0.20	1.0301	3.340	7.469
0.50	1.0304	3.340	7.650
1.00	1.0307	3.341	7.954
2.00	1.0314	3.343	8.450
5.00	1.0336	3.347	9.713
10.00	1.0371	3.355	11.294
15.00	1.0407	3.363	12.528

### Iodine in Blood (Gray label)

IODINE CONCENTRATION MG/CC	TARGET DENSITY G/CC	ELECTRON DENSITY X 10 <sup>23</sup> CM-1	Z <sub>EFF</sub>
Blood	1.0760	3.511	7.344
0.50	1.0763	3.512	7.636
2.00	1.0773	3.514	8.402
5.00	1.0794	3.518	9.621
10.00	1.0827	3.525	11.158
15.00	1.0861	3.539	12.363

### Calcium in PW-LR (Gray label)

IODINE CONCENTRATION MG/CC	TARGET DENSITY G/CC	ELECTRON DENSITY X 10 <sup>23</sup> CM-1	Z <sub>EFF</sub>
10	1.035	3.389	7.646
20	1.052	3.437	8.054
40	1.091	3.541	8.757
60	1.120	3.632	9.314
120	1.224	3.933	10.557
240	1.422	4.504	12.153

### Standard 062 Inserts

PART NO.	DESCRIPTION	*PHYSICAL DENSITY, g/cc	ELECTRON DENSITY, x 10 <sup>23</sup> electrons/cc	Z <sub>EFF</sub>
062A-10	Muscle Equivalent Electron Density Plug	1.06	3.483	7.238
062A-11	Adipose Equivalent Electron Density Plug	0.96	3.171	6.310
062MA-16	Water Equivalent Insert	1.029	3.333	7.343
062MA-39	Water-fillable Electron Density Plug, Ø 1" removable vial inside (Real water data provided)	1.00	3.340	7.417



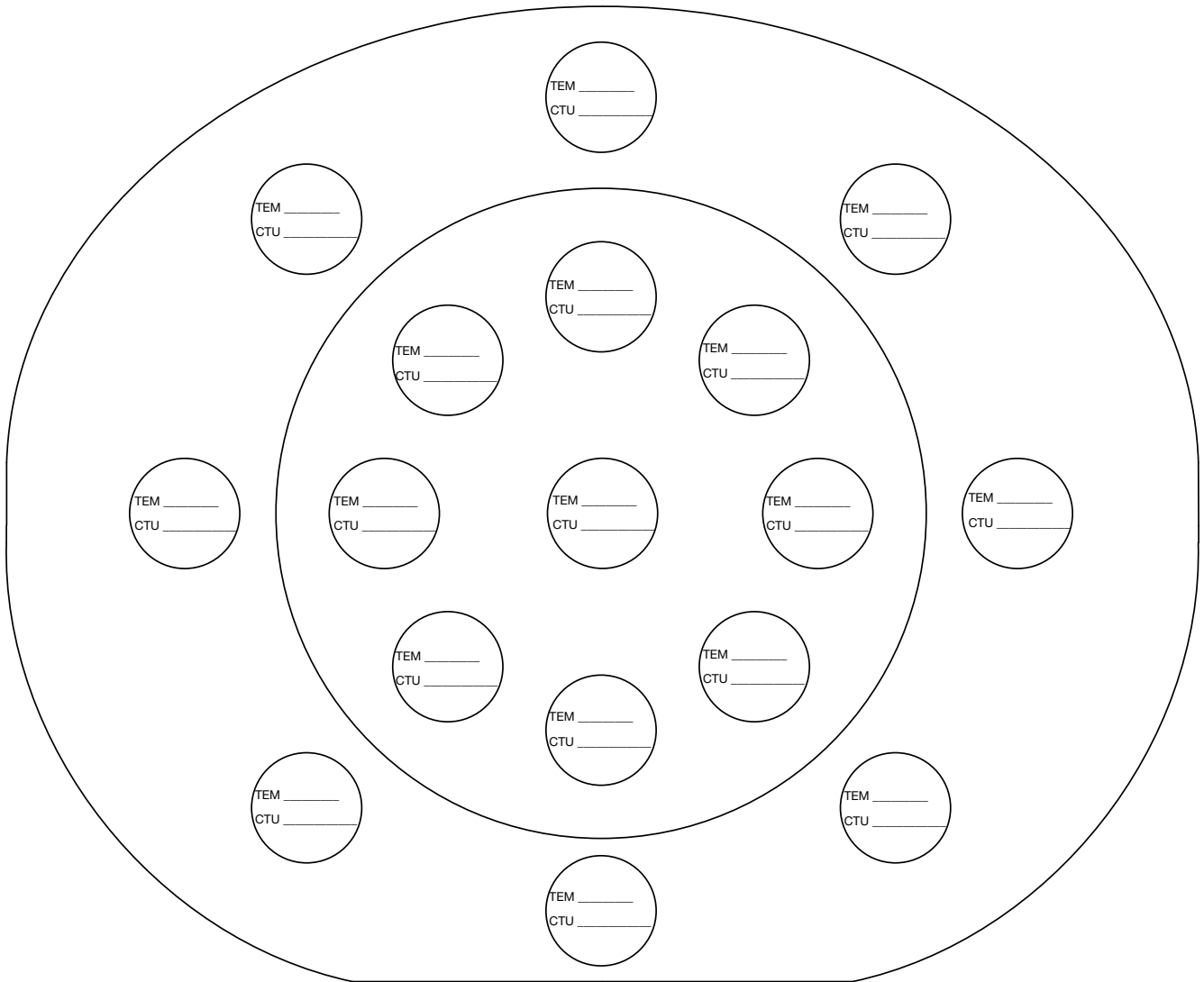
# TEST DATA SHEET

TEST DATE: \_\_\_\_\_

PHANTOM S/N: \_\_\_\_\_

PHANTOM S/N: \_\_\_\_\_

DATE: \_\_\_\_\_



TEM: Tissue Equivalent Material

TESTER: \_\_\_\_\_

## HANDLING & WARRANTY

### HANDLING INSTRUCTIONS

It is recommended to store phantom and its inserts in the provided carrying case. In order to minimize the shrinking/collapsing of the phantom's holes (shrinking/collapsing magnitude can be up to a few tenths of microns) due to the material nature and long term storage it is recommended that the carrying case that stores the phantom is laid on one side so as the phantom's sections have the holes in a vertical orientation. Also, it is recommended that for long term storage all the phantom's holes are fitted with the appropriate matching parts.

### WARRANTY

All standard CIRS products and accessories are warranted by CIRS against defects in material and workmanship for a period as specified below. During the warranty period, the manufacturer will repair or, at its option, replace, at no charge, a product containing such defect provided it is returned, transportation prepaid, to the manufacturer. Products repaired in warranty will be returned transportation prepaid.

There are no warranties, expressed or implied, including without limitation any implied warranty of merchantability or fitness, which extend beyond the description on the face hereof. This expressed warranty excludes coverage of, and does not provide relief for, incidental or consequential damages of any kind or nature, including but not limited to loss of use, loss of sales or inconvenience. The exclusive remedy of the purchaser is limited to repair, recalibration, or replacement of the product at manufacturer's option.

This warranty does not apply if the product, as determined by the manufacturer, is defective because of normal wear, accident, misuse, or modification.

#### NON-WARRANTY SERVICE

If repairs or replacement not covered by this warranty are required, a repair estimate will be submitted for approval before proceeding with said repair or replacement.

### RETURNS

If you are not satisfied with your purchase for any reason, please contact Customer Service or your local distributor prior to returning the product. Visit <https://www.cirsinc.com/distributors/> to find your local distributor. Call 800-617-1177, email [rma@cirsinc.com](mailto:rma@cirsinc.com), or fax an RMA request form to 757-857-0523. CIRS staff will attempt to remedy the issue via phone or email as soon as possible. If unable to correct the problem, a return material authorization (RMA) number will be issued. Non-standard or "customized" products may not be returned for refund or exchange unless such product is deemed by CIRS not to comply with documented order specifications. You must return the product to CIRS within 30 calendar days of the issuance of the RMA. All returns should be packed in the original cases and or packaging and must include any accessories, manuals and documentation that shipped with the product. The RMA number must be clearly indicated on the outside of each returned package. CIRS recommends that you use a carrier that offers shipment tracking for all returns and insure the full value of your package so that you are completely protected if the shipment is lost or damaged in transit. If you choose not to use a carrier that offers tracking or insure the product, you will be responsible for any loss or damage to the product during shipping. CIRS will not be responsible for lost or damaged return shipments. Return freight and insurance is to be pre-paid.

#### WITH RMA NUMBER, ITEMS MAY BE RETURNED TO:

CIRS Receiving  
900 Asbury Ave  
Norfolk, Virginia, 23513 USA

PRODUCT	WARRANTY PERIOD
Multi-Energy CT Phantom	60 Months*

\*Inserts excluded





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Publication: 662 UG 071620

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