

NEMA® Cardiology Phantom

Nuclear Associates Model 07-680



Figure 1. The NEMA Cardiology phantom

- Phantom and test procedures simulate a range of fluoroscopically-guided invasive and interventional procedures
- Provides simultaneous objective measurements of image quality and phantom entrance dose
- Test results characterize the performance of the complete system under simulated clinical conditions
- All tests are performed using the imaging system configured for normal clinical use

Introduction

The NEMA Cardiology Phantom was designed by collaboration with SCA&I to provide a cardiovascular fluoroscopy benchmark phantom. It is used to test systems under conditions simulating normal clinical use for fluoroscopically-guided invasive and interventional procedures.

The phantom test ensemble includes: tests for imaging-field geometry, spatial resolution, low-contrast iodine detectability, working thickness range, motion unsharpness and phantom entrance dose.

Applications

Test objects are positioned at the center of the NEMA Cardiology Phantom. This simulates the location of clinically important organs. The NEMA Cardiology Phantom, positioned with its center at the x-ray system's isocenter, simulates clinical imaging geometry. Therefore, the geometric magnification of the test objects is similar to that of the clinical target. The receptor blur, focal spot penumbra blur and x-ray scatter are also similar in test and clinical conditions. The entrance surface of a thick phantom is closer to the x-ray tube than the entrance surface of a thin phantom. This is an additional reason why patient (phantom) dose increases with phantom thickness.

- **Visualized field size** A plate is placed on the entrance surface of the image receptor. The plate is fluorographed to determine the actual field of view (FOV).
- **Congruence of irradiated and visualized fields** This test is not needed if the shutters are fully seen in the FOV under test. (CAUTION: digitally synthesized shutters may simulate this effect without actual beam collimation.)
- **Spatial resolution** A standard bar pattern insert is included in the central test plate. The test plate is placed with the bars at 45° to the video lines or digital image matrix. This produces the smallest change in the moiré pattern, resulting from a small change in angle. See Figures 2 and 3.

Features

- **Independent confirmation**
Reassurance of an optimally working system
- **Quick evaluation**
The machine is tested in its clinical configuration
- **Verification**
That the system actually needs to be serviced, allowing you to save time, money and avoid more serious problems later on
- **Ease-of-use**
Anyone with technical knowledge can do the tests to determine if corrective action is necessary
- **Peace of mind**
To make sure that you are getting just what you paid for



Figure 2. Spatial Resolution: the 1.4 & 1.6 line-pair/mm targets are resolved. The 1.8 & 2.0 targets are not resolved

- **Spatial resolution** (*continued*)

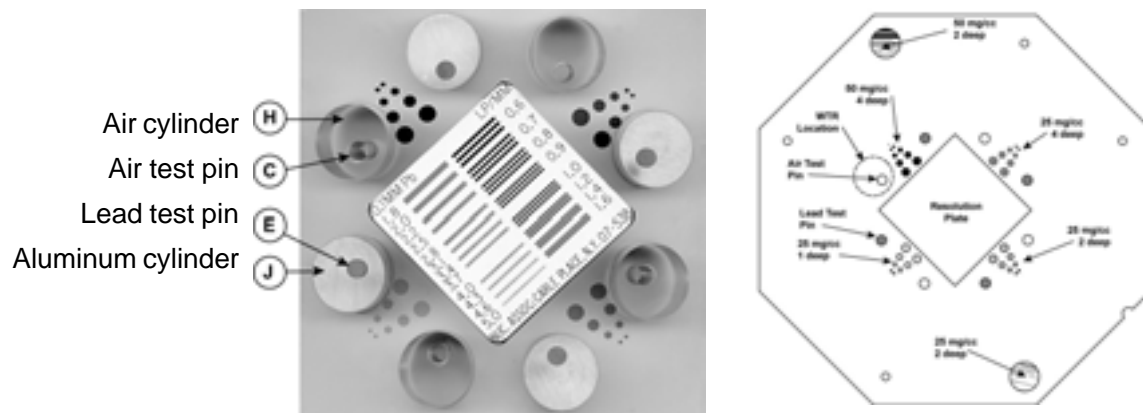


Figure 3. Photograph and diagram of the central test plate. Note the resolution test plate, iodine contrast-detail targets, and working thickness range targets

- **Low contrast detectability** Four sets of holes with diameters of 4, 3, 2, and 1 mm are filled with elemental iodine dispersed in epoxy. The relative areal concentration of iodine in the four patterns is 20, 10, 5, 2.5 mg/cm². The test operator is required to identify the smallest visible pair of targets in each pattern. See Figure 4.

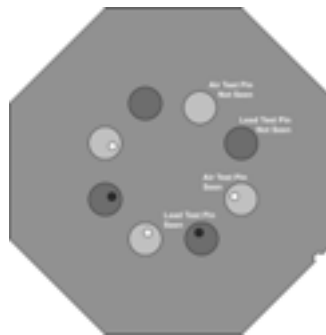


Figure 4. Working Thickness Range. Three examples of white clipping and two examples of black clipping

- **Visibility of moving structures** A rotating spoke target allows visual evaluation of motion unsharpness and the effects of temporal averaging. The device contains five steel wires of different diameters (0.022, 0.016, 0.012, 0.009 and 0.005 inches or 0.56, 0.41, 0.30, 0.23, 0.13 mm). Two lead dots are used to evaluate lag and recursive filtering. Rotation speed is 30 revolutions/min. The linear velocity of the outer lead dot is 200 mm/sec. The rotating disk replaces the central test plate at the isocenter. See Figure 5.

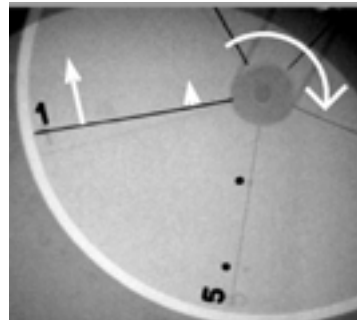


Figure 5. Motion target

- **Dosimetry – dosimetry tools** The NEMA Cardiology Phantom entrance exposure rate is measured at a standardized position in front of the entrance surface of the phantom (25 mm). This position is considered an acceptable choice for this particular benchmarking phantom. The phantom can also be configured to generate the FDA measuring point (30 cm in front of the image receptor). See Figure 6.

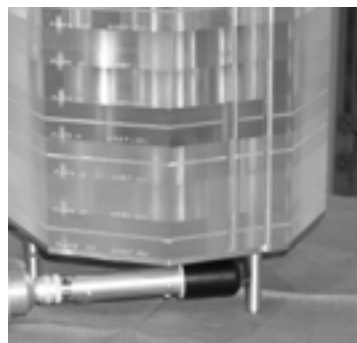
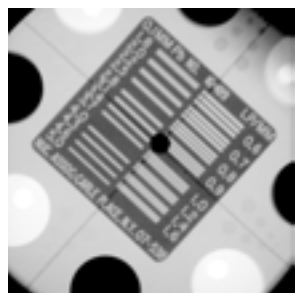


Figure 6. Example of typical dosimetry measurement Geometry. Dosimetry center is always 25 mm below bottom of phantom

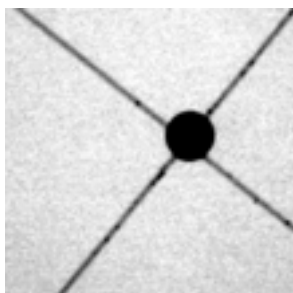
- **Working thickness range** The ability to image structures overlaid by bone or air. Systems with inadequate single-image latitude are unable to do this in bright (air) or dark (bone) portions of the image. The NEMA Cardiology Phantom contains eight cylinders composed of different heights of air, aluminum and plastic. These cylinders are calibrated for a total 20 cm phantom thickness. A 50 mm deep air challenge target overlaps the four air cylinders. The bright side dynamic range is determined by how many of these targets are seen. A 5 mm lead challenge target overlaps the four aluminum cylinders. The dark side dynamic range is determined by counting these targets. See Figure 4.

How does the NEMA Cardiology Phantom actually work?

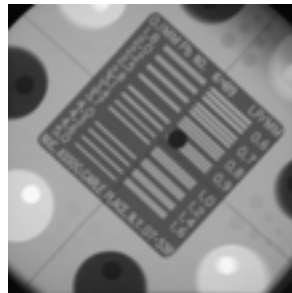
The field size plate is placed on top of the phantom. A second plate with a centered radiopaque dot is placed in the base. The imaging gantry is adjusted until the cross wires intersect the approximate center of the disk. See Figure 7.



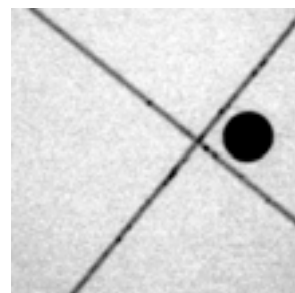
A



B



C



D

Fluorographs A and B demonstrate acceptable alignment of the NEMA phantom.

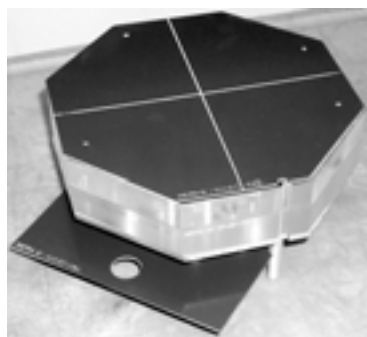
In fluorograph A, the spatial resolution test plate and several of the low contrast detectability targets are shown. Both lines cross at the dot.

Fluorograph B shows both lines crossing at the dot. (The test plates have been removed.)

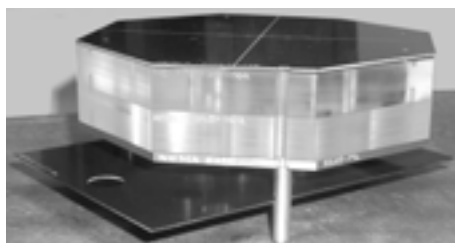
Fluorographs C and D demonstrate poor alignment of the NEMA phantom.

In fluorograph C, the spatial resolution test plate and several of the low contrast detectability targets are also seen in this image. The intersection of the two lines is outside the dot.

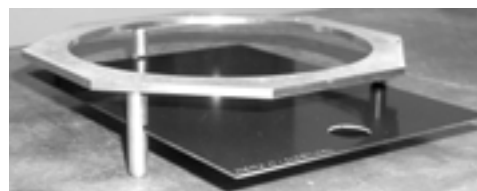
Fluorograph D shows the intersection of the two lines outside the dot. (The test plates have been removed.)



***NEMA Base with both lower (dot) and upper (cross) alignment plates in position**



***NEMA Base with both lower (dot) and upper (cross) alignment plates in position. Note that the grooves on the side of each plate ensure the correct orientation of the plates**

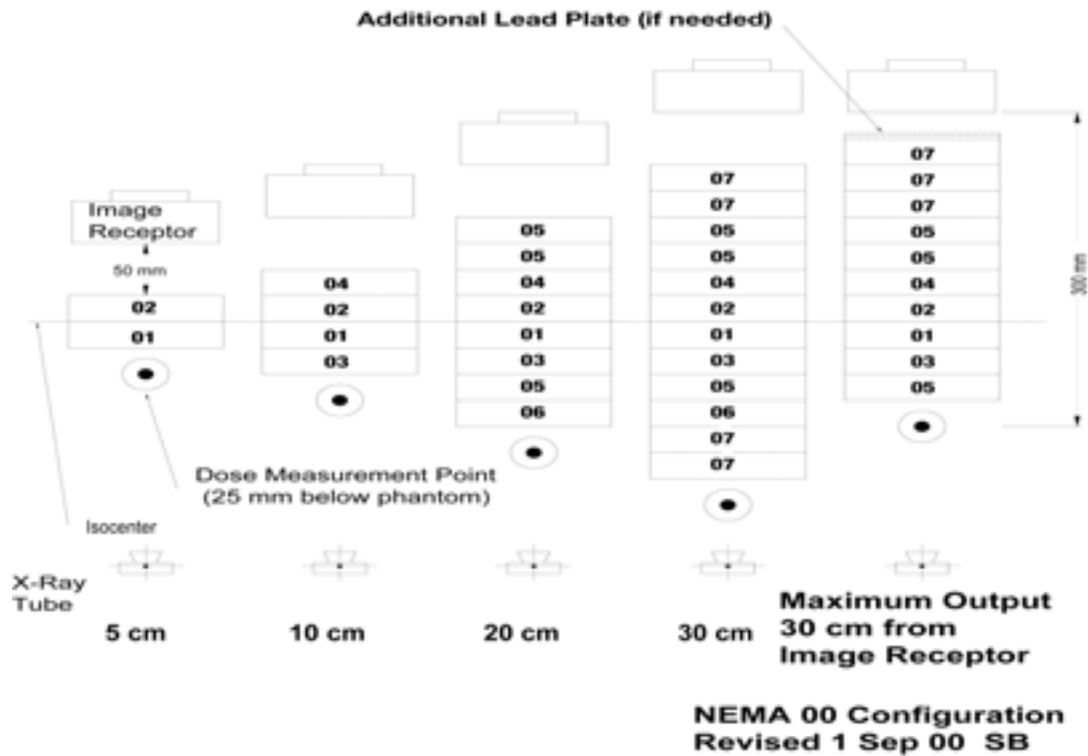


NEMA Base with lower alignment plate (dot plate) in position. Note that the leading edge of the plate fully engages the cutout in the rear leg

Figure 7. Alignment Tools

** For photographic purposes, only two of the test plates are shown; alignment is actually performed using required number of test plates.*

Plate identification and stacking order



Specifications

Material

Material	Thickness tolerance	Comments
PMMA plates	± 1 mm	
Aluminum	± 0.5 mm	Type-1100
Piano wires	Commercial steel	These are "standard" items
Lead pins	± 1 mm	
Lead plate	± 0.1 mm	
Copper plate	± 0.1 mm	
Iodine	$\pm 5\%$	Reagent grade tolerance is concentration in epoxy
PC boards		Solder-covered traces thick enough to be seen through 30 cm of PMMA

Available model(s)

07-680 NEMA Cardiology Phantom, consists of phantom, rotating target (110 or 220 V), test stand, alignment pins, x-ray test pattern, and carrying case

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA. Specifications are subject to change without notice.

NEMA is a registered trademark of the National Electrical Manufacturers Association for its publication of voluntary standards and guidelines. NEMA is not a certification mark. RadiaXon is a trademark of WRP-Asia Pacific Corporation.

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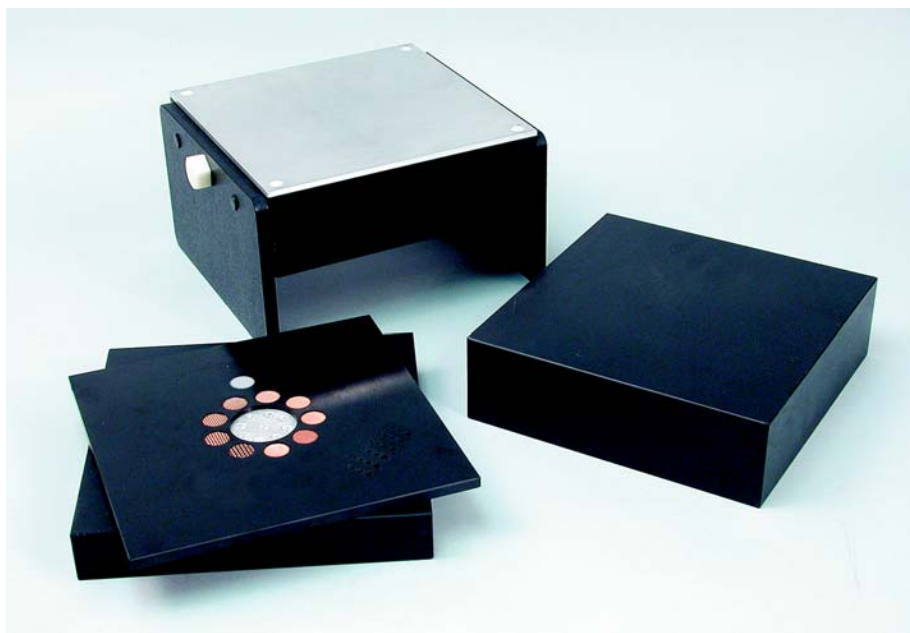
See also, RadiaXon™ Radiation Attenuation Gloves (Model 57-965) used in interventional procedures.

ACR Radiography Fluoroscopy Accreditation Phantom

Model 07-903



Diagnostic Imaging



- Complies with ACR phantom specifications for fluoroscopy accreditation
- Ideal for initial QA assessment and for routine monthly QA testing
- Highly durable PMMA phantom material offers the same x-ray attenuation properties as acrylic

Introduction

The ACR Radiography Fluoroscopy Accreditation Phantom is designed to be an integral part of the American College of Radiology (ACR) Radiography Fluoroscopy Accreditation Program. This voluntary program provides physicians with an opportunity for a comprehensive peer review of their Radiography Fluoroscopy facility, personnel qualifications, image quality and quality assurance programs.

Applications

The ACR Radiography Fluoroscopy Accreditation Phantom can be used for initial QA assessment and routine monthly QA testing to help ensure patients are receiving the best possible x-ray examinations. The phantom is manufactured from PMMA equivalent epoxy that offers the same x-ray attenuation properties as acrylic with significantly greater durability.

The overall phantom measures 25 wide x 25 long x 20.7 cm high and consists of three attenuation plates, one test object plate and a detachable stand for easy, reproducible set-up.

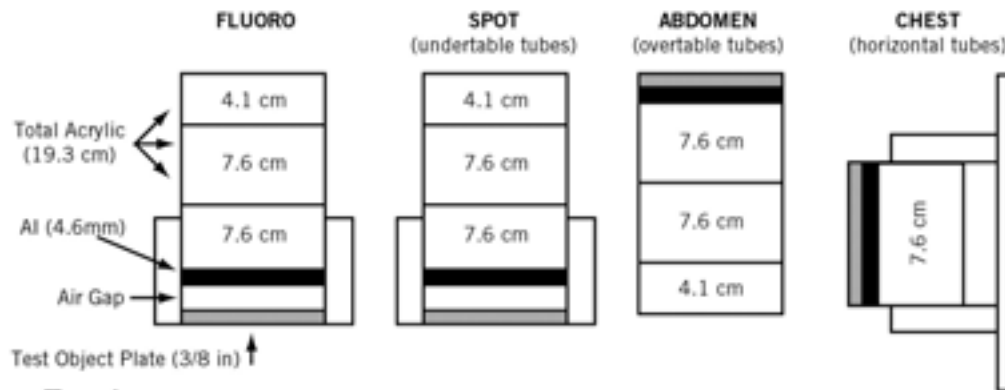
Test objects include high-resolution copper mesh targets from 12 to 80 lines per inch, two separate contrast-detail test objects.

Features

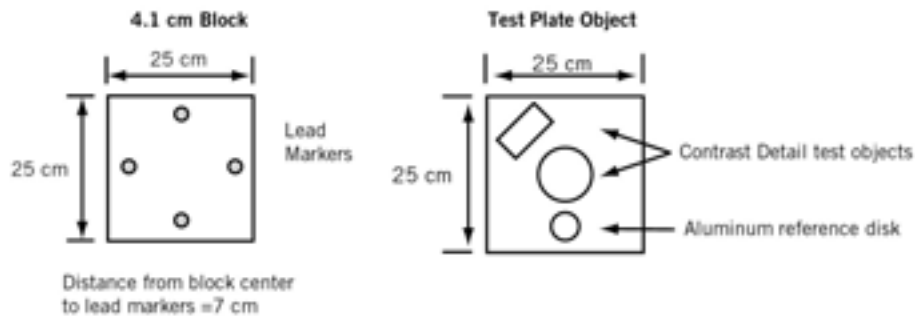
- Easy-to-use stand for easy use and reproducible images
- High resolution copper mesh targets and low contrast hole patterns help to quantify the full dynamic range of the systems capabilities

Specifications

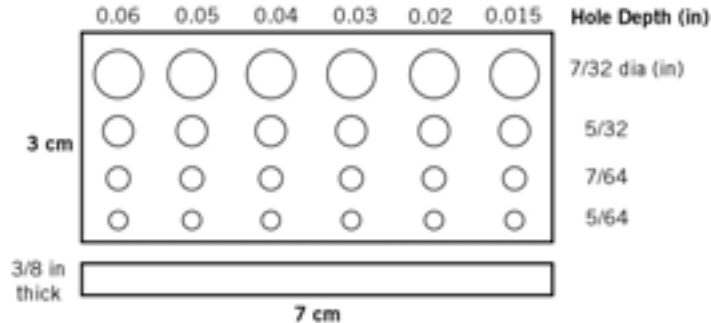
Side view



Top view



Contrast-detail test object

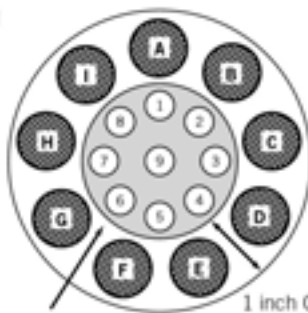


HIGH CONTRAST MESH

LINES PER INCH

- A-80
- B-12
- C-16
- D-20
- E-24
- F-30
- G-40
- H-50
- I-60

Meshes arranged in incremental order
Lines angled at 45°



LOW CONTRAST HOLES

IN ALUMINUM DISK

HOLE DEPTHS

- 1 - 0.068
- 2 - 0.049
- 3 - 0.035
- 4 - 0.025
- 5 - 0.018
- 6 - 0.0126
- 7 - 0.0091
- 8 - 0.0063
- 9 - 0.0040

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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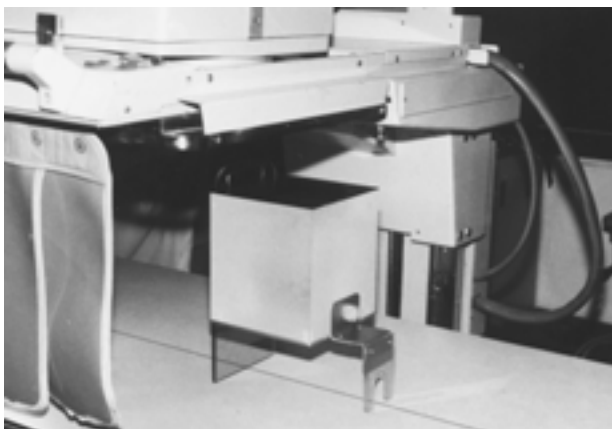
CDRH Fluoroscopic Phantom Model 07-649

DI

Diagnostic Imaging

Introduction

The Nationwide Evaluation of X-Ray Trends (NEXT*) fluoroscopy protocol has been issued to provide guidelines for quality control procedures for diagnostic fluoroscopy. In order to perform these procedures, a suitable phantom was developed: the Model 07-649 CDRH Fluoroscopic Phantom.



In a survey of fluoroscopic facilities for the NEXT program, it was determined that a substantial proportion of facilities could not visualize low-contrast test objects; this strongly suggests image quality problems. Measurements for this survey were performed using the Model 07-649 CDRH Fluoroscopic Phantom. In addition to air kerma rate (free in air) measurements, imaging performance was assessed using the Fluoroscopic Image Quality Test Object (included with phantom).¹ The phantom also contains a lead stop plate and copper attenuation plate.

Applications

By using the Model 07-649 CDRH Fluoroscopic Phantom, doses at fluoroscopy can be reduced, and fluoroscopic image quality can be improved.

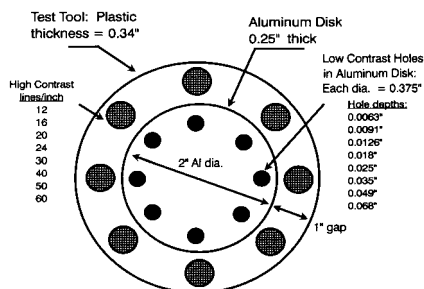
Specifications

This patient-equivalent phantom of uniform thickness consists of a 7 inch thick acrylic block, one Fluoroscopic Image Quality Test Object, one lead stop plate and one copper attenuation plate. The base of the phantom is comprised of two type-1100 aluminum plates, each 2.3 mm thick. The phantom has four lead beads embedded on top, to be used as collimation orientation points. It stands on two legs, approximately 4 inches off the tabletop. One leg is specially designed as a probe holder.

Lead stop plate This 3.2 mm (0.125 inch) plate simulates maximum attenuation, and can be used to measure the maximum air kerma rate (free in air)

Copper attenuation plate This 1.6 mm (0.06 inch) copper filter simulates the presence of a 2 mm thick layer of barium sulfate, and can be used to measure the air kerma rate (free in air)

Fluoroscopic image quality test object



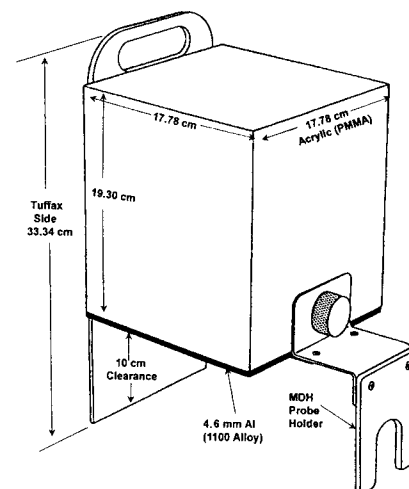
This is comprised of eight low-contrast test holes (each 0.375 inch Ø, and ranging in depth from 0.0063 to 0.068 inch) and eight wire meshes (ranging from 12 to 60 lines per inch). The test object is used for the assessment of spatial resolution, and can easily be taken on and off the phantom

Free clinical study reprint available

- Orhan H. Suleiman, MS, Ph.D., Burton J. Conway, MS, Phil Quinn, MS, Robert G. Antonsen, BS, Fred G. Rueter, Dsc, Robert J. Slayton, MS, and David C. Spelic, MS, Ph.D., "Nationwide Survey of Fluoroscopy: Radiation Dose and Image Quality," *Radiology*, 203:2 (May 1997), 471-476. **Request Reprint No. 523B.**

* The Conference of Radiation Control Program Directors (CRCPD), the professional organization of state and local radiation control agencies, along with the Food and Drug Administration (FDA) of the federal government, conducts the Nationwide Evaluation of X-Ray Trends (NEXT) survey program.

- Conforms to Center for Devices and Radiological Health (CDRH) specifications
- This phantom is now required in order to comply with QC tests recommended in the ACR's Barium Enema QC Manual
- Recommended in AAPM Report #60, "Instrumentation Requirements of Diagnostic Radiological Physicists"
- Optimized for both under- and over-table fluoroscopic tubes
- Compact, and easy to use



Dimensions 7 x 7 x 8 in (h) (17.8 x 17.8 x 19.3 cm)

Weight 21 lb (9.55 kg)

Optional accessories

Fluoroscopic Image Quality Test Object (Model 07-649-1169)

Carrying Case (Model 89-649)

Available model(s)

07-649 CDRH Fluoroscopic Phantom, includes fluoroscopic image quality test object, lead stop plate, and copper attenuation plate

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

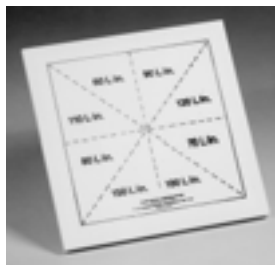
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Fluoroscopic System Resolution Test Tools

Model 07-601

- For resolution checks of fluoroscopic imaging systems



60-150 mesh
(Model 07-618)

These 7.50 inch square plastic plates each have a 7 inch square area containing eight groups of copper or brass mesh screening in the following mesh-size ranges: 16 to 60 lines/inch, 30 to 100 lines/inch or 60 to 150 lines/inch. The screens are arranged in an irregular rotation to permit discrete visualization of groups. They can also be used to optimize television system focus as well as mirror optics and image intensifier settings.

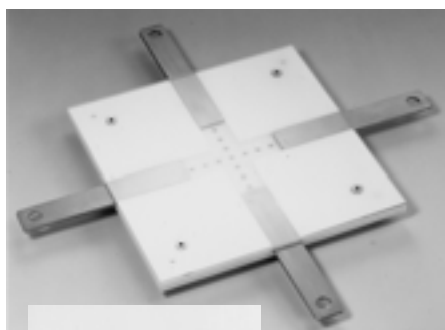
Specifications

Dimensions 7.5 (w) x 7.5 (d) x 0.35 in (t)
(19 x 19 x 0.3 cm)

Weight 0.5 lb (0.225 kg)

Available model(s)

- 07-601** Fluoroscopic Resolution Tool, 16-60 mesh
- 07-619** Fluoroscopic Resolution Tool, 30-100 mesh
- 07-618** Fluoroscopic Resolution Tool, 60-150 mesh
- 07-601-1414** Fluoroscopic Resolution Tool, 16-60 mesh, 14 x 14 inch



X-ray film of beam alignment device taken by a misaligned fluoroscope machine with a defective collimator

Fluoroscopic Beam Alignment Device

Model 07-600

- Reduces exposure to the patient

In misaligned fluoroscopic image intensifier systems, the portion of the field that falls outside the visible area of the image receptor does not contribute to the useful fluoroscopic image and can result in unnecessary exposure to the patient.

If corrective measures are required, this device will provide a measurement of optimum beam alignment. It consists of an aluminum plate with four sliding brass strips set in recessed channels. The strips define the visible area of the image receptor and are adjustable with respect to the center of the measurement plate. A transparent plastic overlay on the aluminum plate prevents the vertical

displacement of the brass strips. Holes drilled at 0.5 inch intervals through the center of each channel are filled with high density plugs. The visibility of the plugs in the fluoroscopic image permits their use as a means of centering the device.

Specifications

Dimensions 9 (w) x 9 (d) x 0.625 in (t)
(23 x 23 x 1.6 cm)

Weight 5 lb (2.27 kg)

Available model(s)

- 07-600** Fluoroscopic Beam Alignment Device
- 07-600-1414** Fluoroscopic Beam Alignment Device, 14 x 14 inch



Flex Film Cassettes

Models 07-800 Series

- Three popular sizes are available for your convenience: 5 x 7, 8 x 10, and 10 x 12 inch

Flex Film Cassettes are:

- Convenient to use; an alignment grid is printed on one side
- Easy-to-load; they fit easily around contoured items
- Durable; use them again and again
- Resistant to moisture and dirt; they're easy to clean
- Available in custom sizes; cassettes have been manufactured in sizes up to 68 inches long. Metric sizes are also available on special order

We are pleased to offer Flex Film Cassettes, the flexible vinyl x-ray film holders that provide unsurpassed detail and resolution. Unlike conventional cassettes, Flex Film Cassettes contain no screen, so you get direct exposure of the x-ray film and a better image. Flex Film Cassettes offer an ideal combination of firmness and flexibility for a variety of medical and industrial applications; that's why they are the most widely used flexible film cassettes in the industry.

Flex Film Cassettes are the best choice for QC testing of imaging equipment. They are ideal for use with such test tools as: the Mini CT QC Phantom, all X-Ray Test Patterns, all Slit Cameras, and all Focal Spot Imaging Test Tools, as well as many others. If you are currently using, or plan to purchase, any of the above test tools, then you need our Flex Film Cassettes.

Specifications

Weight Less than 1 lb

Available model(s)

- 07-800-5007** Flex Film Cassette, 5 x 7 inch
- 07-800-1824** Flex Film Cassette, 18 x 24 cm
- 07-800-8010** Flex Film Cassette, 8 x 10 inch
- 07-800-8012** Flex Film Cassette, 8 x 12 inch
- 07-800-1012** Flex Film Cassette, 10 x 12 inch
- 07-800-1417** Flex Film Cassette, 14 x 17 inch

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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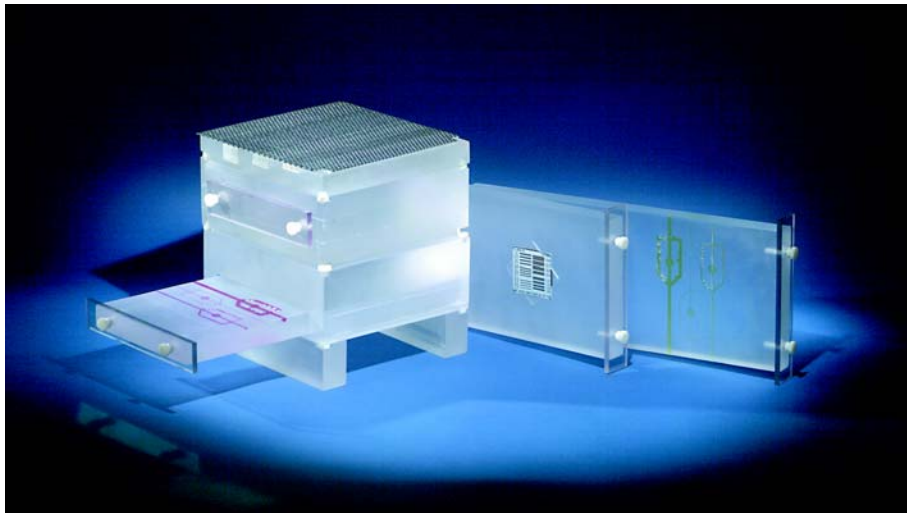
07-601-ds rev 1 14 feb 03

Digital Subtraction Angiography (DSA) Phantom*

Model 76-710



Diagnostic Imaging



- New phantom design yields dramatic improvement in the quality of the subtracted image
- Conforms to Report #15 by the American Association of Physicists in Medicine (AAPM)
- Evaluates digital functions of DSA systems
- Checks contrast range, resolution, linearity, uniformity, amplifier dynamic range, registration accuracy and subtraction effectiveness
- Provides easy-to-interpret results
- Quantitatively measures high- and low-contrast spatial resolution

Introduction

This Model 76-710 Digital Subtraction Angiography (DSA) Phantom† conforms to the recommendation in Report #15 by the American Association of Physicists in Medicine (AAPM) - Digital Radiology/Fluorography Task Group of the Diagnostic X-Ray Imaging Committee.

Benefits

- Dramatic improvement in the quality of the subtracted image due to:
 - Improved phantom stability
 - Increased homogeneity of bone material in bone blocks
- Eliminates occurrence of mis-registration artifacts caused by inadvertent movement of the phantom components during image acquisition

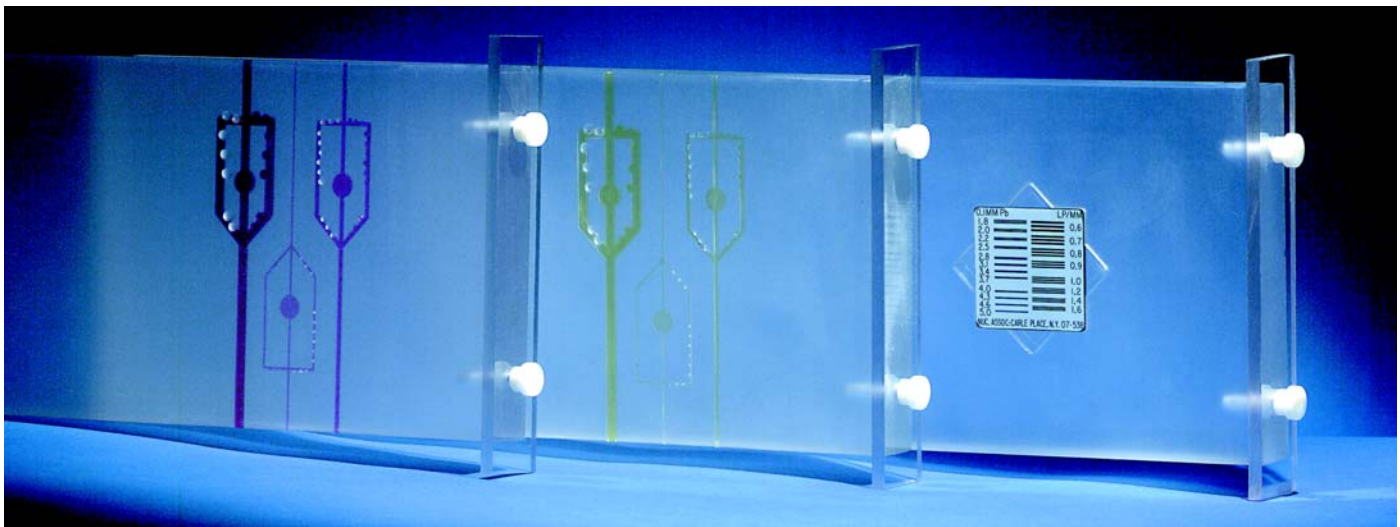
* Designed by Joel E. Gray, Ph.D., Professor Emeritus, Mayo Graduate School of Medicine and Jerome P. Taubel, R.T., Department of Diagnostic Radiology, Mayo Clinic® and Foundation. Manufactured under licensing agreement with Mayo Foundation for Medical Education and Research.

† This phantom conforms to the recommendation in Report #15 by the American Association of Physicists in Medicine (AAPM)-Digital Radiography/Fluoroscopy Task Group of the Diagnostic X-Ray Imaging Committee.

See also, RadiaXon™ Radiation Attenuation Gloves (Model 57-965) used in interventional procedures.

Features

- Retaining hasps ensure a tight fit between the step blocks, for reduced motion artifacts
- Specially-designed “stop” on the end of the slot blocks improves the positional accuracy of the insert material during image acquisition, and reduces the number of DSA frames that must be acquired
- The U-block provides a very sturdy support when entrance exposures are being measured with a dosimeter ion chamber
- Two artery blocks in two concentrations of iodine: 15 mg/ml and 150 mg/ml, for increased clinical relevance
- A 300 mg/ml iodine artery block is available as an option



The DSA phantom includes:

- Registration Plate
- Slot Block
- 150 mg/ml Artery Block
- 15 mg/ml Artery Block
- Bone Block
- Step Block
- U-Block Base
- Retaining Hasps

Specifications

Weight 30.7 lb (13.9 kg)

Optional accessories

300 mg/ml Stenosis/Aneurysm Artery Block. (Not included with phantom) (Model 76-710-7300)

Digital Subtraction Angiography Phantom, with Artery Block, 15 mg per ML venous concentration (Model 76-700)

Artery Block (from 76-700 phantom), with 15 mg per ML venous concentration (Model 76-705)

Digital Subtraction Angiography Phantom, with Artery Block, 150 mg per ML arterial concentration (Model 76-700-1150)

Artery Block (from 76-700-1150 phantom), with 150 mg per ML arterial concentration (Model 76-705-1150)

Digital Subtraction Angiography Phantom, with Artery Block, 300 mg per ML arterial concentration (Model 76-700-1300)

Artery Block (from 76-700-1300 phantom), with 300 mg per ML arterial concentration (Model 76-705-1300)

Step Wedge (Model 76-711)

Slot Block (Model 76-712)

Bone Block (Model 76-713)

Blank Insert (Model 76-714)

Low-Contrast Artery Insert (Model 76-715)

Low-Contrast Iodine Line Pair Insert (Model 76-716)

High-Contrast Resolution Pattern Insert (Model 76-717) (does not include test pattern(s))

Registration Plate (Model 76-718)

Linearity Insert (Model 76-719)

Optional high-contrast resolution test patterns

High-Precision Test Pattern, 0.01 mm thick (Model 07-527)

High-Precision Test Pattern, 0.10 mm thick (Model 07-538-1000)

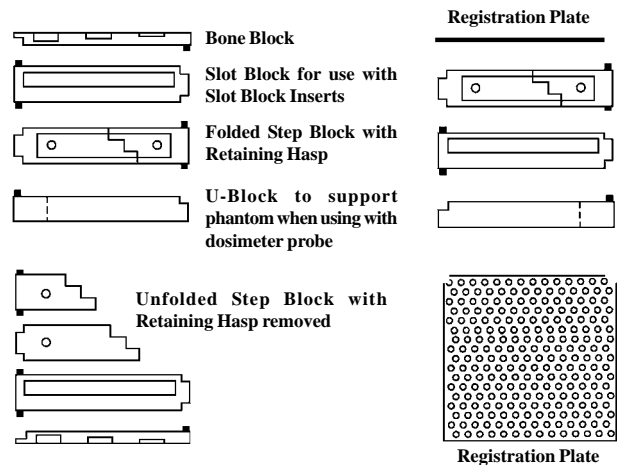
Ultra-High Precision Test Pattern, 0.10 mm thick (Model 07-538-2000)

(See Test Patterns data sheet for a complete listing)

Available model(s)

76-710 DSA Phantom

Possible DSA phantom configurations



For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA. Specifications are subject to change without notice.

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CDRAD Contrast Detail Digital and Conventional Radiography Phantom Model 07-652



Diagnostic Imaging

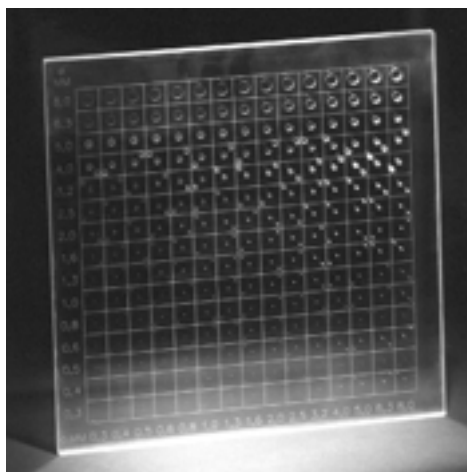
Introduction

Most definitions of image quality in radiology are based on characterizing the physical properties of the image chain. However, medical diagnosis is not made by the image alone; observer perception greatly affects the result.

Digital radiography

The CDRAD Phantom from Nuclear Associates is an excellent tool for evaluating the imaging characteristics of digital radiographic systems, including stimulable phosphor computed radiography systems and teleradiography systems.

One of the principle concerns with the use of digital radiography, is the potential reduction in the visibility of detail due to the blurring introduced at various places within the system, such as the film digitizers, display monitors, and the sampling of the image into discrete pixels. Loss of detail is the image characteristic which can have an adverse affect on diagnosis. Resolution (bar phantom) test objects which are used to evaluate conventional x-ray imaging systems are generally not appropriate for evaluating digital systems. The CDRAD Phantom provides a reliable and objective evaluation of the loss of detail from blurring at any point within the system.



- Optimized for evaluation of digital systems
- Improves diagnostic accuracy
- Can also be used for conventional radiography systems

Used to evaluate loss of detail in:

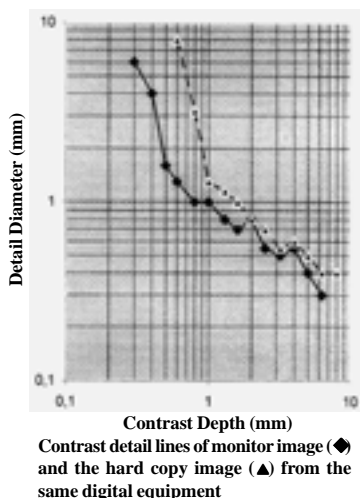
- Film digitizers
- Computed Radiography (CR) systems
- Display monitors
- Laser printers

Used to adjust and optimize:

- Image processing parameters
- Viewing conditions

Image evaluation

- To evaluate the phantom image, the observer indicates the location of the second spot in each square. Correct indication proves that a contrast is actually seen
- At the transition from visible to invisible, it is difficult to decide in which corner the second spot is located, and the response equals pure chance
- The line connecting the central spots with the smallest visible diameter and contrast is called the Contrast Detail (CD) Curve
- For comparison of the imaging performance of different systems, phantom images are made under identical conditions and evaluated by the same observer at the same time. The better system will produce an image in which smaller contrasts and details are visible. This results in a shift of the CD curve to the lower left part of the image. (See graph)
- In the detail (vertical) direction, the diameter of the holes increases step-wise and logarithmically from 0.3 to 8.0 mm. The image shows 15 rows of spots with increasing detail



Phantom specifications

- The CDRAD Phantom consists of a Plexiglas® tablet with cylindrical holes of exact diameter and depth (tolerances: 0.02 mm)
- The radiographic image of the phantom provides information about the imaging performance of the whole system
- The image shows 225 squares: 15 rows and 15 columns
- In each square, either one or two spots (the images of the holes) are present. The first three rows show only one spot, while the other rows have two identical spots; one in the middle and one in a randomly chosen corner. (See graph)
- The optical densities of the spots are higher than the uniform background
- In the contrast (horizontal) direction, the depth of the holes increases logarithmically, and the image shows 15 columns of spots with increasing contrast
- Comparison of the performance of several observers is also possible. The better performing observer produces a CD curve more to the lower left part of the image

Specifications

Dimensions 10.4 x 10.4 x 0.3 in thick (26.4 x 26.4 x 0.76 cm)

Weight 3 lb (1.34 kg)

Available model(s)

07-652 CDRAD Contrast Detail Digital and Conventional Radiography Phantom

See also CDMAMM Phantom (Model 18-227)

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

Specifications are subject to change without notice.

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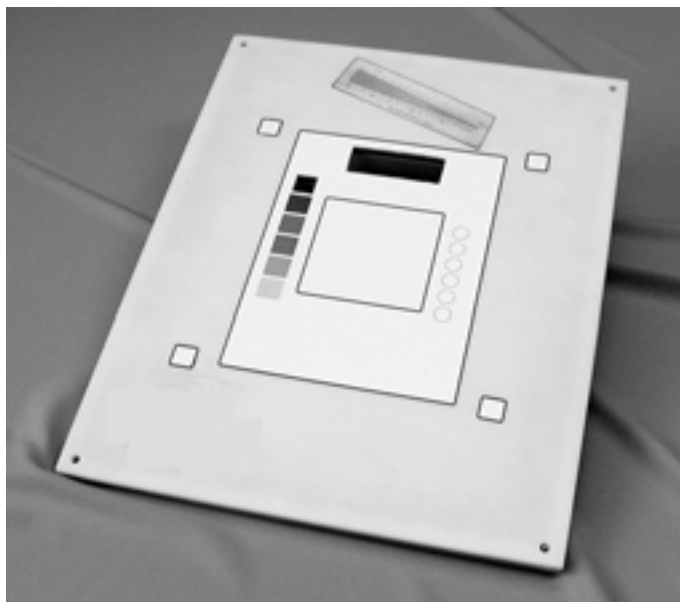
07-652-ds rev 1 10 mar 03

For additional information on the use of this phantom, see:
www.emory.edu/x-rays/sprawls/technology

EZ CR/DR “DIN” Test Tool

Model 07-605-7777

- Quick and easily optimize images from your CR/DR system
- Effectively reduces equipment downtime
- Incorporates the “DIN” standard test pattern, DIN 6868/58
- Dramatically reduces repeat patient exams; thus preventing unnecessary patient exposure due to problems related to the image acquisition chain and poor image quality
- Lightweight; durable
- Easy-to-use; no moving parts
- Cost-effective



Features

Now you can quickly check all these important parameters:

- Dynamic Range
- Contrast Resolution
- Homogeneity
- Resolution

Specifications

Dimensions 14 (w) x 17 (d) x 0.5 in (t)
(35.5 x 43.1 x 1.5 cm)

Weight 7.05 lb (3.20 kg)

Available model(s)

07-605-7777 EZ CR/DR “DIN” Test Tool

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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07-605-7777-ds rev 1 10 mar 03

Introduction

The EZ CR/DR “DIN” Test Tool is a timely and valuable solution to the image quality maintenance problem. Technologists, radiologists and physicists can easily perform quick and reliable assessments of their CR/DR systems.

Today’s new image acquisition chains are considerably more complex than conventional screen/film systems. Computed Radiography (CR)/Digital Radiography (DR) systems involve special processing for each body part. This is controlled by computers, rather than chemical processors and soft copy displays, which are calibrated using light meters rather than visual inspection. CR/DR systems also incorporate laser beams, photomultiplier tubes, network gateways and laser printers. The EZ CR/DR “DIN” Test Tool is designed specifically for evaluating the entire CR/DR image acquisition chain.

Applications

Ideal for use as a preventive maintenance quality control test tool, the EZ CR/DR “DIN” Test Tool can also be used to take regularly scheduled measured data points from the image, such as line pair resolution measurements, ROIs (regions of interest) and geometry symmetry. Measurements/angle can be used to evaluate monitor, as well as printed film image quality.

By performing daily quality control checks, both before the first patient is examined and at the end of the day, equipment problems can be accurately and easily pinpointed and corrected. Equipment downtime will also be significantly reduced, resulting in increased patient throughput. Patients will no longer need to endure repeat exams due to poor image quality.

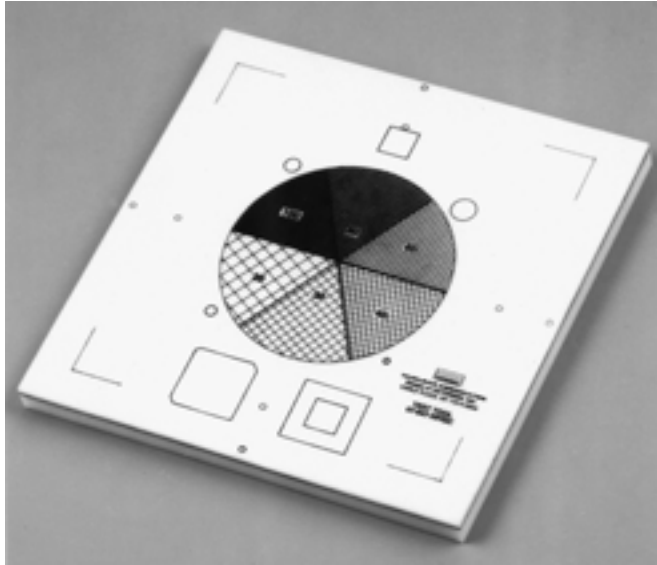
You’ll soon realize a dramatic savings in film costs when you use our EZ CR/DR “DIN” Test Tool as part of your QC program. In addition, radiological personnel will experience significantly less of the problems and frustrations associated with equipment maintenance and thank you for it.

R/F QC Phantom

Model 07-647



Diagnostic Imaging



- Designed specifically with the radiologic technologist in mind
- Provides an accurate overall evaluation of image quality consistency
- For QC of phototimer and automatic brightness control consistency
- Ideal for use in determining subtle degradation in imaging performance
- Fast, easy to use; average test time is less than 5 minutes per unit
- For use with radiography, fluoroscopy, and spot films, too
- Verifies fluoroscopic monitor contrast and brightness adjustment

Introduction

The R/F QC Phantom is designed to provide the diagnostic radiologic technologist with an accurate, easy-to-use tool for evaluating the image quality and performance of standard diagnostic radiographic and fluoroscopic imaging systems.

Applications

For fine-tuning of radiographic and fluoroscopic imaging systems, it is recommended that the phantom be imaged at least monthly on all radiographic and fluoroscopic equipment. To attain the most accurate, up-to-date quality control information, a daily or weekly frequency is preferable. When used daily, the R/F QC Phantom will allow the technologist to quickly determine whether the equipment is functioning correctly. This easy-to-use phantom allows the user to complete the suggested protocol in approximately 5 minutes or less, when used on a standard R/F system. Once the phantom is imaged, simply graph the results to determine any trends that may indicate a degradation of imaging system performance, such as a steady but slow change in the fluoro kVp or in the radiographic mAs.

Specifications

Dimensions 7 x 7 x 0.56 in (t)
(17.78 x 17.78 x 1.42 cm)

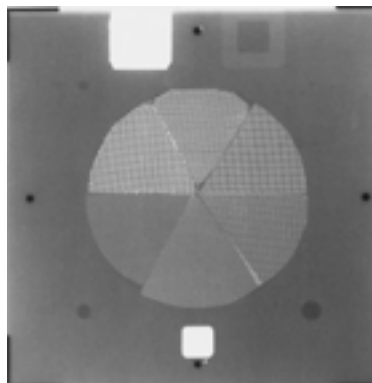
Weight 1.1 lb (0.5 kg)

Available model(s)
07-647 R/F QC Phantom

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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Light field collimated to alignment markers on the test tool. This image shows excellent correspondence between the x-ray field and the light field

Features

- At the center of the phantom are pie-shaped wedges of varying mesh sizes: 20#, 30#, 40#, 60#, 80#, and 100# L/in, for evaluating high-contrast performance
- Surrounding the mesh are four low contrast “masses” of different diameters: 2, 4, 6, and 8 mm
- At one edge of the phantom is a small “density difference” patch, for a measure of contrast on the films
- At the opposite edge of the phantom are two monitor adjustment squares, each having a low contrast square insert
- The phantom contains a 2 mm copper attenuator which allows it to simulate the attenuation of an average adult
- At the corners of the test tool are lines for aligning the light field
- QC charts are provided for plotting both the radiographic and fluoroscopic results
- Along the sides of the test tool are beads 1 cm inside and outside of the lines started in the corners

Contrast Imaging Phantom

Model 07-643

- Check dynamic range of the video system
- Check the system all at once
- Use it during all fluoro modes - pulsed, non-pulsed, etc.
- Check film range and density



Specifications

Dimensions

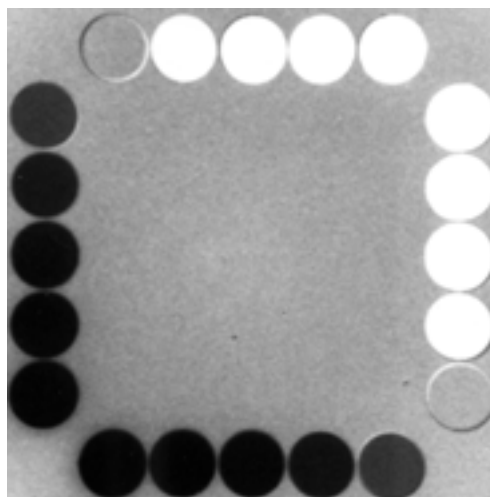
Outside diameter 9.05 in (23 cm)

Thickness 0.5 in (1.28 cm)

Weight 2.80 lb (1.26 kg)

Available model(s)

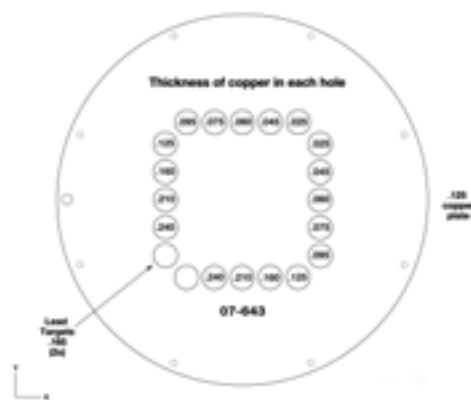
07-643 Contrast Imaging Phantom



Model 07-643 x-ray image

Introduction

The Contrast Imaging Phantom (Model 07-643) is an accurate, easy-to-use, indispensable tool for evaluating image quality and determining that the imaging system is operating at its full potential. It will immediately let you know if there's a problem.



Model 07-643 diagram

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

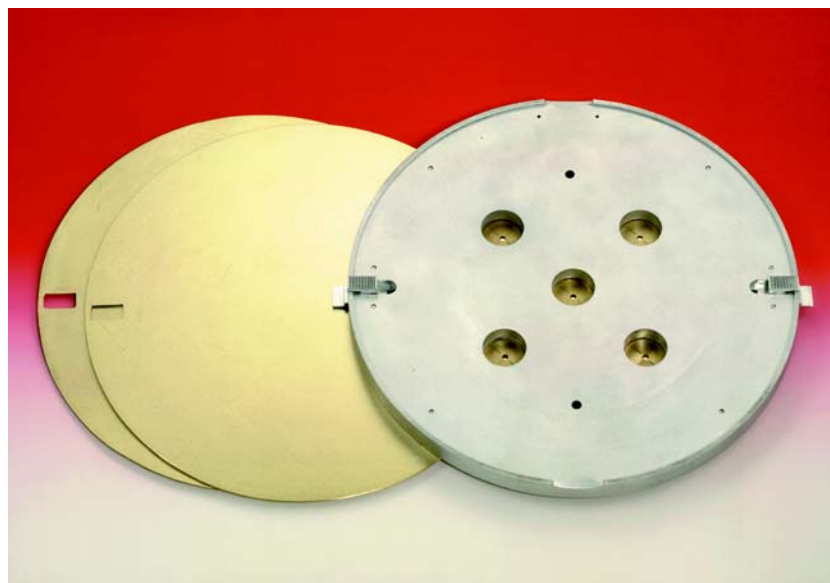
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We now have available sterile Image Intensifier Covers, call for details.

Fluoroscopic Imaging Test Phantom

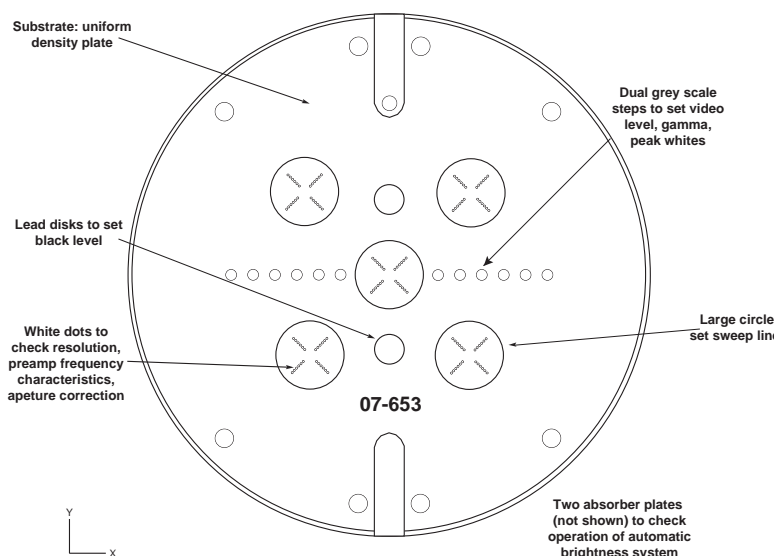
Model 07-653



Introduction

Ensure the optimum performance of your Fluoroscopic System with the Fluoroscopic Imaging Test Phantom.

This compact, versatile, and extremely easy-to-use phantom is innovatively designed to enable you to evaluate, adjust and optimize fluoro video cameras, brightness systems and image processing systems. Its proven design makes it ideal for use by x-ray service engineers.



Phantom diagram (Model 07-653)

DI

Diagnostic Imaging

The Fluoroscopic Imaging Test Phantom provides a test pattern enabling the precise adjustment of many critical parameters of the Fluoroscopic System:

- Video level, contrast, peak whites, black level
- Shading or vignetting correction
- Automatic brightness
- Sweep linearity
- Frequency response, aperture correction

Specifications

Dimensions

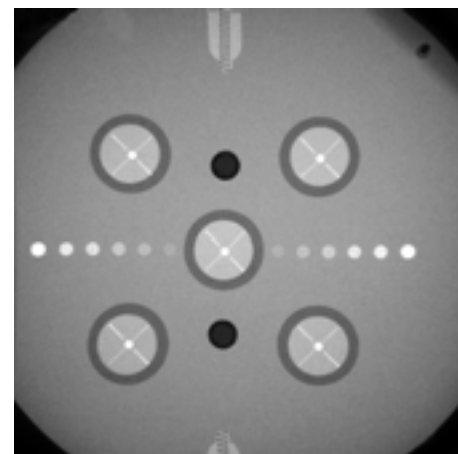
Outside diameter 8.97 in (22.78 cm)

Thickness 0.5 in (1.28 cm)

Weight 4.10 lb (1.86 kg)

Available model(s)

07-653 Fluoroscopic Imaging Test Phantom



X-ray image (Model 07-653)

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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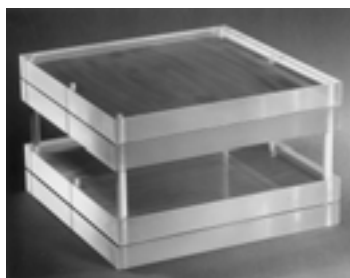
Diagnostic X-Ray Phantoms

Model 76-2 Series

- Phantoms conform to AAPM recommendations contained in Report #31, "Standardized Methods for Measuring Diagnostic X-Ray Exposure"
- Patient-equivalent acrylic and aluminum phantoms provide the necessary attenuation between the source and AEC or ABC detectors
- Helps you comply with JCAHO requirements for radiographic exposure measurements
- These phantoms are recommended in AAPM Report #60, "Instrumentation Requirements of Diagnostic Radiological Physicists"

JCAHO requires that x-ray exposure measurements be determined for commonly used projections in all radiographic suites. In order to provide this information when using Automatic Exposure Control (AEC) or Automatic Brightness Control (ABC) systems, specially designed phantoms must be used. Attenuating material must be used between the source and AEC or ABC detectors. Since these detectors are energy dependent, measurement of skin entrance exposure requires the use of patient-equivalent phantoms for meaningful results.

AAPM Report #31 recommends the use of four special phantoms for use in diagnostic x-rays. These acrylic and aluminum phantoms are patient-equivalent, and are specifically designed to conform to the AAPM recommendations.



Chest X-Ray Phantom (Model 76-211)

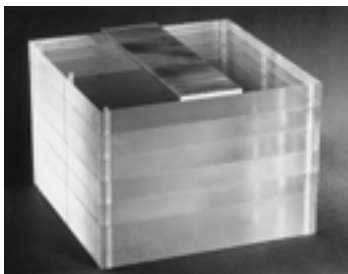
The Chest Phantom consists of four sheets of 25 x 25 x 2.54 cm clear acrylic, one sheet of 25 cm x 25 cm x 1 mm and one sheet of 25 cm x 25 cm x 2 mm type-1100 high-purity aluminum, and spacers to provide a 5.08 cm air gap. Clinical testing of the phantom has shown it to be equivalent to a 23 cm patient for the PA chest projection.

Weight 17.5 lb (8 kg)

Abdomen/Lumbar Spine Phantom (Model 76-212)

The Phantom consists of five sheets of 25 x 25 x 2.54 cm and one sheet of 25 x 25 x 5.08 cm clear acrylic to achieve a 17.78 cm thick phantom. In order to provide additional attenuation in the spinal region, a 7 cm x 25 cm x 4.5 mm thick piece of high-purity alloy aluminum is included.

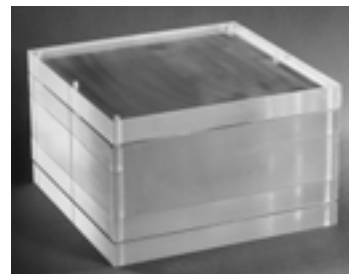
Weight 37 lb (17 kg)



Skull X-Ray Phantom (Model 76-213)

The Skull Phantom has the same configuration as the Chest Phantom, but without the air gap. It consists of four sheets of 25 x 25 x 2.54 cm clear acrylic, one sheet of 25 cm x 25 cm x 1 mm and one sheet of 25 cm x 25 cm x 2 mm high-purity alloy aluminum, and a center sheet of 25 x 25 x 5.08 cm clear acrylic.

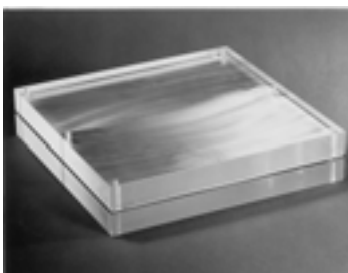
Weight 26.5 lb (12 kg)



Extremity X-Ray Phantom (Model 76-214)

The Extremity Phantom consists of one 25 x 25 x 2 cm piece of high-purity alloy aluminum sandwiched between two sheets of 25 x 25 x 2.54 cm clear acrylic.

Weight 10 lb (4.5 kg)



Make-Your-Own-Phantom Modular Kit (Model 76-215)

This kit contains all the components needed to make any one of the phantoms on this page. It includes:

- Five sheets 25 x 25 x 2.54 cm thick acrylic
- One sheet 25 x 25 x 5.08 cm thick acrylic
- One sheet 25 cm x 25 cm x 1 mm thick aluminum
- One sheet 25 cm x 25 cm x 2 mm thick aluminum
- One sheet 7 cm x 25 cm x 4.5 mm thick aluminum
- Spacers for a 5.08 cm air gap

Weight 34 lb (15.3 kg)

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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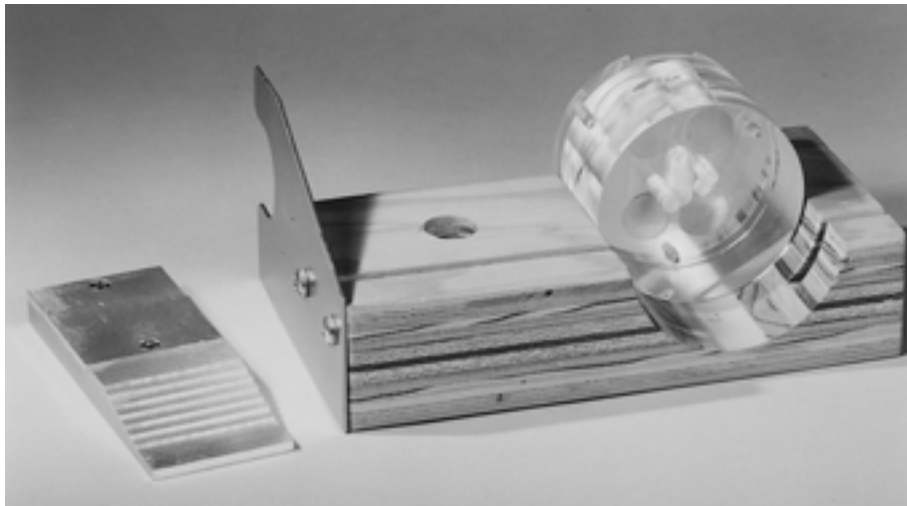
76-2-ds rev 1 10 mar 03

CDRH Dental Image Quality Test Tool

Nuclear Associates Model 76-025



Diagnostic Imaging



- Designed to meet the requirements for the NEXT* dental survey protocol
- Conforms to Center for Devices and Radiological Health (CDRH) specifications
- Provides a means of reproducible setup, ensuring a consistent test protocol
- Cost-effective; reduces the need for repeat films
- Reduces setup time
- Increases patient safety
- Minimizes chance of misdiagnosis
- Ideal for dental service engineers and inspectors

Introduction

The Nationwide Evaluation of X-Ray Trends (NEXT) dental protocol has been issued to provide guidelines for quality control procedures for diagnostic dental radiography. In order to perform these procedures, a suitable phantom was developed: the CDRH Dental Image Quality Test Tool (Model 76-025).

The JCAHO requires certain standards to be met regarding radiographic quality control. The CDRH Dental Image Quality Test Tool (Model 76-025) facilitates compliance with these standards, since the standards were compiled using a prototype of this phantom.

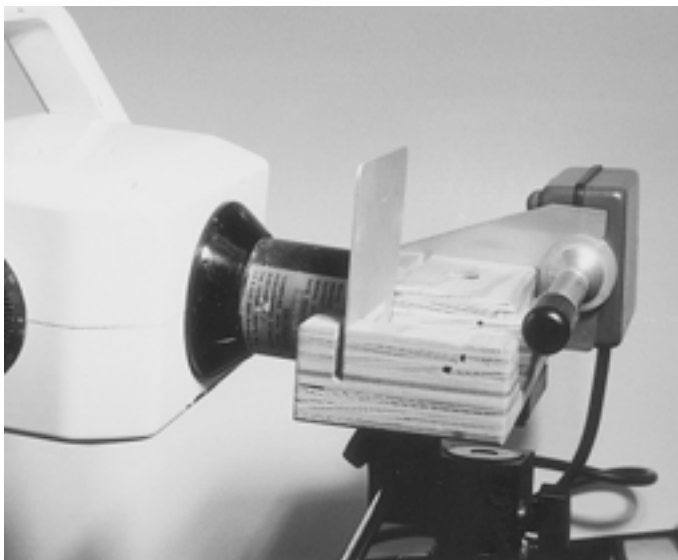
The CDRH Dental Image Quality Test Tool (Model 76-025) is designed specifically for testing the functionality of dental x-ray units, and provides a means of evaluating half value layer, determination of kVp, and assessing overall image quality. It is the only dental test tool designed with dental service personnel and inspectors in mind. The test tool will significantly improve the ability of service personnel to quickly and accurately survey the image quality of the x-ray unit. The CDRH Dental Image Quality Test Tool can also be used as a constancy check for x-ray film processing, making it the most versatile and cost-effective dental test tool available today.

Applications

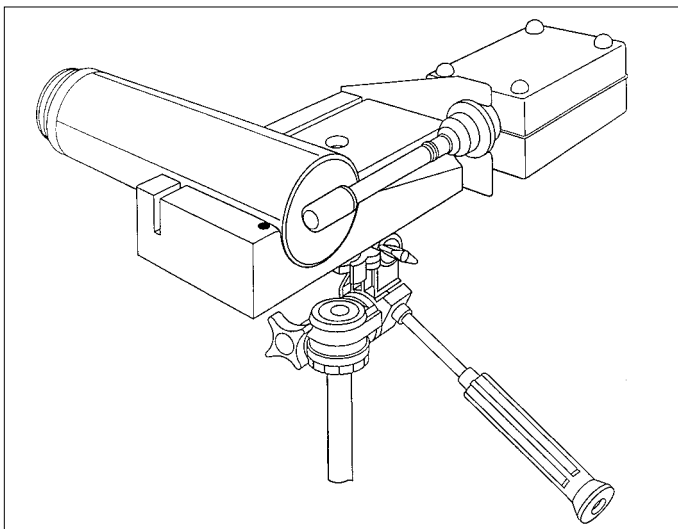
Clinical imaging involves diagnosis of tooth pathology. In order to permit an accurate simulated clinical image evaluation, the test tool contains a human tooth encased in its center. The CDRH Dental Image Quality Test Tool (Model 76-025) consists of a wooden cradle (to hold the test tool body), built-in slots (for attenuation filters), a film slot, an exposure chamber holder, and a mounting screw (for use with a tripod). The test tool comes with an aluminum step wedge that is designed for evaluating darkroom fog and consistency testing. The step wedge has two slots, one for exposing a film pack and one for evaluating darkroom fog. The film slot also ensures easy, reproducible placement of the film for consistent imaging.

To use the CDRH Dental Image Quality Test Tool (Model 76-025), it is necessary to establish an acceptable baseline or standard for the x-ray unit performance. The test tool should be imaged using the same technical factors that were used to establish the baseline. These images, when compared to the baseline, will allow the user to determine if image quality degradation is occurring so appropriate corrective action can be taken.

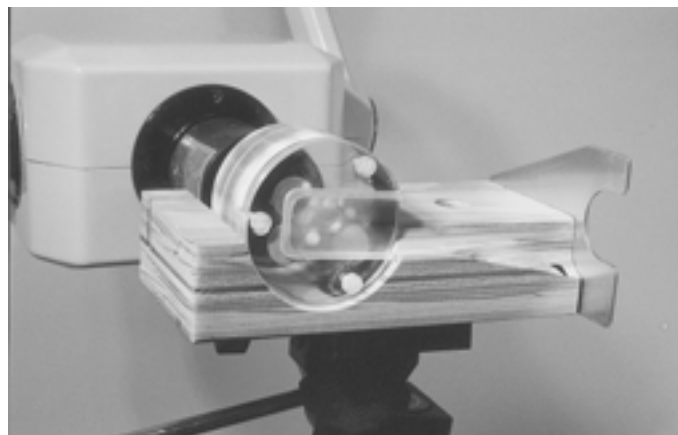
* NEXT (Nationwide Evaluation of X-Ray Trends) is a committee of the Conference of Radiation Control Program Directors (CRCPD) that oversees quality control procedures for diagnostic radiology. They issue procedure protocols and guidelines for imaging modalities.



CDRH Dental Image Quality Test Tool (Model 76-025) set up for half value layer measurements



CDRH Dental Image Quality Test Tool (Model 76-025) set up for dental exposure measurement protocols



CDRH Dental Image Quality Test Tool (Model 76-025) set up for image evaluation protocols (film not shown in phantom for visualization purposes)

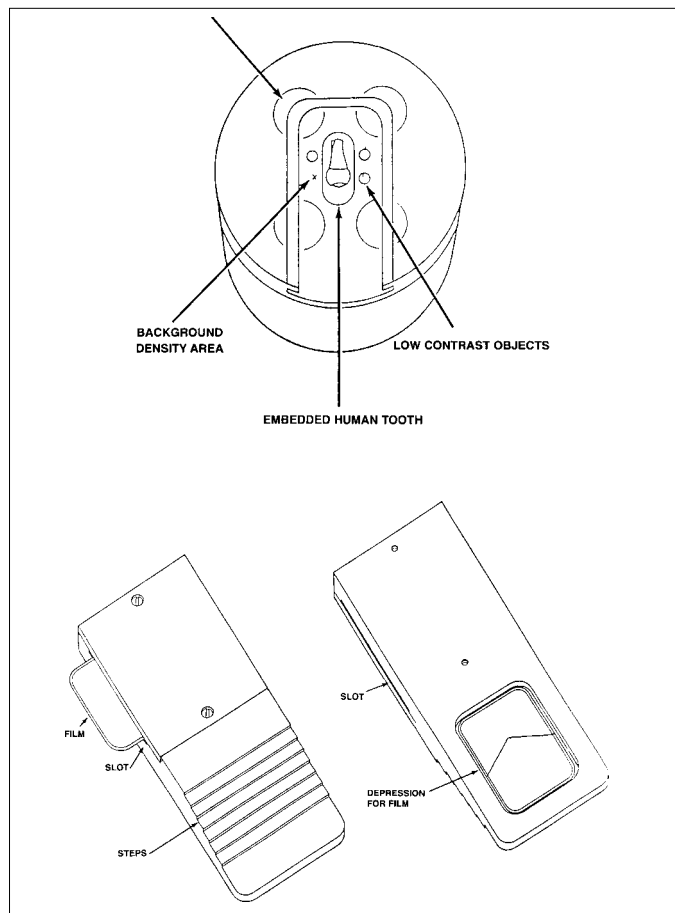


Diagram of Aluminum Step Wedge used for darkroom fog and consistency testing

Specifications

The test tool includes:

- Four different copper wire meshes that have the following lines-per-inch ratios: 100, 120, 150, and 200
- Four air steps for contrast and density measurements
- One human tooth encased in the phantom material

Material Wood base; acrylic test tool; type-1100 aluminum step wedge

Dimensions

Base 3.94 (w) x 7.87 (d) x 1.93 in (h) (10 x 20 x 4.9 cm)

Test tool 7.6 cm Ø x 5.5 cm long (3 x 2.17 cm)

Step wedge 5.1 (w) x 12.7 (d) x 1.3 cm (h)

Weight 2.06 (0.88 kg)

Optional accessories

Aluminum Step Wedge (Model 76-025-4000)

Available model(s)

76-025 CDRH Dental Image Quality Test Tool, includes aluminum step wedge

76-025-6661 Dental Image Quality Test Tool with Decayed Tooth, includes aluminum step wedge

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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Cardiac Digital Imaging/Cine-Video Quality Control Phantom and Patient Identifier*

Nuclear Associates Model 07-656

This patient-equivalent phantom provides permanent patient identification information (required by the ACC), as well as quality control checks for digital imaging (when exposed on the cine film or videotape at the beginning of the study, before the patient is placed on the table).

The phantom (all mounted in a single plate) consists of:

- High contrast resolution test pattern
- Four-step density contrast test section
- Mesh screen (20, 30, 40 mesh), to test for uniformity of focus
- Copper plate: 0.0937 inch thick

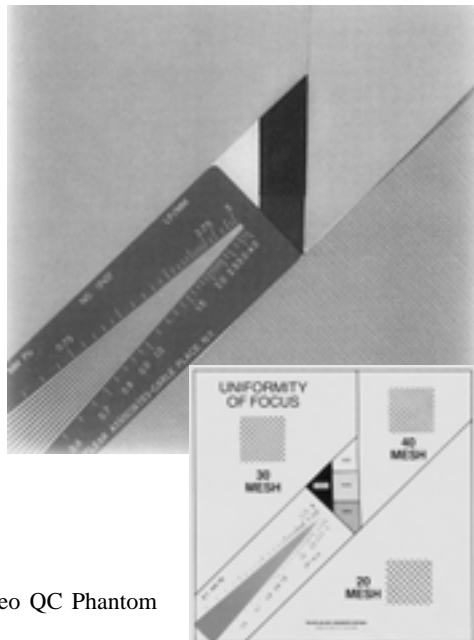
Specifications

Dimensions 8.50 x 8.50 x 0.375 thick (21.5 x 21.5 x 1.2 cm)

Weight 3 lb (1.3 kg)

Available model(s)

07-656 Cardiac Digital Imaging/Cine-Video QC Phantom and Patient Identifier



■ Recommended as part of the Image Compression Study being conducted by the American College of Cardiology (ACC) DICOM Committee

■ Selected by the ACC as the image quality criteria for digital imaging

■ This device provides:

- Patient identification information at the beginning of a cine or video study
- Quality control test of resolution
- Quality control tests of density and contrast
- Quality control test of uniformity of focus

* Designed by Joel E. Gray, Ph.D., Professor Emeritus, Department of Diagnostic Radiology, Mayo Clinic®, Rochester, MN 55905. Manufactured under licensing agreement with Mayo Foundation for Medical Education and Research.

Ultra-High Purity HVL Attenuators

Model 07-434

- HVL attenuators recommended for mammography
- 99.9% pure for accurate HVL measurements

Because type-1100 aluminum is only 99.0% pure, it has some impurities that can give a HVL value which is 7.5% lower than those measured with pure aluminum.

When doing HVL measurements with a mammography unit, it is recommended that the highest purity aluminum be used. This set of six attenuators satisfies this recommendation, because they are 99.9% pure (type-1145).

Specifications

Dimensions 10 cm x 10 cm x 0.1 mm

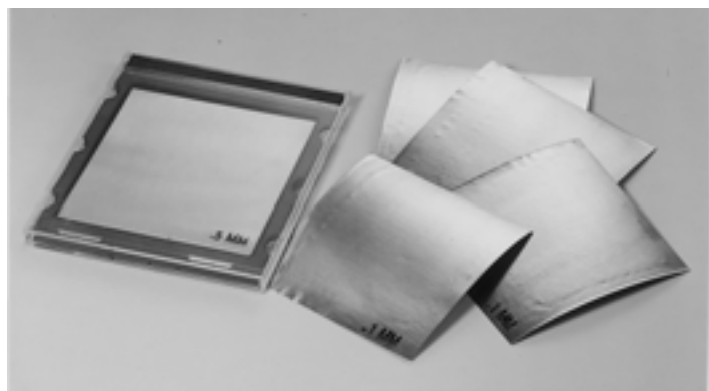
Weight 0.15 lb (0.06 kg)

Available model(s)

07-434 Ultra-High Purity HVL Attenuators, set of 6

07-430 Standard Aluminum HVL Attenuators, set of 11

07-431 Copper HVL Attenuators, set of 10



For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

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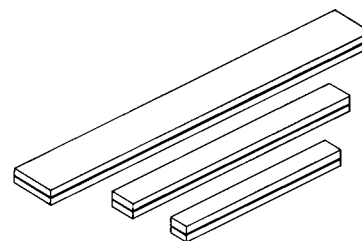
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07-656-ds rev 1 10 mar 03

Fluoro Contrast Test Disks and Lead Contrast Strips

Models 07-615 & 07-638

- Designed specifically for monitoring the percent contrast of the image-intensifier tube/lens system
- For quality control testing of the cine imaging chain
- Testing can easily be performed by the in-house technical staff



Measuring the percent contrast using either the Fluoro Contrast Test Disks or Lead Contrast Strips can be performed annually and/or whenever a new image-intensifier tube is installed. This test should be part of the QC testing program of the cine imaging chain. Fluoro Contrast Test Disks and Lead Contrast Strips make performing all required measurements easy. The disks satisfy NEMA® (National Electrical Manufacturers Association) requirements for image

intensifiers and facilitate compliance with NEMA Standard XR-16.

To measure percent contrast, a disk or strip is taped to the center of the fluoro grid during a 2 to 3-second cine run, using the Adult Cine Attenuator (Model 07-614-8080) in the beam. The resulting optical densities to the side and behind the image of the disk (on the developed cine frames) are then measured with a calibrated densitometer, such as our Hand-Held Deluxe Digital Clamshell Densitometer (Model 07-443).

Specifications

Fluoro contrast test disk

Disk thickness 0.125 inch thick lead, sandwiched between two 0.125 inch thick white acrylic plates

Each set consists of six disks, one each of the following diameters: 1.875, 2.125, 2.375, 2.625, 2.875, and 3.375 inch

Weight of set 1.84 lb (0.83 kg)

Lead contrast strip

The strips have a thickness of 0.125 inch and a width equal to 0.1 of the active diameter of the input phosphor. Three strips are provided for 4, 6, and 9 inch input phosphors

Weight of set 3 lb (1.4 kg)

Optional accessories

Hand-Held Deluxe Digital Clamshell Densitometer (Model 07-443)

Available model(s)

07-638 Fluoro Contrast Test Disks, set of six

07-615 Lead Contrast Strips, set of three

Cine Attenuators

Models 07-614-8080 & 07-630

- Help measure fluoro input radiation levels
- Available in adult and pediatric thicknesses



The input radiation level of a fluoroscopic unit can be measured directly by placing an x-ray ion chamber behind the antiscatter grid and then imaging the appropriate Cine Attenuator. The adult model has a 2.4 mm copper plate sandwiched between 0.125 inch thick acrylic sheets; the pediatric version is a 0.9 mm copper plate between the acrylic sheets.

The attenuators are designed to simulate an average adult or pediatric patient in regard to the exposure factors required by the ABC system. The final optical density on the processed frames is controlled by the size of the aperture in the diaphragm, which is

located directly in front of the cine camera lens. To determine the optimal on-frame optical density, a series of cine runs are made using different sized apertures, with either the adult or pediatric cine attenuator in the beam.

Specifications

Dimensions 7 x 7 in (17.8 x 17.8 cm)

Weight 2 lb (0.9 kg)

Available model(s)

07-630 Pediatric Cine Attenuator

07-614-8080 Adult Cine Attenuator, 8 x 8 inch

For additional information, please contact Cardinal Health, Radiation Management Services customer service at 440.248.9300, 800.850.4608, or fax: 440.349.2307; located at 6045 Cochran Road, Cleveland, Ohio 44139-3303, USA.

Specifications are subject to change without notice.

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Image Intensifier Covers

Models 03-003 to 03-604



Diagnostic Imaging

Model	Description	Dimension	Weight	Package
03-018	Image Intensifier Cover	18 inch Ø (46 cm)	4 lb (1.8 kg)	50
03-024	Image Intensifier Cover	24 inch Ø (61 cm)	4 lb (1.8 kg)	50
03-030	Image Intensifier Cover	30 inch Ø (76 cm)	4 lb (1.8 kg)	50
03-036	Image Intensifier Cover	36 inch Ø (91 cm)	4 lb (1.8 kg)	50
03-039	Image Intensifier Cover	39 inch Ø (99 cm)	5 lb (2.3 kg)	50
03-042	Image Intensifier Cover	42 inch Ø (107 cm)	5 lb (2.3 kg)	50
03-183	Image Intensifier Cover	18 (h) X 36 inch (w) (46 x 91 cm)	5 lb (2.3 kg)	50
03-303	Image Intensifier Cover	30 (h) x 30 inch (w) (76 x 76 cm)	9 lb (4.1 kg)	50
03-308	Image Intensifier Cover	30 (w) x 38 inch (h) (76 x 97 cm)	9 lb (4.1 kg)	50
03-363	Image Intensifier Cover	36 (w) x 30 inch (h) (91 x 76 cm)	9 lb (4.1 kg)	50
03-360	Image Intensifier Cover Kit	36 + 36 + 30 inch (3 unit kit)	9 lb (4.1 kg)	50
03-403	Image Intensifier Cover	40 (w) x 30 inch (h) (102 x 76 cm)	9 lb (4.1 kg)	50
03-404	Image Intensifier Cover	40 (w) x 40 inch (h) (102 x 102 cm)	9 lb (4.1 kg)	50
03-483	Image Intensifier Cover	48 (w) x 30 inch (h) (122 x 76 cm)	10 lb (4.5 kg)	50
03-524	Image Intensifier Cover	52 (h) x 48 inch (w) (132 x 122 cm)	20 lb (9.1 kg)	50
03-604	Mini C-Arm Cover	60 (h) x 40 inch (w) (152 x 102 cm)	20 lb (9.1 kg)	40
03-003	Image Intensifier Cover	30 inch Ø (76 cm)	4 lb (1.8 kg)	100
03-009	Image Intensifier Cover	39 inch Ø (99 cm)	5 lb (2.3 kg)	100
03-275	Image Intensifier Cover (non-sterile)	27 (h) x 50 inch (w) (69 x 127 cm)	4 lb (1.8 kg)	50
03-406	Image Intensifier Cover (non-sterile)	40 (w) x 60 inch (h) (102 x 152 cm)	20 lb (9.1 kg)	50
03-029	Foot Pedal Cover	18 x 15 inch	4 lb (1.8 kg)	50
03-413	Remote Control Cover	4 (h) x 13 inch (w) (10 x 33 cm), with 4 inch cuff	3 lb (1.4 kg)	100



The Image Intensifier Covers are non-latex and protect both the patient and the equipment when performing a sterile procedure. They provide an excellent barrier and facilitates sterile handling of equipment. Each cover is individually packed in "peel open" pouches that provide high assurance of sterility.

Ultrasound Probe Covers

Models 03-416 to 03-748

Model	Description	Dimension	Weight	Package
03-416	Ultrasound Probe Cover	4 (w) x 16 inch (h) (10 x 41 cm)	3 lb (1.4 kg)	100
03-432	Ultrasound Probe Cover	4 (w) x 32 inch (h) (10 x 81 cm)	3 lb (1.4 kg)	100
03-714	Ultrasound Probe Cover	7 (w) x 14 inch (h) (18 x 36 cm)	3 lb (1.4 kg)	100
03-732	Ultrasound Probe Cover	7 (w) x 32 inch (h) (18 x 81 cm)	3 lb (1.4 kg)	100
03-748	Ultrasound Probe Cover	7 (w) x 48 inch (h) (18 x 122 cm)	4 lb (1.8 kg)	100
03-748PC	Ultrasound Probe Cover with 5 inch Pocket	7 (w) x 48 inch (h) (18 x 122 cm)	4 lb (1.8 kg)	100
03-748B	Ultrasound Probe Cover Pocket and Gel	7 (w) x 48 inch (h) (18 x 122 cm)	5 lb (2.3 kg)	50
03-670	Ultrasound Probe Cover	6 (w) x 70 inch (h) (15 x 178 cm)	5 lb (2.3 kg)	50



These non-latex covers protect both the patient and the equipment when performing a sterile ultrasound procedure. Probe covers are designed for one-time use only and are individually packaged in sterile pouches.

Ultrasound Gel Products

Models 03-361 to 03-924

Ultrasound gels are:

- conductive
- non-staining
- non-corrosive
- salt and alcohol free
- odorless
- water soluble

Ultrasound scanning gels are specially formulated with the needs of the diagnostic imaging professional in mind. Our gel provides a superior transmission medium for high intensity sound waves. Our gel is also available in a therapeutic formulation for the therapeutic professional.

Model	Description	Dimension	Weight	Package
03-924S	Ultrasound Scanning Gel	250 ml squeeze bottle	16 lb (7.3 kg)	24
03-901S	Ultrasound Scanning Gel	5 L container	11 lb (5 kg)	1
03-924	Therapeutic Scanning Gel	250 ml squeeze bottle	16 lb (7.3 kg)	24
03-901	Therapeutic Scanning Gel	5 L container	11 lb (5 kg)	1
03-361	Ultrasound Scanning Gel	20 ml sterile packet	3 lb (1.4 kg)	25



For additional information, please contact Radiation Management Services business of Cardinal Health at 440.248.9300, fax 440.349.2307, or e-mail rmsinfo@cardinal.com; located at 6045 Cochran Rd., Cleveland, Ohio 44139-3303, USA.

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