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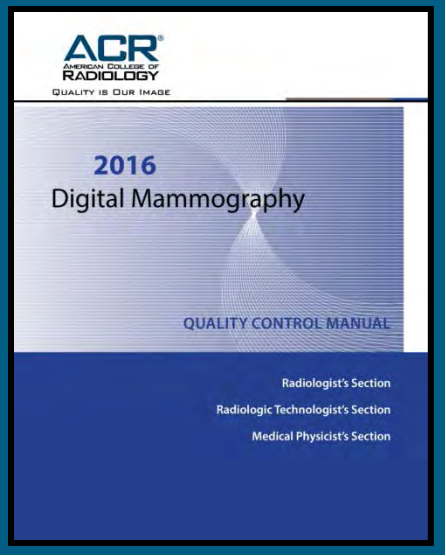
The New ACR Digital Mammography QC Manual

Webinar for Medical Physicists

Tuesday, December 6
and
Wednesday, December 7, 2016



Introduction

Eric Berns, PhD

Chair, ACR Subcommittee on QA in Mammography

Priscilla Butler, MS

Medical Physicist and Senior Director, ACR Quality and Safety

Handout

Topic	Speaker	Duration	Page in Manual
Introduction	Butler	5 min	*
Transitioning to the New Manual and FAQs	Butler	20 min	FAQs
Testing	Berns	60 min	see forms
Required Tests			
1. Mammography Equipment Evaluation (MEE) - MQSA Requirements			133
2. ACR DM Phantom Image Quality			137
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11. Evaluation of Site's Technologist QC Program			182
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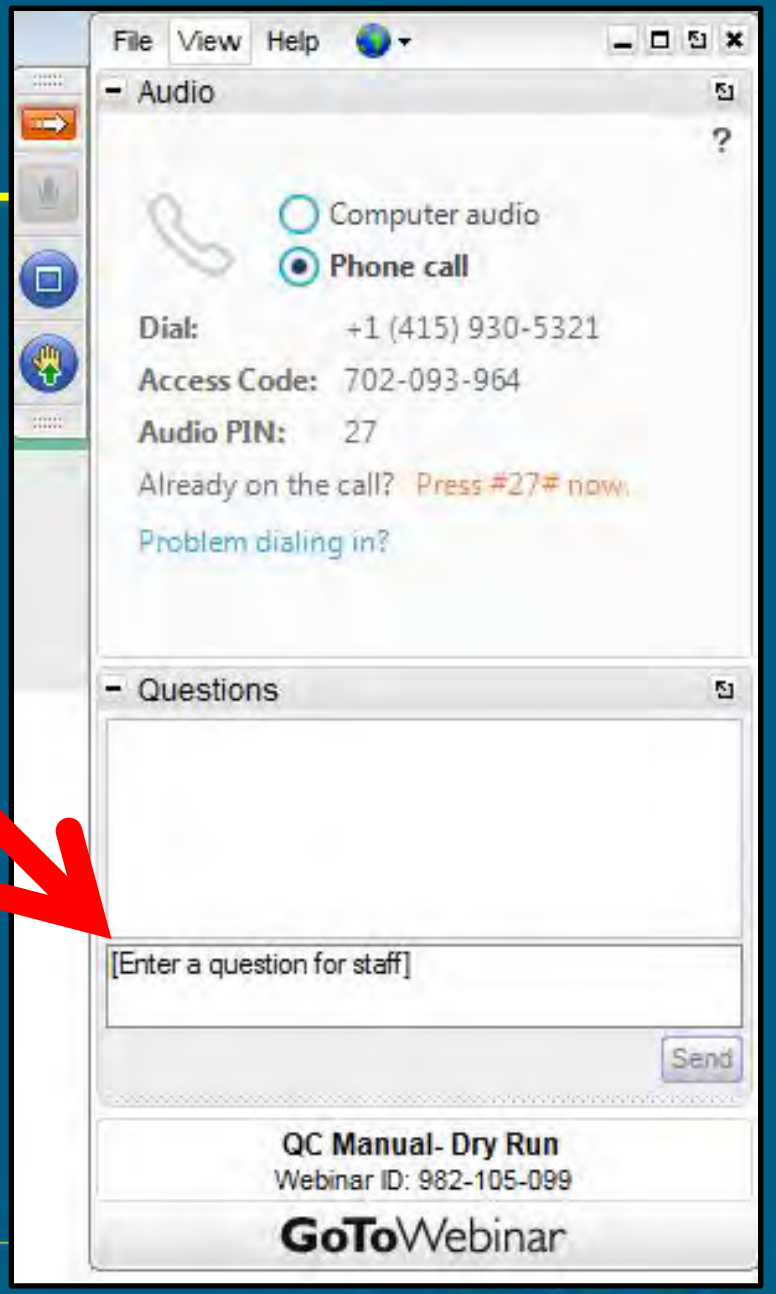
Major Component Service/Upgrade/Replacement/Repair	Berns	15 min	129
Questions	All	20 min	*

Questions

- Submit questions at any time during the webinar
- If we don't get to your question, send them via email to dmqc@acr.org and we'll respond ASAP
- Fodder for future FAQs



This webinar is being recorded for future posting

Next Up: Me
Transitioning to the New Manual and FAQs

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Transitioning to the New ACR Digital Mammography QC Manual and FAQs – Medical Physicists

Priscilla F. Butler, MS

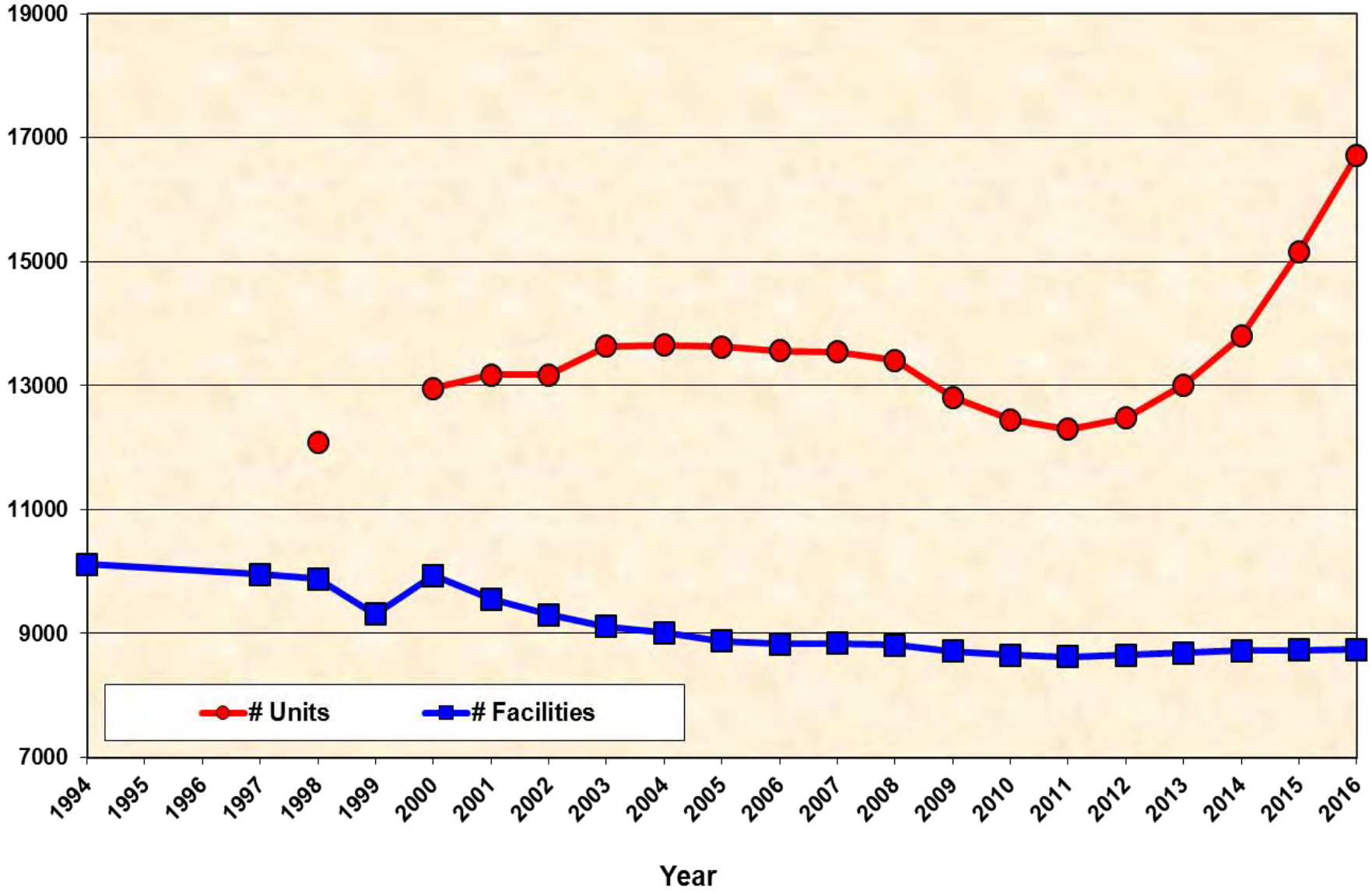
Medical Physicist and Senior Director, ACR, Reston, VA

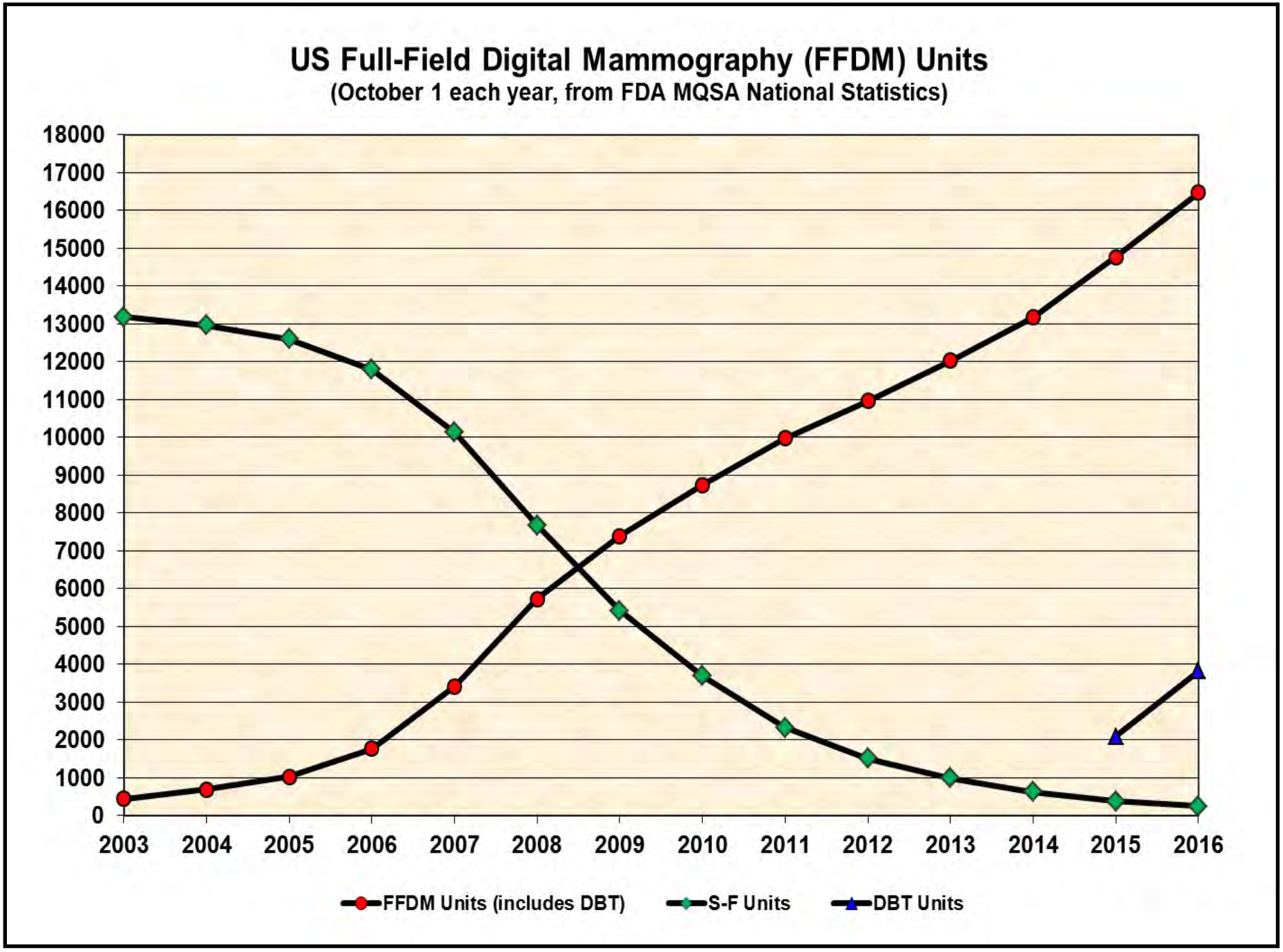
Overview

- Goals of the new QC Manual
- MQSA and QC
- Timing
- Applicability
- Transitioning
- FAQs
- What's Next for the ACR

US Mammography Units and Facilities

(October 1 each year, from GAO and FDA MQSA National Statistics)




US Full-Field Digital Mammography (FFDM) Units
(October 1 each year, from FDA MQSA National Statistics)
18000
17000
16000
15000
14000
13000
12000
11000
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
FFDM Units (includes DBT)
S-F Units
DBT Units

Full Field Digital Mammography (FFDM) or Digital Breast Tomosynthesis (DBT) Unit	Accreditation Body Approval Date Effective Date			
	ACR	SAR	SIA	STX
GE Senographe 2000D	12/18/02 02/15/03	08/15/06 08/15/06	08/28/03 10/01/03	05/21/04 05/21/04
Fischer Imaging SenoScan	07/24/03 08/15/03			05/21/04 05/21/04
Lorad/Hologic Selenia (Molybdenum target)	09/02/03 09/15/03	08/15/06 08/15/06	08/28/03 10/01/03	05/21/04 05/21/04
GE Senographe DS	08/12/04 09/15/04	08/15/06 08/15/06	01/12/06 01/17/06	08/12/04 09/15/04
Siemens Mammomat Novation DR	10/07/05 10/15/05	08/26/08 08/26/08	01/26/06 02/01/06	06/29/06 06/29/06
GE Senographe Essential	06/29/06 07/15/06	08/15/06 08/15/06	08/24/06 08/24/06	09/05/06 09/05/06
Fuji Computed Radiography for Mammography	11/13/06 11/15/06	10/12/06 10/12/06	11/13/06 11/13/06	11/13/06 11/13/06
Hologic Selenia (Tungsten target)	02/01/08 02/01/08	02/01/08 02/01/08	02/01/08 02/01/08	02/01/08 02/01/08
Siemens Mammomat Novation S	02/11/09 02/11/09	02/11/09 02/11/09	02/11/09 02/11/09	02/11/09 02/11/09
Hologic Selenia S	02/11/09 02/11/09	02/11/09 02/11/09	02/11/09 02/11/09	02/11/09 02/11/09
Hologic Selenia Dimensions 2D	02/11/09 02/11/09	02/11/09 02/11/09	02/11/09 02/11/09	02/11/09 02/11/09
Carestream Directview Computed Radiography (CR) Mammography	02/08/11 02/16/11	01/07/11 01/07/11	01/07/11 01/07/11	02/08/11 02/08/11
Siemens Mammomat Inspiration	02/11/11 02/11/11	02/11/11 02/11/11	02/11/11 02/11/11	02/11/11 02/11/11
Hologic Selenia Encore	06/15/11 06/15/11	06/15/11 06/15/11	06/15/11 06/15/11	06/15/11 06/15/11
Philips (Sectra) MicroDose L30	10/20/11 10/21/11	07/18/11 07/18/11		08/03/11 08/03/11
Siemens Mammomat Inspiration Pure	08/23/11 08/23/11	08/23/11 08/23/11	08/23/11 08/23/11	08/23/11 08/23/11
GE Senographe Care	10/07/11 10/07/11	10/07/11 10/07/11	10/07/11 10/07/11	10/07/11 10/07/11
Planmed Nuance	12/13/11 12/27/11	12/20/11 12/20/11		01/20/12 01/20/12
Planmed Nuance Excel	12/13/11 12/27/11	12/20/11 12/20/11		01/20/12 01/20/12
Fuji Aspire Computed Radiography for Mammography	01/20/12 01/20/12	01/20/12 01/20/12	01/20/12 01/20/12	01/20/12 01/20/12
Giotto Image 3D/3DL	11/02/12 11/02/12	7/24/12 7/24/12		03/09/12 03/09/12
Fuji Aspire HD	03/28/12 04/10/12	7/24/12 7/24/12	05/25/12 05/25/12	03/28/12 04/10/12
Konica Minolta Xpress Digital Mammography CR System	04/19/12 04/27/12	7/24/12 7/24/12		04/19/12 04/27/12
Agfa CR Mammography System	09/04/12 09/14/12	7/24/12 7/24/12		06/08/12 06/08/12
Fuji Aspire HD-s	06/25/13 06/25/13	06/25/13 06/25/13	06/25/13 06/25/13	06/25/13 06/25/13
Fuji Aspire HD Plus	06/25/13 06/25/13	06/25/13 06/25/13	06/25/13 06/25/13	06/25/13 06/25/13
Siemens Mammomat Inspiration Prime	07/11/13 07/11/13	07/11/13 07/11/13	07/11/13 07/11/13	07/11/13 07/11/13
Philips MicroDose SI L50	09/23/13 09/23/13	09/23/13 09/23/13	09/23/13 09/23/13	09/23/13 09/23/13
Siemens Mammomat Inspiration ECO	11/20/13 11/20/13	11/20/13 11/20/13	11/20/13 11/20/13	11/20/13 11/20/13
Fuji Aspire Cristalle	10/21/14 10/21/14	10/21/14 10/21/14	10/21/14 10/21/14	10/21/14 10/21/14
iCRco 3600M Mammography CR System	01/20/15 02/03/15			
Siemens Mammomat Fusion	09/21/15	09/21/15	09/21/15	09/21/15

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QC is complicated

Over 35 FDA-approved mfrs/models & QC

ACR DM QC Manual Project

American College of Radiology
Subcommittee on Quality Assurance in Mammography
of the
Committee on Mammography Accreditation

Eric Berns, PhD (chair)

Jay Baker, MD
Lora Barke, DO
Lawrence Bassett, MD, FACR
R. Edward Hendrick, PhD, FACR
Debra Monticciolo, MD, FACR
Doug Pfeiffer, MS, FACR

Margarita Zuley, MD
Christine Adent, RT(R)
Shelli Dixon, RT(R)
John Sandrick, PhD (MITA, retired)
Robert Uzenoff, BS (MITA)
Moustaffa Zerhouni (MITA)

Priscilla Butler, MS, FACR (ACR Staff Member)
Marion Boston, RT(R) (ACR Staff Member)
Pamela Platt, BSRT(R) (ACR Staff Member)

ACR Subcommittee on QA in Mammography - Current

- Chair – Eric Berns
- Technologists
  - Rhonda Baird
  - Shelli Dixon
  - Lanna Zulkoski
- Medical Physicists
  - Douglas Pfeiffer
- Radiologists
  - Lora Barke
  - Debra Monticciolo
- MITA (mfrs)
  - Robert Uzenoff
  - Megan Hayes
- ACR Staff
  - Priscilla (Penny) Butler
  - Marion Boston
  - Pamela Platt

Quality Control: What Is It and Why Is It Important?

Primary Purpose

- Reduce exposure to patients and personnel
- Ensure adequate and consistent patient image quality
- Detect and correct for potential problems, before they impact patient image quality and care

What it's not:

- Not a detailed technical evaluation of a unit
- Not a detailed measure of a limits of a unit
- Not the optimization of a unit

ACR DM QC Manual Project

- **Subcommittee Goals:**
  - **Standardize all QC tests for all digital mfrs**
  - **Standardize test frequencies**
  - **Standardize performance criteria**

ACR DM QC Manual Project

- **QC Tests:**
  - **Tests come from a review of a variety of sources (MQSA, SFM, ACRIN DMIST, Manufacturer's QC programs, MITA, European and other Int'l QC programs, subcommittee clinical experience, etc.)**
  - **Clinically relevant**
  - **User/operator friendly**
  - **Eliminate non-productive testing**
- ***Just because you <u>can</u> test something, doesn't mean you <u>should</u>!***

ACR Digital QC Manual - Structure

- Radiologist's Section
- Radiologic Technologist's Section
- Medical Physicist's Section
- Appendices
- **Clinical Image Quality Section (w/Patient Positioning and Compression and Clinical Image Quality Evaluation) is currently being revised
  - Clinical Image Quality Guide (from 1999 Mammography QC Manual) is currently posted on ACR website

MQSA Regs on Digital Mammography QC

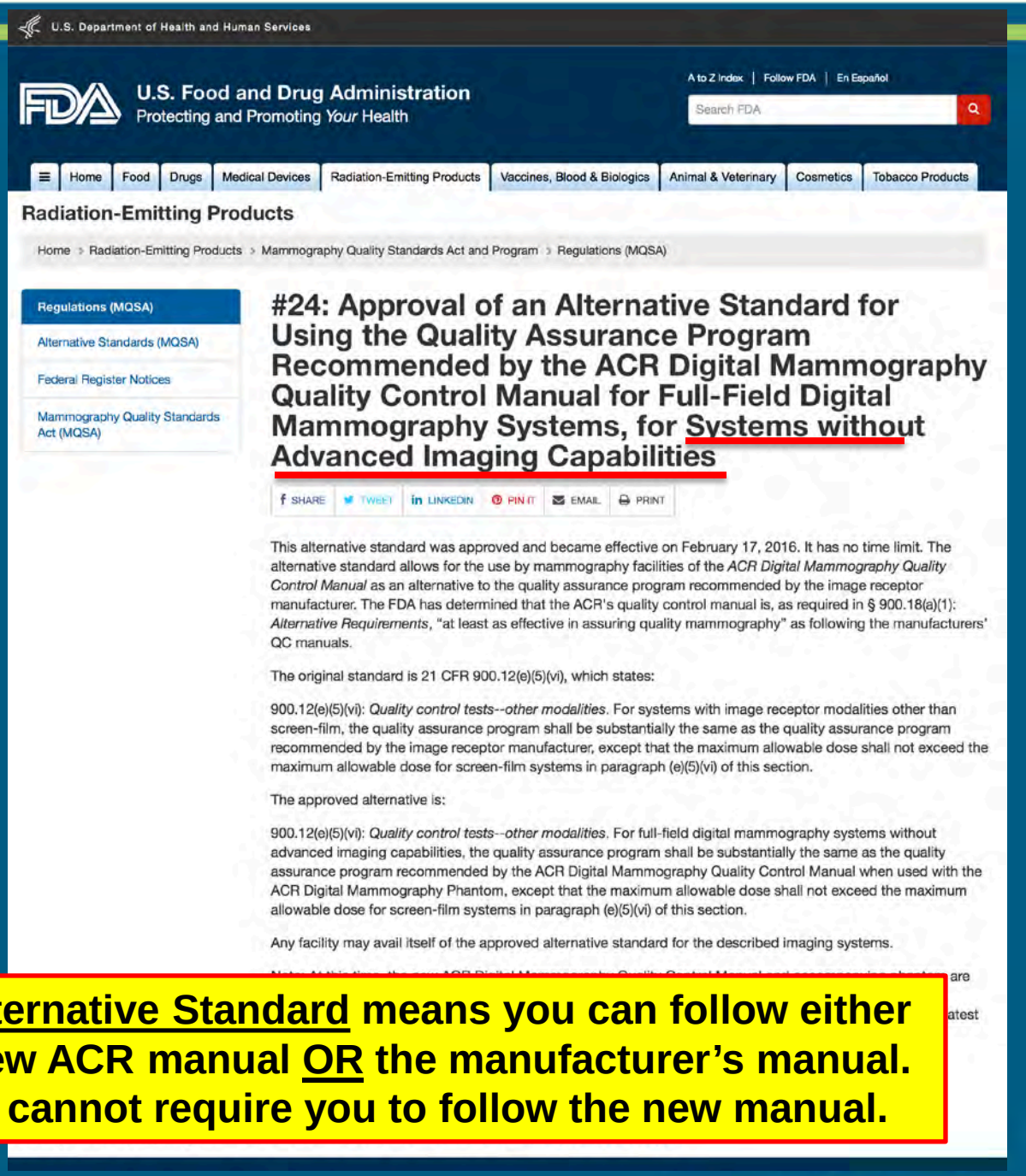
- **"For systems with image receptor modalities other than screen-film, the quality assurance program shall be substantially the same as the quality assurance program recommended by the image receptor manufacturer."**

- **In order to use the new ACR QC manual , we had to apply for an "alternative standard" from the FDA.**

February 17, 2016

FDA approved ACR's alternative standard allowing facilities to use new manual under MQSA

Only applies to FFDM systems without advanced imaging capabilities (i.e., tomosynthesis, contrast enhancement, etc.)



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Radiation-Emitting Products

Home > Radiation-Emitting Products > Mammography Quality Standards Act and Program > Regulations (MQSA)

Regulations (MQSA)
Alternative Standards (MQSA)
Federal Register Notices
Mammography Quality Standards Act (MQSA)

#24: Approval of an Alternative Standard for Using the Quality Assurance Program Recommended by the ACR Digital Mammography Quality Control Manual for Full-Field Digital Mammography Systems, for Systems without Advanced Imaging Capabilities

SHARE TWEET LINKEDIN PIN IT EMAIL PRINT

This alternative standard was approved and became effective on February 17, 2016. It has no time limit. The alternative standard allows for the use by mammography facilities of the *ACR Digital Mammography Quality Control Manual* as an alternative to the quality assurance program recommended by the image receptor manufacturer. The FDA has determined that the ACR's quality control manual is, as required in § 900.18(a)(1): *Alternative Requirements*, "at least as effective in assuring quality mammography" as following the manufacturers' QC manuals.

The original standard is 21 CFR 900.12(e)(5)(vi), which states:

900.12(e)(5)(vi): *Quality control tests--other modalities*. For systems with image receptor modalities other than screen-film, the quality assurance program shall be substantially the same as the quality assurance program recommended by the image receptor manufacturer, except that the maximum allowable dose shall not exceed the maximum allowable dose for screen-film systems in paragraph (e)(5)(vi) of this section.

The approved alternative is:

900.12(e)(5)(vi): *Quality control tests--other modalities*. For full-field digital mammography systems without advanced imaging capabilities, the quality assurance program shall be substantially the same as the quality assurance program recommended by the ACR Digital Mammography Quality Control Manual when used with the ACR Digital Mammography Phantom, except that the maximum allowable dose shall not exceed the maximum allowable dose for screen-film systems in paragraph (e)(5)(vi) of this section.

Any facility may avail itself of the approved alternative standard for the described imaging systems.

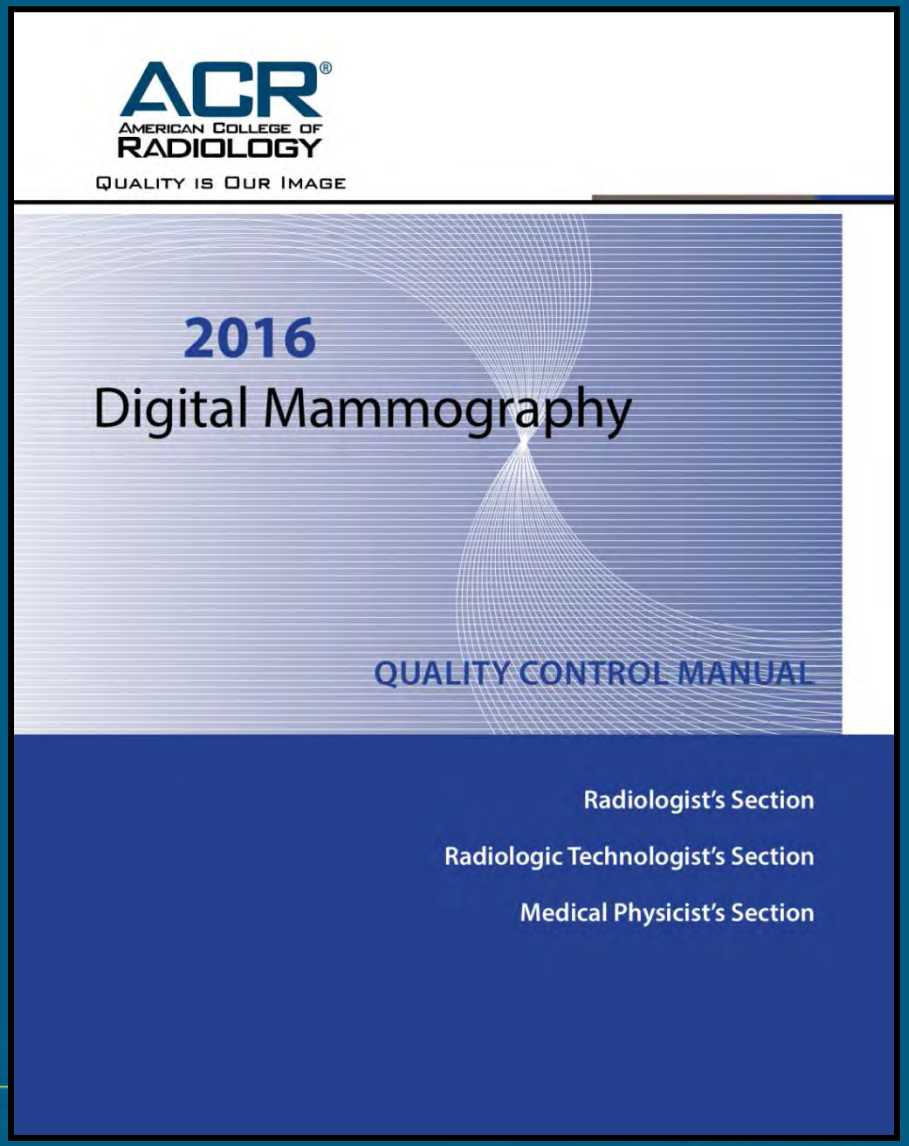
An Alternative Standard means you can follow either the new ACR manual OR the manufacturer's manual. ACR cannot require you to follow the new manual.

ACR DM QC Manual

Published
July 29, 2016

Link for free download sent to all ACR mammography accredited facilities

Look for email in next few weeks with link to updated version with corrections



May I Start Using the New Manual Now (and Stop Using the Old)?

- No, not yet
- ACR publishes new QC procedures for its accreditation programs 1 year in advance of the time it goes into effect; this provides time for:
  - Facilities to get familiar with the new procedures (while using their existing procedures)
  - ACR to make software revisions to evaluate the new QC and phantom images
  - FDA to integrate the new QC into their inspection procedures
- We expect this to happen July 2017

Who Can Use the New Manual?

- Facilities with digital mammography units with only 2D capabilities
- Facilities with 2D computed radiography (CR) systems

Who Cannot Use the New Manual?

- Facilities with digital mammography units with tomosynthesis capabilities
- Facilities with digital mammography units with contrast-enhanced imaging capabilities
- Facilities with digital mammography units with other advanced imaging capabilities (TBD)

Our Facility Has 1 of Each...Now What?

- **Option 1:**
  - **Follow the new ACR QC Manual for the 2D digital mammography unit**
  - **Follow the manufacturer's QC for digital mammography units with tomosynthesis or contrast-enhanced imaging capabilities**
- **Option 2:**
  - **Follow the manufacturers' QC manuals for each unit**

After July 2017, How May We Make the Switch to the New Manual?

- The medical physicist must first conduct annual survey of unit using new QC manual and new phantom
  - Sets up techniques and procedure for technologist QC
- QC technologist may then start routine QC using the new manual and new phantom

Must the Initial Medical Physicist's Annual Survey be Done on the Digital Mammography Unit and the Display Devices on the Same Day?

- No
- However, the QC technologist may only start routine QC using the new QC manual and new phantom after the entire Annual Survey is complete

May We Use the Old ACR Phantom to Perform the Tests in the New QC Manual?

- No
- The tests in the new QC Manual are entirely designed around the new ACR Digital Mammography Phantom

We Like Some of the Tests in the New QC Manual, Some We Don't. May We Perform Some Tests from One Manual and Some Tests from the Other?

- No, its all or none

Our Medical Physicist Prefers the New QC Manual, Our QC Technologists Wants to Use the Manufacturer's QC Manual. Is That OK?

- No, its all or none
- The facility, in consultation with their medical physicist, should decide which manual they will follow for each unit

www.acraccreditation.org/Modalities/Mammography

DIGITAL MAMMOGRAPHY QC MANUAL RESOURCES

2016 ACR Digital Mammography QC Manual Resources

In 2016, the Food and Drug Administration approved the ACR alternative standard request to allow mammography facilities to use the new ACR Digital Mammography Quality Control (QC) Manual and Digital Mammography QC Phantom in routine QC of digital equipment. Approval of this alternative standard will enable mammography QC technologists and medical physicists to use the new manual in lieu of manufacturers' quality control manuals.

The FDA specifies that the new manual may be used only for full-field digital mammography systems without advanced imaging capabilities (e.g., tomosynthesis and contrast enhancement). The new ACR manual will go into effect in July 2017 for facilities that choose to use it for QC.

A link to download the new manual at no charge was emailed to the facility and technologist contacts (the persons with the ACR Mammography Accreditation login information) at all ACR-accredited mammography facilities on August 1, 2016, with instructions to share the link with their colleagues at the facilities, including their medical physicists.

For help with questions about the 2016 ACR Digital Mammography QC Manual, contact the ACR at DMQC@acr.org.

2016 ACR Digital Mammography QC Manual

- Purchase the Manual
- ACR Digital Mammography QC Manual FAQ — **Updated 8/22/16**

Digital Mammography Quality Control Test Forms

- Radiologic Technologist's Tests – Excel — **Updated 9/24/16**
- Sample Radiologic Technologist's Tests – PDF — **Updated 9/24/16**
- Medical Physicist's Tests – Excel — **Updated 9/24/16**
- Sample Medical Physicist's Tests – PDF — **Updated 9/24/16**

Approved ACR Digital Mammography Phantoms

- CIRS
- Gammex

New!

ACR FAQs – Updated 8/22/16

Q. I am the medical physicist for several ACR-accredited mammography facilities. How should I obtain the new QC manual?

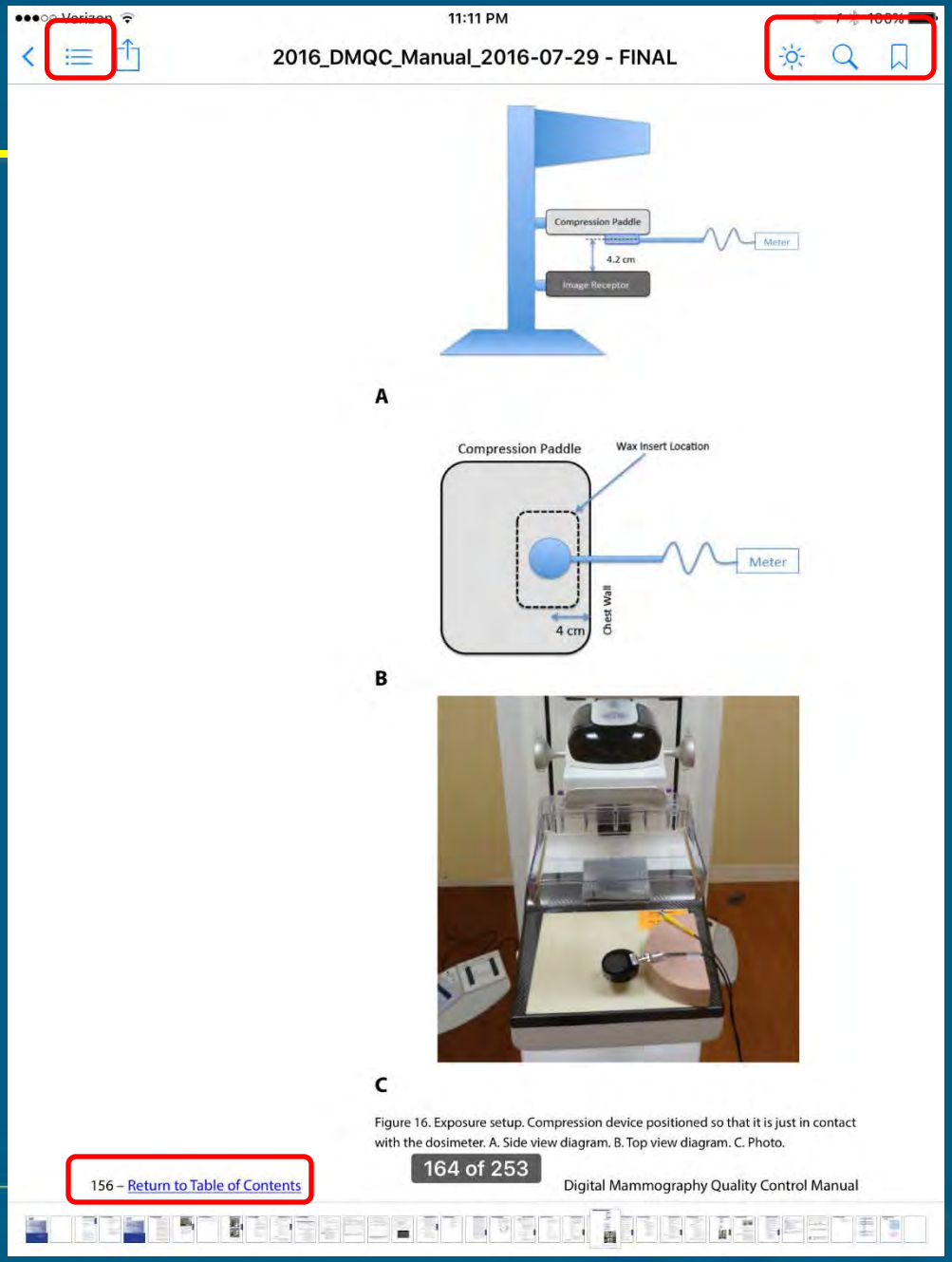
A. A link to download the new manual at no charge was emailed to the facility's staff with the ACR Mammography Accreditation log-in information at all ACR-accredited mammography facilities. They were instructed to share this link with their medical physicists. Contact your mammography facility and ask them to send you the link.

ACR FAQs – Misc

Q. Is the new QC manual available in hard copy?

A. No. The new manual is only available as an electronic file (PDF). If you would like a hard copy, you may print the PDF file. You may wish to use an office printing company to print the manual.

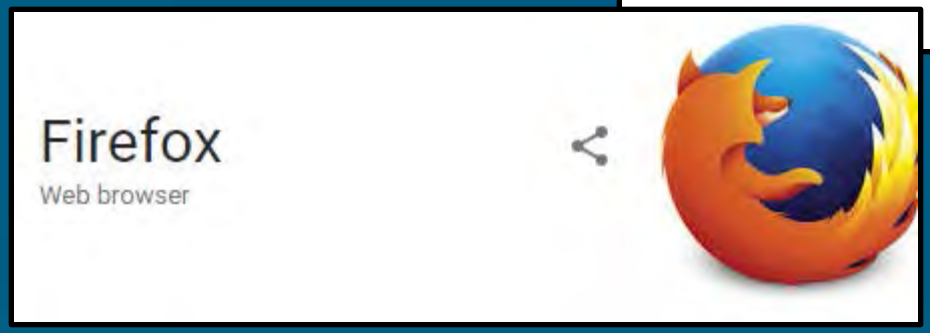
But, it is really cool on a tablet!



ACR FAQs – Misc

Q. I am having trouble downloading the new QC manual. Help!

A. Try copying and pasting the link into a different internet browser, such as Chrome or Firefox. That usually takes care of any download problems.



DIGITAL MAMMOGRAPHY QC MANUAL RESOURCES

2016 ACR Digital Mammography QC Manual Resources

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For help with questions about the 2016 ACR Digital Mammography QC Manual, contact the ACR at DMQC@acr.org.

2016 ACR Digital Mammography QC Manual

- Purchase the Manual
- ACR Digital Mammography QC Manual FAQ — **Updated 8/22/16**

Digital Mammography Quality Control Test Forms

- Radiologic Technologist's Tests – Excel **— Updated 9/24/16**
- Sample Radiologic Technologist's Tests – PDF **— Updated 9/24/16**
- Medical Physicist's Tests – Excel **— Updated 9/24/16**
- Sample Medical Physicist's Tests – PDF **— Updated 9/24/16**

Approved ACR Digital Mammography Phantoms

- CIRS
- Gammex

Facility, Unit and Test Equipment Data

Medical Physicist's Tests

Facility Information	
Facility Name	Happy Valley Mammography
Address	Suite 1
Address	1 Oak Street
City, State, Zip	Anywhere ST 11111
MAP ID# *(00000)*	00001
MAP Unit# *(00000-00)*	05
Lead Interpreting Radiologist	Dr. Mary Awsome
Quality Control Technologist	Sue Fantastic, RT(R)(M)
Rm B	
Room ID	Rm B
Survey Date	August 29, 2016
MP Report Date	August 31, 2016
Da	
X-	
X-Ra	
X-Ray Uni	
X-Ray U	
DR	X
CR	Boeing
CR Reader Manufacturer	5000
CR Reader Model	22222
CR Reader Serial #	January 3, 2016
CR Date of Manufacture	January 6, 2016
CR Date of Installation	March 6, 1900
SID (cm)	66
DC Offset	0.00
mA Large	100
mA Small	40
Magnification Stand Factor Used	1.5
Nominal Pixel Size (µm)	100

2. ACR DM Phantom Image Quality

Facility Name	Happy Valley Mammography	MAP ID-Unit# *(00000-00)*	00001 - 05
Mfr & Model	Ford Imager	Room ID	Rm B
ACR DM Phantom Mfr and S/N	Sunbeam 333	Survey Date	August 29, 2016

Excel Forms Autopopulate Info on Each Form

Formula-rich spreadsheets with pass/fail logic

Sample Completed Forms

1. ACR DM Phantom Image Quality

Weekly

Facility Happy Valley Mammography **Room ID** Rm A

MAP ID-Unit# *(00000-00)* 00001 - 01 **Unit Mfr & Model** Chrysler Super

		Year	2016				
		Date *(month & day)*	8/1/2016	8/8/2016	8/15/2016	8/22/2016	8/29/2016
		Tech Initials	SF	SF	SF	SF	SF
Resulting Techniques		Image receptor size	largest	largest	largest	largest	largest
		AEC mode	Auto-Filter	Auto-Filter	Auto-Filter	Auto-Filter	Auto-Filter
		Target/filter	Mo/Mo	Mo/Mo	Mo/Mo	Mo/Mo	Mo/Mo
		kVp	28	28	28	28	28
		mAs	98	100	99	101	98
ACR DM Phantom		Artifacts P/F	P	P	P	P	P
		Fiber score	5.5	5.0	5.5	5.0	5.5
		Speck group score	4.5	4.5	4.5	5.0	5.0
		Mass score	3.5	4.0	4.0	3.5	4.0
		Overall Pass/Fail	**Pass**	**Pass**	**Pass**	**Pass**	**Pass**

P = Pass **F = Fail**

ACR DM QC Manual – What's Next

- ACR revising accreditation process and software to incorporate the new manual and phantom
- Appendix for tomosynthesis QC

Summary

- The new ACR Digital Mammography QC Manual has been approved by FDA via an alternative standard for non-advanced imaging systems
- Its been published and distributed
- Facilities may or may not use it, but ACR encourages its use
- Facilities may start using it alone in July 2017
- MP must do annual survey first, then tech may do QC

Thank You

Next Up: Dr. Berns
Testing

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The New ACR Digital Mammography QC Manual

The Quality Control Tests

By Eric Berns, PhD

Digital Mammography Quality Control Tests
Medical Physicist's Tests

Note: *Complete Facility, Unit and Test Equipment Data tab first to populate facility information into forms*

Test	Minimum Frequency	Corrective Action Timeframe
1. Mammography Equipment Evaluation - MQSA Requirements	MEE	Before clinical use
2. ACR DM Phantom Image Quality	MEE and Annual	Before clinical use
3. Spatial Resolution	MEE and Annual	Within 30 days
4. Automatic Exposure Control System Performance	MEE and Annual	Within 30 days
5. Average Glandular Dose	MEE and Annual	Before clinical use
6. Unit Checklist	MEE and Annual	Critical: before clinical use; less critical: w/in 30 days
7. Computed Radiography *(if applicable)*	MEE and Annual	Before clinical use
8. Acquisition Workstation (AW) Monitor QC	MEE and Annual	W/in 30 days; before clinical use for severe defects
9. Radiologist Workstation (RW) Monitor QC	MEE and Annual	W/in 30 days; before clinical use for severe defects
10. Film Printer QC *(if applicable)*	MEE and Annual	Before clinical use
11. Evaluation of Site's Technologist QC Program	MEE and Annual	Within 30 days
12. Evaluation of Display Device Technologist QC Program	MEE and Annual	Within 30 days
MEE or Troubleshooting - Beam Quality (Half-Value Layer) Assessment	MEE or Troubleshooting	MEE - before clinical use; troubleshooting - w/in 30 days
MEE or Troubleshooting - kVp Accuracy and Reproducibility	MEE or Troubleshooting	MEE - before clinical use; troubleshooting - w/in 30 days
MEE or Troubleshooting - Collimation Assessment	MEE or Troubleshooting	MEE - before clinical use; troubleshooting - w/in 30 days
Troubleshooting - Ghost Image Evaluation	Troubleshooting	Before clinical use
Troubleshooting - Viewbox Luminance	Troubleshooting	NA

Summary Report Forms

Medical Physicist's DM QC Test Summary

Mammography Technique Chart

Medical Physicist QC Letter for the Radiologist

Supplemental Forms

Facility, Unit and Test Equipment Data

QC Equipment List - Medical Physicist

ACR Digital Mammography (DM) Phantom *(may use facility's phantom)*

0.1 mm aluminum sheets

Hi-resolution bar pattern - 2 to 10 lp/mm

2, 4, and 6 cm thick acrylic, BR-12 or BR-50 sheets

kV meter

Dosimeter

Lead sheet or equivalent

Photometer to measure luminance

Thin metal ruler (For CR)

Coins, ready-pack film, electronic collimation test tool(s), or equivalent

Facility, Unit and Test Equipment Data

Medical Physicist's Tests

Facility Information	
Facility Name	ACR Webinar
Address	1234 Webinar Road
Address	
City, State, Zip	Reston, VA 54321
MAP ID# *(00000)*	99999
MAP Unit# *(00000-00)*	01
Lead Interpreting Radiologist	Lead Rad, MD
Quality Control Technologist	Ms. QC Lead Tech
Rm B	
Room ID	Room 1
Survey Date	December 6, 2016
MP Report Date	December 6, 2016
Date of Previous Survey	December 5, 2015
DM Unit Information	
X-Ray Unit Manufacturer	Unit Mfr A
X-Ray Unit Model	Unit Model ABC
X-Ray Unit Control Serial #	Unit SN 9999
X-Ray Unit Date of Manufacture	December 1, 2010
X-Ray Unit Date of Installation	12/5/11
DR	X
CR	Fuji
CR Reader Manufacturer	3000
CR Reader Model	CR Reader Model A
CR Reader Serial #	CR SN 123
CR Date of Manufacture	December 1, 2000
CR Date of Installation	December 2, 2000
SID (cm)	70
DC Offset	50.00
mA Large	100
mA Small	40
Magnification Stand Factor Used	1.8
Nominal Pixel Size (µm)	70
Test Equipment Info	
ACR DM Phantom Manufacturer and S/N	ACR DM Phantom SN: 3344
Dosimeter Manufacturer/Model	Dosimeter Mfr A
Dosimeter Calibration Date	November 1, 2016
kVp Meter Manufacturer/Model	kVp Meter Mfr B
kVp Meter Calibration Date	November 2, 2016
Medical Physicist Info	
Medical Physicist Name	MP Name Jane Doe
Telephone Number	333-444-5555
email	Jane.doe@acr.email
Signature	MP Signature of Jane Doe

1. Mammography Equipment Evaluation (MEE)

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

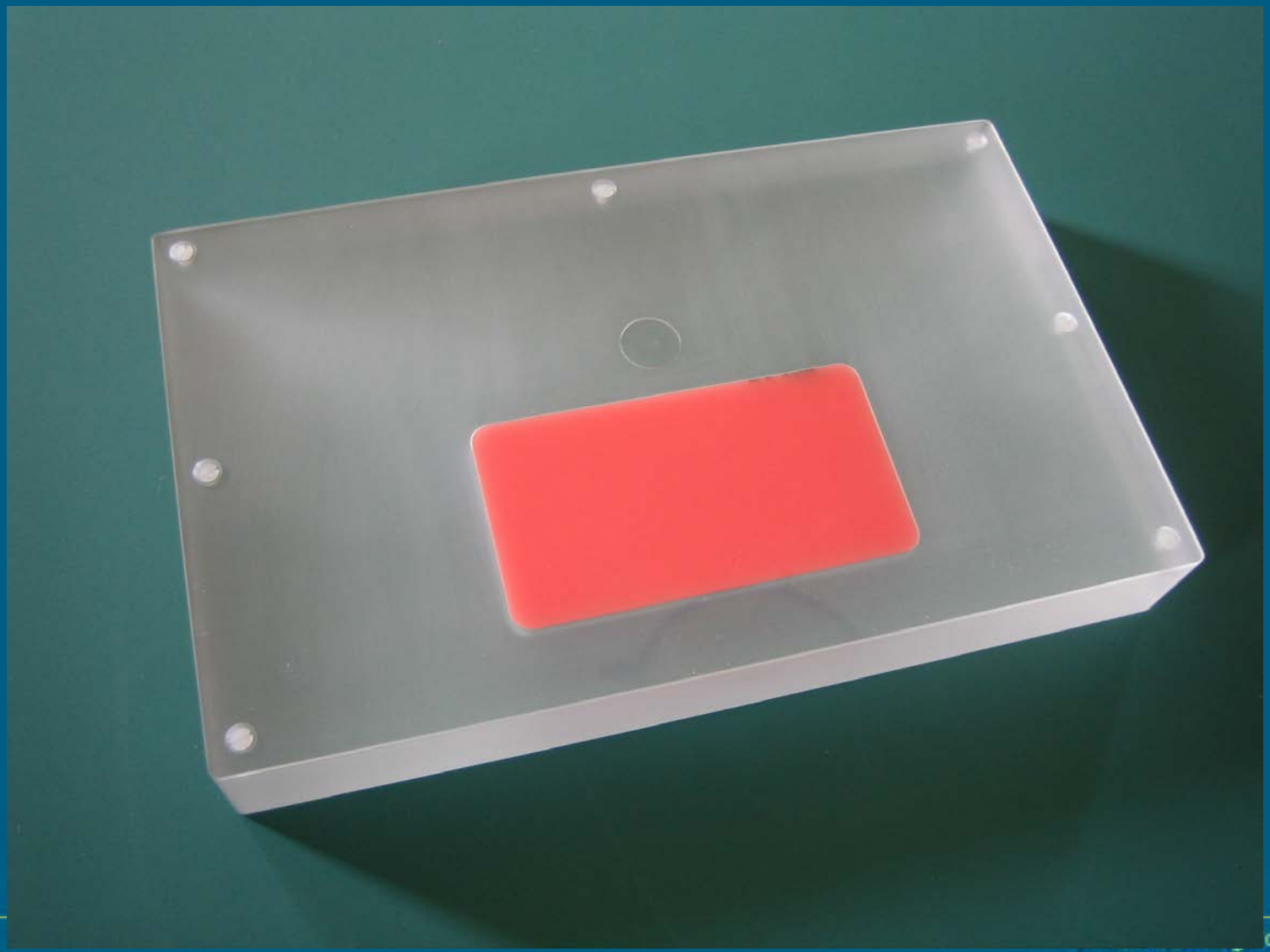
MQSA Requirements for Equipment [FDA Rule Sec. 900.12 (b)] - only applies to MEE

Feature	FDA Rule	Requirement	Meets? Yes/No/NA
Motion of tube-image receptor assembly	3(i)	The assembly shall be capable of being fixed in any position where it is designed to operate. Once fixed in any such position, it shall not undergo unintended motion.	Yes
	3(ii)	This mechanism shall not fail in the event of power interruption.	Yes
Image receptor sizes	4(iii)	Systems used for magnification procedures shall be capable of operation with the grid removed from between the source and image receptor.	Yes
Light fields	5	For any mammography system with a light beam that passes through the X-ray beam-limiting device, the light shall provide an average illumination of not less than 160 lux (15 ft-candles) at 100 cm or the maximum source-image receptor distance (SID), whichever is less.	Yes
Magnification	6(i)	Systems used to perform noninterventional problem-solving procedures shall have radiographic magnification capability available for use by the operator.	Yes
	6(ii)	Systems used for magnification procedures shall provide, at a minimum, at least one magnification value within the range of 1.4 to 2.0.	Yes
Focal spot selection	7(i)	When more than one focal spot is provided, the system shall indicate, prior to exposure, which focal spot is selected.	Yes
	7(ii)	When more than one target material is provided, the system shall indicate, prior to exposure, the preselected target material.	Yes
	7(iii)	When the target material and/or focal spot is selected by a system algorithm that is based on the exposure or on a test exposure, the system shall display, after the exposure, the target material and/or focal spot actually used during the exposure.	Yes
Application of compression	8(i)(A)	Each system shall provide an initial power-driven compression activated by hands-free controls operable from both sides of the patient.	Yes
	8(i)(B)	Each system shall provide fine adjustment compression controls operable from both sides of the patient.	Yes
Compression paddle	8(ii)(A)	Systems shall be equipped with different sized compression paddles that match the sizes of all full-field image receptors provided for the system.	Yes
	8(ii)(B)	Compression paddle shall be flat and parallel to the breast support table and shall not deflect from parallel by more than 1.0 cm at any point on the surface of the compression paddle when compression is applied.	Yes
	8(ii)(C)	Equipment intended by the manufacturer's design to not be flat and parallel to the breast support table during compression shall meet the manufacturer's design specifications and maintenance requirements.	Yes
	8(ii)(D)	Chest wall edge of the compression paddle shall be straight and parallel to the edge of the image receptor.	Yes
	8(ii)(E)	Chest wall edge may be bent upward to allow for patient comfort but shall not appear on the image.	Yes
Technique factor selection and display	9(i)	Manual selection of mAs or at least one of its component parts (mA and/or time) shall be available.	Yes
	9(ii)	The technique factors (kVp and either mA and seconds or mAs) to be used during an exposure shall be indicated before the exposure begins, except when AEC is used, in which case the technique factors that are set prior to the exposure shall be indicated.	Yes
	9(iii)	Following AEC mode use, the system shall indicate the actual kVp and mAs (or mA and time) used during the exposure.	Yes
Lighting**	14	The facility shall make special lights for film illumination, i.e., hot-lights, capable of producing light levels greater than that provided by the view box, available to the interpreting physicians.	Yes
Film masking devices**	15	Film masking devices that can limit the illuminated area to a region equal to or smaller than the exposed portion of the film are available to all interpreting physicians interpreting for the facility.	Yes
Beam quality assessment	*	Must meet the specifications of FDA's Performance Standards for Ionizing Radiation Emitting Products (Part 1020.30	Yes
kVp accuracy & reproducibility	*	The mean kVp must not differ from the nominal by more than + 5% of the nominal kVp.	Yes
	*	The coefficient of variation must be ≤0.02.	Yes
Collimation assessment	*	If sum of left plus right edge deviations or anterior plus chest edge deviations exceeds 2% of SID, seek service adjustment.	Yes
	*	If X-ray field exceeds image receptor at any side by more than + 2% of SID or if X-ray field falls within image receptor on the chest wall side, seek service adjustment.	Yes
	*	If chest-wall edge of compression paddle is within the image receptor or projects beyond the chest-wall edge of the image receptor by more than 1% of SID, seek service correction.	Yes
		Overall Pass/Fail	**Pass**

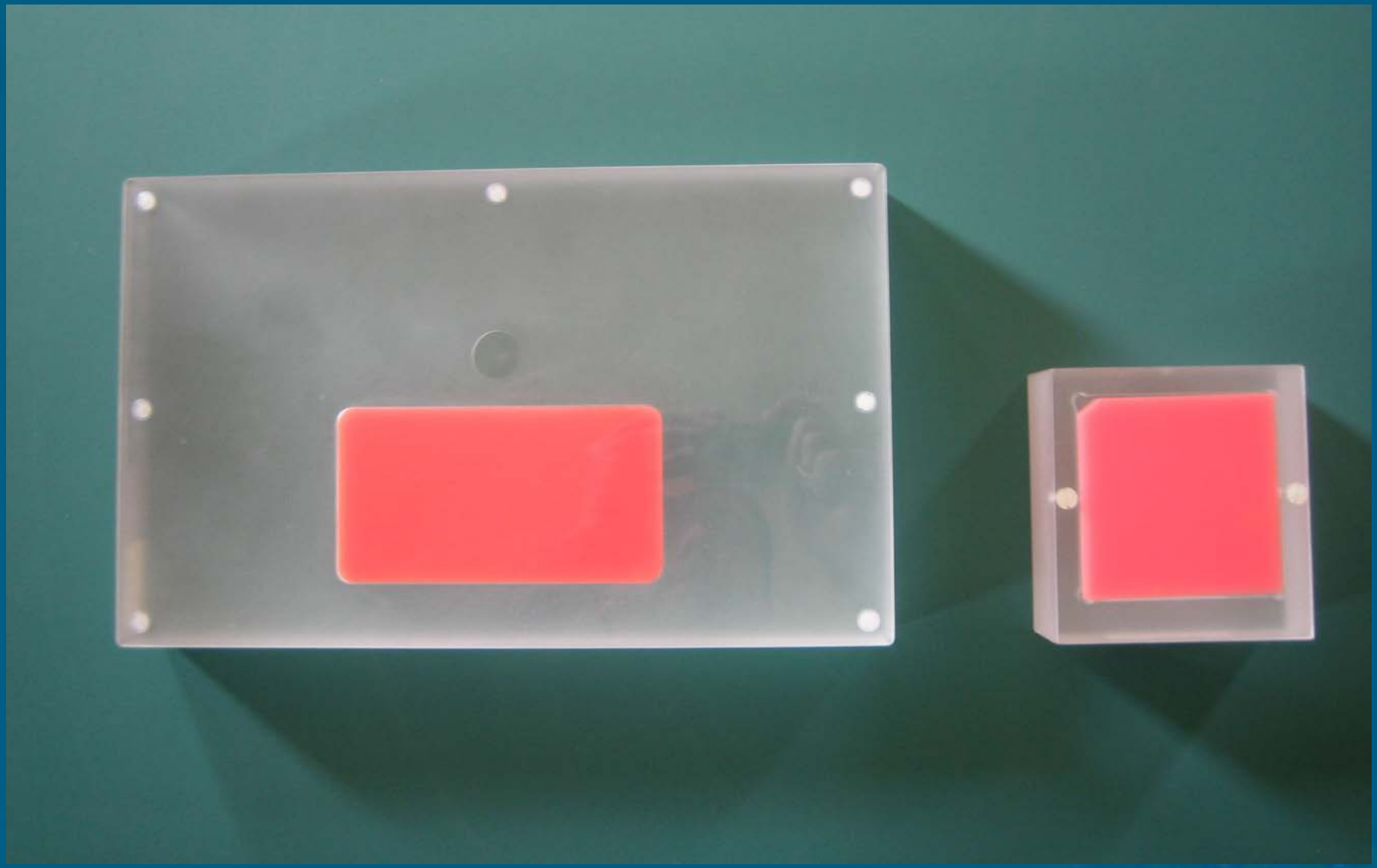
** ACR adoption for MEEs of pertinent sections in FDA Rule 900.12(e)(5) that apply to annual testing of screen-film only*

*** NA is acceptable if 1) no hard copy interpretations are made, 2) no hard copy comparisons are made or 3) for new units at existing facilities if these were previously evaluated and have not changed*

The ACR DM Phantom



The ACR DM Phantom



2. ACR DM Phantom Image Quality

Facility Name _____ **MAP ID-Unit#** *(00000-00)* _____ - _____

Mfr & Model _____ **Room ID** _____

ACR DM Phantom Mfr and S/N _____ **Survey Date** _____

Phantom Setup

Equipment: ACR DM Phantom *(required)*

Follow procedure in the Technologist's ACR Technique & Procedure Summaries:

- Use clinical technique for typical screening exam of 4.2 cm 50/50 breast
- Largest IR & paddle, 5 daN or 12 lbs, Score on AW
- Adjust W/L to optimize test objects, zoom & pan entire image
- For Config 2 & 3 using kVp & mAs closest to phantom techniques

Phantom patient name: _____

Phantom patient ID: _____

Image sent to which PACS? _____

Phantom Setup:

AEC mode: _____

Paddle size (IR size): _____

Paddle type (reg or flex): _____

View or selected image: _____

Compression force: _____

AEC cell position (if avail): _____

Target/filter (if app): Mo/Rh kVp (if app): _____

Density setting (if app): _____

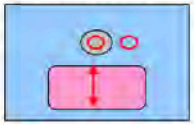
Mag factor (mag mode only): _____

		Contact Mode			Mag Mode		
		Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3	Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3
Resulting Techniques *(if available)*	Target/filter						
	Image receptor size						
	kVp						
	mAs						
	Unit-indicated AGD (mGy)						
ACR DM Phantom Evaluation	Artifacts P/F						
	Fiber score						
	Speck group score						
	Mass score						
	Phantom P/F						
Raw Image SNR & CNR	DC offset *(if applicable)*						
	Mean cavity signal						
	Mean background signal						
	Std dev of background						
	Calculated SNR						
	Calculated CNR						
	SNR ≥40.0 (P/F)		CNR from Previous Year (if avail; does not apply to MEEs)	CNR Lower Limit (85% of PY)			
	CNR ≥2.0 (P/F)			CNR ≥ -15% of Previous Year (P/F)			
Distance Measurement	Parallel to A-C axis (mm)						
	Meas = 70.0 ±14.0 mm (P/F)						
	Overall Pass/Fail	**Pass**					

Initiated (or updated) technologist's ACR Technique and Procedure Summaries form _____

Analysis

	Full Point	Half Point
Fibers	≥8 mm long	≥5 & <8 mm
Specks	4 - 6 specks	2 - 3 specks
Masses	≥ ¾ border	≥ ½ & < ¾ border



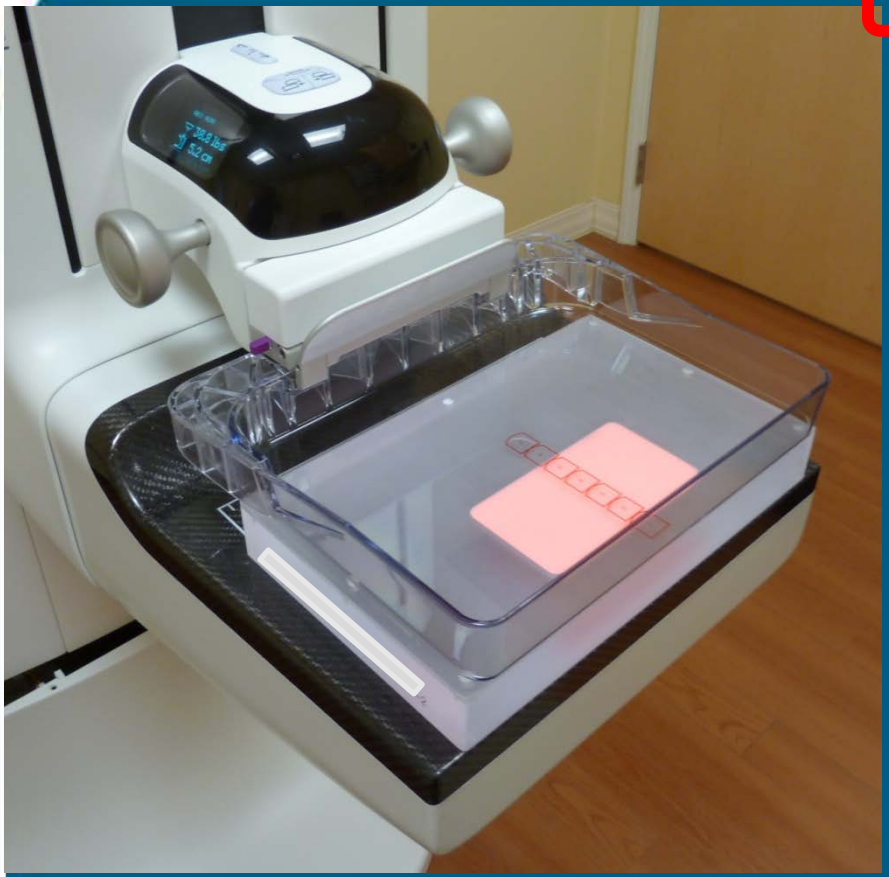
$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{Std\ Dev\ of\ Bkgd}$$

$$CNR = \frac{(Mean\ Cavity\ Signal - Mean\ Bkgd\ Signal)}{Std\ Dev\ of\ Bkgd}$$

Action Limits

Required: ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
MEE & Annual: SNR must be ≥40.0; CNR ≥2.0. Annual: CNR must be ≥ 85% of previous year.
Measured wax insert distance must be 70.0 ± 14.0 mm.

Timeframe: Failures of required items must be corrected before clinical use.



2. ACR DM Phantom Image Quality

Facility Name _____ MAP ID-Unit# *(00000-00)* _____ - _____

Mfr & Model _____ Room ID _____

ACR DM Phantom Mfr and S/N _____ Survey Date _____

Phantom Setup

Equipment: ACR DM Phantom *(required)*

Follow procedure in the Technologist's ACR Technique & Procedure Summaries:

- Use clinical technique for typical screening exam of 4.2 cm 50/50 breast
- Largest IR & paddle, 5 daN or 12 lbs, Score on AW
- Adjust W/L to optimize test objects, zoom & pan entire image
- For Config 2 & 3 using kVp & mAs closest to phantom techniques

Phantom patient name: _____

Phantom patient ID: _____

Image sent to which PACS? _____

Phantom Setup:

AEC mode: _____

Paddle size (IR size): _____

Paddle type (reg or flex): _____

View or selected image: _____

Compression force: _____

AEC cell position (if avail): _____

Target/filter (if app): Mo/Rh kVp (if app): _____

Density setting (if app): _____

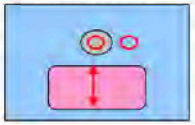
Mag factor (mag mode only): _____

		Contact Mode			Mag Mode		
		Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3	Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3
Resulting Techniques *(if available)*	Target/filter						
	Image receptor size						
	kVp						
	mAs						
	Unit-indicated AGD (mGy)						
ACR DM Phantom Evaluation	Artifacts P/F						
	Fiber score						
	Speck group score						
	Mass score						
	Phantom P/F						
Raw Image SNR & CNR	DC offset *(if applicable)*						
	Mean cavity signal						
	Mean background signal						
	Std dev of background						
	Calculated SNR						
	Calculated CNR						
	SNR ≥40.0 (P/F)		CNR from Previous Year (if avail; does not apply to MEEs)	CNR Lower Limit (85% of PY)			
	CNR ≥2.0 (P/F)			CNR ≥ -15% of Previous Year (P/F)			
Distance Measurement	Parallel to A-C axis (mm)						
	Meas = 70.0 ±14.0 mm (P/F)						
	Overall Pass/Fail	Pass					

Initiated (or updated) technologist's ACR Technique and Procedure Summaries form _____

Analysis

	Full Point	Half Point
Fibers	≥8 mm long	≥5 & <8 mm
Specks	4 - 6 specks	2 - 3 specks
Masses	≥ ¾ border	≥ ½ & < ¾ border



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Action Limits

Required: ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
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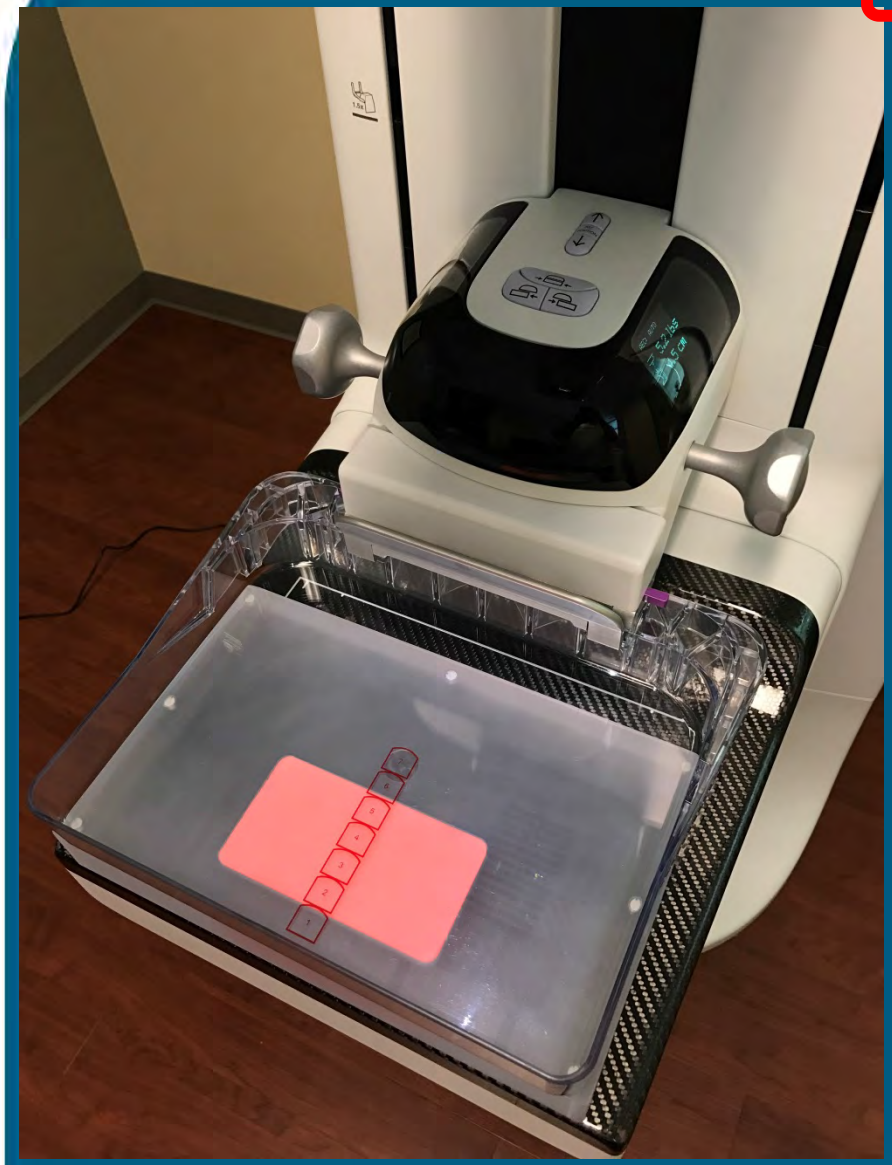
Measured wax insert distance must be 70.0 ± 14.0 mm.

Timeframe: Failures of required items must be corrected before clinical use.



2. ACR DM Phantom Image Quality

Facility Name _____ **MAP ID-Unit#** *(00000-00)* _____ - _____

Mfr & Model _____ **Room ID** _____

ACR DM Phantom Mfr and S/N _____ **Survey Date** _____

Phantom Setup

Equipment: ACR DM Phantom *(required)*

Follow procedure in the Technologist's ACR Technique & Procedure Summaries:

- Use clinical technique for typical screening exam of 4.2 cm 50/50 breast
- Largest IR & paddle, 5 daN or 12 lbs, Score on AW
- Adjust W/L to optimize test objects, zoom & pan entire image
- For Config 2 & 3 using kVp & mAs closest to phantom techniques

Phantom patient name: _____

Phantom patient ID: _____

Image sent to which PACS? _____

Phantom Setup:

AEC mode: _____

Paddle size (IR size): _____

Paddle type (reg or flex): _____

View or selected image: _____

Compression force: _____

AEC cell position (if avail): _____

Target/filter (if app): Mo/Rh kVp (if app): _____

Density setting (if app): _____

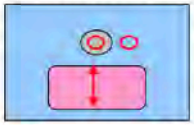
Mag factor (mag mode only): _____

		Contact Mode			Mag Mode		
		Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3	Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3
Resulting Techniques *(if available)*	Target/filter						
	Image receptor size						
	kVp						
	mAs						
	Unit-indicated AGD (mGy)						
ACR DM Phantom Evaluation	Artifacts P/F						
	Fiber score						
	Speck group score						
	Mass score						
	Phantom P/F						
Raw Image SNR & CNR	DC offset *(if applicable)*						
	Mean cavity signal						
	Mean background signal						
	Std dev of background						
	Calculated SNR						
	Calculated CNR						
	SNR ≥40.0 (P/F)		CNR from Previous Year (if avail; does not apply to MEEs)	CNR Lower Limit (85% of PY)			
	CNR ≥2.0 (P/F)			CNR ≥ -15% of Previous Year (P/F)			
Distance Measurement	Parallel to A-C axis (mm)						
	Meas = 70.0 ±14.0 mm (P/F)						
	Overall Pass/Fail	**Pass**					

Initiated (or updated) technologist's ACR Technique and Procedure Summaries form _____

Analysis

	Full Point	Half Point
Fibers	≥8 mm long	≥5 & <8 mm
Specks	4 - 6 specks	2 - 3 specks
Masses	≥ ¾ border	≥ ½ & < ¾ border



$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{Std\ Dev\ of\ Bkgd}$$

$$CNR = \frac{(Mean\ Cavity\ Signal - Mean\ Bkgd\ Signal)}{Std\ Dev\ of\ Bkgd}$$

Action Limits

Required: ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
MEE & Annual: SNR must be ≥40.0; CNR ≥2.0. Annual: CNR must be ≥ 85% of previous year.
Measured wax insert distance must be 70.0 ± 14.0 mm.

Timeframe: Failures of required items must be corrected before clinical use.

2. ACR DM Phantom Image Quality

Facility Name _____ **MAP ID-Unit#** *(00000-00)* _____ - _____

Mfr & Model _____ **Room ID** _____

ACR DM Phantom Mfr and S/N _____ **Survey Date** _____

Phantom Setup

Equipment: ACR DM Phantom *(required)*

Follow procedure in the Technologist's ACR Technique & Procedure Summaries:

- Use clinical technique for typical screening exam of 4.2 cm 50/50 breast
- Largest IR & paddle, 5 daN or 12 lbs, Score on AW
- Adjust W/L to optimize test objects, zoom & pan entire image
- For Config 2 & 3 using kVp & mAs closest to phantom techniques

Phantom patient name: _____

Phantom patient ID: _____

Image sent to which PACS? _____

Phantom Setup:

AEC mode: _____

Paddle size (IR size): _____

Paddle type (reg or flex): _____

View or selected image: _____

Compression force: _____

AEC cell position (if avail): _____

Target/filter (if app): Mo/Rh kVp (if app): _____

Density setting (if app): _____

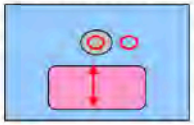
Mag factor (mag mode only): _____

		Contact Mode			Mag Mode		
		Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3	Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3
Resulting Techniques *(if available)*	Target/filter						
	Image receptor size						
	kVp						
	mAs						
	Unit-indicated AGD (mGy)						
ACR DM Phantom Evaluation	Artifacts P/F						
	Fiber score						
	Speck group score						
	Mass score						
	Phantom P/F						
Raw Image SNR & CNR	DC offset *(if applicable)*						
	Mean cavity signal						
	Mean background signal						
	Std dev of background						
	Calculated SNR						
	Calculated CNR						
	SNR ≥40.0 (P/F)		CNR from Previous Year (if avail; does not apply to MEEs)	CNR Lower Limit (85% of PY)			
	CNR ≥2.0 (P/F)			CNR ≥ -15% of Previous Year (P/F)			
Distance Measurement	Parallel to A-C axis (mm)						
	Meas = 70.0 ±14.0 mm (P/F)						
	Overall Pass/Fail	**Pass**					

Initiated (or updated) technologist's ACR Technique and Procedure Summaries form _____

Analysis

	Full Point	Half Point
Fibers	≥8 mm long	≥5 & <8 mm
Specks	4 - 6 specks	2 - 3 specks
Masses	≥ ¾ border	≥ ½ & < ¾ border



$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{Std\ Dev\ of\ Bkgd}$$

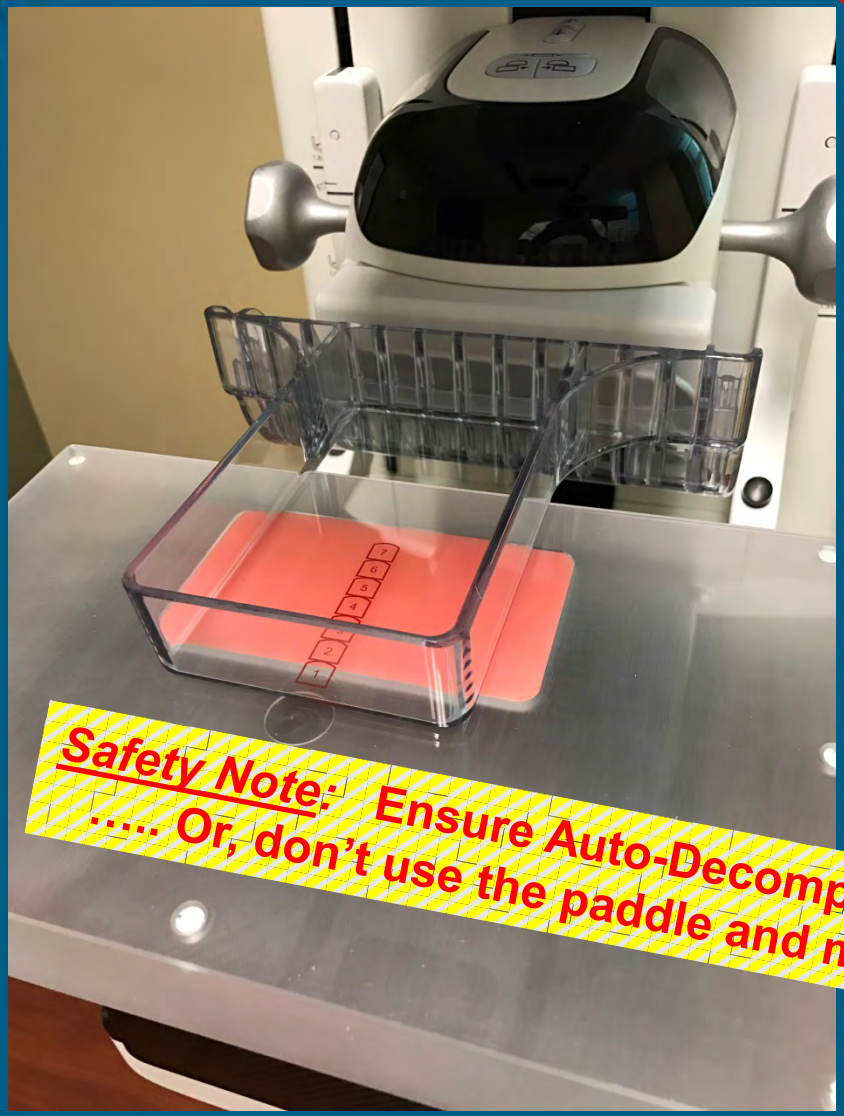
$$CNR = \frac{(Mean\ Cavity\ Signal - Mean\ Bkgd\ Signal)}{Std\ Dev\ of\ Bkgd}$$

Action Limits

Required: ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
MEE & Annual: SNR must be ≥40.0; CNR ≥2.0. Annual: CNR must be ≥ 85% of previous year.
Measured wax insert distance must be 70.0 ± 14.0 mm.

Timeframe: Failures of required items must be corrected before clinical use.

2. ACR DM Phantom Image Quality



Safety Note: Ensure Auto-Decompress is turned off!! ….. Or, don't use the paddle and make sure phantom is secure!

Facility Name | MAP ID-Unit# (00000-00) | Mfr & Model | Room ID | ACR DM Phantom Mfr and S/N | Survey Date

Phantom Setup

Equipment: ACR DM Phantom *(required)*

Follow procedure in the Technologist's ACR Technique & Procedure Summaries:
- Use clinical technique for typical screening exam of 4.2 cm 50/50 breast
- Largest IR & paddle, 5 daN or 12 lbs, Score on AW
- Adjust W/L to optimize test objects, zoom & pan entire image
- For Config 2 & 3 using kVp & mAs closest to phantom techniques

Phantom patient name: | Phantom patient ID: | Image sent to which PACS?

Phantom Setup: AEC mode: | Paddle size (IR size): | Paddle type (reg or flex): | View or selected image: | Compression force: | AEC cell position (if avail): | Target/filter (if app): Mo/Rh | kVp (if app): | Density setting (if app): | Mag factor (mag mode only):

		Contact Mode			Mag Mode		
		Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3	Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3
Resulting Techniques *(if available)*	Target/filter						
	Image receptor size						
	kVp						
	mAs						
	Unit-indicated AGD (mGy)						
ACR DM Phantom Evaluation	Artifacts P/F						
	Fiber score						
	Speck group score						
	Mass score						
	Phantom P/F						
SNR & CNR Raw Image	DC offset *(if applicable)*						
	Mean cavity signal						
	Mean background signal						
	Std dev of background						
	Calculated SNR						
	Calculated CNR						
	SNR ≥40.0 (P/F)		CNR from Previous Year (if avail; does not apply to MEEs)	CNR Lower Limit (65% of PY)			
	CNR ≥2.0 (P/F)			CNR ≥ -15% of Previous Year (P/F)			
Distance Measurement	Parallel to A-C axis (mm)						
	Meas = 70.0 ±14.0 mm (P/F)						
	Overall Pass/Fail	Pass					

Initiated (or updated) technologist's ACR Technique and Procedure Summaries form

$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{Std\ Dev\ of\ Bkgd}$$

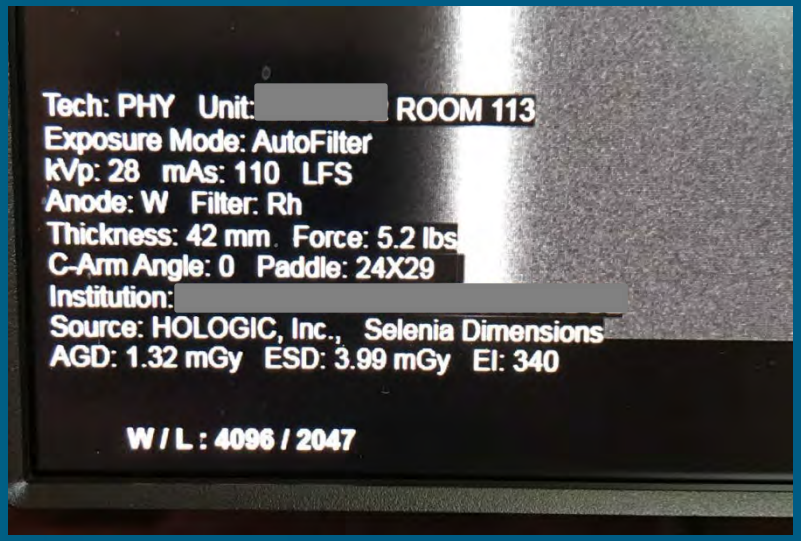
$$(Mean\ Bkgd\ Signal)$$

Masses

Action Limits

Required: ACR DM Phantom
Fiber score must be ≥2.0; speck g…
MEE & Annual: SNR must be ≥40.0; CNR ≥2.0. …ear.
Measured wax insert distance must be 70.0 ± 14.0 mm.

Timeframe: Failures of required items must be corrected before clinical use.



2. ACR DM Phantom Image Quality

Facility Name	ACR Webinar		MAP ID-Unit# *(00000-00)*	99999 - 01		
Mfr & Model	Unit Mfr A Unit Model ABC		Room ID	Room 1		
ACR DM Phantom Mfr and S/N	ACR DM Phantom SN: 3344		Survey Date	December 6, 2016		

Phantom Setup

Equipment: ACR DM Phantom *(required)*

Follow procedure in the Technologist's ACR Technique & Procedure Summaries:
- Use clinical technique for typical screening exam of 4.2 cm 50/50 breast
- Largest IR & paddle, 5 daN or 12 lbs, Score on AW
- Adjust W/L to optimize test objects, zoom & pan entire image
- For Config 2 & 3 using kVp & mAs closest to phantom techniques

Phantom patient name: ACR Phantom Test
Phantom patient ID: #12345
Image sent to which PACS? Yes

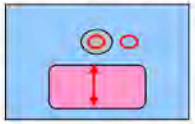
Phantom Setup:
AEC mode: Auto-Filter
Paddle size (IR size): Large
Paddle type (reg or flex): Reg
View or selected image: LCC
Compression force: 5
AEC cell position (if avail): Auto
Target/filter (if app): W/Rh kVp (if app): Auto
Density setting (if app): 0
Mag factor (mag mode only): 1.8

		Contact Mode			Mag Mode		
		Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3	Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3
Resulting Techniques *(if available)*	Target/filter	W/Rh	W/Ag		W/Rh	W/Ag	
	Image receptor size	Large	Large		Mag	Mag	
	kVp	28	28		29	29	
	mAs	110	110		100	100	
	Unit-indicated AGD (mGy)	1.32					
ACR DM Phantom Evaluation	Artifacts P/F	P	P	P	P	P	P
	Fiber score	5.0					
	Speck group score	4.0					
	Mass score	4.0					
	Phantom P/F	P					
SNR & CNR Raw Image	DC offset *(if applicable)*	50.00					
	Mean cavity signal	358.69					
	Mean background signal	341.42					
	Std dev of background	5.6					
	Calculated SNR	51.95					
	Calculated CNR	3.08					
	SNR ≥40.0 (P/F)	P	CNR from Previous Year (if avail; does not apply to MEEs)	CNR Lower Limit (85% of PY)	CNR ≥ -15% of Previous Year (P/F)		
	CNR ≥2.0 (P/F)	P					
Distance Measurement	Parallel to A-C axis (mm)	72			72		
	Meas = 70.0 ±14.0 mm (P/F)	P			P		
Overall Pass/Fail		Pass					

Initiated (or updated) technologist's ACR Technique and Procedure Summaries form: Yes

Analysis

	Full Point	Half Point
Fibers	≥8 mm long	≥5 & <8 mm
Specks	4 - 6 specks	2 - 3 specks
Masses	≥ ¾ border	≥ ½ & < ¾ border



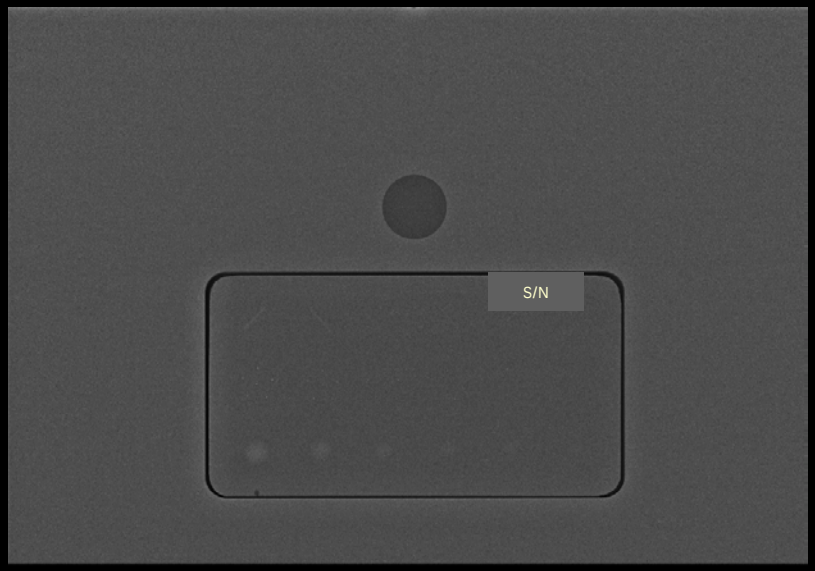
$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{Std\ Dev\ of\ Bkgd}$$

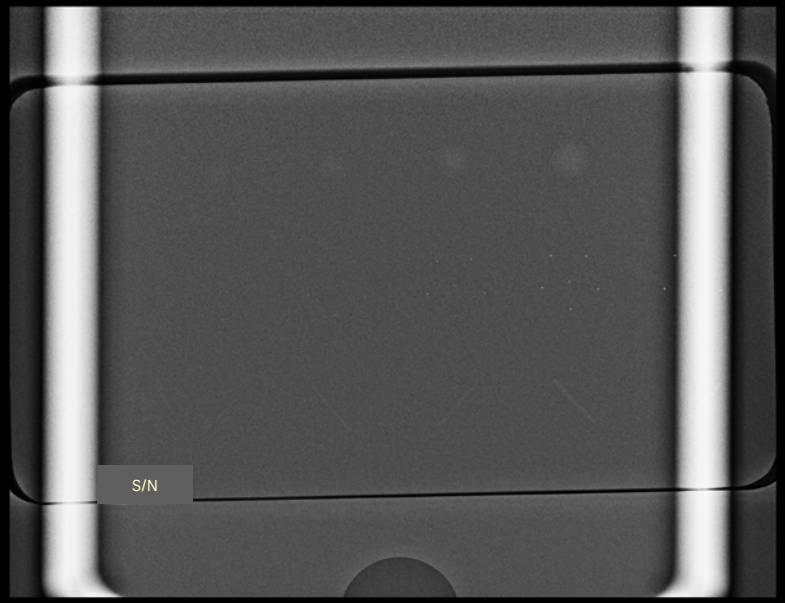
$$CNR = \frac{(Mean\ Cavity\ Signal - Mean\ Bkgd\ Signal)}{Std\ Dev\ of\ Bkgd}$$

Action Limits

Required: ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
MEE & Annual: SNR must be ≥40.0; CNR ≥2.0. Annual: CNR must be ≥ 85% of previous year.
Measured wax insert distance must be 70.0 ± 14.0 mm.

Timeframe: Failures of required items must be corrected before clinical use.





2. ACR DM Phantom Image Quality

Facility Name	ACR Webinar		**MAP ID-Unit#** *(00000-00)*	99999 - 01		
Mfr & Model	Unit Mfr A Unit Model ABC		**Room ID**	Room 1		
ACR DM Phantom Mfr and S/N	ACR DM Phantom SN: 3344		**Survey Date**	December 6, 2016		

Phantom Setup

Equipment: ACR DM Phantom *(required)*

Follow procedure in the Technologist's ACR Technique & Procedure Summaries:
- Use clinical technique for typical screening exam of 4.2 cm 50/50 breast
- Largest IR & paddle, 5 daN or 12 lbs, Score on AW
- Adjust W/L to optimize test objects, zoom & pan entire image
- For Config 2 & 3 using kVp & mAs closest to phantom techniques

Phantom patient name: ACR Phantom Test
Phantom patient ID: #12345
Image sent to which PACS? Yes

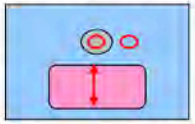
Phantom Setup:
AEC mode: Auto-Filter
Paddle size (IR size): Large
Paddle type (reg or flex): Reg
View or selected image: LCC
Compression force: 5
AEC cell position (if avail): Auto
Target/filter (if app): W/Rh kVp (if app): Auto
Density setting (if app): 0
Mag factor (mag mode only): 1.8

		Contact Mode			Mag Mode		
		Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3	**Clinical - ACR DM Phantom**	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3
Resulting Techniques *(if available)*	Target/filter	W/Rh	W/Ag		W/Rh	W/Ag	
	Image receptor size	Large	Large		Mag	Mag	
	kVp	28	28		29	29	
	mAs	110	110		100	100	
	Unit-indicated AGD (mGy)	1.32					
ACR DM Phantom Evaluation	Artifacts P/F	P	P	P	P	P	P
	Fiber score	5.0					
	Speck group score	4.0					
	Mass score	4.0					
	Phantom P/F	P					
Raw Image SNR & CNR	DC offset *(if applicable)*	50.00					
	Mean cavity signal	358.69					
	Mean background signal	341.42					
	Std dev of background	5.6					
	Calculated SNR	51.95	CNR from Previous Year (if avail; does not apply to MEEs)	CNR Lower Limit (85% of PY)	CNR ≥ -15% of Previous Year (P/F)		
	Calculated CNR	3.08					
	SNR ≥40.0 (P/F)	P					
	CNR ≥2.0 (P/F)	P					
Distance Measurement	Parallel to A-C axis (mm)	72			72		
	Meas = 70.0 ±14.0 mm (P/F)	P			P		
Overall Pass/Fail		Pass					

Initiated (or updated) technologist's ACR Technique and Procedure Summaries form Yes

Analysis

	Full Point	Half Point
Fibers	≥8 mm long	≥5 & <8 mm
Specks	4 - 6 specks	2 - 3 specks
Masses	≥ ¾ border	≥ ½ & < ¾ border



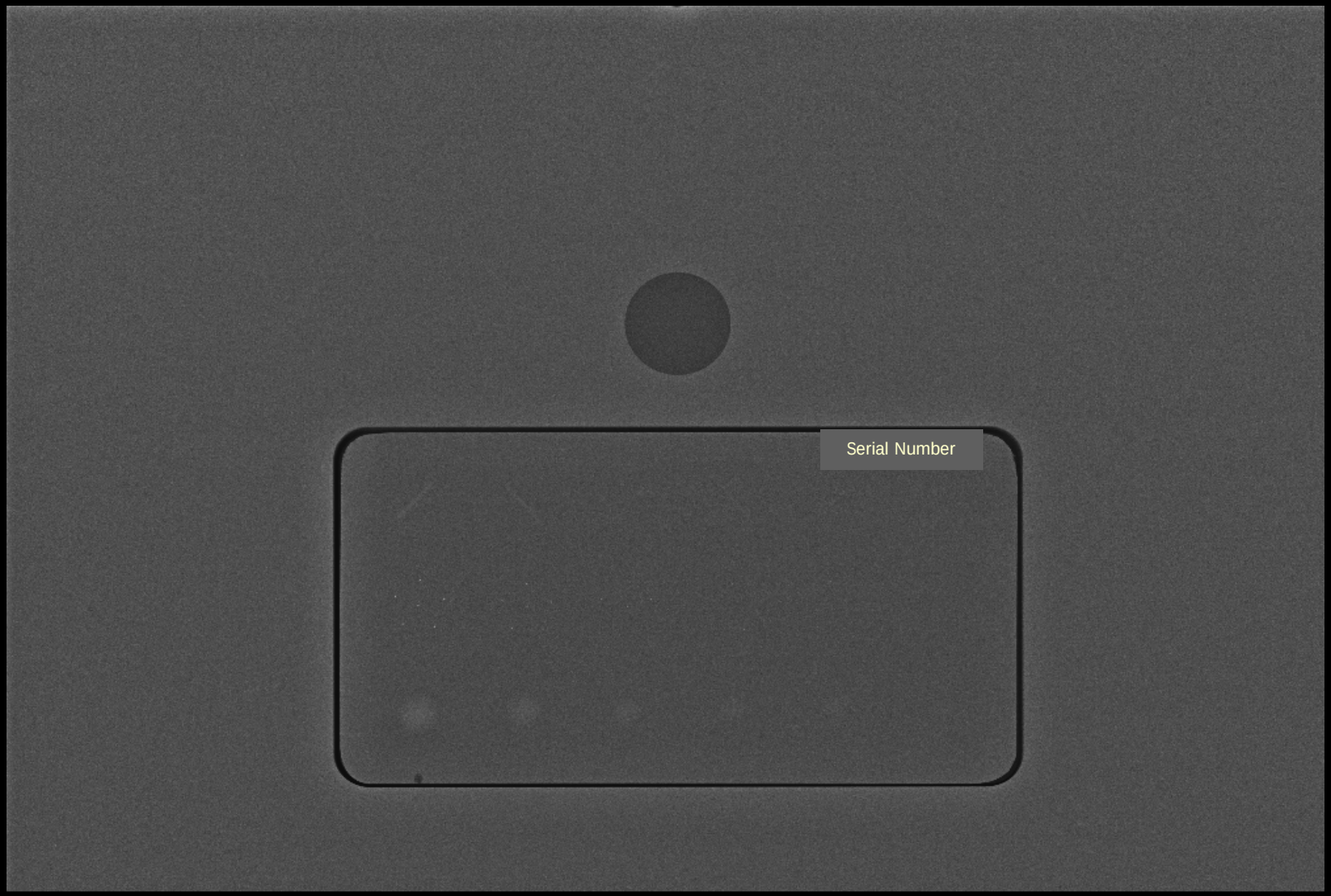
$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{Std\ Dev\ of\ Bkgd}$$

$$CNR = \frac{(Mean\ Cavity\ Signal - Mean\ Bkgd\ Signal)}{Std\ Dev\ of\ Bkgd}$$

Action Limits

Required: ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
MEE & Annual: SNR must be ≥40.0; CNR ≥2.0. Annual: CNR must be ≥ 85% of previous year.
Measured wax insert distance must be 70.0 ± 14.0 mm.

Timeframe: Failures of required items must be corrected before clinical use.


Serial Number

Pass Criteria: 2 Fibers, 3 Specks, 2 Masses

Equivalent to SFM Phantom: 4 Fibers, 3 Specks, 3 Masses

ACR®
AMERICAN COLLEGE OF RADIOLOGY
QUALITY IS OUR IMAGE

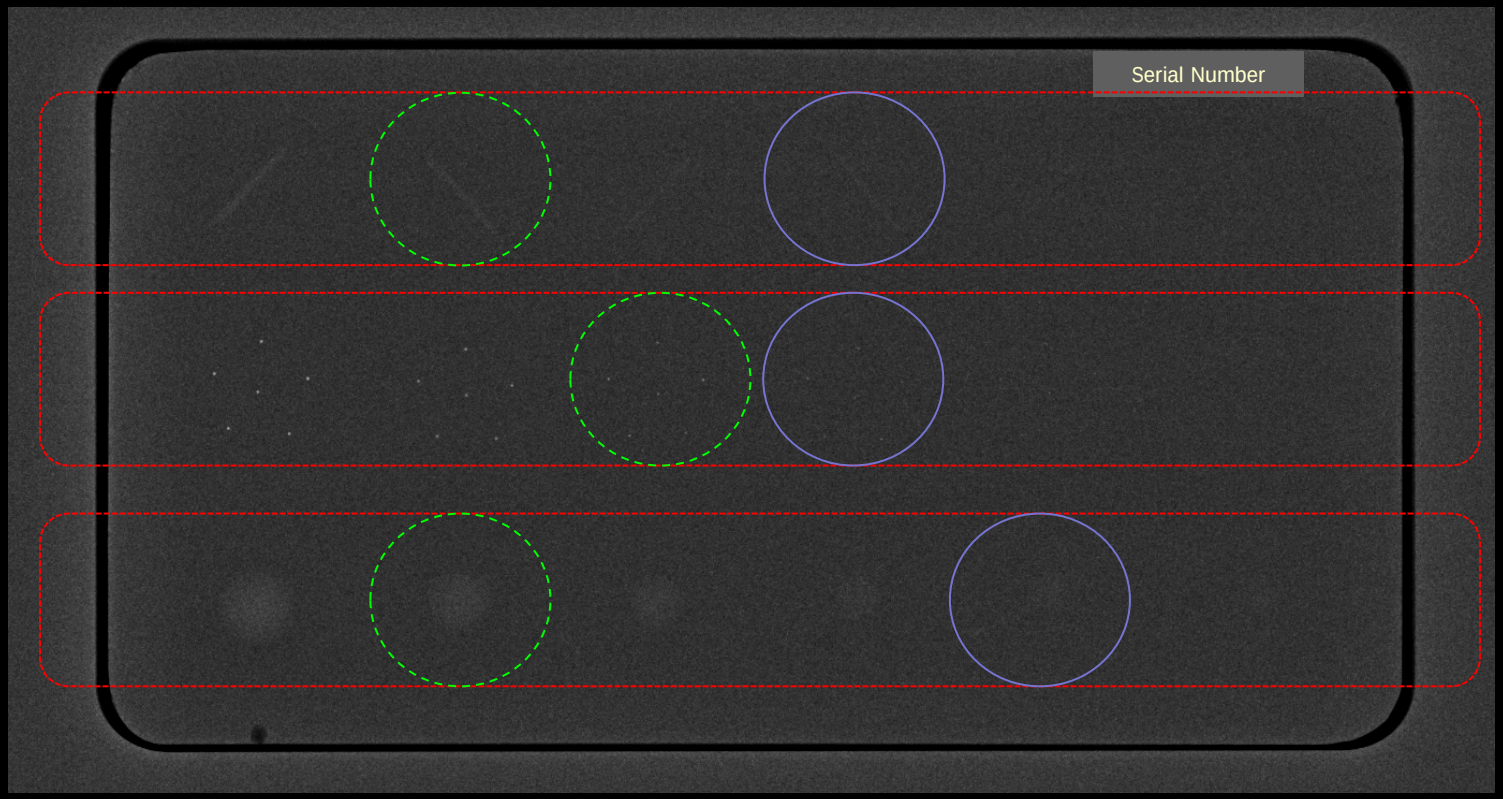
ACR Digital Mammography Phantom Image Scoring Key*

Test Object	Full Point	Half Point
Fibers (6)	• Full length visible (≥8 mm long) • Correct location • Correct orientation • 1 break allowed (must be ≤ width of fiber)	• At least half of length visible (≥5 and <8 mm long) • Correct location • Correct orientation • 1 break allowed (must be ≤ width of fiber)
Speck Groups (6)	• 4 - 6 specks visible • Correct locations	• 2 - 3 specks visible • Correct locations
Masses (6)	• Density difference visible • Border is continuous and generally circular (≥ ¾ border visible) • Correct location	• Density difference visible • Border is not continuous or generally circular (≥ ½ and < ¾ border visible) • Correct location
Artifacts	Only fail for artifacts if they are in a location that could impact clinical imaging ***and*** they are clinically significant. Fail if: • Artifacts are as prominent as (or more prominent than) the visible test objects in the phantom image, or • Artifacts obscure test objects in the phantom, or • Artifacts could affect clinical interpretation	

** Consult the ACR 2016 Digital Mammography Quality Control Manual for complete information on scoring the phantom*

ACR Digital Mammography Phantom Image Scoring Key*

Test Object	Full Point	Half Point
Fibers (6)	• Full length visible (≥8 mm long) • Correct location • Correct orientation • 1 break allowed (must be ≤ width of fiber)	• At least half of length visible (≥5 and <8 mm long) • Correct location • Correct orientation • 1 break allowed (must be ≤ width of fiber)
Speck Groups (6)	• 4 - 6 specks visible • Correct locations	• 2 - 3 specks visible • Correct locations
Masses (6)	• Density difference visible • Border is continuous and generally circular (≥ ¾ border visible) • Correct location	• Density difference visible • Border is not continuous or generally circular (≥ ½ and < ¾ border visible) • Correct location
Artifacts	Only fail for artifacts if they are in a location that could impact clinical imaging ***and*** they are clinically significant. Fail if: • Artifacts are as prominent as (or more prominent than) the visible test objects in the phantom image, or • Artifacts obscure test objects in the phantom, or • Artifacts could affect clinical interpretation	



2. ACR DM Phantom Image Quality

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
ACR DM Phantom Mfr and S/N	ACR DM Phantom SN: 3344	**Survey Date**	December 6, 2016

Phantom Setup

Equipment: ACR DM Phantom *(required)*

Follow procedure in the Technologist's ACR Technique & Procedure Summaries:
- Use clinical technique for typical screening exam of 4.2 cm 50/50 breast
- Largest IR & paddle, 5 daN or 12 lbs, Score on AW
- Adjust W/L to optimize test objects, zoom & pan entire image
- For Config 2 & 3 using kVp & mAs closest to phantom techniques

Phantom patient name: ACR Phantom Test
Phantom patient ID: #12345
Image sent to which PACS? Yes

Phantom Setup:

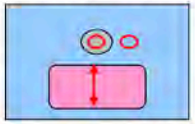
AEC mode:	Auto-Filter
Paddle size (IR size):	Large
Paddle type (reg or flex):	Reg
View or selected image:	LCC
Compression force:	5
AEC cell position (if avail):	Auto
Target/filter (if app): W/Rh — kVp (if app):	Auto
Density setting (if app):	0
Mag factor (mag mode only):	1.8

		Contact Mode			Mag Mode		
		Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3	**Clinical - ACR DM Phantom**	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3
Resulting Techniques *(if available)*	Target/filter	W/Rh	W/Ag		W/Rh	W/Ag	
	Image receptor size	Large	Large		Mag	Mag	
	kVp	28	28		29	29	
	mAs	110	110		100	100	
	Unit-indicated AGD (mGy)	1.32					
ACR DM Phantom Evaluation	Artifacts P/F	P	P	P	P	P	P
	Fiber score	5.0					
	Speck group score	4.0					
	Mass score	4.0					
	Phantom P/F	P					
Raw Image SNR & CNR	DC offset *(if applicable)*	50.00					
	Mean cavity signal	358.69					
	Mean background signal	341.42					
	Std dev of background	5.6					
	Calculated SNR	51.95					
	Calculated CNR	3.08					
	SNR ≥40.0 (P/F)	P	CNR from Previous Year (if avail; does not apply to MEEs)	CNR Lower Limit (85% of PY)			
	CNR ≥2.0 (P/F)	P		CNR ≥ -15% of Previous Year (P/F)			
Distance Measurement	Parallel to A-C axis (mm)	72			72		
	Meas = 70.0 ±14.0 mm (P/F)	P			P		
Overall Pass/Fail		Pass					

Initiated (or updated) technologist's ACR Technique and Procedure Summaries form Yes

Analysis

	Full Point	Half Point
Fibers	≥8 mm long	≥5 & <8 mm
Specks	4 - 6 specks	2 - 3 specks
Masses	≥ ¾ border	≥ ½ & < ¾ border



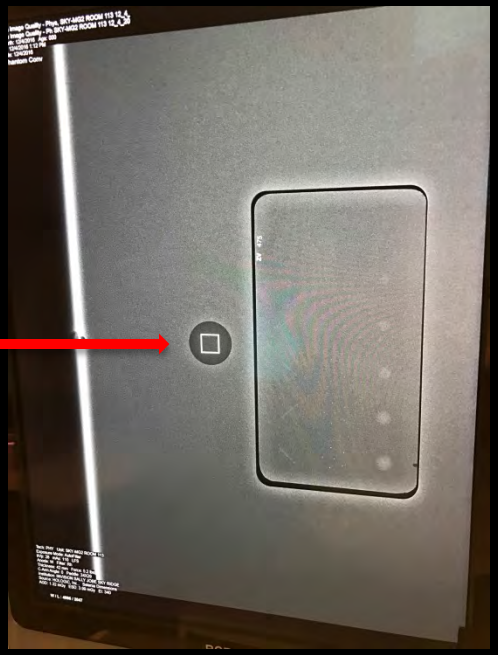
$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{Std\ Dev\ of\ Bkgd}$$

$$CNR = \frac{(Mean\ Cavity\ Signal - Mean\ Bkgd\ Signal)}{Std\ Dev\ of\ Bkgd}$$

Action Limits

Required: ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
MEE & Annual: SNR must be ≥40.0; CNR ≥2.0. Annual: CNR must be ≥ 85% of previous year.
Measured wax insert distance must be 70.0 ± 14.0 mm.

Timeframe: Failures of required items must be corrected before clinical use.



2. ACR DM Phantom Image Quality

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
ACR DM Phantom Mfr and S/N	ACR DM Phantom SN: 3344	**Survey Date**	December 6, 2016

Phantom Setup

Equipment: ACR DM Phantom *(required)*

Follow procedure in the Technologist's ACR Technique & Procedure Summaries:
- Use clinical technique for typical screening exam of 4.2 cm 50/50 breast
- Largest IR & paddle, 5 daN or 12 lbs, Score on AW
- Adjust W/L to optimize test objects, zoom & pan entire image
- For Config 2 & 3 using kVp & mAs closest to phantom techniques

Phantom patient name: ACR Phantom Test
Phantom patient ID: #12345
Image sent to which PACS? Yes

Phantom Setup:

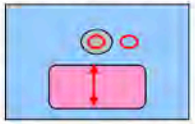
AEC mode:	Auto-Filter
Paddle size (IR size):	Large
Paddle type (reg or flex):	Reg
View or selected image:	LCC
Compression force:	5
AEC cell position (if avail):	Auto
Target/filter (if app): W/Rh kVp (if app):	Auto
Density setting (if app):	0
Mag factor (mag mode only):	1.8

		Contact Mode			Mag Mode		
		Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3	**Clinical - ACR DM Phantom**	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3
Resulting Techniques *(if available)*	Target/filter	W/Rh	W/Ag		W/Rh	W/Ag	
	Image receptor size	Large	Large		Mag	Mag	
	kVp	28	28		29	29	
	mAs	110	110		100	100	
	Unit-indicated AGD (mGy)	1.32					
ACR DM Phantom Evaluation	Artifacts P/F	P	P	P	P	P	P
	Fiber score	5.0					
	Speck group score	4.0					
	Mass score	4.0					
	Phantom P/F	P					
SNR & CNR Raw Image	DC offset *(if applicable)*	50.00					
	Mean cavity signal	358.69					
	Mean background signal	341.42					
	Std dev of background	5.6					
	Calculated SNR	51.95					
	Calculated CNR	3.08					
	SNR ≥40.0 (P/F)	P	CNR from Previous Year (if avail; does not apply to MEEs)	CNR Lower Limit (85% of PY)			
	CNR ≥2.0 (P/F)	P		CNR ≥ -15% of Previous Year (P/F)			
Distance Measurement	Parallel to A-C axis (mm)	72			72		
	Meas = 70.0 ±14.0 mm (P/F)	P			P		
Overall Pass/Fail		Pass					

Initiated (or updated) technologist's ACR Technique and Procedure Summaries form Yes

Analysis

	Full Point	Half Point
Fibers	≥8 mm long	≥5 & <8 mm
Specks	4 - 6 specks	2 - 3 specks
Masses	≥ ¾ border	≥ ½ & < ¾ border



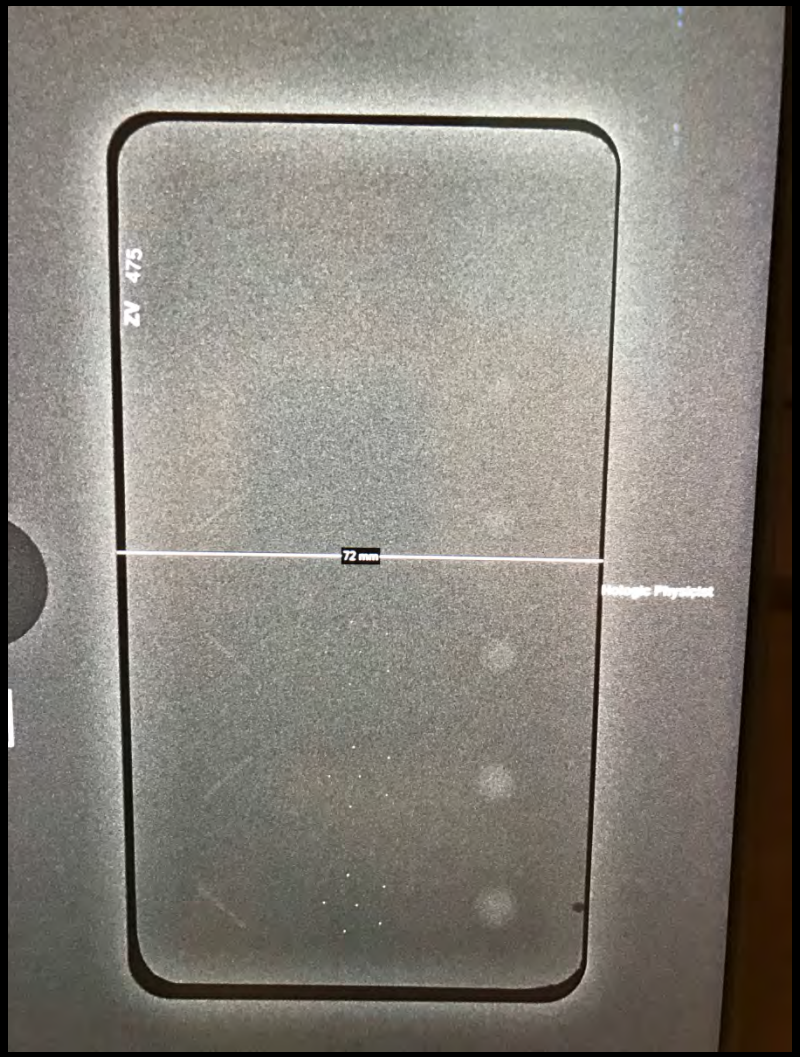
$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{\text{Std Dev of Bkgd}}$$

$$CNR = \frac{(Mean\ Cavity\ Signal - Mean\ Bkgd\ Signal)}{\text{Std Dev of Bkgd}}$$

Action Limits

Required: ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
MEE & Annual: SNR must be ≥40.0; CNR ≥2.0. Annual: CNR must be ≥ 85% of previous year.
Measured wax insert distance must be 70.0 ± 14.0 mm.

Timeframe: Failures of required items must be corrected before clinical use.



2. ACR DM Phantom Image Quality

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
ACR DM Phantom Mfr and S/N	ACR DM Phantom SN: 3344	**Survey Date**	December 6, 2016

Phantom Setup

Equipment: ACR DM Phantom *(required)*

Follow procedure in the Technologist's ACR Technique & Procedure Summaries:
- Use clinical technique for typical screening exam of 4.2 cm 50/50 breast
- Largest IR & paddle, 5 daN or 12 lbs, Score on AW
- Adjust W/L to optimize test objects, zoom & pan entire image
- For Config 2 & 3 using kVp & mAs closest to phantom techniques

Phantom patient name: ACR Phantom Test
Phantom patient ID: #12345
Image sent to which PACS? Yes

Phantom Setup:

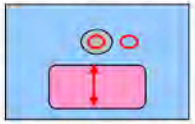
AEC mode:	Auto-Filter
Paddle size (IR size):	Large
Paddle type (reg or flex):	Reg
View or selected image:	LCC
Compression force:	5
AEC cell position (if avail):	Auto
Target/filter (if app): W/Rh kVp (if app):	Auto
Density setting (if app):	0
Mag factor (mag mode only):	1.8

		Contact Mode			Mag Mode		
		Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3	Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3
Resulting Techniques *(if available)*	Target/filter	W/Rh	W/Ag		W/Rh	W/Ag	
	Image receptor size	Large	Large		Mag	Mag	
	kVp	28	28		29	29	
	mAs	110	110		100	100	
	Unit-indicated AGD (mGy)	1.32					
ACR DM Phantom Evaluation	Artifacts P/F	P	P	P	P	P	P
	Fiber score	5.0					
	Speck group score	4.0					
	Mass score	4.0					
	Phantom P/F	P					
SNR & CNR Raw Image	DC offset *(if applicable)*	50.00					
	Mean cavity signal	358.69					
	Mean background signal	341.42					
	Std dev of background	5.6					
	Calculated SNR	51.95					
	Calculated CNR	3.08					
	SNR ≥40.0 (P/F)	P	CNR from Previous Year (if avail; does not apply to MEEs)	CNR Lower Limit (85% of PY)			
	CNR ≥2.0 (P/F)	P		CNR ≥ -15% of Previous Year (P/F)			
Distance Measurement	Parallel to A-C axis (mm)	72			72		
	Meas = 70.0 ±14.0 mm (P/F)	P			P		
Overall Pass/Fail		Pass					

Initiated (or updated) technologist's ACR Technique and Procedure Summaries form Yes

Analysis

	Full Point	Half Point
Fibers	≥8 mm long	≥5 & <8 mm
Specks	4 - 6 specks	2 - 3 specks
Masses	≥ ¾ border	≥ ½ & < ¾ border



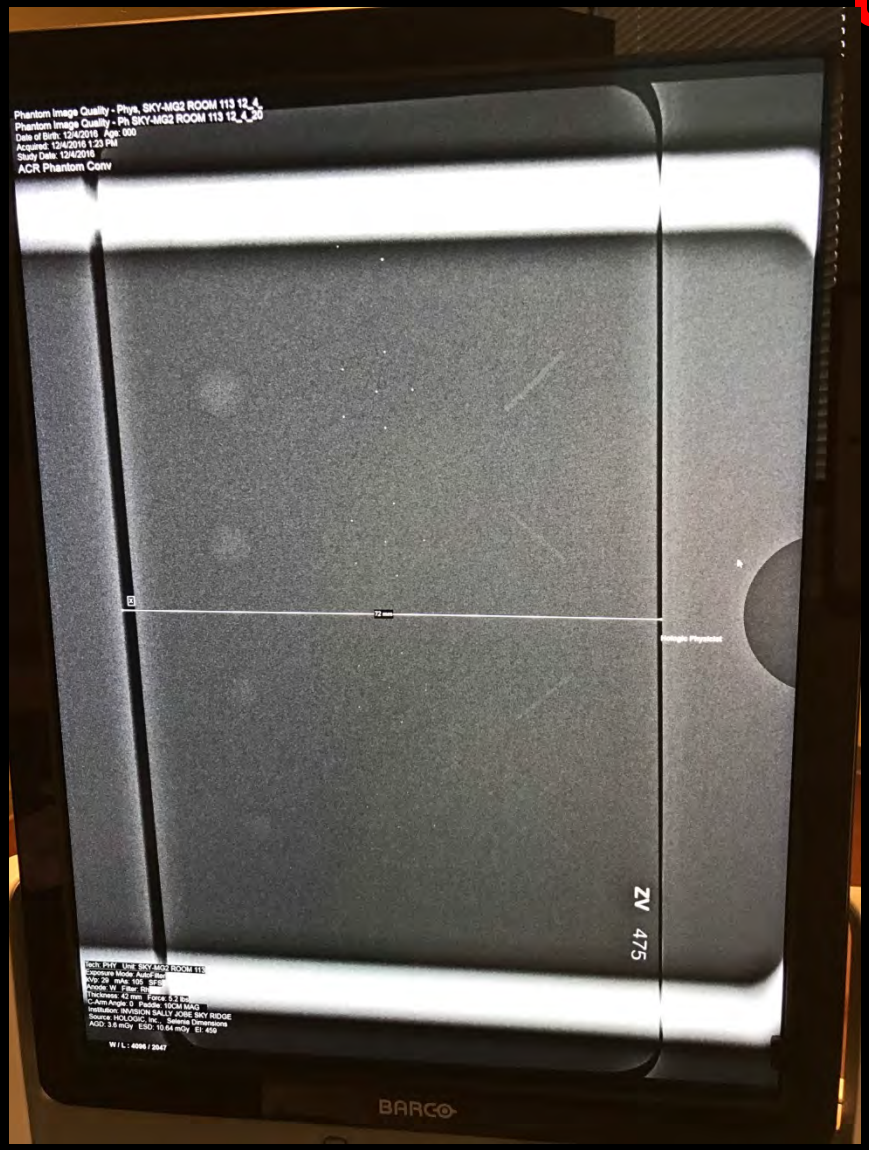
$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{Std\ Dev\ of\ Bkgd}$$

$$CNR = \frac{(Mean\ Cavity\ Signal - Mean\ Bkgd\ Signal)}{Std\ Dev\ of\ Bkgd}$$

Action Limits

Required: ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
MEE & Annual: SNR must be ≥40.0; CNR ≥2.0. Annual: CNR must be ≥ 85% of previous year.
Measured wax insert distance must be 70.0 ± 14.0 mm.

Timeframe: Failures of required items must be corrected before clinical use.



2. ACR DM Phantom Image Quality

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
ACR DM Phantom Mfr and S/N	ACR DM Phantom SN: 3344	**Survey Date**	December 6, 2016

Phantom Setup

Equipment: ACR DM Phantom *(required)*

Follow procedure in the Technologist's ACR Technique & Procedure Summaries:
- Use clinical technique for typical screening exam of 4.2 cm 50/50 breast
- Largest IR & paddle, 5 daN or 12 lbs, Score on AW
- Adjust W/L to optimize test objects, zoom & pan entire image
- For Config 2 & 3 using kVp & mAs closest to phantom techniques

Phantom patient name: ACR Phantom Test
Phantom patient ID: #12345
Image sent to which PACS? Yes

Phantom Setup:
AEC mode: Auto-Filter
Paddle size (IR size): Large
Paddle type (reg or flex): Reg
View or selected image: LCC
Compression force: 5
AEC cell position (if avail): Auto
Target/Filter (if app): W/Rh kVp (if app): Auto
Density setting (if app): 0
Mag factor (mag mode only): 1.8

		Contact Mode			Mag Mode		
		Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3	Clinical - ACR DM Phantom	Manual - Target/Filter Config 2	Manual - Target/Filter Config 3
Resulting Techniques *(if available)*	Target/filter	W/Rh	W/Ag		W/Rh	W/Ag	
	Image receptor size	Large	Large		Mag	Mag	
	kVp	28	28		29	29	
	mAs	110	110		100	100	
	Unit-indicated AGD (mGy)	1.32					
ACR DM Phantom Evaluation	Artifacts P/F	P	P	P	P	P	P
	Fiber score	5.0					
	Speck group score	4.0					
	Mass score	4.0					
	Phantom P/F	P					
SNR & CNR Raw Image	DC offset *(if applicable)*	50.00					
	Mean cavity signal	358.69					
	Mean background signal	341.42					
	Std dev of background	5.6					
	Calculated SNR	51.95					
	Calculated CNR	3.08					
	SNR ≥40.0 (P/F)	P					
	CNR ≥2.0 (P/F)	P					
Distance Measurement	Parallel to A-C axis (mm)	72			72		
	Meas = 70.0 ±14.0 mm (P/F)	P			P		

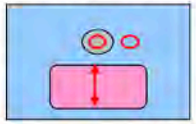
CNR from Previous Year (if avail; does not apply to MEEs) | CNR Lower Limit (85% of PY) | CNR ≥ -15% of Previous Year (P/F)

Overall Pass/Fail: Pass

Initiated (or updated) technologist's ACR Technique and Procedure Summaries form: Yes

Analysis

	Full Point	Half Point
Fibers	≥8 mm long	≥5 & <8 mm
Specks	4 - 6 specks	2 - 3 specks
Masses	≥ ¾ border	≥ ½ & < ¾ border



$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{Std\ Dev\ of\ Bkgd}$$

$$CNR = \frac{(Mean\ Cavity\ Signal - Mean\ Bkgd\ Signal)}{Std\ Dev\ of\ Bkgd}$$

Action Limits

Required: ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
MEE & Annual: SNR must be ≥40.0; CNR ≥2.0. Annual: CNR must be ≥ 85% of previous year.
Measured wax insert distance must be 70.0 ± 14.0 mm.

Timeframe: Failures of required items must be corrected before clinical use.

3. Spatial Resolution

Facility Name ACR Webinar
Mfr & Model Unit Mfr A Unit Model ABC
MAP ID-Unit# *(00000-00)* 99999 - 01
Room ID Room 1
Survey Date December 6, 2016

Procedure

Equipment: ACR DM Phantom, line-pair test tool

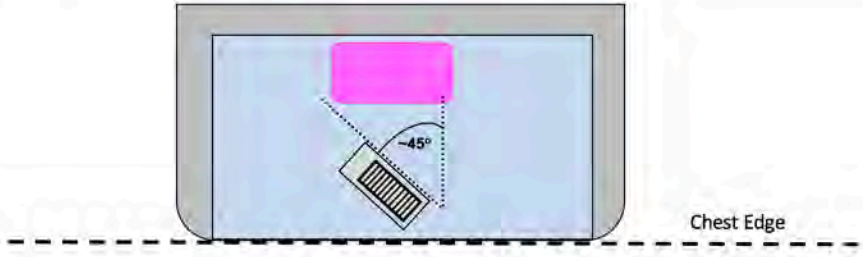
Place ACR DM Phantom reversed on breast support (wax insert away from chest edge)
Place bar pattern on top of phantom and under paddle at ~45°
Lightly compress paddle to touch bar pattern
Acquire "raw" images using manual mode closest to ACR DM Phantom technique

Phantom Setup:
Paddle size (IR size):
Paddle type (reg or flex):

		Contact Mode	Mag Mode
Setup Techniques	Mag factor	Contact	1.8
	Target/filter	Mo/Rh	W/Rh
	kVp	28	28
	mAs	100	100
Spatial Resolution Score	Line-pair score	7.1	8.0
	Overall Pass/Fail	Pass	Pass

Action Limits

Required: Spatial resolution must be ≥ 4.0 lp/mm for contact mode and 6.0 lp/mm for magnification mode.
Timeframe: Failures must be corrected within 30 days.



3. Spatial Resolution

Facility Name ACR Webinar
Mfr & Model Unit Mfr A Unit Model ABC
MAP ID-Unit# *(00000-00)* 99999 - 01
Room ID Room 1
Survey Date December 6, 2016

Procedure

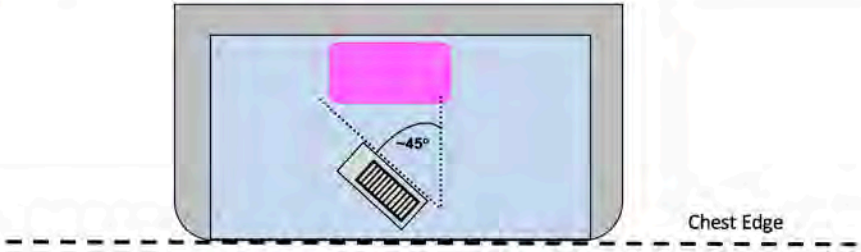
Equipment: ACR DM Phantom, line-pair test tool
Place ACR DM Phantom reversed on breast support (wax insert away from chest edge)
Place bar pattern on top of phantom and under paddle at ~45°
Lightly compress paddle to touch bar pattern
Acquire "raw" images using manual mode closest to ACR DM Phantom technique

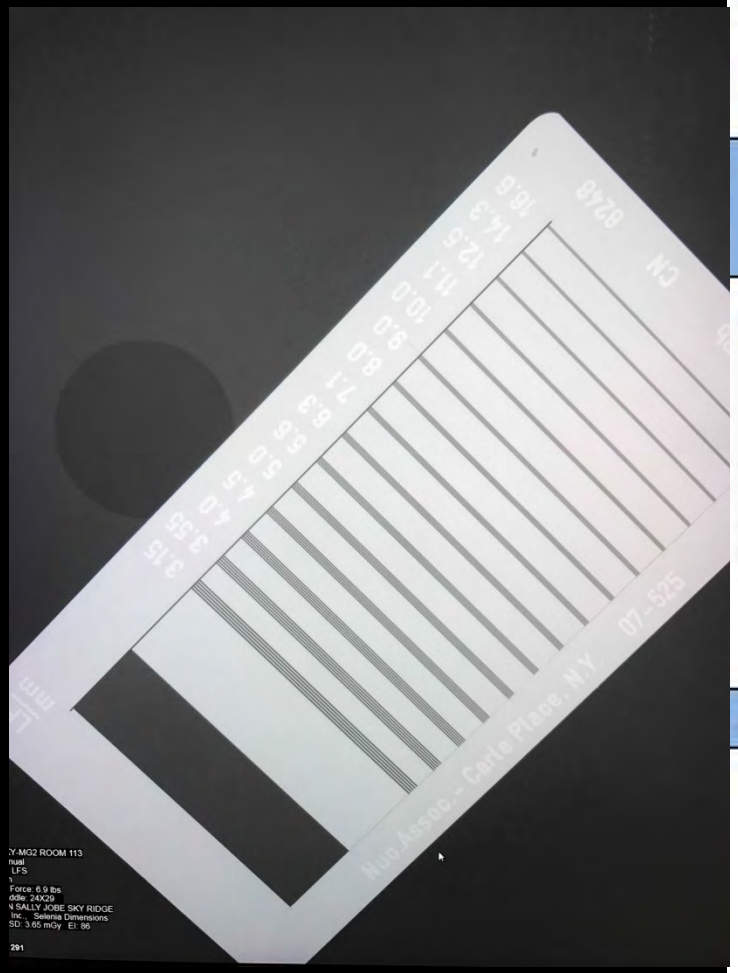
Phantom Setup:
Paddle size (IR size):
Paddle type (reg or flex):

		Contact Mode	Mag Mode
Setup Techniques	Mag factor	Contact	1.8
	Target/filter	Mo/Rh	W/Rh
	kVp	28	28
	mAs	100	100
Spatial Resolution Score	Line-pair score	7.1	8.0
	Overall Pass/Fail	Pass	Pass

Action Limits

Required: Spatial resolution must be ≥ 4.0 lp/mm for contact mode and 6.0 lp/mm for magnification mode.
Timeframe: Failures must be corrected within 30 days.





3. Spatial Resolution

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

Procedure

Equipment: ACR DM Phantom, line-pair test tool

Place ACR DM Phantom reversed on breast support (wax insert away from chest edge)

Place bar pattern on top of phantom and under paddle at ~45°

Lightly compress paddle to touch bar pattern

Acquire "raw" images using manual mode closest to ACR DM Phantom technique

Phantom Setup:

Paddle size (IR size):

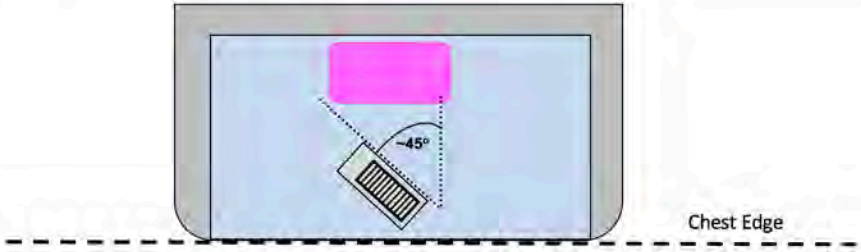
Paddle type (reg or flex):

		Contact Mode	Mag Mode
Setup Techniques	Mag factor	Contact	1.8
	Target/filter	Mo/Rh	W/Rh
	kVp	28	28
	mAs	100	100
Spatial Resolution Score	Line-pair score	7.1	8.0
	Overall Pass/Fail	**Pass**	**Pass**

Action Limits

Required: Spatial resolution must be ≥ 4.0 lp/mm for contact mode and 6.0 lp/mm for magnification mode.

Timeframe: Failures must be corrected within 30 days.



3. Spatial Resolution

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

Procedure

Equipment: ACR DM Phantom, line-pair test tool

Place ACR DM Phantom reversed on breast support (wax insert away from chest edge)

Place bar pattern on top of phantom and under paddle at ~45°

Lightly compress paddle to touch bar pattern

Acquire "raw" images using manual mode closest to ACR DM Phantom technique

Phantom Setup:

Paddle size (IR size):

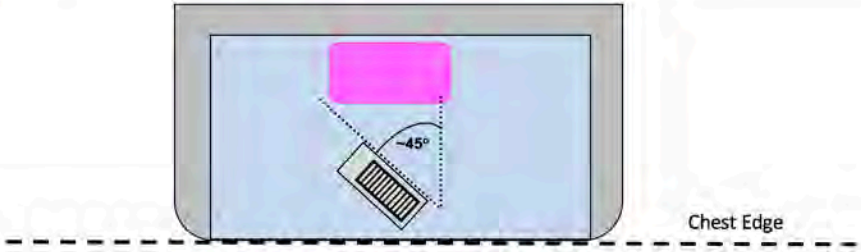
Paddle type (reg or flex):

		Contact Mode	Mag Mode
Setup Techniques	Mag factor	Contact	1.8
	Target/filter	Mo/Rh	W/Rh
	kVp	28	28
	mAs	100	100
Spatial Resolution Score	Line-pair score	7.1	8.0
	Overall Pass/Fail	Pass	Pass

Action Limits

Required: Spatial resolution must be ≥ 4.0 lp/mm for contact mode and 6.0 lp/mm for magnification mode.

Timeframe: Failures must be corrected within 30 days.



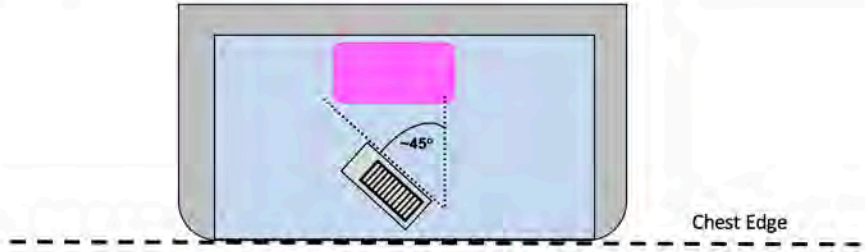
3. Spatial Resolution

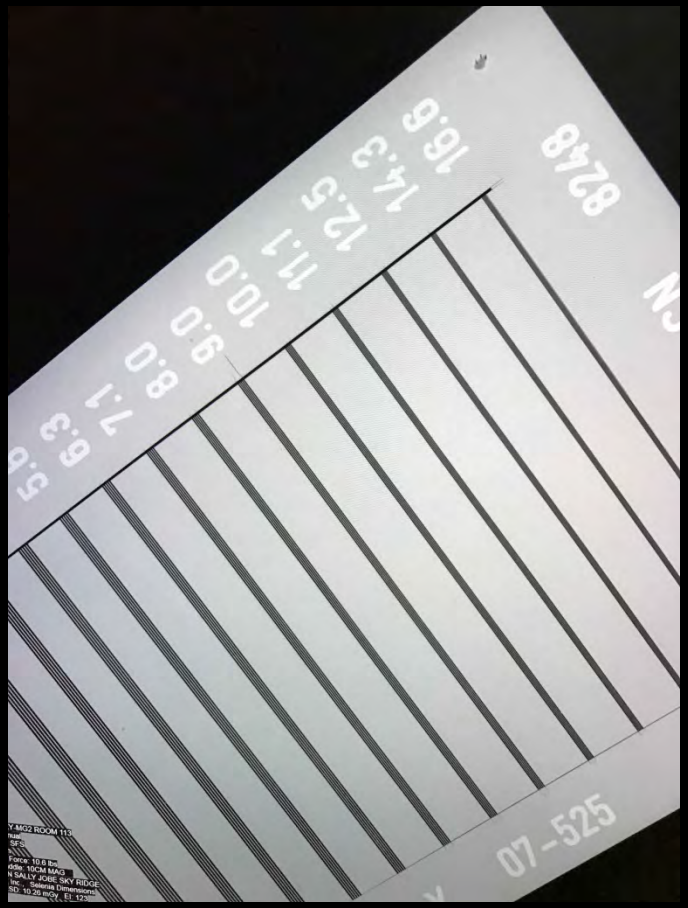
Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

Procedure	**Equipment:** ACR DM Phantom, line-pair test tool Place ACR DM Phantom reversed on breast support (wax insert away from chest edge) Place bar pattern on top of phantom and under paddle at ~45° Lightly compress paddle to touch bar pattern Acquire "raw" images using manual mode closest to ACR DM Phantom technique	**Phantom Setup:** Paddle size (IR size): Paddle type (reg or flex):

		Contact Mode	Mag Mode
Setup Techniques	Mag factor	Contact	1.8
	Target/filter	Mo/Rh	W/Rh
	kVp	28	28
	mAs	100	100
Spatial Resolution Score	Line-pair score	7.1	8.0
	Overall Pass/Fail	Pass	Pass

Action Limits	**Required:** Spatial resolution must be ≥ 4.0 lp/mm for contact mode and 6.0 lp/mm for magnification mode. **Timeframe:** Failures must be corrected within 30 days.





3. Spatial Resolution

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

Procedure

Equipment: ACR DM Phantom, line-pair test tool

Place ACR DM Phantom reversed on breast support (wax insert away from chest edge)

Place bar pattern on top of phantom and under paddle at ~45°

Lightly compress paddle to touch bar pattern

Acquire "raw" images using manual mode closest to ACR DM Phantom technique

Phantom Setup:

Paddle size (IR size):

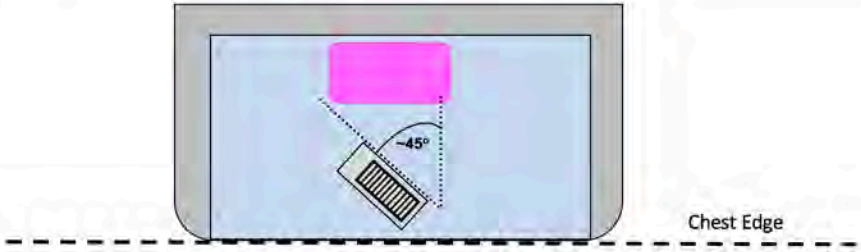
Paddle type (reg or flex):

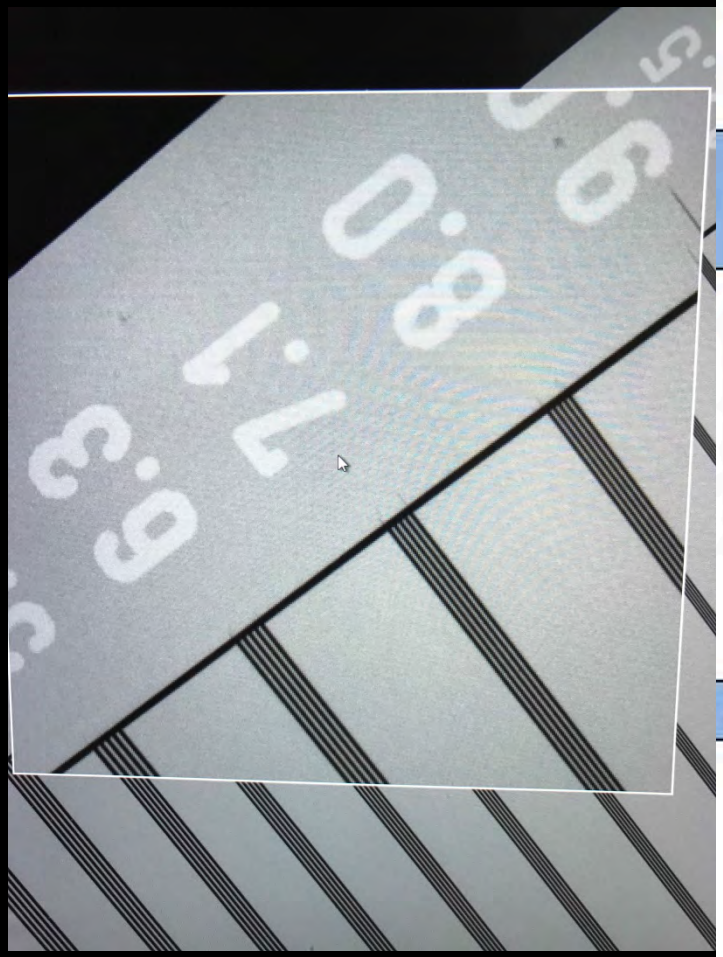
		Contact Mode	Mag Mode
Setup Techniques	Mag factor	Contact	1.8
	Target/filter	Mo/Rh	W/Rh
	kVp	28	28
	mAs	100	100
Spatial Resolution Score	Line-pair score	7.1	8.0
	Overall Pass/Fail	**Pass**	**Pass**

Action Limits

Required: Spatial resolution must be ≥ 4.0 lp/mm for contact mode and 6.0 lp/mm for magnification mode.

Timeframe: Failures must be corrected within 30 days.





3. Spatial Resolution

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

Procedure

Equipment: ACR DM Phantom, line-pair test tool

Place ACR DM Phantom reversed on breast support (wax insert away from chest edge)

Place bar pattern on top of phantom and under paddle at ~45°

Lightly compress paddle to touch bar pattern

Acquire "raw" images using manual mode closest to ACR DM Phantom technique

Phantom Setup:

Paddle size (IR size):

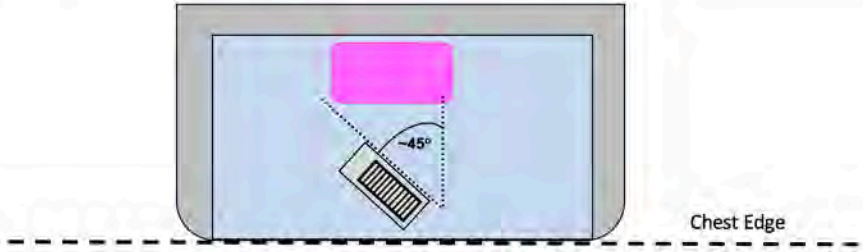
Paddle type (reg or flex):

		Contact Mode	Mag Mode
Setup Techniques	Mag factor	Contact	1.8
	Target/filter	Mo/Rh	W/Rh
	kVp	28	28
	mAs	100	100
Spatial Resolution Score	Line-pair score	7.1	8.0
	Overall Pass/Fail	Pass	Pass

Action Limits

Required: Spatial resolution must be ≥ 4.0 lp/mm for contact mode and 6.0 lp/mm for magnification mode.

Timeframe: Failures must be corrected within 30 days.



4. Automatic Exposure Control System Performance

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

Procedure

Equipment: 2, 4, 6 cm of BR-12, BR-50 or acrylic
Install small paddle (reg or flex) (Use large if small not available)
Use regular or flex paddle used for most clinical imaging
Set thickness at actual thickness of phantom (2, 4, or 6 cm)
Acquire images using clinical techniques
SNR data must be obtained from raw image

Phantom Setup:

Paddle size (IR Size):	Large
Paddle type (reg or flex):	Reg
AEC cell position (if avail):	2
Mag setting:	1.8
Mfr DC offset, if app:	50.00
Other settings:	

AEC Thickness Tracking

		Setup Techniques		Resultant Techniques				Signal and Noise Measurements			
Mode	Thick-ness (cm)	AEC Mode	Density setting	Target/ Filter	kVp	mAs	Indicat-ed AGD (mGy)	Mean Bkgd Signal	Std Dev of Bkgd	DC Offset (if app)	SNR
Contact	2	Auto-Filter	0	W/Rh	26	45	0.56	325.5	5.3	50.00	51.88
Contact	4	Auto-Filter	0	W/Rh	28	88	1.30	318.2	5.1	50.00	52.59
Contact	6	Auto-Filter	0	W/Rh	30	125	1.90	310.2	5.4	50.00	48.19
Mag	4	Auto-Filter	0	W/Rh	29	66	1.60	323.0	4.9	50.00	55.71

$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{\text{Std Dev of Bkgd}}$$

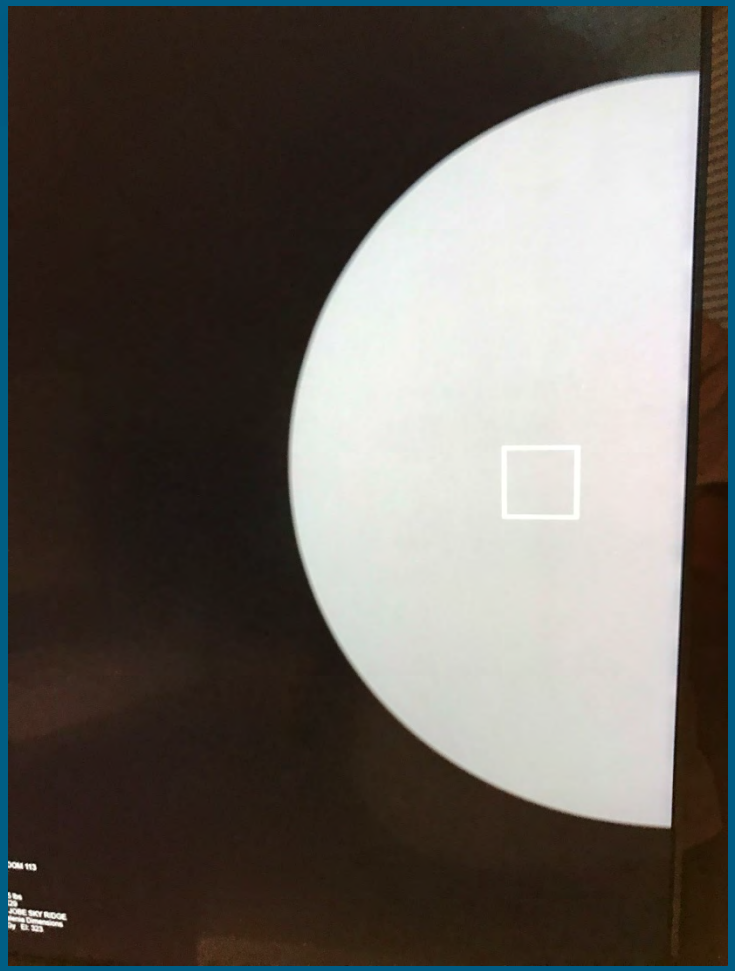
Analysis

			MEE and Annual		Annual		
Mode	Thick-ness (cm)	SNR	Lowest Limit for SNR	Pass/Fail	Previous Year (PY) SNR	SNR Lower Limit (85% of PY)	SNR ≥ -15% of PY (P/F)
Contact	2	51.9			50.6	43.0	P
Contact	4	52.6	40.0	P	52.3	44.5	P
Contact	6	48.2			44.2	37.6	P
Mag	4	55.7			60.2	51.2	P
						Overall Pass/Fail	**Pass**

Action Limits

Required: MEE and Annual: SNR must be ≥40.0 for 4.0 cm in contact mode.
Annual: SNR must be ≥ -15% of previous year over the clinically used phantom thickness and imaging modes.

Timeframe: Failures must be corrected within 30 days.



4. Automatic Exposure Control System Performance

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

Procedure

Equipment: 2, 4, 6 cm of BR-12, BR-50 or acrylic
Install small paddle (reg or flex) (Use large if small not available)
Use regular or flex paddle used for most clinical imaging
Set thickness at actual thickness of phantom (2, 4, or 6 cm)
Acquire images using clinical techniques
SNR data must be obtained from raw image

Phantom Setup:

Paddle size (IR Size):	Large
Paddle type (reg or flex):	Reg
AEC cell position (if avail):	2
Mag setting:	1.8
Mfr DC offset, if app:	50.00
Other settings:	

AEC Thickness Tracking

		Setup Techniques		Resultant Techniques				Signal and Noise Measurements			
Mode	Thick-ness (cm)	AEC Mode	Density setting	Target/ Filter	kVp	mAs	Indicat-ed AGD (mGy)	Mean Bkgd Signal	Std Dev of Bkgd	DC Offset (if app)	SNR
Contact	2	Auto-Filter	0	W/Rh	26	45	0.56	325.5	5.3	50.00	51.88
Contact	4	Auto-Filter	0	W/Rh	28	88	1.30	318.2	5.1	50.00	52.59
Contact	6	Auto-Filter	0	W/Rh	30	125	1.90	310.2	5.4	50.00	48.19
Mag	4	Auto-Filter	0	W/Rh	29	66	1.60	323.0	4.9	50.00	55.71

Analysis

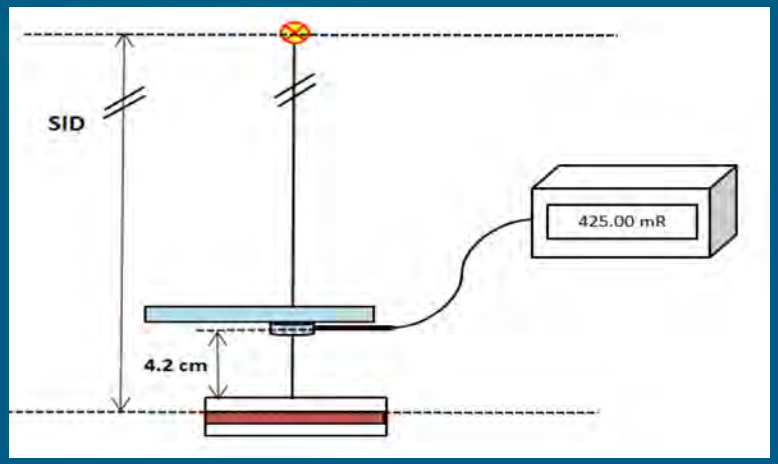
$$SNR = \frac{(Mean\ Bkgd\ Signal - DC\ offset)}{\text{Std Dev of Bkgd}}$$

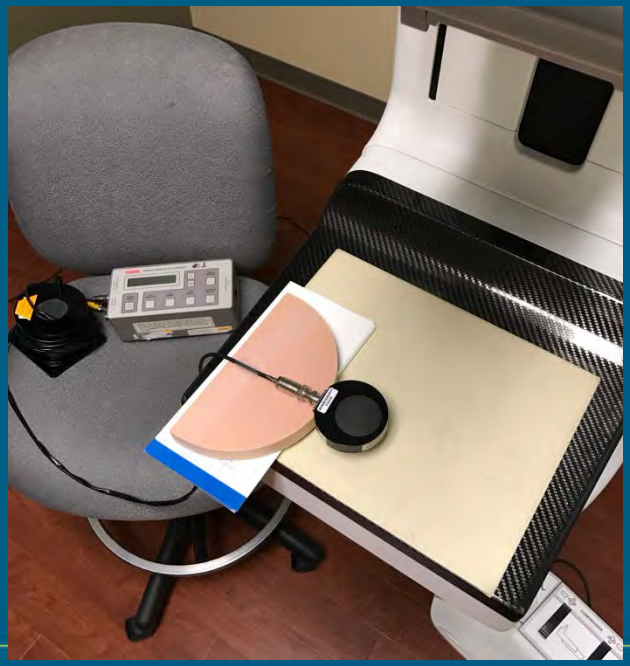
			MEE and Annual		Annual		
Mode	Thick-ness (cm)	SNR	Lowest Limit for SNR	Pass/Fail	Previous Year (PY) SNR	SNR Lower Limit (85% of PY)	SNR ≥ -15% of PY (P/F)
Contact	2	51.9			50.6	43.0	P
Contact	4	52.6	40.0	P	52.3	44.5	P
Contact	6	48.2			44.2	37.6	P
Mag	4	55.7			60.2	51.2	P
						Overall Pass/Fail	**Pass**

Action Limits

Required: MEE and Annual: SNR must be ≥40.0 for 4.0 cm in contact mode.
Annual: SNR must be ≥ -15% of previous year over the clinically used phantom thickness and imaging modes.

Timeframe: Failures must be corrected within 30 days.





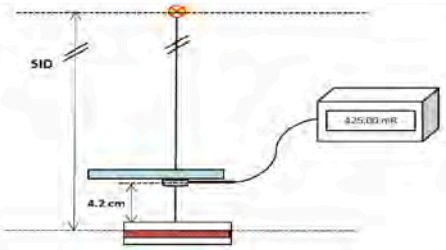
5. Average Glandular Dose

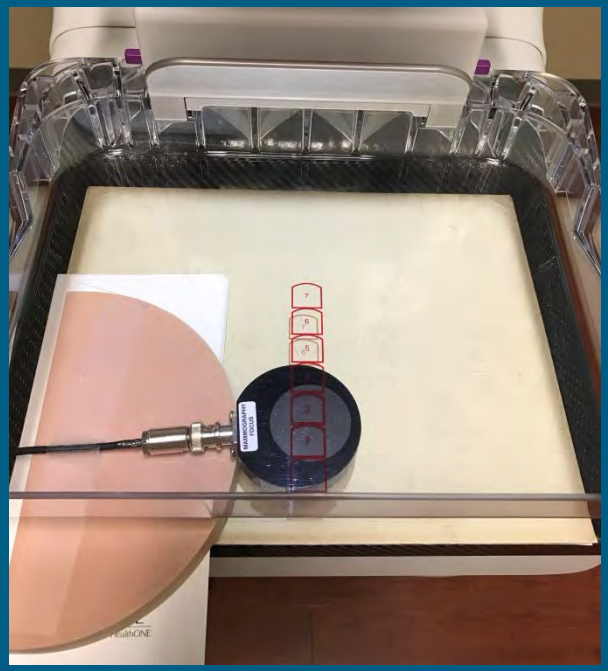
Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
ACR DM Phantom Mfr & S/N	ACR DM Phantom SN: 3344	**Survey Date**	December 6, 2016

Procedure	**Equipment:** Dosimeter	Dosimetry system:	Dosimeter Mfr A
	Use the technique from the ACR DM Phantom image page.	Calibration date:	11/1/16
	Measure mR/mAs or total exposure for dose calculation(s).	Correction factor, if app:	
	Make exposure measurements at 4.2 cm	SID (cm):	70

	Phantom	**ACR DM Phantom**	
Technique Factors Resulting From ACR DM Phantom Acquisition	Breast thickness (cm)	4.2	
	ACR DM Phantom material	Acrylic	
	AEC mode	Auto-Filter	
	Target/filter	W/Rh	
	kVp	28	
	mAs	110	
Exposure Data (at skin surface)	Measured HVL (mm Al)	0.462	
	mAs Setting for Manual Exposure Measurement	100.0	
	Exposure #1 (mR)	423.0	
	Exposure #2 (mR)	425.0	
	Exposure #3 (mR)	426.0	
	Average Exposure (mR)	424.7	
	Total Exposure (mR)	467.1	
AGD Calculation D = Kgcs	Average Entrance Exposure - K (mR)	467.1	
	g-factor x c-factor x (8.76 mGy/R)	2.292	
	s-factor	1.042	
	Computed AGD (mGy)	**1.12**	
AGD Result	**Pass/Fail**	**Pass**	
Indicated vs. Calculated AGD (if avail)	**Unit-indicated AGD from DM Phantom Image (mGy)**	1.32	
	% Difference	**18.3%**	
	Indicated within ±25% of measured?	**Pass**	

Action Limits	**Required:**	AGD for a single cranio-caudal view of the ACR DM Phantom must not exceed 3.0 mGy.
	Recommended:	If available, unit-indicated AGD should be within ±25% of calculated AGD.
	Timeframe:	Doses >3 mGy must be corrected before clinical use; failures of the unit-indicated AGD must be corrected within 30 days.





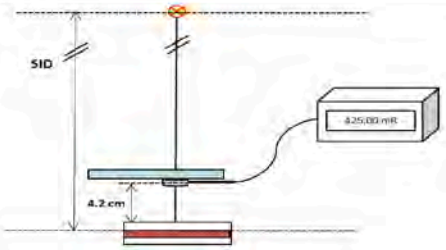
5. Average Glandular Dose

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
ACR DM Phantom Mfr & S/N	ACR DM Phantom SN: 3344	**Survey Date**	December 6, 2016

Procedure	**Equipment:** Dosimeter	Dosimetry system:	Dosimeter Mfr A
	Use the technique from the ACR DM Phantom image page.	Calibration date:	11/1/16
	Measure mR/mAs or total exposure for dose calculation(s).	Correction factor, if app:	
	Make exposure measurements at 4.2 cm	SID (cm):	70

		Phantom	**ACR DM Phantom**
Technique Factors Resulting From ACR DM Phantom Acquisition		Breast thickness (cm)	4.2
		ACR DM Phantom material	Acrylic
		AEC mode	Auto-Filter
		Target/filter	W/Rh
		kVp	28
		mAs	110
Exposure Data (at skin surface)		Measured HVL (mm Al)	0.462
		mAs Setting for Manual Exposure Measurement	100.0
		Exposure #1 (mR)	423.0
		Exposure #2 (mR)	425.0
		Exposure #3 (mR)	426.0
		Average Exposure (mR)	424.7
		Total Exposure (mR)	467.1
AGD Calculation D = Kgcs		Average Entrance Exposure - K (mR)	467.1
		g-factor x c-factor x (8.76 mGy/R)	2.292
		s-factor	1.042
		Computed AGD (mGy)	**1.12**
AGD Result		**Pass/Fail**	**Pass**
Indicated vs. Calculated AGD *(if avail)*		**Unit-indicated AGD from DM Phantom Image (mGy)**	1.32
		% Difference	**18.3%**
		Indicated within ±25% of measured?	**Pass**

Action Limits	**Required:**	AGD for a single cranio-caudal view of the ACR DM Phantom must not exceed 3.0 mGy.
	Recommended:	If available, unit-indicated AGD should be within ±25% of calculated AGD.
	Timeframe:	Doses >3 mGy must be corrected before clinical use; failures of the unit-indicated AGD must be corrected within 30 days.



$D = Kgcs$

D = Mean Glandular Dose

K = Entrance surface air kerma

g = glandularity of 50%

c = corrects for difference in composition (age dependent)

s = X-ray spectrum correction (Target/Filter)

Note: g and c depend on thickness, glandularity, and HVL.

***Primary Ref*:** D.R. Dance, et al. Additional for the Estimation of Mean Glandular Breast Dose Using the UK Mammography Dosimetry Protocol. Physics in Medicine and Biology 45, 3225-3240, 2000.

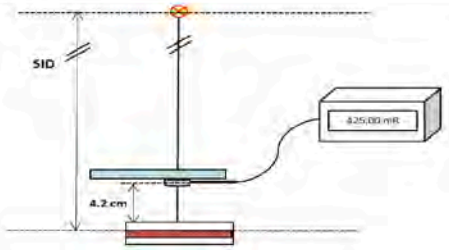
5. Average Glandular Dose

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
ACR DM Phantom Mfr & S/N	ACR DM Phantom SN: 3344	**Survey Date**	December 6, 2016

Procedure	**Equipment:** Dosimeter	Dosimetry system:	Dosimeter Mfr A
	Use the technique from the ACR DM Phantom image page.	Calibration date:	11/1/16
	Measure mR/mAs or total exposure for dose calculation(s).	Correction factor, if app:	
	Make exposure measurements at 4.2 cm	SID (cm):	70

		Phantom	**ACR DM Phantom**
Technique Factors Resulting From ACR DM Phantom Acquisition		Breast thickness (cm)	4.2
		ACR DM Phantom material	Acrylic
		AEC mode	Auto-Filter
		Target/filter	W/Rh
		kVp	28
		mAs	110
Exposure Data (at skin surface)		Measured HVL (mm Al)	0.462
		mAs Setting for Manual Exposure Measurement	100.0
		Exposure #1 (mR)	423.0
		Exposure #2 (mR)	425.0
		Exposure #3 (mR)	426.0
		Average Exposure (mR)	424.7
		Total Exposure (mR)	467.1
AGD Calculation D = Kgcs		Average Entrance Exposure - K (mR)	467.1
		g-factor x c-factor x (8.76 mGy/R)	2.292
		s-factor	1.042
AGD Result		**Computed AGD (mGy)**	**1.12**
		Pass/Fail	**Pass**
Indicated vs. Calculated AGD (if avail)		**Unit-indicated AGD from DM Phantom Image (mGy)**	1.32
		% Difference	**18.3%**
		Indicated within ±25% of measured?	**Pass**

Action Limits	**Required:**	AGD for a single cranio-caudal view of the ACR DM Phantom must not exceed 3.0 mGy.
	Recommended:	If available, unit-indicated AGD should be within ±25% of calculated AGD.
	Timeframe:	Doses >3 mGy must be corrected before clinical use; failures of the unit-indicated AGD must be corrected within 30 days.



DM Phantom g-factor * c-factor * 8.76 mGy/R Calculator							
Breast Thickness (cm)	HVL (mm Al)	Quad Factor	Linear Factor	Constant	g * c	Entrance Exp Conversion	g * c * 8.76 mGy/R
4.2	0.462	0.1539	0.3775	0.0544	0.2617	8.76	2.292

Acrylic and BR-12 s-factors	
Target-Filter	s-factor
Mo/Mo	1.000
Mo/Rh	1.017
Rh/Rh	1.061
Rh/Al	1.044
W/Rh	1.042
W/Al	1.050
W/Ag	1.072

Acrylic g-factor * c-factor * 8.76 mGy/R Table							
Breast Thickness (cm)	HVL (mm Al)						
	0.3	0.35	0.4	0.45	0.5	0.55	0.6
2	2.944	3.301	3.639	3.945	4.226	4.49	4.72
4	1.672	1.897	2.114	2.348	2.589	2.82	3.071
6	1.164	1.32	1.471	1.639	1.761	2.015	2.22
8	0.847	0.967	1.087	1.195	1.315	1.483	1.647

BR-12 g-factor * c-factor * 8.76 mGy/R for BR-12 Table							
Breast Thickness (cm)	HVL (mm Al)						
	0.3	0.35	0.4	0.45	0.5	0.55	0.6
2	3.4164	3.7931	4.1435	4.4588	4.7567	5.0195	5.1421
4	1.8133	2.0586	2.2864	2.5316	2.7857	3.031	3.2762
6	1.1826	1.349	1.5067	1.6819	1.8746	2.0674	2.2864
8	0.8585	0.9811	1.1038	1.2264	1.349	1.533	1.7082

5. Average Glandular Dose

Facility Name ACR Webinar | **MAP ID-Unit#** *(00000-00)* 99999 - 01
Mfr & Model Unit Mfr A Unit Model ABC | **Room ID** Room 1
ACR DM Phantom Mfr & S/N ACR DM Phantom SN: 3344 | **Survey Date** December 6, 2016

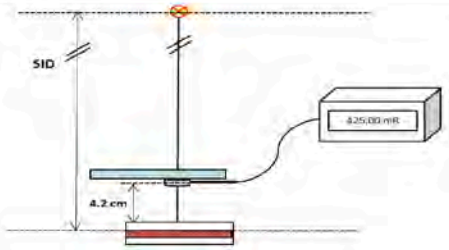
Procedure

Equipment: Dosimeter | Dosimetry system: Dosimeter Mfr A
Use the technique from the ACR DM Phantom image page. | Calibration date: 11/1/16
Measure mR/mAs or total exposure for dose calculation(s). | Correction factor, if app:
Make exposure measurements at 4.2 cm | SID (cm): 70

	Phantom	ACR DM Phantom
Technique Factors Resulting From ACR DM Phantom Acquisition	Breast thickness (cm)	4.2
	ACR DM Phantom material	Acrylic
	AEC mode	Auto-Filter
	Target/filter	W/Rh
	kVp	28
	mAs	110
Exposure Data (at skin surface)	Measured HVL (mm Al)	0.462
	mAs Setting for Manual Exposure Measurement	100.0
	Exposure #1 (mR)	423.0
	Exposure #2 (mR)	425.0
	Exposure #3 (mR)	426.0
	Average Exposure (mR)	424.7
	Total Exposure (mR)	467.1
AGD Calculation D = Kgcs	Average Entrance Exposure - K (mR)	467.1
	g-factor x c-factor x (8.76 mGy/R)	2.292
	s-factor	1.042
AGD Result	**Computed AGD (mGy)**	**1.12**
	Pass/Fail	**Pass**
Indicated vs. Calculated AGD (if avail)	**Unit-indicated AGD from DM Phantom Image (mGy)**	1.32
	% Difference	**18.3%**
	Indicated within ±25% of measured?	**Pass**

Action Limits

Required: AGD for a single cranio-caudal view of the ACR DM Phantom must not exceed 3.0 mGy.
Recommended: If available, unit-indicated AGD should be within ±25% of calculated AGD.
Timeframe: Doses >3 mGy must be corrected before clinical use; failures of the unit-indicated AGD must be corrected within 30 days.



6. Unit Checklist

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

Procedure	**Equipment:** None Inspect the unit and evaluate the functionality according to the checklist below

Item	Yes/No/NA
1. Free-standing unit is mechanically stable.*	Yes
2. All moving parts move smoothly, without obstructions to motion.	Yes
3. All locks and detents work properly.*	Yes
4. Image receptor holder assembly is free from vibrations.*	Yes
5. Image receptor slides smoothly into holder assembly (CR).	Yes
6. Image receptor is held securely by assembly in any orientation (CR).*	Yes
7. Patient or operator is not exposed to sharp or rough edges, or other hazards.*	Yes
8. Paddles are all intact with no cracks or sharp edges.*	Yes
9. Mammography area is clean and free from significant dust and debris that may cause artifacts.	Yes
10. Operator protected during exposure by adequate radiation shielding.*	Yes
11. All indicators working properly.	Yes
12. Autodecompression can be overridden to maintain compression (and status displayed).*	Yes
13. Manual emergency compression release can be activated in the event of a power failure.*	Yes
14. Is the audible exposure indicator at an appropriate volume level?	Yes
15. Operator technique charts are current and posted.	Yes
16. Other:	
17. Other:	
18. Other:	
Overall Pass/Fail	**Pass**

Action Limits	**Required:**	All items, both critical (*) and noncritical, must pass.
	Timeframe:	Failures of critical items (*) must be corrected before clinical use; less critical items must be corrected within 30 days.

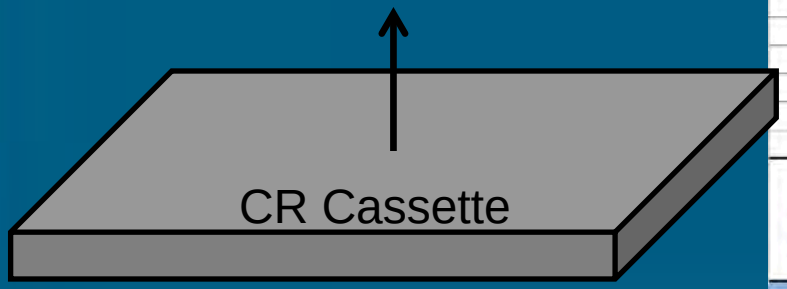
6. Unit Checklist

Facility Name ACR Webinar
MAP ID-Unit# *(00000-00)* 99999 - 01
Mfr & Model Unit Mfr A Unit Model ABC
Room ID Room 1
Survey Date December 6, 2016

Procedure	Equipment: None Inspect the unit and evaluate the functionality according to the checklist below

Item	Yes/No/NA
1. Free-standing unit is mechanically stable.*	**Yes**
2. All moving parts move smoothly, without obstructions to motion.	Yes
3. All locks and detents work properly.*	**Yes**
4. Image receptor holder assembly is free from vibrations.*	**Yes**
5. Image receptor slides smoothly into holder assembly (CR).	Yes
6. Image receptor is held securely by assembly in any orientation (CR).*	**Yes**
7. Patient or operator is not exposed to sharp or rough edges, or other hazards.*	**Yes**
8. Paddles are all intact with no cracks or sharp edges.*	**Yes**
9. Mammography area is clean and free from significant dust and debris that may cause artifacts.	Yes
10. Operator protected during exposure by adequate radiation shielding.*	**Yes**
11. All indicators working properly.	Yes
12. Autodecompression can be overridden to maintain compression (and status displayed).*	**Yes**
13. Manual emergency compression release can be activated in the event of a power failure.*	**Yes**
14. Is the audible exposure indicator at an appropriate volume level?	Yes
15. Operator technique charts are current and posted.	Yes
16. Other:	
17. Other:	
18. Other:	
Overall Pass/Fail	**Pass**

Action Limits		
	Required:	All items, both critical (*) and noncritical, must pass.
	Timeframe:	Failures of critical items (*) must be corrected before clinical use; less critical items must be corrected within 30 days.



7. Computed Radiography *(if applicable)*

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**CR Room**	
CR Reader Mfr & Model	3000 CR Reader Model A	**Survey Date**	December 6, 2016
CR Serial Number	CR SN 123	**Medical Physicist**	MP Name Jane Doe
CR Date of Manufacture	December 1, 2000	**Signature**	

Inter-Plate Consistency & Artifact Evaluation

Procedure	**Equipment:** ACR DM Phantom	AEC mode:	AEC detector position:
	ACR DM Phantom on breast support plate with associated paddle.		Target/filter:
	Auto-Time, Set kV to ACR DM Phantom kV, cell position 2 if available.		kVp:

Small Cassettes

Cassette ID	mAs Evaluation mAs	mAs P/F	SNR Evaluation *(if available)* Signal	Std Dev	SNR	SNR P/F	Artifact Pass/Fail	Overall Pass/Fail
1	68.0	P	402.0	5.02	80.1	P	P	Pass
2	78.0	P	389.0	5.15	75.5	P	P	Pass
3	69.0	P	412.0	5.3	77.7	P	P	Pass
4	72.0	P	375.0	5.5	68.2	P	P	Pass
5								
6								
7								
8								

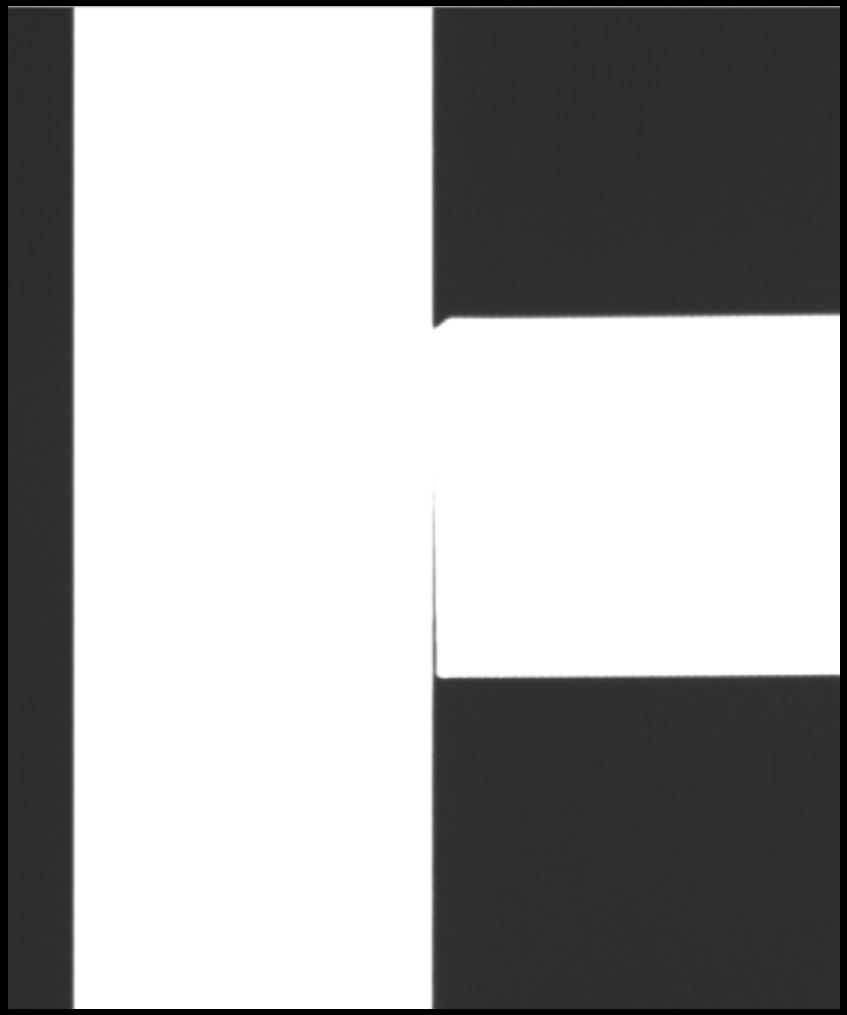
		Allowable			Allowable
Minimum mAs:	68.00	64.58	Minimum SNR:	68.18	67.84
Mean mAs:	71.75		Mean SNR:	75.38	
Maximum mAs	78.00	78.93	Maximum SNR	80.08	82.92

Large Cassettes

Cassette ID	mAs Evaluation mAs	mAs P/F	SNR Evaluation *(if available)* Signal	Std Dev	SNR	SNR P/F	Artifact Pass/Fail	Overall Pass/Fail
1	110.0	P	325.0	4.2	77.4	P	P	Pass
2	110.0	P	333.0	4.5	74.0	P	P	Pass
3	115.0	P	326.0	4.4	74.1	P	P	Pass
4	124.0	P	365.0	4.4	83.0	P	P	Pass
5								
6								
7								
8								

		Allowable			Allowable
Minimum mAs:	110.00	103.28	Minimum SNR:	74.00	69.40
Mean mAs:	114.75		Mean SNR:	77.11	
Maximum mAs	124.00	126.23	Maximum SNR	82.95	84.82

Action Limits	**Required:**	mAs must be within ±10% of average mAs.
		SNR must be within ±15% of average SNR.
		Must be free of clinically significant artifacts.
	Timeframe:	Failures must be corrected before clinical use.



7. Computed Radiography *(if applicable, continued)*

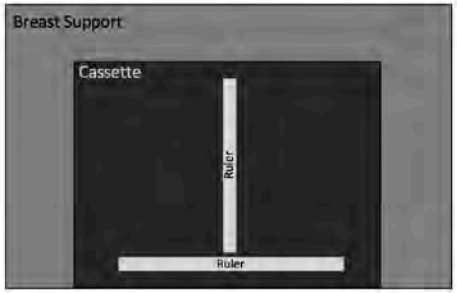
Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

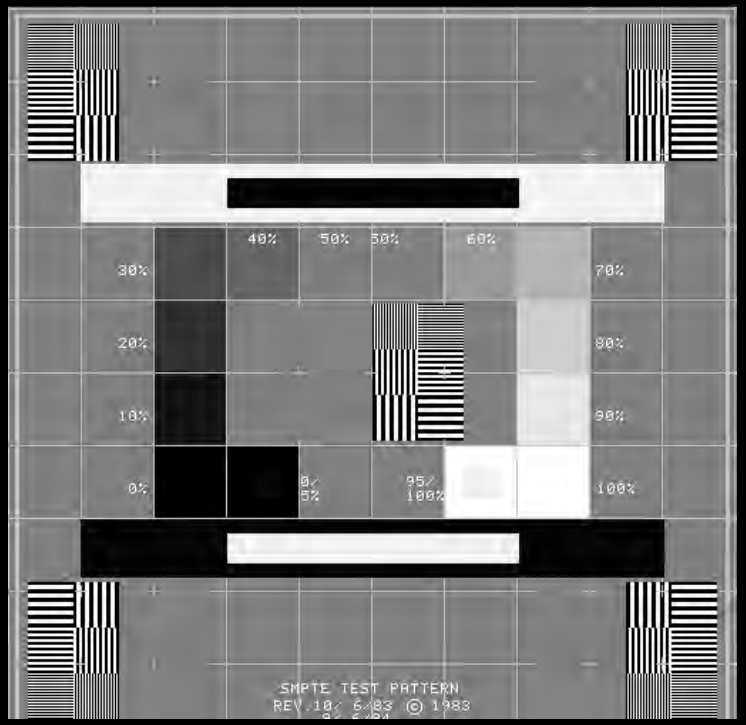
CR Reader Scanner Performance

Procedure	**Equipment:** 2 thin metal rulers (or equivalent). Place rulers in the shape of a T on a cassette which is placed on top of the breast support. Expose at extremely low manual technique (~25 kVp, 4 mAs).

	Pass/Fail
Parallel to Chest Wall	Pass
Perpendicular to Chest Wall	Pass

Action Limits	**Recommendation:** The edges of the "T" should appear smooth and sharp. If they are not, and appear jagged or nonsmooth, then this could indicate a problem with the CR reader performance.





8. Acquisition Workstation (AW) Monitor QC

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
Medical Physicist	MP Name Jane Doe	**Survey Date**	December 6, 2016
Signature			

Procedure

Equipment: Luminance meter

Note: Some of these QC tests may or may not be possible to perform depending on the monitor QC capabilities

Test Pattern Image Quality: Use TG18-QC, SMPTE or other relevant pattern (if available)

Luminance Check: TG 18 LN8-01 & LN8-18 test patterns, or others that provide measure of L_{min} & L_{max} (if available)

Monitor manufacturer:	**Model:**	Monitor Model A
	Monitor serial number	321
	Monitor date of manufacture	12/1/16
Monitor Condition	Significant findings P/F	F
Test Pattern Image Quality *(if available)*	Test pattern centered appropriately?	Yes
	0%-5% contrast boxes visible?	Yes
	95%-100% contrast boxes visible?	Yes
	Alphanumerics sharp and legible?	Yes
	3 "Quality Control" patches visible (TG18)?	NA
	Line-pair images distinct (center)?	Yes
	Line-pair images distinct (corners)?	Yes
	Grayscale ramps smooth *(if avail)* ?	Yes
	Test pattern P/F	Pass
Luminance Check *(if available)*	Measured Luminance minimum (cd/m^2)	NA
	Mfr recommendation for L_{min} *(if avail)*	NA
	L_{min} meets mfr recommendation ±30%?	NA
	Measured Luminance maximum (cd/m^2)	NA
	Mfr recommendation for L_{max} *(if avail)*	NA
	L_{max} meets mfr recommendation ±10%?	NA
	Luminance check P/F	NA
DICOM GSDF	W/in ±10% of targeted contrast response P/F *(if avail)*	NA
Mfr Automated Test	Most recent set of mfr automated tests P/F	NA
	Overall Pass/Fail	Fail

Significant findings indicated on figure below

Luminance Uniformity	
Center	NA
Upper Left	NA
Upper Right	NA
Lower Left	NA
Lower Right	NA
Max	
Min	
% Diff	
P/F	NA

Action Limits

Required: Any identified screen blemish that could interfere with clinical information must be removed.

Test pattern image quality must pass all visual tests.

L_{min} must be within ±30% of mfr specifications (or, if not available ≤1.5 cd/m^2).

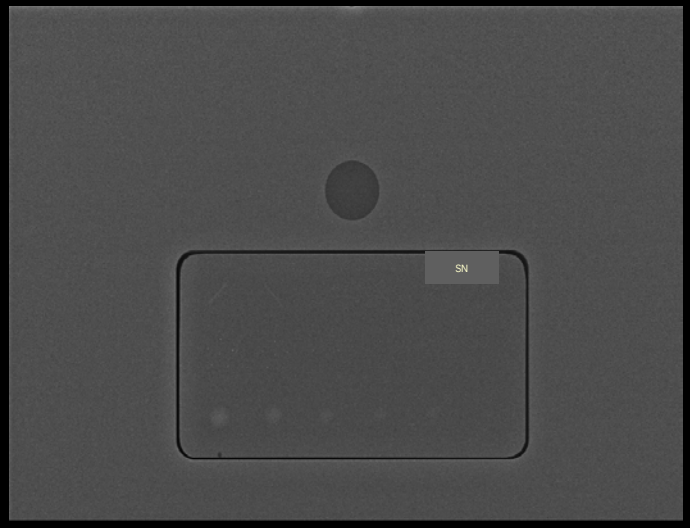
L_{max} must be within ±10% of mfr specifications (or, if not available ≥150 cd/m^2).

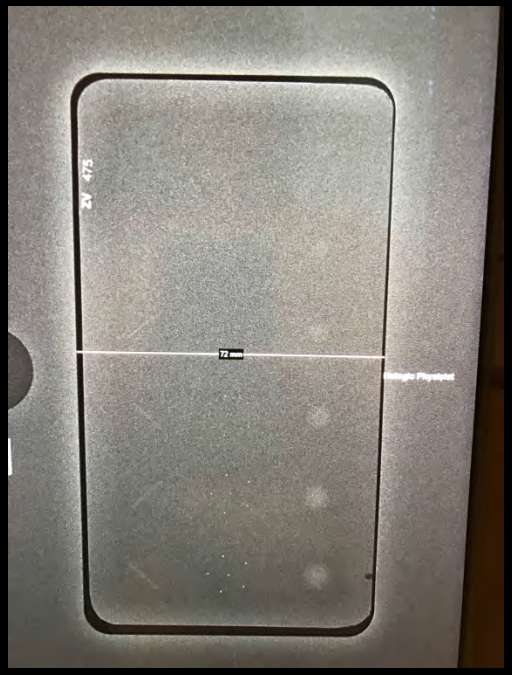
Luminance uniformity must be ≤30%

GSDF measured contrast response must be within ±10% of targeted contrast response.

Mfr's automated tests must pass mfr specifications (if 1 test fails, indicate "F").

Timeframe: Significant monitor cleanliness defects must be corrected before clinical use; all other required tests must be corrected within 30 days.





9. Radiologist Workstation (RW) Monitor QC

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Workstation ID	Workstation #1	**Survey Date**	December 6, 2016
Medical Physicist	MP Name Jane Doe	**Signature**	

Procedure

Equipment: ACR DM Phantom Image, luminance meter
Note: Some of these QC tests may or may not be possible to perform depending on the monitor QC capabilities
ACR DM Phantom: use phantom acquired from any DM within facility network, preferably one MP has acquired
Test Pattern Image Quality: Use TG18-QC, SMPTE or other relevant pattern
Luminance: TG 18 LN8-01, LN8-18 & TG 18 UNL80 test patterns or other relevant test patterns

		Monitor manufacturer:	Model:	Left*	Right*
			Monitor serial number	100230	100231
			Monitor date of manufacture	12/1/16	1/1/16
Ambient Light		Are ambient light conditions adequate for DM?		Yes	
Monitor Condition		Significant findings P/F		P	P
ACR DM Phantom Evaluation		Artifacts P/F		P	P
		Fiber score		5.0	5.0
		Speck group score		4.5	4.5
		Mass score		4.0	4.0
		Phantom P/F		P	P
Distance Measurement		Parallel to A-C axis (mm)		72.0	72.0
		Meas = 70.0 ±14.0 mm (P/F)		P	P
Test Pattern Image Quality		Test pattern centered appropriately?		Yes	Yes
		0%-5% contrast boxes visible?		Yes	Yes
		95%-100% contrast boxes visible?		Yes	Yes
		Alphanumerics sharp and legible?		Yes	Yes
		3 "Quality Control" patches visible (TG18)?		Yes	Yes
		Line-pair images distinct (center)?		Yes	Yes
		Line-pair images distinct (corners)?		Yes	Yes
		Grayscale ramps smooth?		Yes	Yes
		Test pattern P/F		P	P
Luminance Check		Measured Luminance minimum (cd/m^2)		0.75	0.09
		Mfr recommendation for L_{min} *(if avail)*		1.0	1.0
		L_{min} meets mfr recommendation ±30%?		P	F
		Measured Luminance maximum (cd/m^2)		502.3	485.3
		Mfr recommendation for L_{max} *(if avail)*		500	500
		L_{max} meets mfr recommendation ±10%?		P	P
		Luminance check P/F		P	P
DICOM GSDF *(if avail)*		Within ±10% of targeted contrast response P/F		P	P
Mfr Automated Test		Most recent set of mfr automated tests P/F		P	P
			Overall Pass/Fail	**Pass**	**Pass**

Significant findings indicated on figures below

**Left and right monitors; complete additional forms if more than 2 monitors used*

Luminance Uniformity

Monitor	Left	Right
Center	425.0	433.0
Upper L	432.0	415.0
Upper R	444.0	455.0
Lower L	420.0	446.0
Lower R	415.0	435.0
Max	444.0	455.0
Min	415.0	415.0
% Diff	6.8	9.2
P/F	P	P

Luminance Matching

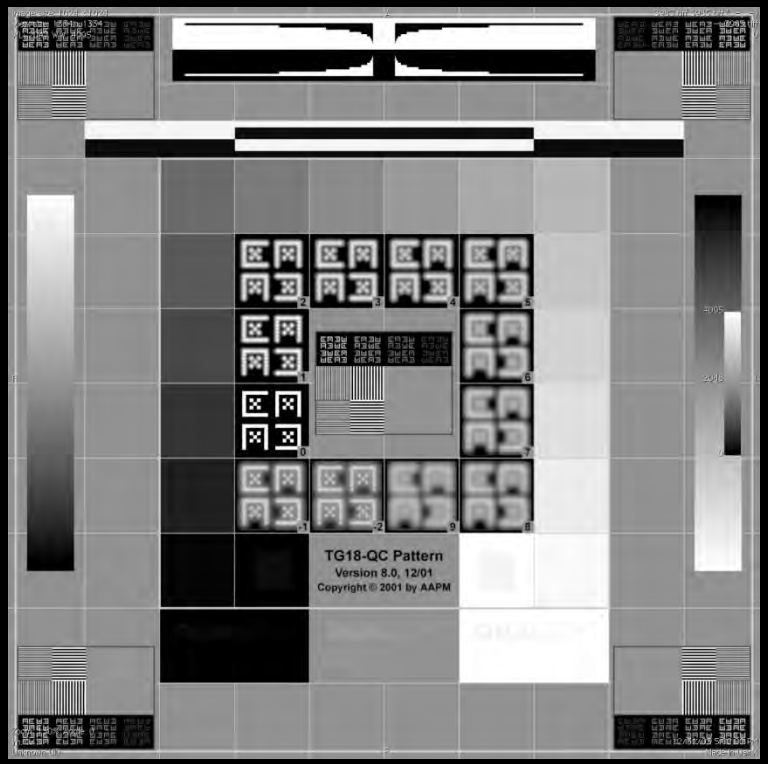
P/F	P

Action Limits

Required:
Any identified monitor blemish that could interfere with clinical information must be removed.
ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
Measured distance of wax insert must be 70.0 ±14.0 mm.
Test pattern image quality must pass all visual tests.
L_{min} must be within ±30% of mfr specifications (or, if not available ≤1.5 cd/m^2).
L_{max} must be within ±10% of mfr specifications (or, if not available ≥420 cd/m^2).
Luminance uniformity must be ≤30%; luminance matching must be ≤20%.
GSDF measured contrast response must be within ±10% of targeted contrast response.
Mfr's automated tests must pass mfr specifications (if 1 test fails, indicate "F").

Recommended:
Ambient light conditions should be appropriate for mammography; max of 45 lux is recommended.

Timeframe:
Phantom must pass and significant monitor cleanliness defects must be corrected before clinical use; all other required tests must be corrected within 30 days.



9. Radiologist Workstation (RW) Monitor QC

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Workstation ID	Workstation #1	**Survey Date**	December 6, 2016
Medical Physicist	MP Name Jane Doe	**Signature**	

Procedure

Equipment: ACR DM Phantom Image, luminance meter
Note: Some of these QC tests may or may not be possible to perform depending on the monitor QC capabilities
ACR DM Phantom: use phantom acquired from any DM within facility network, preferably one MP has acquired
Test Pattern Image Quality: Use TG18-QC, SMPTE or other relevant pattern
Luminance: TG 18 LN8-01, LN8-18 & TG 18 UNL80 test patterns or other relevant test patterns

		Left*	Right*
Monitor manufacturer:	**Model:**		
	Monitor serial number	100230	100231
	Monitor date of manufacture	12/1/16	1/1/16
Ambient Light	Are ambient light conditions adequate for DM?	Yes	
Monitor Condition	Significant findings P/F	P	P
ACR DM Phantom Evaluation	Artifacts P/F	P	P
	Fiber score	5.0	5.0
	Speck group score	4.5	4.5
	Mass score	4.0	4.0
	Phantom P/F	P	P
Distance Measurement	Parallel to A-C axis (mm)	72.0	72.0
	Meas = 70.0 ±14.0 mm (P/F)	P	P
Test Pattern Image Quality	Test pattern centered appropriately?	Yes	Yes
	0%-5% contrast boxes visible?	Yes	Yes
	95%-100% contrast boxes visible?	Yes	Yes
	Alphanumerics sharp and legible?	Yes	Yes
	3 "Quality Control" patches visible (TG18)?	Yes	Yes
	Line-pair images distinct (center)?	Yes	Yes
	Line-pair images distinct (corners)?	Yes	Yes
	Grayscale ramps smooth?	Yes	Yes
	Test pattern P/F	P	P
Luminance Check	Measured Luminance minimum (cd/m^2)	0.75	0.09
	Mfr recommendation for L_{min} *(if avail)*	1.0	1.0
	L_{min} meets mfr recommendation ±30%?	P	F
	Measured Luminance maximum (cd/m^2)	502.3	485.3
	Mfr recommendation for L_{max} *(if avail)*	500	500
	L_{max} meets mfr recommendation ±10%?	P	P
	Luminance check P/F	P	P
DICOM GSDF *(if avail)*	Within ±10% of targeted contrast response P/F	P	P
Mfr Automated Test	Most recent set of mfr automated tests P/F	P	P
	Overall Pass/Fail	**Pass**	**Pass**

Significant findings indicated on figures below

**Left and right monitors; complete additional forms if more than 2 monitors used*

Luminance Uniformity

Monitor	Left	Right
Center	425.0	433.0
Upper L	432.0	415.0
Upper R	444.0	455.0
Lower L	420.0	446.0
Lower R	415.0	435.0
Max	444.0	455.0
Min	415.0	415.0
% Diff	6.8	9.2
P/F	P	P

Luminance Matching

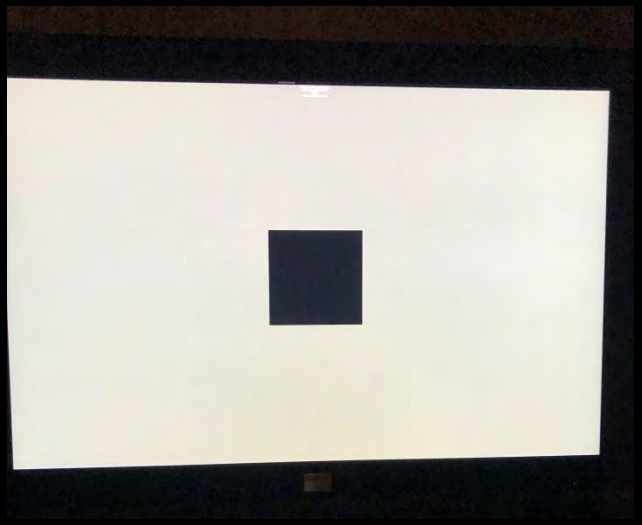
P/F	P

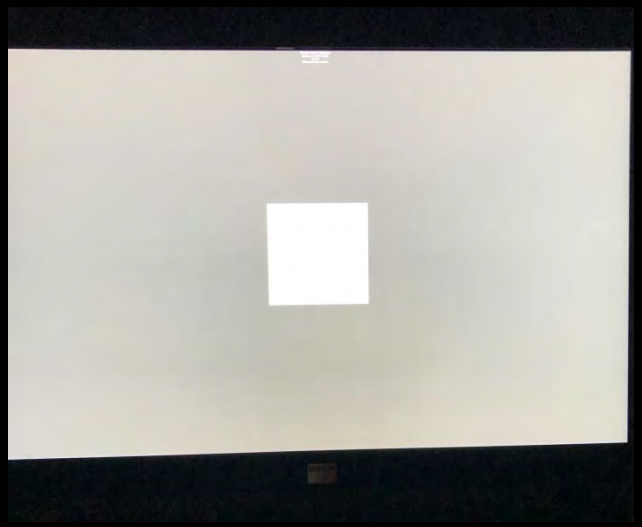
Action Limits

Required:
Any identified monitor blemish that could interfere with clinical information must be removed.
ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
Measured distance of wax insert must be 70.0 ±14.0 mm.
Test pattern image quality must pass all visual tests.
L_{min} must be within ±30% of mfr specifications (or, if not available ≤1.5 cd/m^2).
L_{max} must be within ±10% of mfr specifications (or, if not available ≥420 cd/m^2).
Luminance uniformity must be ≤30%; luminance matching must be ≤20%.
GSDF measured contrast response must be within ±10% of targeted contrast response.
Mfr's automated tests must pass mfr specifications (if 1 test fails, indicate "F").

Recommended:
Ambient light conditions should be appropriate for mammography; max of 45 lux is recommended.

Timeframe:
Phantom must pass and significant monitor cleanliness defects must be corrected before clinical use; all other required tests must be corrected within 30 days.





9. Radiologist Workstation (RW) Monitor QC

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Workstation ID	Workstation #1	**Survey Date**	December 6, 2016
Medical Physicist	MP Name Jane Doe	**Signature**	

Procedure

Equipment: ACR DM Phantom Image, luminance meter
Note: Some of these QC tests may or may not be possible to perform depending on the monitor QC capabilities
ACR DM Phantom: use phantom acquired from any DM within facility network, preferably one MP has acquired
Test Pattern Image Quality: Use TG18-QC, SMPTE or other relevant pattern
Luminance: TG 18 LN8-01, LN8-18 & TG 18 UNL80 test patterns or other relevant test patterns

		Left*	Right*
Monitor manufacturer:	**Model:**		
	Monitor serial number	100230	100231
	Monitor date of manufacture	12/1/16	1/1/16
Ambient Light	Are ambient light conditions adequate for DM?	Yes	
Monitor Condition	Significant findings P/F	P	P
ACR DM Phantom Evaluation	Artifacts P/F	P	P
	Fiber score	5.0	5.0
	Speck group score	4.5	4.5
	Mass score	4.0	4.0
	Phantom P/F	P	P
Distance Measurement	Parallel to A-C axis (mm)	72.0	72.0
	Meas = 70.0 ±14.0 mm (P/F)	P	P
Test Pattern Image Quality	Test pattern centered appropriately?	Yes	Yes
	0%-5% contrast boxes visible?	Yes	Yes
	95%-100% contrast boxes visible?	Yes	Yes
	Alphanumerics sharp and legible?	Yes	Yes
	3 "Quality Control" patches visible (TG18)?	Yes	Yes
	Line-pair images distinct (center)?	Yes	Yes
	Line-pair images distinct (corners)?	Yes	Yes
	Grayscale ramps smooth?	Yes	Yes
	Test pattern P/F	P	P
Luminance Check	Measured Luminance minimum (cd/m^2)	0.75	0.09
	Mfr recommendation for L_{min} *(if avail)*	1.0	1.0
	L_{min} meets mfr recommendation ±30%?	P	F
	Measured Luminance maximum (cd/m^2)	502.3	485.3
	Mfr recommendation for L_{max} *(if avail)*	500	500
	L_{max} meets mfr recommendation ±10%?	P	P
	Luminance check P/F	P	P
DICOM GSDF *(if avail)*	Within ±10% of targeted contrast response P/F	P	P
Mfr Automated Test	Most recent set of mfr automated tests P/F	P	P
	Overall Pass/Fail	**Pass**	**Pass**

Significant findings indicated on figures below

**Left and right monitors; complete additional forms if more than 2 monitors used*

Luminance Uniformity

Monitor	Left	Right
Center	425.0	433.0
Upper L	432.0	415.0
Upper R	444.0	455.0
Lower L	420.0	448.0
Lower R	415.0	435.0
Max	444.0	455.0
Min	415.0	415.0
% Diff	6.8	9.2
P/F	P	P

Luminance Matching

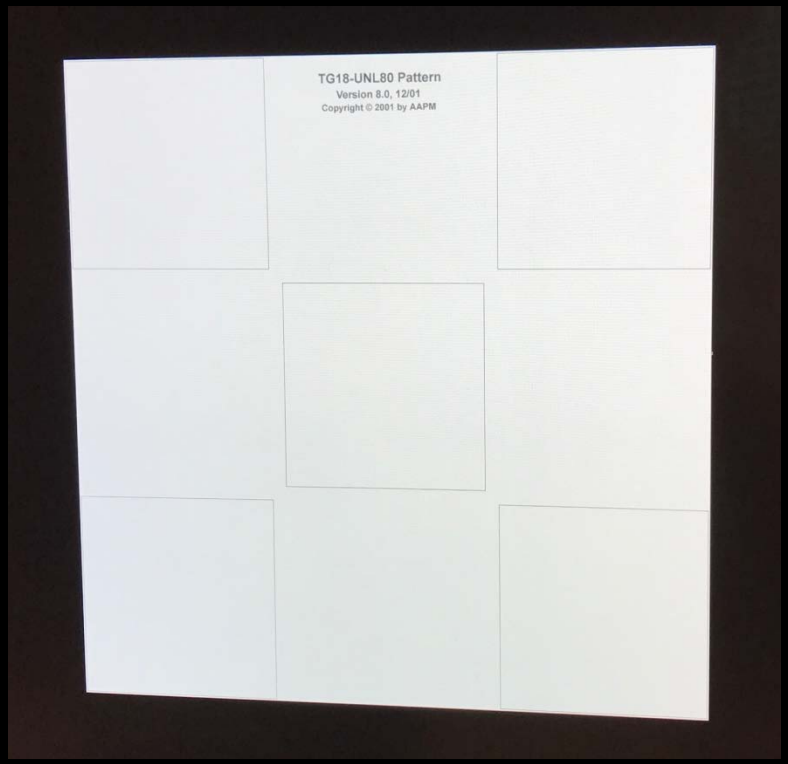
P/F	P

Action Limits

Required:
Any identified monitor blemish that could interfere with clinical information must be removed.
ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
Measured distance of wax insert must be 70.0 ±14.0 mm.
Test pattern image quality must pass all visual tests.
L_{min} must be within ±30% of mfr specifications (or, if not available ≤1.5 cd/m^2).
L_{max} must be within ±10% of mfr specifications (or, if not available ≥420 cd/m^2).
Luminance uniformity must be ≤30%; luminance matching must be ≤20%.
GSDF measured contrast response must be within ±10% of targeted contrast response.
Mfr's automated tests must pass mfr specifications (if 1 test fails, indicate "F").

Recommended:
Ambient light conditions should be appropriate for mammography; max of 45 lux is recommended.

Timeframe:
Phantom must pass and significant monitor cleanliness defects must be corrected before clinical use; all other required tests must be corrected within 30 days.



9. Radiologist Workstation (RW) Monitor QC

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Workstation ID	Workstation #1	**Survey Date**	December 6, 2016
Medical Physicist	MP Name Jane Doe	**Signature**	

Procedure

Equipment: ACR DM Phantom Image, luminance meter
Note: Some of these QC tests may or may not be possible to perform depending on the monitor QC capabilities
ACR DM Phantom: use phantom acquired from any DM within facility network, preferably one MP has acquired
Test Pattern Image Quality: Use TG18-QC, SMPTE or other relevant pattern
Luminance: TG 18 LN8-01, LN8-18 & TG 18 UNL80 test patterns or other relevant test patterns

		Left*	Right*
Monitor manufacturer:	**Model:**		
	Monitor serial number	100230	100231
	Monitor date of manufacture	12/1/16	1/1/16
Ambient Light	Are ambient light conditions adequate for DM?	Yes	
Monitor Condition	Significant findings P/F	P	P
ACR DM Phantom Evaluation	Artifacts P/F	P	P
	Fiber score	5.0	5.0
	Speck group score	4.5	4.5
	Mass score	4.0	4.0
	Phantom P/F	P	P
Distance Measurement	Parallel to A-C axis (mm)	72.0	72.0
	Meas = 70.0 ±4.0 mm (P/F)	P	P
Test Pattern Image Quality	Test pattern centered appropriately?	Yes	Yes
	0%-5% contrast boxes visible?	Yes	Yes
	95%-100% contrast boxes visible?	Yes	Yes
	Alphanumerics sharp and legible?	Yes	Yes
	3 "Quality Control" patches visible (TG18)?	Yes	Yes
	Line-pair images distinct (center)?	Yes	Yes
	Line-pair images distinct (corners)?	Yes	Yes
	Grayscale ramps smooth?	Yes	Yes
	Test pattern P/F	P	P
Luminance Check	Measured Luminance minimum (cd/m^2)	0.75	0.09
	Mfr recommendation for L_{min} *(if avail)*	1.0	1.0
	L_{min} meets mfr recommendation ±30%?	P	F
	Measured Luminance maximum (cd/m^2)	502.3	485.3
	Mfr recommendation for L_{max} *(if avail)*	500	500
	L_{max} meets mfr recommendation ±10%?	P	P
	Luminance check P/F	P	P
DICOM GSDF *(if avail)*	W/in ±10% of targeted contrast response P/F	P	P
Mfr Automated Test	Most recent set of mfr automated tests P/F	P	P
	Overall Pass/Fail	**Pass**	**Pass**

Significant findings indicated on figures below

**Left and right monitors; complete additional forms if more than 2 monitors used*

Luminance Uniformity

Monitor	Left	Right
Center	425.0	433.0
Upper L	432.0	415.0
Upper R	444.0	455.0
Lower L	420.0	446.0
Lower R	415.0	435.0
Max	444.0	455.0
Min	415.0	415.0
% Diff	6.8	9.2
P/F	P	P

Luminance Matching

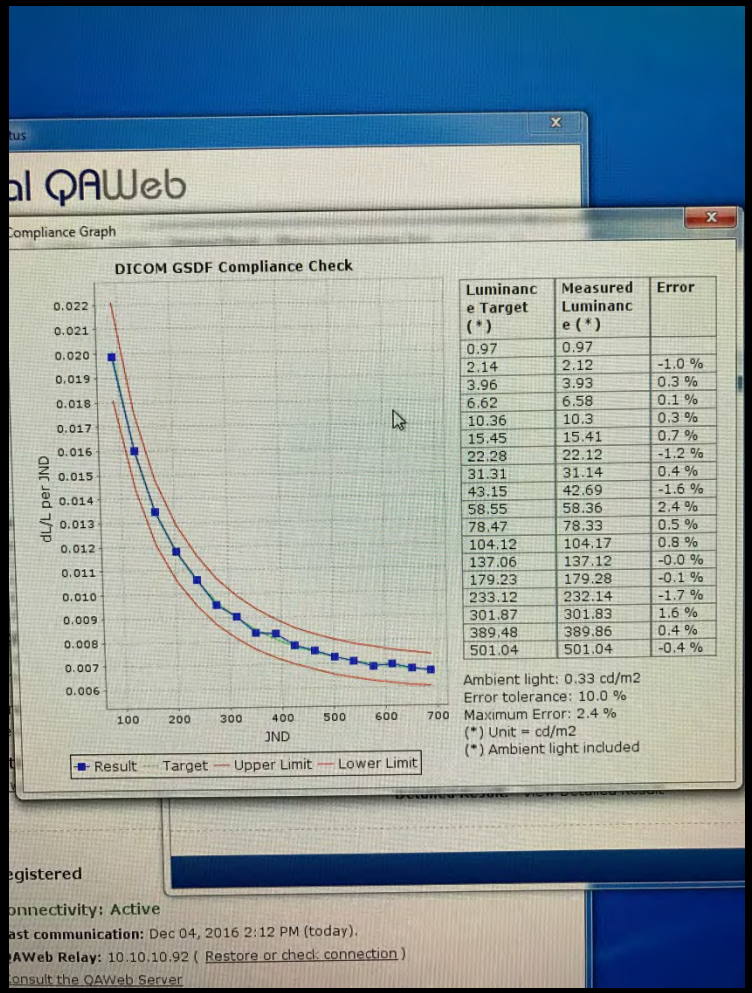
P/F	P

Action Limits

Required:
- Any identified monitor blemish that could interfere with clinical information must be removed.
- ACR DM Phantom image must be free of clinically significant artifacts.
- Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
- Measured distance of wax insert must be 70.0 ±4.0 mm.
- Test pattern image quality must pass all visual tests.
- L_{min} must be within ±30% of mfr specifications (or, if not available ≤1.5 cd/m^2).
- L_{max} must be within ±10% of mfr specifications (or, if not available ≥420 cd/m^2).
- Luminance uniformity must be ≤30%; luminance matching must be ≤20%.
- GSDF measured contrast response must be within ±10% of targeted contrast response.
- Mfr's automated tests must pass mfr specifications (if 1 test fails, indicate "F").

Recommended:
- Ambient light conditions should be appropriate for mammography; max of 45 lux is recommended.

Timeframe:
- Phantom must pass and significant monitor cleanliness defects must be corrected before clinical use; all other required tests must be corrected within 30 days.



9. Radiologist Workstation (RW) Monitor QC

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Workstation ID	Workstation #1	**Survey Date**	December 6, 2016
Medical Physicist	MP Name Jane Doe	**Signature**	

Procedure

Equipment: ACR DM Phantom Image, luminance meter
Note: Some of these QC tests may or may not be possible to perform depending on the monitor QC capabilities
ACR DM Phantom: use phantom acquired from any DM within facility network, preferably one MP has acquired
Test Pattern Image Quality: Use TG18-QC, SMPTE or other relevant pattern
Luminance: TG 18 LN8-01, LN8-18 & TG 18 UNL80 test patterns or other relevant test patterns

		Left*	Right*
Monitor manufacturer:	**Model:**		
	Monitor serial number	100230	100231
	Monitor date of manufacture	12/1/16	1/1/16
Ambient Light	Are ambient light conditions adequate for DM?	Yes	
Monitor Condition	Significant findings P/F	P	P
ACR DM Phantom Evaluation	Artifacts P/F	P	P
	Fiber score	5.0	5.0
	Speck group score	4.5	4.5
	Mass score	4.0	4.0
	Phantom P/F	P	P
Distance Measurement	Parallel to A-C axis (mm)	72.0	72.0
	Meas = 70.0 ±14.0 mm (P/F)	P	P
Test Pattern Image Quality	Test pattern centered appropriately?	Yes	Yes
	0%-5% contrast boxes visible?	Yes	Yes
	95%-100% contrast boxes visible?	Yes	Yes
	Alphanumerics sharp and legible?	Yes	Yes
	3 "Quality Control" patches visible (TG18)?	Yes	Yes
	Line-pair images distinct (center)?	Yes	Yes
	Line-pair images distinct (corners)?	Yes	Yes
	Grayscale ramps smooth?	Yes	Yes
	Test pattern P/F	P	P
Luminance Check	Measured Luminance minimum (cd/m^2)	0.75	0.09
	Mfr recommendation for L_{min} *(if avail)*	1.0	1.0
	L_{min} meets mfr recommendation ±30%?	P	F
	Measured Luminance maximum (cd/m^2)	502.3	485.3
	Mfr recommendation for L_{max} *(if avail)*	500	500
	L_{max} meets mfr recommendation ±10%?	P	P
	Luminance check P/F	P	P
DICOM GSDF *(if avail)*	Within ±10% of targeted contrast response P/F	P	P
Mfr Automated Test	Most recent set of mfr automated tests P/F	P	P
	Overall Pass/Fail	**Pass**	**Pass**

Significant findings indicated on figures below

**Left and right monitors; complete additional forms if more than 2 monitors used*

Luminance Uniformity

Monitor	Left	Right
Center	425.0	433.0
Upper L	432.0	415.0
Upper R	444.0	455.0
Lower L	420.0	446.0
Lower R	415.0	435.0
Max	444.0	455.0
Min	415.0	415.0
% Diff	6.8	9.2
P/F	P	P

Luminance Matching

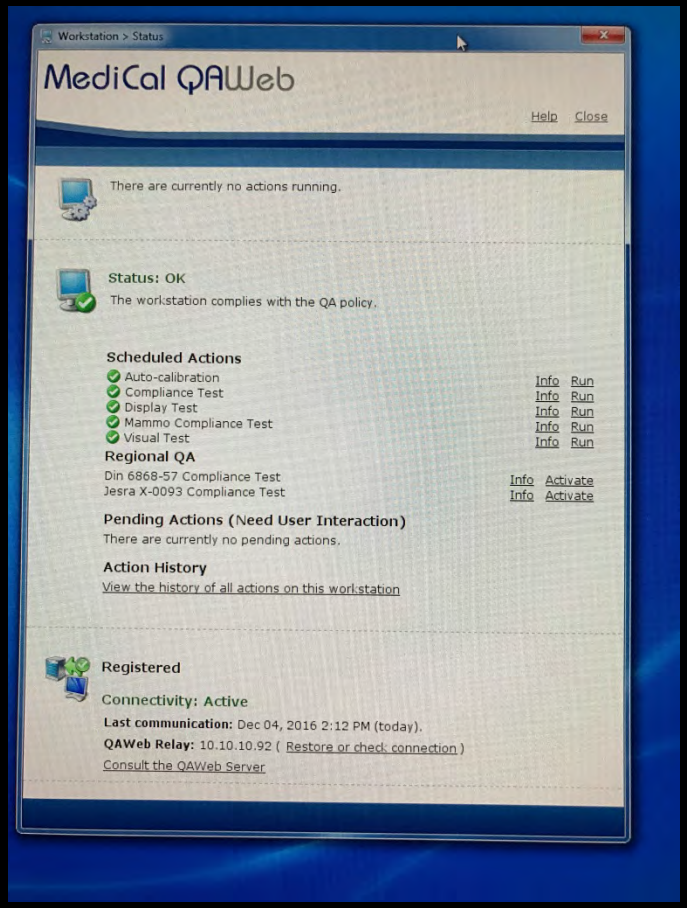
P/F	P

Action Limits

Required:
Any identified monitor blemish that could interfere with clinical information must be removed.
ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
Measured distance of wax insert must be 70.0 ±14.0 mm.
Test pattern image quality must pass all visual tests.
L_{min} must be within ±30% of mfr specifications (or, if not available ≤1.5 cd/m^2).
L_{max} must be within ±10% of mfr specifications (or, if not available ≥420 cd/m^2).
Luminance uniformity must be ≤30%; luminance matching must be ≤20%.
GSDF measured contrast response must be within ±10% of targeted contrast response.
Mfr's automated tests must pass mfr specifications (if 1 test fails, indicate "F").

Recommended:
Ambient light conditions should be appropriate for mammography; max of 45 lux is recommended.

Timeframe:
Phantom must pass and significant monitor cleanliness defects must be corrected before clinical use; all other required tests must be corrected within 30 days.



9. Radiologist Workstation (RW) Monitor QC

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Workstation ID	Workstation #1	**Survey Date**	December 6, 2016
Medical Physicist	MP Name Jane Doe	**Signature**	

Procedure

Equipment: ACR DM Phantom Image, luminance meter
Note: Some of these QC tests may or may not be possible to perform depending on the monitor QC capabilities
ACR DM Phantom: use phantom acquired from any DM within facility network, preferably one MP has acquired
Test Pattern Image Quality: Use TG18-QC, SMPTE or other relevant pattern
Luminance: TG 18 LN8-01, LN8-18 & TG 18 UNL80 test patterns or other relevant test patterns

		Model:	Left*	Right*
Monitor manufacturer:				
		Monitor serial number	100230	100231
		Monitor date of manufacture	12/1/16	1/1/16
Ambient Light	Are ambient light conditions adequate for DM?		Yes	
Monitor Condition	Significant findings P/F		P	P
ACR DM Phantom Evaluation	Artifacts P/F		P	P
	Fiber score		5.0	5.0
	Speck group score		4.5	4.5
	Mass score		4.0	4.0
	Phantom P/F		P	P
Distance Measurement	Parallel to A-C axis (mm)		72.0	72.0
	Meas = 70.0 ±14.0 mm (P/F)		P	P
Test Pattern Image Quality	Test pattern centered appropriately?		Yes	Yes
	0%-5% contrast boxes visible?		Yes	Yes
	95%-100% contrast boxes visible?		Yes	Yes
	Alphanumerics sharp and legible?		Yes	Yes
	3 "Quality Control" patches visible (TG18)?		Yes	Yes
	Line-pair images distinct (center)?		Yes	Yes
	Line-pair images distinct (corners)?		Yes	Yes
	Grayscale ramps smooth?		Yes	Yes
	Test pattern P/F		P	P
Luminance Check	Measured Luminance minimum (cd/m^2)		0.75	0.09
	Mfr recommendation for L_{min} *(if avail)*		1.0	1.0
	L_{min} meets mfr recommendation ±30%?		P	F
	Measured Luminance maximum (cd/m^2)		502.3	485.3
	Mfr recommendation for L_{max} *(if avail)*		500	500
	L_{max} meets mfr recommendation ±10%?		P	P
	Luminance check P/F		P	P
DICOM GSDF *(if avail)*	W/in ±10% of targeted contrast response P/F		P	P
Mfr Automated Test	Most recent set of mfr automated tests P/F		P	P
		Overall Pass/Fail	**Pass**	**Pass**

Significant findings indicated on figures below

**Left and right monitors; complete additional forms if more than 2 monitors used*

Luminance Uniformity

Monitor	Left	Right
Center	425.0	433.0
Upper L	432.0	415.0
Upper R	444.0	455.0
Lower L	420.0	446.0
Lower R	415.0	435.0
Max	444.0	455.0
Min	415.0	415.0
% Diff	6.8	9.2
P/F	P	P

Luminance Matching

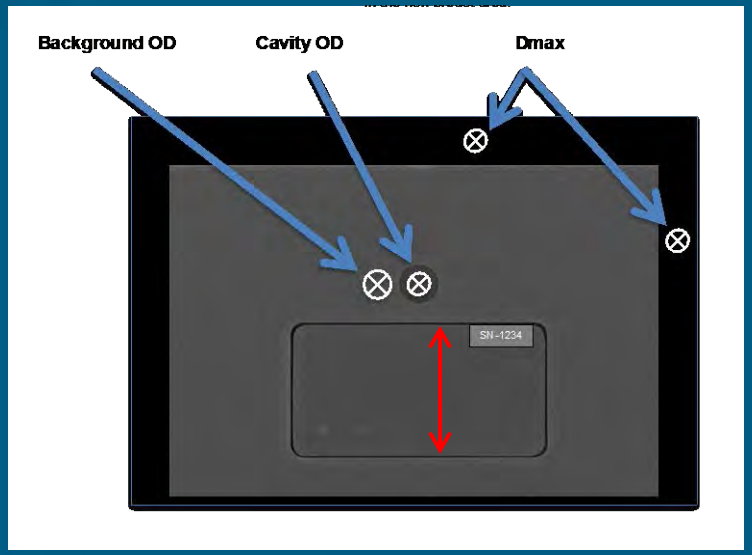
P/F	P

Action Limits

Required:
Any identified monitor blemish that could interfere with clinical information must be removed.
ACR DM Phantom image must be free of clinically significant artifacts.
Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.
Measured distance of wax insert must be 70.0 ±14.0 mm.
Test pattern image quality must pass all visual tests.
L_{min} must be within ±30% of mfr specifications (or, if not available ≤1.5 cd/m^2).
L_{max} must be within ±10% of mfr specifications (or, if not available ≥420 cd/m^2).
Luminance uniformity must be ≤30%; luminance matching must be ≤20%.
GSDF measured contrast response must be within ±10% of targeted contrast response.
Mfr's automated tests must pass mfr specifications (if 1 test fails, indicate "F").

Recommended:
Ambient light conditions should be appropriate for mammography; max of 45 lux is recommended.

Timeframe:
Phantom must pass and significant monitor cleanliness defects must be corrected before clinical use; all other required tests must be corrected within 30 days.



10. Film Printer QC *(if applicable)*

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Printer ID	Printer #1	**Survey Date**	December 6, 2016
Medical Physicist	MP Name Jane Doe	**Signature**	

Procedure

Applicability: If film printer is used clinically for mammography (i.e., for interpretation and to provide images to referring physicians and patients)

Equipment: Densitometer

Print an ACR DM Phantom image acquired from any DM unit within facility network, preferably one MP has just acquired.

Do not change window/level settings from acquired image prior to printing.

Print the phantom image from the workstation/computer typically used to print clinical films.

Dmax should be measured either at extreme left or right edge of film or at extreme non-chest wall edge.

Film Printer Manufacturer	Kodak	**Film Printer Serial Number**	1235695
Film Printer Model	8900	**Film Printer Date of Manufacture**	12/1/05
Workstation for printing	Tech Workstation #3	**DM ID or workstation ID**	Room 1

	Film size	8 x 10	
ACR DM Phantom	Artifacts P/F	P	
	Fiber score	5.0	
	Speck group score	4.5	
	Mass score	4.0	
	Phantom P/F	P	
Back-ground	Bkgd OD *(Outside cavity)*	1.85	
	Bkgd OD ≥ 1.6 (P/F)	P	
Contrast	Cavity OD	2.10	
	Bkgd OD *(use value from above)*	1.85	
	Contrast = Cavity OD - Bkgd OD	0.25	
	Contrast ≥0.1 (P/F)	P	
D_{max}	D_{max} OD	3.75	
	D_{max} OD ≥3.1 (P/F)	P	
Distance Measurement	Parallel to A-C axis (mm)	72.0	
	Meas = 70.0 ±14.0 mm (P/F)	P	
	Overall Pass/Fail	**Pass**	

Action Limits

Required: ACR DM Phantom image must be free of clinically significant artifacts.

Fiber score must be ≥2.0; speck group score must be ≥3.0; mass score must be ≥2.0.

Background OD must be ≥1.6 (1.7 to 2.2 is recommended; approx 2.0 is optimal).

Contrast (Cavity OD - Background OD) must be ≥0.1.

D_{max} must be ≥3.1 (≥3.5 is recommended).

Measured distance of wax insert must be 70.0 ±14.0 mm.

Timeframe: Failures of required items must be corrected before printing of clinical images.

11. Evaluation of Site's Technologist QC Program

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

Radiologic Technologist's Quality Control Tests	Frequency	Test Performed, Analyzed & Documented	Missing Data	Incorrect Scoring or Calculations	Missing Corrective Action Documentation	Other	Comments
1. **ACR DM Phantom Image Quality**	Weekly	✓					
Scores of latest phantom image: (Latest QC Tech Score / Med Phys Score)							
Fiber: 5.0 / 5.0							
Speck group: 4.0 / 4.5							
Mass: 4.5 / 4.5							
2. **CR Cassette Erasure** *(if app)*	Weekly	✓					
3. **Comp Thickness Indicator**	Monthly	✓					
4. **Visual Checklist**	Monthly	✓					
5. **AW Monitor QC**	Monthly	✓					
9. **Facility QC Review**	Quarterly	✓					
10. **Compression Force**	Semiannual	✓					
11. **Mfr Detector Calibration** *(if app)*		✓					
Optional - Repeat Analysis	As Needed						
Optional - System QC for Radiologist	NA						
Optional - Radiologist IQ Feedback	NA						
Corrective Action Log documentation adequate?	Yes						

Overall Pass/Fail for Performance of Technologist QC Program: Pass

Additional Comments: Site QC is in excellent shape.

Action Limits	**Required:**	MQSA regulations [FDA Rule 900.12(d)(1)(iii) specify that "each facility shall have the services of a medical physicist available to survey mammography equipment and oversee the equipment-related quality assurance practices of the facility." Completion of this "Evaluation of Site's Technologist QC Program" form documents that this oversight has been conducted. In order for the overall evaluation to pass, there must be a) no significant missing data, b) the tests must be analyzed without gross errors, and c) appropriate corrective action for failures must be taken (and documented). See test procedures for more information.
	Timeframe:	Failures must be corrected within 30 days.

12. Evaluation of Display Device Technologist QC Program

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Medical Physicist	MP Name Jane Doe	**Display Device Location**	Outpatient Reading Center - Smith Street
Signature		**Survey Date**	December 6, 2016

Display Device ID & Room	Display Device Description (RW, Printer, Viewbox)	Test Performed, Analyzed & Documented Incorrectly	Missing Data	Incorrect Scoring or Calculations	Missing Corrective Action Documentation	Mfr Automated Tests (if Applicable)	Other	Comments	P/F
Example: Mammography reading room	RW	✓	✓	✓	✓			Discussed with manager	P
Workstation 1	RW	✓							P
Workstation 2	RW	✓							P
Workstation 3	RW	✓							P
Laser Printer - Basement File Room	Printer	✓							P
Corrective Action Log documentation adequate?	Yes								
								Overall Pass/Fail for Performance of Display Device Technologist QC Program	**Pass**

Additional Comments:

Action Limits	**Required:**	MQSA regulations [FDA Rule 900.12(d)(1)(iii) specify that "each facility shall have the services of a medical physicist available to survey mammography equipment and oversee the equipment-related quality assurance practices of the facility." Completion of this "Evaluation of Site's Technologist QC Program" form documents that this oversight has been conducted. In order for the overall evaluation to pass, there must be a) no significant missing data, b) the tests must be analyzed without gross errors, and c) appropriate corrective action for failures must be taken (and documented). See test procedures for more information.
	Timeframe:	Failures must be corrected within 30 days.

MEE or Troubleshooting
Beam Quality (Half-Value Layer) Assessment

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

Procedure	**Equipment:** Dosimeter, 0.1 mm Al sheets, lead sheet	Dosimetry system:	Dosimeter Mfr A
	Cover the detector with lead sheet or apron	Calibration date:	November 1, 2016
	Make at least 1 measurement for each available target-filter combination		

		DM Phantom											
		Target/Filter 1		**Target/Filter 2**		**Target/Filter 3**							
Target/filter		W/Rh		W/Ag									
Nominal kVp setting		28		28									
mAs		100.0		100.0									
		Exposure Measurements											
		mm AL	**X (mR)**	**mm AL**	**X (mR)**	**mm AL**	**X (mR)**	**mm AL**	**X (mR)**	**mm AL**	**X (mR)**	**mm AL**	**X (mR)**
No Aluminum	E_0	0	520	0	420.0	0		0		0		0	
Al Thickness (mm) t_a	E_a	0.3	385.0	0.4	301.0								
Al Thickness (mm) t_b	E_b	0.4	224.0	0.5	189.0								
Calculated or measured HVL (mm Al)		0.372		0.477									
Minimum allowed HVL		0.28		0.28									
Overall Pass/Fail		**Pass**		**Pass**									

$$HVL = \frac{t_b \ln[2E_a/E_0] - t_a \ln[2E_b/E_0]}{\ln [E_a/E_b]}$$

Action Limits	**Required:**	The HVL must meet the specifications of FDA's Performance Standards for Ionizing Radiation Emitting Products (Part 1020.30) as shown below.
	Timeframe:	All failures must be corrected before clinical use.

FDA X-ray Tube Voltage (kilovolt peak) and Minimum HVL

Designed Operating Range (kV)	Measured Operating Voltage (kV)	Minimum HVL (mm of Al)
Below 50	20	0.2
	25	0.25
	30	0.3

MEE or Troubleshooting
kVp Accuracy and Reproducibility

Facility Name ACR Webinar
Mfr & Model Unit Mfr A Unit Model ABC
MAP ID-Unit# *(00000-00)* 99999 - 01
Room ID Room 1
Survey Date December 6, 2016

kVp Accuracy and Reproducibility

Procedure	**Equipment:** kVp meter, lead sheet Cover the entire detector with lead sheet, a lead apron or other device. Remove the paddle.

kVp meter kVp Meter Mfr B
Calibration Date: 11/2/16
Setting

		Low Clinical kVp	ACR DM Phantom Clinical kVp	High Clinical kVp
Technique	Nominal kVp setting	25	28	35
	Target/filter	W/Rh	W/Rh	W/Ag
	Focal spot	Large	Large	Large
	mAs	50.0	50.0	50.0
Data	Measured kVp value 1	24.8	28.0	35.2
	Measured kVp value 2		28.1	
	Measured kVp value 3		28.1	
Analysis	Mean kVp	24.80	28.07	35.20
	Standard deviation (SD)		0.06	
	Mean kVp - nominal kVp	-0.20	0.07	0.20
	0.05 x nominal kVp	1.25	1.40	1.75
	% error	-0.80%	0.24%	0.57%
	% error P/F	P	P	P
	Coefficient of variation (CV)		0.0	
	CV P/F		P	
	Overall Pass/Fail	**Pass**	**Pass**	**Pass**

Action Limits	**Required:**	Mean kVp must not differ from the nominal by more than ±5% of the nominal kVp. Coefficient of variation must be ≤0.02.
	Timeframe:	When test is for MEE, all failures must be corrected before clinical use. When test is for troubleshooting, all failures must be corrected within 30 days.

MEE or Troubleshooting Collimation Assessment

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	December 6, 2016

Procedure

Equipment: Coins, film, electronic collimation test tool(s), etc.

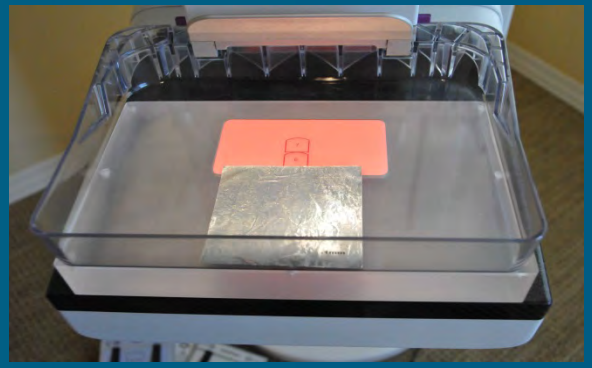
Eqpt used: Self Developing Film **kVp:** 30 **mAs:** 200

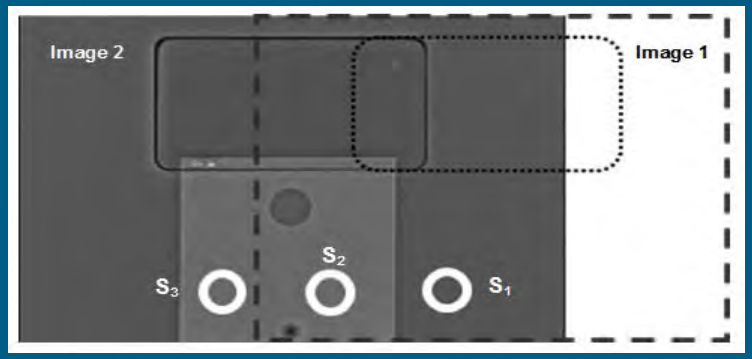
		Largest Detector Size Available	Small Detector Size (CR only)
Technique	Target material	Molybdenum	Molybdenum
	Collimator size (cm)	Large	Large
	SID (mm)	700	700
Deviation Between X-ray Field and Light Field	Left edge deviation (mm)	3.0	3.0
	Right edge deviation (mm)	2.0	4.0
	Sum of left and right edge deviations	5.0	7.0
	Sum as % of SID	0.71	1.00
	Anterior edge deviation (mm)	3.0	4.0
	Chest edge deviation (mm)	5.0	4.0
	Sum of anterior and chest edge deviations	8.0	8.0
	Sum as % of SID	1.14	1.14
	Pass/Fail	P	P
Deviation Between X-ray Field and Edges of the Image Receptor	Left edge deviation	2.0	4.0
	% of SID (retain sign)	0.29	0.57
	Right edge deviation	3.0	3.0
	% of SID (retain sign)	0.43	0.43
	Anterior edge deviation	2.0	2.0
	% of SID (retain sign)	0.29	0.29
	Chest edge deviation	1.0	1.0
	% of SID (retain sign)	0.14	0.14
	Pass/Fail	P	P
Alignment of Chest-Wall Edges of Compression Paddle and IR	Difference between paddle edge and film		
	Difference as % of SID		
	Pass/Fail	P	P
	Overall Pass/Fail		

Action Limits

Required: If sum of left plus right edge deviations or anterior plus chest edge deviations exceeds 2% of SID, seek service adjustment.
If X-ray field exceeds image receptor at any side by more than +2% of SID or if X-ray field falls within image receptor on the chest wall side, seek service adjustment.
If chest-wall edge of compression paddle is within the image receptor or projects beyond the chest-wall edge of the image receptor by more than 1% of SID, seek service correction.

Timeframe: When test is for MEE, all failures must be corrected before clinical use.
When test is for troubleshooting, all failures must be corrected within 30 days.





Troubleshooting
Ghost Image Evaluation

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Mfr & Model	Unit Mfr A Unit Model ABC	**Room ID**	Room 1
		Survey Date	ACR Webinar

Procedure	**Equipment:** ACR DM Phantom, 0.1 mm Al sheet (10 cm x 10 cm)	**Phantom Setup**	
	Largest image receptor size	**Paddle Size** *(IR size)* :	
	Clinical paddle (reg or flex)	**Paddle Type** *(reg or flex)* :	
	Apply 5 daN or 12 lbs comp force	**Exposure Mode:**	
		Compression Force:	12 lbs or 5 daN
	Position ACR DM Phantom with wax insert opposite from chest wall edge.	**AEC Cell Position** *(if avail)* :	
	AEC cell position to position "3".	**Density Setting:**	
	Use clinical (AEC) technique for both images		
	Image 1: Position phantom like Setup Image #1 (edge extends 1" beyond midline).		
	Image 2: Position phantom like Setup Image #2 with Al placed on top.		
	Signal data must be obtained from raw image		

		Image 1	Image 2
Resulting Techniques from Image Acquisition	Target/filter	W/Rh	W/Rh
	kVp	28	28
	mAs	90.0	90.0
Ghosting Analysis *(see images below)*	S_1		301.4
	S_2		283.2
	S_3		282.9
	Ghosting Index		-0.020
	Overall Pass/Fail		**Pass**

$$\text{Ghosting Index} = \frac{(S_3 - S_2)}{(S_1 - S_2)}$$

Action Limits	**Required:**	The ghosting index must be within 0±0.3.
	Timeframe:	Failures must be corrected before clinical use.

Troubleshooting

Viewbox Luminance

Facility Name	ACR Webinar	**MAP ID-Unit#** *(00000-00)*	99999 - 01
Medical Physicist	MP Name Jane Doe	**Viewbox Location**	Rad Screening Room
Signature		**Survey Date**	December 6, 2016

Procedure	**Equipment:** Luminance meter Measure luminance for all viewboxes, record the luminance value for the viewbox with the lowest luminance. Note: Only check a deficiency if it is significant and could impact interpretation; if the observation is not significant, just make a note in comments

	Viewbox Designation	Measurements: Viewbox Luminance (cd/m^2)	Significant Deficiencies: Dirt and Marks	Color Difference	Luminance Difference	Non-Uniformity	Functioning Masks Missing	Pass/Fail
1.	Alternator 1	3542	✓					P
2.	Viewbox 1	3126		✓	✓	✓		P
3.								
4.								
5.								
6.								
7.								
8.								
9.								
10.								
					Tech QC Review for Viewbox Luminance			
						Overall Pass/Fail		Pass

Comments:

Action Limits	**Recommended:** Mammography viewboxes should be capable of a luminance of 3,000 cd/m^2, be uniform, clean and have functioning masks; if these are not met, corrective action should be taken.

Major Component Service, Upgrade, Replacement & Repair

Item	Component	Major Repair	Medical Physicist Involvement
Automatic Exposure Control (AEC)	***AEC replacement***	***Y***	***On-site***
	AEC recalibration that effects dose	***Y***	***On-site***
	AEC sensor replacement	***Y***	***On-site***
	AEC circuit board replacement	***Y***	***On-site***
	Density control - internal adjustment*	N	Oversight
	Thickness compensation internal* adjustment	N	Oversight
Bucky Replacement	***AEC sensor also replace***	***Y***	***On-site***
	AEC sensor not replaced	N	Oversight
	DM detector also replaced	***Y***	***On-site***
	DM detector not replaced	N	Oversight
Collimator	***Replacement***	***Y***	***On-site***
	Reassembly with blade replacement	***Y***	***On-site***
	Adjustment	N	Oversight
Compression Device	Pressure adjustment	N	Optional
	Thickness scale accuracy adjustment but only if it affects AEC performance	N	Oversight
	Repair of auto decompression	N	Optional
Compression Paddle	Paddle (new to facility)	N	Oversight
	Deflection adjustment	N	Oversight
	Adjustment due to extension beyond allowable limit, or visible on images	N	Oversight
X-ray Unit	***Installation***	***Y***	***On-site***
	Reassembly	***Y***	***On-site***
	X-ray tube replacement	***Y***	***On-site***
	High voltage generator replacement	***Y***	***On-site***
	Filter replacement	***Y***	***On-site***
	Manufacturer's software upgrade or modifications	***Y***	***On-site***
	DM detector replacement or repair	***Y***	***On-site***
	kVp, mA or time internal* adjustments	N	Oversight
Display Devices	***New installation or replacement***	***Y***	***On-site***
	New video card or software upgrade	***Y***	***On-site***
	Relocation	N	Oversight
Computed Radiography (CR) and Photostimulable Phosphor (PSP) Plates	***New installation or replacement of CR reader***	***Y***	***On-site***
	Replacement of all PSP plates	***Y***	***On-site***
	One or 2 new PSP plates	N	Oversight

**Internal adjustments refer to equipment adjustments that typically cannot be made by the operator.*

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Thank you,

And now for questions.