ACR Subcommittee on Breast X-ray Imaging Physics: Update

Thomas G. Ruckdeschel, M.S.
ABR Certified Medical Physicist
Alliance Medical Physics LLC
Alpharetta, GA

Disclosure

- Subcommittee on Breast X-ray Imaging Physics – Chair
- Committee on Stereotactic Breast Biopsy Accreditation - *Ex Officio*
- Alliance Medical Physics LLC
  - Qualified Medical Physicist

Overview

I. Introduction

II. The Breast Imaging Physics Subcommittee

III. ACR DM QC Manual Update

IV. RWS MEE

VI. SBB QC Manual and Updated Guidance

VII. Future Directions

Subcommittee on Breast X-ray Imaging Physics

- Thomas G. Ruckdeschel, MS, DABR Chair
- Michael Bonvento, PhD
- William Geiser, MS
- Allen Goode, MS
- Katie Hulme, MS
- Thomas P. Moore, MS
- James Norweck, MS
- Carly Williams, MS
- Roland Wong, MSc
- Michael Yester, PhD
- Liane Philpotts, MD – Ex Officio
- Theresa Branham – ACR Staff
- Dustin Gress, MS – ACR Staff
- Pamela Platt – ACR Staff
- Scott Irving II _ ACR Staff as Support

Members Rotated Off 5/31/2020

- Eric Berns, PhD
  - Chair until 5/31/2019
- Doug Pfeiffer, MS
- Beth Schueler, PhD

What happened to MAP FAQ?

- ACR MAP Website
  - https://www.acraccreditation.org/Modalities/Mammography

- Frequently Asked Questions (FAQ)
- Articles
  - Late 2019 into 2020

The American College of Radiology
Digital Breast Tomosynthesis (DBT) Initial Training: Frequently Asked Questions

(Updated: 3/24/15)

Introduction

Q. I understand that the Food and Drug Administration's MQSA regulations require mammography personnel to obtain 8 hours of initial training before working with new mammographic modalities. I just discovered as of March 2015, FDA considers each Digital Breast Tomosynthesis (DBT) manufacturer's system to be a "new mammographic modality", thus requiring personnel to have 8 hours of initial new-modality training on each manufacturer's DBT system before they interpret/survey or operate. Is this correct?

A. Yes. See the FDA website at http://www.fda.gov/Radiation-EmittingProducts/MammographyQualityStandardsActandProgram/FacilityCertificationandInspection/ucm413117.htm. The following FAQs are based on discussions the ACR had with the FDA's Division of Mammography Quality Standards (DMQS) to obtain clarification of these requirements.

Q. How does the FDA's MQSA definition of a new mammographic modality apply to DBT?

A. Due to the technological differences between DBT systems, and differences in their FDA- approved Indications for Use (IFU), the FDA's Division of Mammography Quality Standards (DMQS) currently considers each manufacturer's DBT system to be a new mammographic modality under the MQSA definition. Under MQSA, personnel need to receive 8 hours of initial new-modality training prior to using any new mammographic modality. For clarification of eligible training, please see the questions below.

Initial Training

Q. Do personnel with 8 hours of DBT training specific to one manufacturer's system meet the requirements for the initial 8 hours of DBT training for another manufacturer's system?

A. No. However, the FDA's Division of Mammography Quality Standards (DMQS) recognizes that there are many features which are common to different DBT systems, so

Personnel who have already received ***8 hours of general training*** in DBT need documentation of training in the features of the particular DBT system they will use that were not covered in generalized DBT training.
Personnel who have received ***8 hours of training on any one DBT unit*** also need documentation of training on the unique features of another DBT system prior to independently using that other system.

MAP Article

Revision History

In April 2018, the FDA approved the ACR to begin to accredit DBT systems. If your facility previously received an extension of your MQSA certificate from the FDA to include this DBT unit(s), you must now accredit your DBT unit(s) with the ACR during your renewal process, and submit your FDA Certificate Extension Approval Letter with the application.

Because DBT is considered a separate mammographic modality under MQSA, and the image quality, QC, and personnel requirements are different from 2D, facilities must accredit the same mammography unit as two separate units.

In order to transmit the information about these units correctly to the FDA, the FFDM unit must appear before the DBT unit. If the FFDM unit is already accredited, add the DBT unit as a new unit. If the unit is completely new to your facility, you must add them both in the same application, but the FFDM unit must be entered into the application first. If the DBT portion of your unit is not being used clinically, it does not need to be accredited. The FFDM portion of the unit must be accredited, whether used clinically or not, as it is the basis for some of the QC testing for the DBT portion.

For clinical images: for both the FFDM and DBT "units" you may submit 2D synthesized images. You may submit 2D acquired images for the FFDM unit, but not for the DBT unit unless the ability to synthesize images is not available on your system. You may not submit tomosynthesis sets for accreditation. Although not recommended, you may submit the same patient for the DBT and FFDM units, but only if both units are in the same application, submitted at the same time.

For phantom images: for the FFDM "unit," you must submit a 2D acquired image. For the DBT "unit" you must submit the best tomosynthesis slice. Best slice is defined as the slice that demonstrates all the test objects in the phantom better than any other slice in the tomosynthesis set.

Digital Breast Tomosynthesis (DBT) and MQSA (from **FDA.gov** (https://www.fda.gov/Radiation-EmittingProducts/MammographyQualityStandardsActandProgram/FacilityCertificationandInspection/ucm447869.htm))

MQSA defines a mammographic modality as "a technology for radiography of the breast." Under MQSA, DBT is considered a mammographic modality.

While there are technological differences between DBT systems, and differences in their FDA-approved Indications for Use, the various FDA-approved DBT systems are now treated under MQSA as a single mammographic modality. Facilities that perform mammography using any of these DBT units are subject to MQSA requirements.

Under MQSA, personnel need to receive 8 hours of initial training prior to independently using any new mammographic modality, defined as a modality in which the person has not previously been trained. While the FDA's Division of Mammography Quality Standards (DMQS) recognizes there are some features that are unique to each specific DBT system, personnel need only obtain training on one DBT system, or general DBT training, to meet the new modality training requirement. Nevertheless, personnel are encouraged to pursue additional training on the unique features of their unit(s) and providers of DBT modality training are encouraged to discuss the similarities and differences between DBT systems.

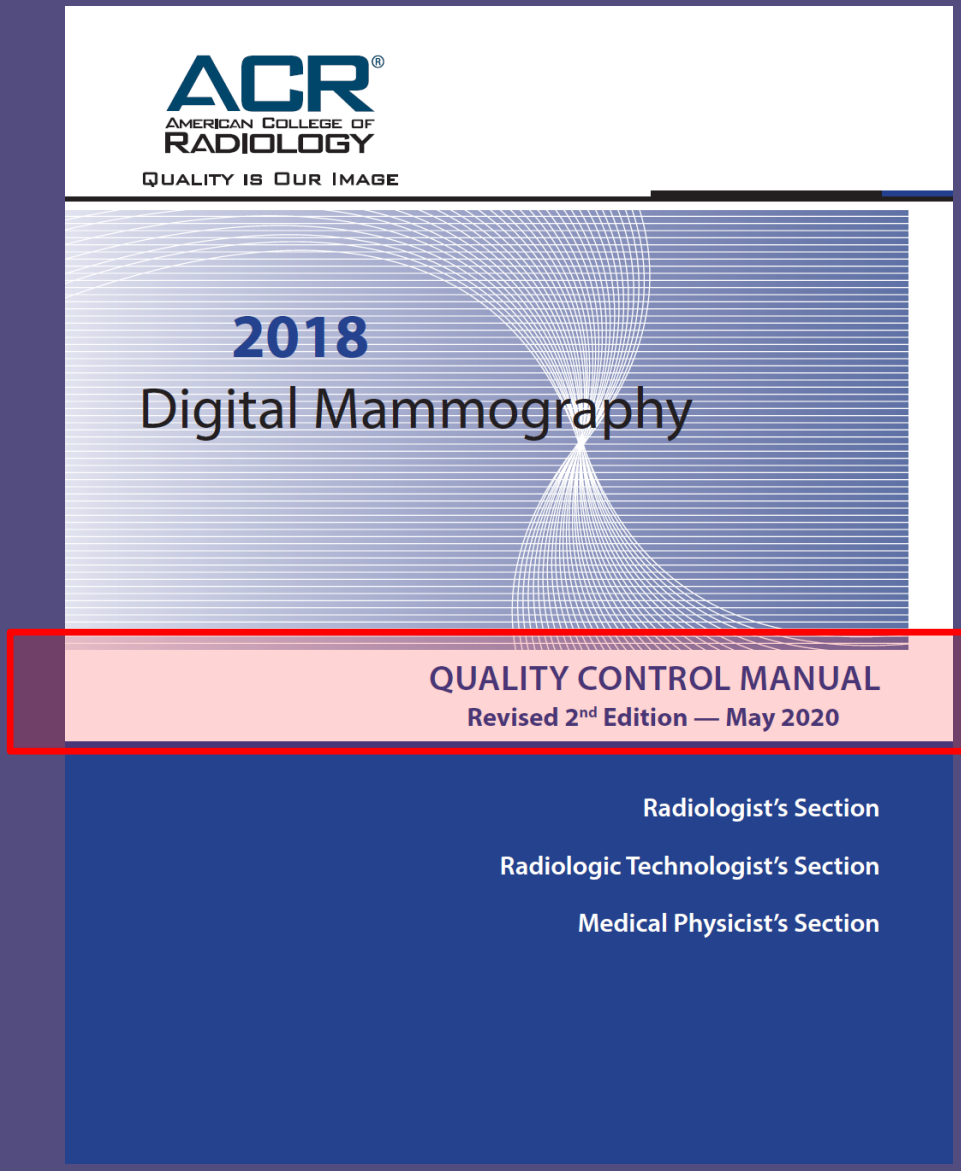
Under MQSA, the new modality training does not need to be provided by the manufacturer. The individual providing the training must be a qualified instructor, defined as "an individual whose training and experience adequately prepare him or her to carry out specified training assignments." Each of the currently approved manufacturers, Hologic, GE, Siemens, and Fuji, offers training on its own system; however, third-party training courses as well as certain informal training can also satisfy the requirement for new mammographic modality training under MQSA. For example, peer training by a qualified peer who has previously met the 8 hours of DBT new modality training requirement is permitted.

The new modality requirement applies to all mammography personnel types, including recently graduated radiology residents, fellows, radiologists providing locum tenens services, consulting medical physicists, and mammography technologists providing per diem services. For residents and fellows, the training can be obtained during residency or fellowship and should be documented in the residency or fellowship letter. Please see DMQS's sample residency letter (https://www.accessdata.fda.gov/cdrh_docs/presentations/pghs/Sample_Residency_Letter_Final_Regulations.htm).

Eight hours of general training in DBT or 8 hours of training on a particular manufacturer's DBT system both satisfy the new mammographic modality training requirement. Documentation may include: letters, certificates or other documents from manufacturers' or other formal training courses, confirming letter from a Continuing Education Unit granting organization, or an attestation about experience with investigational units using DMQS's recommended form
(https://www.accessdata.fda.gov/cdrh_docs/presentations/pghs/Attestation_Form__Attestation_Regarding_Requirements_of_the_Mammography_Quality_Standards

For additional questions regarding DBT and MQSA, contact the FDA Mammography Facility Hotline at 1-800-838-7715 or MQSAhotline@versatechinc.com.

ACR DM QC Manual Update



ACR DM QC Manual Goals

- Standardize QC Tests for all digital mammography manufacturers
- Standardize QC Test Frequencies
- Standardize QC Test Performance Criteria
- To make QC Tests Clinically Relevant and Operator Friendly

ACR DM QC Manual Update

Contents

Radiological Technologist Section Revisions

I. Revisions

Revisions

Date	Page(s)	Section	Description of Revisions
November 2018			2nd edition with digital breast tomosynthesis QC
May 2020	29	Introduction	Clarified FDA position regarding QC for contrast enhancement mammography systems
May 2020	39-44	1. ACR Digital Mammography (DM) Phantom Image Quality	Clarified that phantom QC needs to be performed using clinical system settings
May 2020	74	11. Manufacturer Calibrations	Clarified Objectives

RADIOLOGIC TECHNOLOGIST'S SECTION

RT QC Introduction CE Clarification

2018 Edition

Some digital mammography systems include contrast enhancement. Typically, the QC procedures for contrast enhancement use data or results obtained from the routine digital mammography QC. In order to ensure that no gaps in testing occur, ***facilities with contrast enhancement systems must follow all of the manufacturer's quality control procedures for both the digital mammography application as well as the contrast enhancement applications of their systems.*** The FDA has ***not*** approved the use of the new ACR Digital Mammography QC Manual for digital mammography systems with contrast enhancement.

Note: Facilities ***may not*** use the new ACR Digital Mammography QC Manual for digital mammography systems with contrast enhancement).

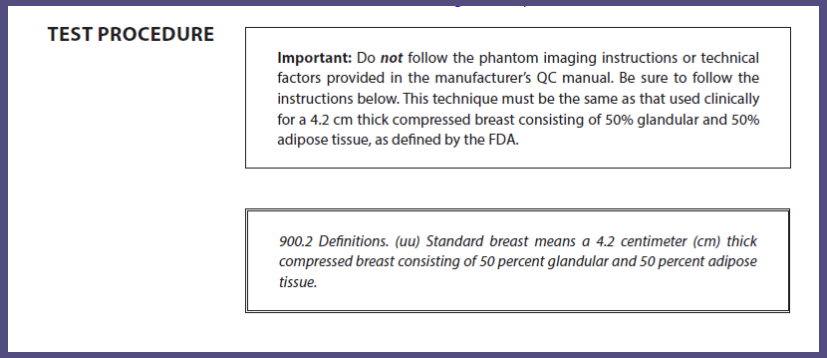
2020 Edition

Some digital mammography systems include contrast enhancement. The FDA has approved the use of the new ACR Digital Mammography QC Manual for digital mammography systems with contrast enhancement. ***Facilities with contrast enhancement systems may follow this manual for QC of the 2D and DBT applications of these units, but should follow manufacturer QC procedures for contrast enhancement applications.***

Note: Facilities ***may*** use the new ACR Digital Mammography QC Manual for digital mammography systems with contrast enhancement, but only for the 2D and DBT applications. Facilities should follow manufacturer QC procedures for contrast enhancement applications.

RT QC
ACR DM Phantom IQ

2018 Edition

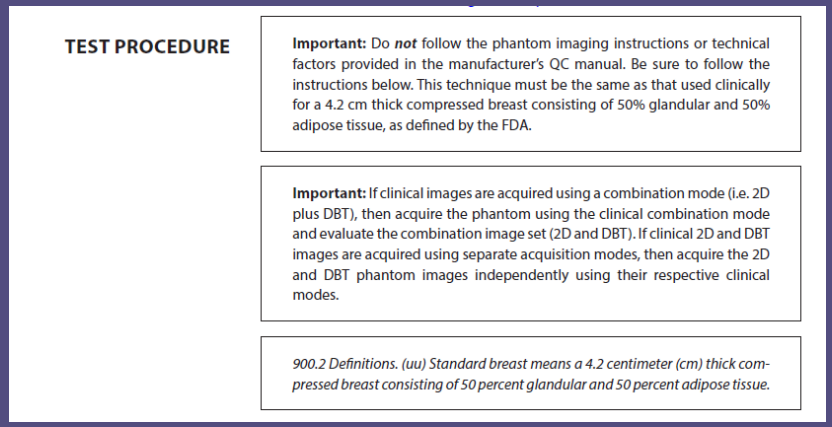


TEST PROCEDURE

Important: Do ***not*** follow the phantom imaging instructions or technical factors provided in the manufacturer's QC manual. Be sure to follow the instructions below. This technique must be the same as that used clinically for a 4.2 cm thick compressed breast consisting of 50% glandular and 50% adipose tissue, as defined by the FDA.

900.2 Definitions. (uu) Standard breast means a 4.2 centimeter (cm) thick compressed breast consisting of 50 percent glandular and 50 percent adipose tissue.

2020 Edition



TEST PROCEDURE

Important: Do ***not*** follow the phantom imaging instructions or technical factors provided in the manufacturer's QC manual. Be sure to follow the instructions below. This technique must be the same as that used clinically for a 4.2 cm thick compressed breast consisting of 50% glandular and 50% adipose tissue, as defined by the FDA.

Important: If clinical images are acquired using a combination mode (i.e. 2D plus DBT), then acquire the phantom using the clinical combination mode and evaluate the combination image set (2D and DBT). If clinical 2D and DBT images are acquired using separate acquisition modes, then acquire the 2D and DBT phantom images independently using their respective clinical modes.

900.2 Definitions. (uu) Standard breast means a 4.2 centimeter (cm) thick compressed breast consisting of 50 percent glandular and 50 percent adipose tissue.

Clarified that Phantom QC needs to be tested using Clinically Used settings

RT QC
ACR DM Phantom IQ

2018 Edition

5. Manually compress the paddle to approximately 5 daN or 12 pounds of compression force. It is important to use the same compression force each time for this test. Note that at this compression force, the compressed breast thickness indicator may not read 4.2 cm.

6. Use the clinical technique (refer to the ACR Technique and Procedure Summaries form) for setting up the phantom. (Be sure to use the same position each time the phantom is exposed.)

7. At the acquisition workstation, select the DBT imaging mode and technique that would be used for a clinical exam acquisition of a 4.2 cm thick compressed breast consisting of 50% glandular and 50% adipose tissue. ***If a combination mode is used clinically (i.e., the unit acquires a 2D and DBT image within the same series of exposures), select that.*** (If the system uses selectable AEC sensor positions, be sure to use the same position each time the phantom is acquired.)

8. Record or verify the following demographic information at the top of the form:

   a. Facility

   b. MAP ID number

   c. Room ID

   d. X-ray unit manufacturer and model

2020 Edition

5. Manually compress the paddle to approximately 5 daN or 12 pounds of compression force. It is important to use the same compression force each time for this test. Note that at this compression force, the compressed breast thickness indicator may not read 4.2 cm.

6. At the acquisition workstation, select the DBT imaging mode and technique that would be used for a clinical exam acquisition of a 4.2 cm thick compressed breast consisting of 50% glandular and 50% adipose tissue. ***If a combination exposure mode (i.e. 2D plus DBT) is most commonly used clinically, use the combination mode for this test, record the data from the 2D and DBT acquisitions, and use those images for analysis. If a DBT-only mode is most commonly used clinically for screening, use the DBT-only mode for this procedure step.*** (If the system uses selectable AEC sensor positions, be sure to use the same position each time the phantom is acquired.)

7. Record or verify the following demographic information at the top of the form:

   a. Facility

   b. MAP ID number

   c. Room ID

   d. X-ray unit manufacturer and model

RT QC Manufacturer Calibrations Clarified

2018 Edition

11. Manufacturer Calibrations *(if applicable)*

OBJECTIVES

To ensure that the systems calibrated properly, according to the manufacturer's recommendations.

FREQUENCY

- *Must* be performed at the frequency specified by the manufacturer.
- Upon installation of new equipment (before clinical use).

Important: This test is applicable if the manufacturer's documentation includes routine detector calibration.

2020 Edition

11. Manufacturer Calibrations *(if applicable)*

OBJECTIVES

To detect and automatically correct equipment problems, especially related to digital detector performance. This may include compensating for dead or over-responding pixels, structured or other noise, nonlinear response, and other technical performance parameters.

FREQUENCY

- *Must* be performed at the frequency specified by the manufacturer.
- Upon installation of new equipment (before clinical use).

Important: This test is applicable if the manufacturer's documentation includes routine detector calibration.

ACR®
AMERICAN COLLEGE OF RADIOLOGY
QUALITY IS OUR IMAGE

2018
Digital Mammography

QUALITY CONTROL MANUAL

Medical Physicist's Section

Revisions

Date	Page(s)	Section	Description of Revisions
November 2018			2nd edition with digital breast tomosynthesis QC
May 2020	121	Introduction	Clarified FDA position regarding QC for contrast enhancement mammography systems
May 2020	143-149	2. ACR Digital Mammography (DM) Phantom Image Quality	Clarified that phantom QC needs to be performed using clinical system settings, and that artifacts must be assessed for all target-filter combinations in clinical use
May 2020	163	4. Spatial Resolution	Clarified 2D magnification mode criteria
May 2020	167	6. Automatic Exposure Control System Performance	Clarified Performance Criteria
May 2020	201	15. Manufacturer Calibration	Clarified Objectives
May 2020	202-203	16. Collimation Assessment	Clarified Frequency and Test Procedure as they pertain to 2D vs. DBT and MEE vs. Annual Survey vs. service events

Revisions

I. Revisions

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May 2020	202-203	16. Collimation Assessment	Clarified Frequency and Test Procedure as they pertain to 2D vs. DBT and MEE vs. Annual Survey vs. service events

MP QC
Spatial Resolution

2018 Edition

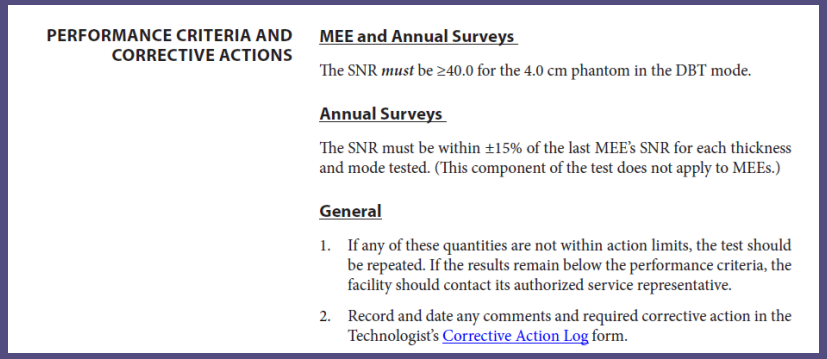
PERFORMANCE CRITERIA AND CORRECTIVE ACTIONS	1. Spatial resolution on the 2D image must be ≥4.0 lp/mm. 2. Spatial resolution on the DBT image must be ≥2.0 lp/mm. 3. If limiting spatial resolution does not meet these criteria, service must be scheduled.

2020 Edition

PERFORMANCE CRITERIA AND CORRECTIVE ACTIONS	1. Spatial resolution of the 2D image(s) must be ≥4.0 lp/mm. 2. Spatial resolution of the 2D magnification mode image(s) must be ≥6.0 lp/mm. 3. Spatial resolution of the DBT image(s) must be ≥2.0 lp/mm. 4. If limiting spatial resolution does not meet these criteria, service must be scheduled.

MP QC
AEC System Performance

2018 Edition



PERFORMANCE CRITERIA AND CORRECTIVE ACTIONS

MEE and Annual Surveys

The SNR ***must*** be ≥40.0 for the 4.0 cm phantom in the DBT mode.

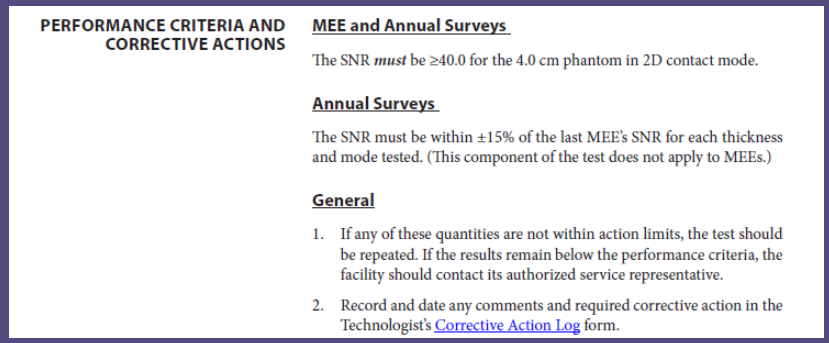
Annual Surveys

The SNR must be within ±15% of the last MEE's SNR for each thickness and mode tested. (This component of the test does not apply to MEEs.)

General

1. If any of these quantities are not within action limits, the test should be repeated. If the results remain below the performance criteria, the facility should contact its authorized service representative.
2. Record and date any comments and required corrective action in the Technologist's Corrective Action Log form.

2020 Edition



PERFORMANCE CRITERIA AND CORRECTIVE ACTIONS

MEE and Annual Surveys

The SNR ***must*** be ≥40.0 for the 4.0 cm phantom in 2D contact mode.

Annual Surveys

The SNR must be within ±15% of the last MEE's SNR for each thickness and mode tested. (This component of the test does not apply to MEEs.)

General

1. If any of these quantities are not within action limits, the test should be repeated. If the results remain below the performance criteria, the facility should contact its authorized service representative.
2. Record and date any comments and required corrective action in the Technologist's Corrective Action Log form.

The performance criteria for DBT SNR is not defined.

MP QC Collimation

2018 Edition

16. Collimation Assessment

OBJECTIVES

- To ensure that the x-ray field aligns with the light field.
- To ensure that the collimator allows for full coverage of the image receptor by the x-ray field but does not allow significant radiation beyond its edges.
- To ensure that the chest-wall edge of the compression paddle aligns acceptably with the chest-wall edge of the image receptor.

FREQUENCY

- For 2D units - as part of the mammography equipment evaluation (MEE) of new units, after relevant service, and after component replacement (Because digital mammography units are very stable, the Collimation Assessment test, which is based on the FDA screen-film annual survey rule in Section 900.12(e)5(vii), only needs to be done for MEEs or if additional troubleshooting is needed to diagnose a potential problem.)
- For DBT units - as part of the MEE of new units, annually, and after relevant service.

2020 Edition

16. Collimation Assessment

OBJECTIVES

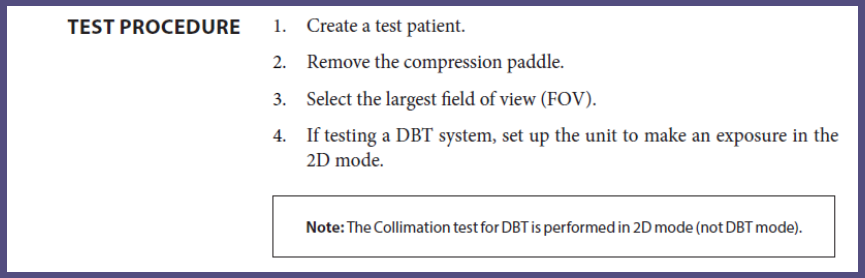
- To ensure that the x-ray field aligns with the light field.
- To ensure that the collimator allows for full coverage of the image receptor by the x-ray field but does not allow significant radiation beyond its edges.
- To ensure that the chest-wall edge of the compression paddle aligns acceptably with the chest-wall edge of the image receptor.

FREQUENCY

- ***For 2D***: as part of the mammography equipment evaluation (MEE) of new units, after relevant service, and after component replacement (Because digital mammography units are very stable, the Collimation Assessment test, which is based on the FDA screen-film annual survey rule in Section 900.12(e)5(vii), only needs to be done for MEEs or if additional troubleshooting is needed to diagnose a potential problem.)
- ***For DBT***: as part of the MEE of new units, ***annually***, and after relevant service.

MP QC
Collimation

2018 Edition

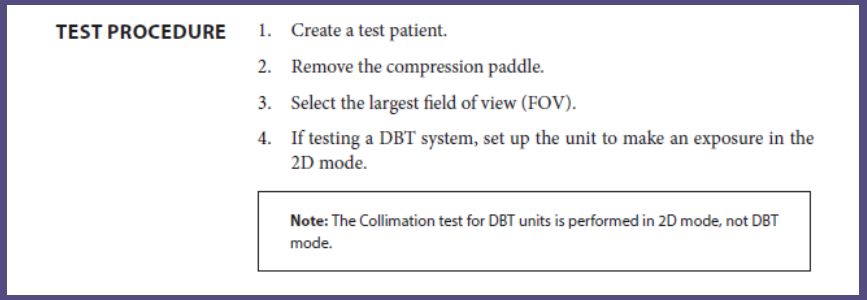


TEST PROCEDURE

1. Create a test patient.
2. Remove the compression paddle.
3. Select the largest field of view (FOV).
4. If testing a DBT system, set up the unit to make an exposure in the 2D mode.

Note: The Collimation test for DBT is performed in 2D mode (not DBT mode).

2020 Edition



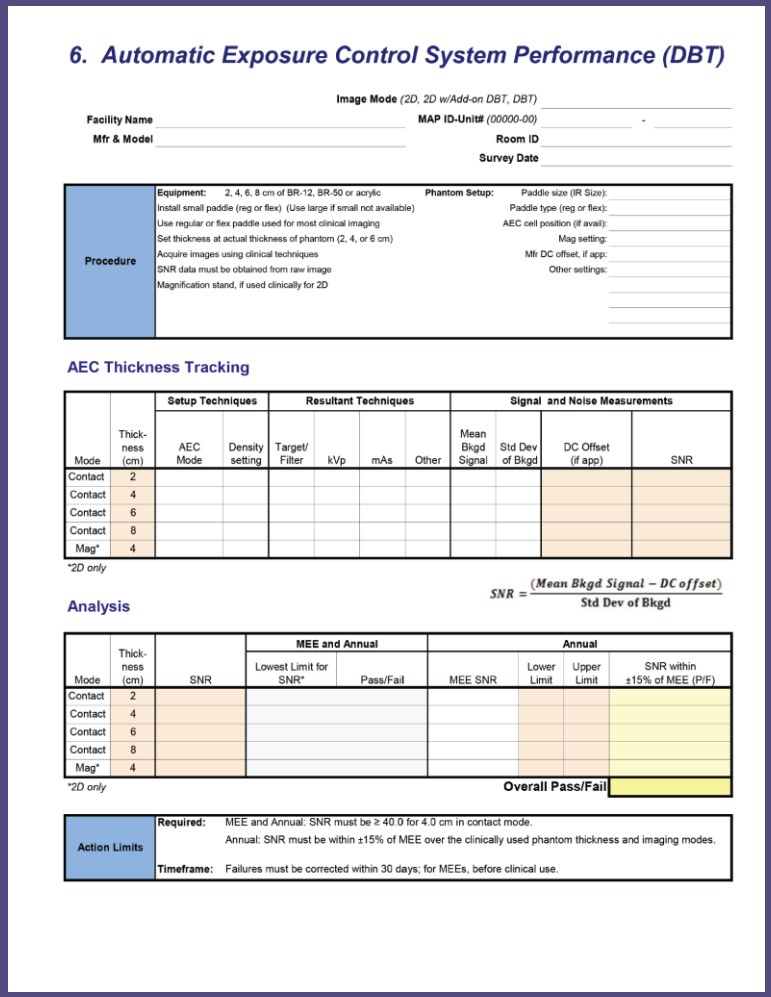
TEST PROCEDURE

1. Create a test patient.
2. Remove the compression paddle.
3. Select the largest field of view (FOV).
4. If testing a DBT system, set up the unit to make an exposure in the 2D mode.

Note: The Collimation test for DBT units is performed in 2D mode, not DBT mode.

For DBT Units, Collimation is performed in 2D mode.

Test Form Added AEC System Performance for DBT



6. Automatic Exposure Control System Performance (DBT)

Image Mode *(2D, 2D w/Add-on DBT, DBT)* _____

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

Mfr & Model _____ **Room ID** _____

Survey Date _____

Procedure			
	Equipment: 2, 4, 6, 8 cm of BR-12, BR-50 or acrylic	**Phantom Setup:**	Paddle size (IR Size):
	Install small paddle (reg or flex) (Use large if small not available)		Paddle type (reg or flex):
	Use regular or flex paddle used for most clinical imaging		AEC cell position (if avail):
	Set thickness at actual thickness of phantom (2, 4, or 6 cm)		Mag setting:
	Acquire images using clinical techniques		Mfr DC offset, if app:
	SNR data must be obtained from raw image		Other settings:
	Magnification stand, if used clinically for 2D		

AEC Thickness Tracking

		Setup Techniques		Resultant Techniques				Signal and Noise Measurements			
Mode	Thick-ness (cm)	AEC Mode	Density setting	Target/ Filter	kVp	mAs	Other	Mean Bkgd Signal	Std Dev of Bkgd	DC Offset (if app)	SNR
Contact	2										
Contact	4										
Contact	6										
Contact	8										
Mag*	4										

*2D only

Analysis

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

			MEE and Annual		Annual			
Mode	Thick-ness (cm)	SNR	Lowest Limit for SNR*	Pass/Fail	MEE SNR	Lower Limit	Upper Limit	SNR within ±15% of MEE (P/F)
Contact	2							
Contact	4							
Contact	6							
Contact	8							
Mag*	4							

*2D only **Overall Pass/Fail**

Action Limits		
	Required:	MEE and Annual: SNR must be ≥ 40.0 for 4.0 cm in contact mode.
		Annual: SNR must be within ±15% of MEE over the clinically used phantom thickness and imaging modes.
	Timeframe:	Failures must be corrected within 30 days; for MEEs, before clinical use.

Review Workstations (RWS) or Display Devices

Review Workstations (RWS)

- ACR DM QC Manual
  - Clear Cut QC instructions
- Non ACR DM QC Manual
  - MQSA requires RWS QC be performed in accordance with FFDM manufacturer's instructions
    - RWS/Monitor manufacturer's instructions
  - Various Manufacturers
    - FFDM/DBT Unit
    - RWS
      - Monitors
  - Various Instructions
    - Model or QC manual version used
- MP & Site responsibility to know the manufacturer's QC program
  - Can be tedious

12.0 Diagnostic Review Workstation Quality Control

12.1 Objective

To assure consistency of the brightness, contrast and image presentation of the radiologist's diagnostic review workstation.

Note This diagnostic review workstation Quality Control procedure applies specifically to the Hologic's SecurView$_{DX}$ diagnostic workstation. This QC procedure may be adopted for use on another vendor's diagnostic review workstation, if that workstation does not have its own Quality Control procedure.

12.2 Frequency

Annually, when applicable.

12.3 Suggested Equipment (Applies to CRT and some LCD displays)

Integrated photometer or photometer supplied by the manufacturer with each diagnostic review workstation.

12.4 Selenia Dimensions Application Consideration

1. At the Acquisition Workstation, select **Admin>Quality Control>Physicist tab>Diagnostic Review Workstation Quality Control**.
2. Select the **Mark Completed** button to label the status of this procedure as finished. Select the **Yes** button to mark the Quality Control procedure as completed.

12.5 Proposed Test Procedure for Workstations without Defined Quality Control

The following sections should only be considered if the workstation manufacturer does not provide an approved Quality Control procedure with their diagnostic review workstation.

12.5.1 Suggested Tests

1. Measure the display white level for each CRT or LCD display.
2. Measure the display black level for each CRT display.
3. Measure the DICOM GSDF compliance for each CRT or LCD display.
4. Measure the white level uniformity performance for each CRT display.

RWS Manufacturer Instructions

Quality Control Manual for Selenia Dimensions and 3Dimensions Systems
Chapter 3: Quality Control Activities for the Medical Physicist

3.12 Diagnostic Review Workstation Quality Control

3.12.1 Objective

To assure consistency of the brightness, contrast and image presentation of the radiologist's diagnostic review workstation.

Note
This diagnostic review workstation Quality Control procedure does not overwrite any Quality Control procedures defined by the manufacturer of the review workstation in use. Instead, this QC procedure serves as a QC protocol for mammography review workstations that do not have a Quality Control procedure established by their manufacturer.

Note
Hologic review workstations come with their own diagnostic review workstation quality control program defined on a separate Quality Control Manual. Please use that QC manual to perform Quality Control on Hologic review workstations.

3.12.2 Frequency

Annually, when applicable.

3.12.3 Suggested Equipment (Applies to CRT and some LCD displays)

Integrated photometer or external photometer.

3.12.4 System Application Consideration

1. At the Acquisition Workstation, select **Admin>Quality Control>Physicist tab>Diagnostic Review Workstation Quality Control**.
2. Select the **Mark Completed** button to label the status of this procedure as finished. Select the **Yes** button to mark the Quality Control procedure as completed.

3.12.5 Proposed Test Procedure for Workstations without Defined Quality Control

The following sections should only be considered if the workstation manufacturer does not provide an approved Quality Control procedure with their diagnostic review workstation.

Monitor Mfr QC - Examples

Barco Mammography Display Systems

Recommended Quality Assurance

DATE 23 October 2019
AUTHOR Albert Xthona | Product Manager
DOCUMENT ID K5905208 version 20

This memo outlines recommended quality checks for Barco display systems used for mammography. These quality checks are not preconditions for warranty service, but rather are recommendations to be followed when using the displays for reading mammography. Instructions and forms below can be incorporated into the overall quality program for a site that aims to comply with MQSA or similar requirements.

This manufacturer's recommendation is for the following products:

- Coronis 5MP & Coronis 5MP Mammo Systems
- Coronis Fusion 10MP System
- MDCG-5121, MDCG-5221, MDNG-5221, MDCG-10130, MFGD 5621HD, MFGD-5421[1]

Unless otherwise noted, the tasks below can be performed with MediCal QAWeb, a quality assurance software package from Barco included with the above display models. These tasks can also equivalently be performed with QAWeb Enterprise; a table of correspondence can be found on the next page.

Barco's MediCal QAWeb Agent software should be set up to perform following tasks:

Task or Test	Recommended Frequency	Intervention type	Reasoning
Auto-calibration	TWICE A YEAR (<8 months)	Transparent and Intervention Free	A re-calibration with the I-Guard® is applied automatically; it will ensure DICOM GSDF compliance.
Visual Test	YEARLY (<15 months)	Manual	Verify a test pattern (e.g. AAPM TG18 QC) for possible artifacts
Luminance Check	On equipment >five years old, YEARLY	Manual	Older systems calibration system should be checked periodically
		And either	
Compliance Test	MONTHLY (<45 days)	Transparent and Intervention Free	Verifies display system is still compliant to the desired display function[2], also checks calibration settings and white luminance.
Display Test[3]	WEEKLY (<13 days)	Transparent and Intervention Free	Verifies the internal display, calibration settings, and the white luminance.
		Or	
Mammo Compliance Test[4]	WEEKLY	Transparent and Intervention Free	Verifies if the display system is still compliant to the desired display function and common white luminance.

To use QAWeb Enterprise as substitute for MediCal QAWeb, consult the table below. Step by step instructions are not provided; please consult the User Guide for QAWeb Enterprise as needed.

[1] The MFGD-5421 is part of the Coronis 5MP system and covered only when used with a Barco display controller.
[2] DICOM GSDF is the recommended display function
[3] Display Test is only available when the MediCal QAWeb is attached to the QAWeb server. Where this test is not available, set the frequency of the Compliance Test to WEEKLY instead and thus the Display Test is not required.
[4] If this test is available (optional through custom installation or through connection to the MediCal QAWeb Server), then both the Compliance Test and Display Test are unnecessary, and their frequency can be set to "Not Scheduled"

Task or Test in MediCal QAWeb	Substitute Tasks and Tests in QAWeb Enterprise	Reasoning
Auto-calibration	Calibration (Image Quality Policy)	A re-calibration with the I-Guard® is applied automatically; it will ensure DICOM GSDF compliance.
Compliance Test	Luminance Response	Verifies display system is still compliant to the desired display function, also checks calibration settings and white luminance.
Display Test	Maximum Luminance	Verifies white point luminance
Mammo Compliance Test	Luminance Response and Inter Display Uniformity	For multi-display setups, this also verifies that white point luminance between two displays stays within limits.
Visual Test TG-18 QC	Visual Test TG18-OIQ	TG-18 OIQ pattern is equivalent to TG-18 QC pattern without features for CRT monitors.

In-person medical physicist testing shall be performed when a reading room is initially configured and after each year of operation. Between these scheduled tests, if equipment is replaced without changing the reading room configuration, this replacement is subject to medical physicist oversight and does not require in-person medical physicist testing.

An example of a Display QC Manual for a mammography facility can be found on the following pages. While other forms may be used, these instructions and forms conform to the above manufacturer's QC recommendations.

For updates to this document, sign-up at my.barco.com, search for your product, e.g. MDMG-5121, and "Subscribe to this product.", or reach out to us as follows :

For support in using Barco products like QAWeb or Barco display systems, please feel free to contact Barco's helpdesk:
Our helpdesk provides you with prompt phone support. A team of experienced support engineers is at your service for any professional assistance.
Healthcare USA/Canada Hours: 8 am to 8 pm EST

Free phone: +1 866 302 7939
Paid phone: +1 678 475 8262
Email: Service.Medical.USA@Barco.com

For questions or comments about these quality recommendations, please feel free to contact the product manager:
Barco
Attn: Albert Xthona
9125 Gemini Drive
Beaverton, Oregon
USA
+1 503 748 6060
albert.xthona@barco.com

ACR DM QC Manual Instructions

Table 1. Digital Mammography (2D and DBT) Quality Control Tests

Test	Minimum Frequency	Corrective Action Timeframe
Technologist Tests		
1. ACR DM Phantom Image Quality	Weekly	Before clinical use
2. Computed Radiography Cassette Erasure *(if applicable)*	Weekly	Before clinical use
3. Compression Thickness Indicator	Monthly	Within 30 days
4. Visual Checklist	Monthly	Critical items: before clinical use; less critical items: within 30 days
5. Acquisition Workstation Monitor QC	Monthly	Within 30 days; before clinical use for severe defects
6. Radiologist Workstation Monitor QC	Monthly	Within 30 days; before clinical use for severe defects
7. Film Printer QC *(if applicable)*	Monthly	Before clinical use
8. Viewbox Cleanliness *(if applicable)*	Monthly	Before clinical use
9. Facility QC Review	Quarterly	Not applicable
10. Compression Force	Semiannual	Before clinical use
11. Manufacturer Calibrations *(if applicable)*	Mfr. Recommendation	Before clinical use
Optional - Repeat Analysis	As Needed	Within 30 days after analysis
Optional - System QC for Radiologist	As Needed	Within 30 days; before clinical use for severe artifacts
Optional - Radiologist Image Quality Feedback	As Needed	Not applicable
Medical Physicist Tests		
1. Mammography Equipment Evaluation (MEE) - MQSA Requirements	MEE	Before clinical use
2. ACR DM Phantom Image Quality	MEE and Annual	Before clinical use
3. DBT Z Resolution	MEE and Annual	Within 30 days
4. Spatial Resolution	MEE and Annual	Within 30 days
5. DBT Volume Coverage	MEE and Annual	Before clinical use
6. Automatic Exposure Control System Performance	MEE and Annual	Within 30 days
7. Average Glandular Dose	MEE and Annual	Before clinical use
8. Unit Checklist	MEE and Annual	Critical items: before clinical use; less critical items: within 30 days
9. Computed Radiography *(if applicable)*	MEE and Annual	Before clinical use
10. Acquisition Workstation Monitor QC	MEE and Annual	Within 30 days; before clinical use for severe defects
11. Radiologist Workstation Monitor QC	MEE and Annual	Within 30 days; before clinical use for severe defects
12. Film Printer QC *(if applicable)*	MEE and Annual	Before clinical use
13. Evaluation of Site's Technologist QC Program	Annual	Within 30 days
14. Evaluation of Display Device Technologist QC Program	Annual	Within 30 days
15. Manufacturer Calibrations *(if applicable)*	Mfr. Recommendation	Before clinical use
16. Collimation Assessment	MEE or Troubleshooting Annual (DBT only)	Within 30 days
MEE or Troubleshooting - Beam Quality (Half-Value Layer) Assessment	MEE or Troubleshooting	Before clinical use
MEE or Troubleshooting - kVp Accuracy and Reproducibility	MEE or Troubleshooting	MEE: before clinical use; troubleshooting: within 30 days
Troubleshooting - Ghost Image Evaluation	Troubleshooting	Before clinical use
Troubleshooting - Viewbox Luminance	Troubleshooting	Not applicable

RWS RT QC

6. Radiologist Workstation (RW) Monitor QC

OBJECTIVES

- To ensure that radiologist workstation monitors are clean and free from dust, fingerprints, and other marks that may interfere with clinical information.
- To ensure monitors are calibrated correctly and the brightness and contrast settings are set correctly.
- To ensure that the image acquisition chain is producing adequate image quality and working consistently and that there are no obvious artifacts.
- To ensure that monitors meet manufacturer specifications via the conduct of Monitor Manufacturer Automated Tests (if available).

> **Important:** Monitor Manufacturer Automated Tests are required if such tests are available in the manufacturer's documentation.

FREQUENCY

Monthly, after relevant service, and upon installation of new workstations (before clinical use).

TEST EQUIPMENT

- Dry, soft, lint-free cloth or cleaning tissue recommended by your RW manufacturer.

> **Note:** : Any other cleaning methods may lead to damage of the anti-reflective screen coating. Please follow your RW manufacturer's recommendations for instructions on proper cleaning and cleaning material. If you don't have them, ask the RW manufacturer.

- Acquired ACR Digital Mammography (DM) Phantom image.
- The American Association of Physicists in Medicine (AAPM) TG18-QC test pattern is strongly preferred. If one is not available on the monitor, ask the authorized service representative to install one. If this is not possible, a SMPTE test pattern or another pattern that allows relevant measurements may be used (Figure 8).
- Radiologist Workstation Monitor QC form.

TEST PROCEDURE

Monitor Condition

1. Check the surface of the monitors for the presence of dust, scratches, defects, fingerprints, shiny patches (from grease or gel), and other foreign material (e.g., pen marks, etc.).

RADIOLOGIC TECHNOLOGIST'S SECTION

2. If dirt, fingerprints, or other foreign material is present, wipe the monitor screen gently using a soft lint-free cloth, dampened with water, paying particular attention to the items noted above. Then wipe with a dry, soft, lint-free cloth. A special-purpose screen cleaning tissue or cloth recommended by the monitor manufacturer may also be used.
3. After drying, recheck the monitor surface to be sure the items noted in step 1 were eliminated. If they were not, clean the monitor again.
4. Record significant findings on the form (see Performance Criteria and Corrective Actions).

ACR DM Phantom

1. Display a phantom image that was acquired on one of the digital mammography units per instructions in Test #1 ACR Digital Mammography Phantom Image Quality.
2. Evaluate for artifacts and score the phantom test objects as in Test #1 ACR Digital Mammography Phantom Image Quality.

Test Pattern Image Quality

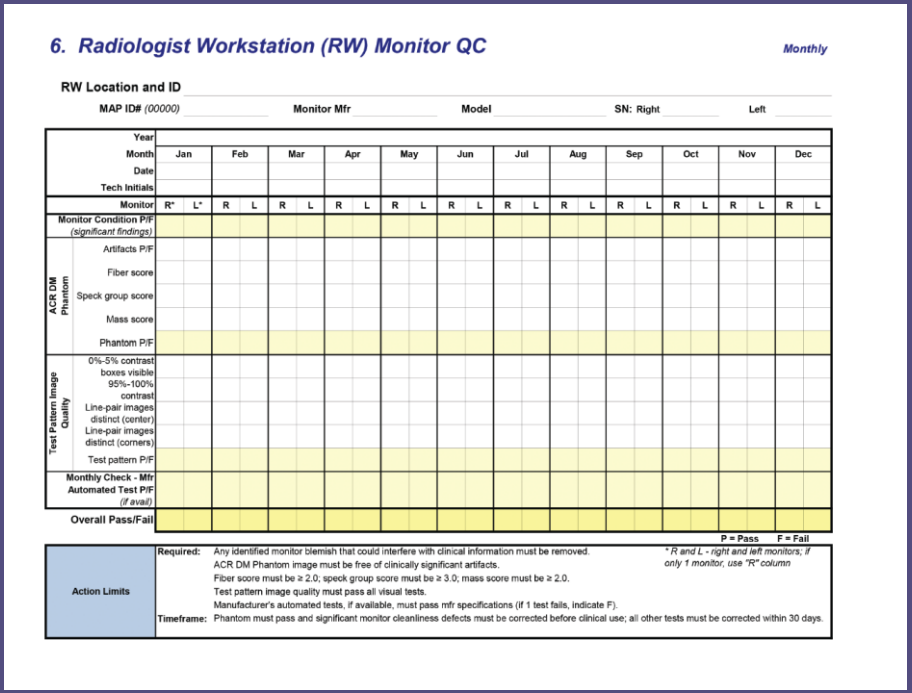
1. Display the test pattern on the monitor.
2. Evaluate the test pattern for the following visible targets and record pass or fail on the form (see the ACR Technique and Procedure Summaries form for further guidance on monitor test pattern evaluation):
   a. Are the 0%-5% contrast boxes visible?
   b. Are 95%-100% contrast boxes visible?
   c. Are the line-pair images at the center and four corners visible and clearly distinguishable?

Monitor Manufacturer Automated Test (if available)

1. Open monitor manufacturer automated test program.
2. Review the results and verify that all tests have passed.
3. Record an overall pass or fail on the form.

RWS RT QC

- Monthly QC
  - Monitor Condition
  - ACR DM Phantom
  - Test Pattern Image Quality



6. Radiologist Workstation (RW) Monitor QC *Monthly*

RW Location and ID

MAP ID# *(00000)* **Monitor Mfr** **Model** **SN:** Right Left

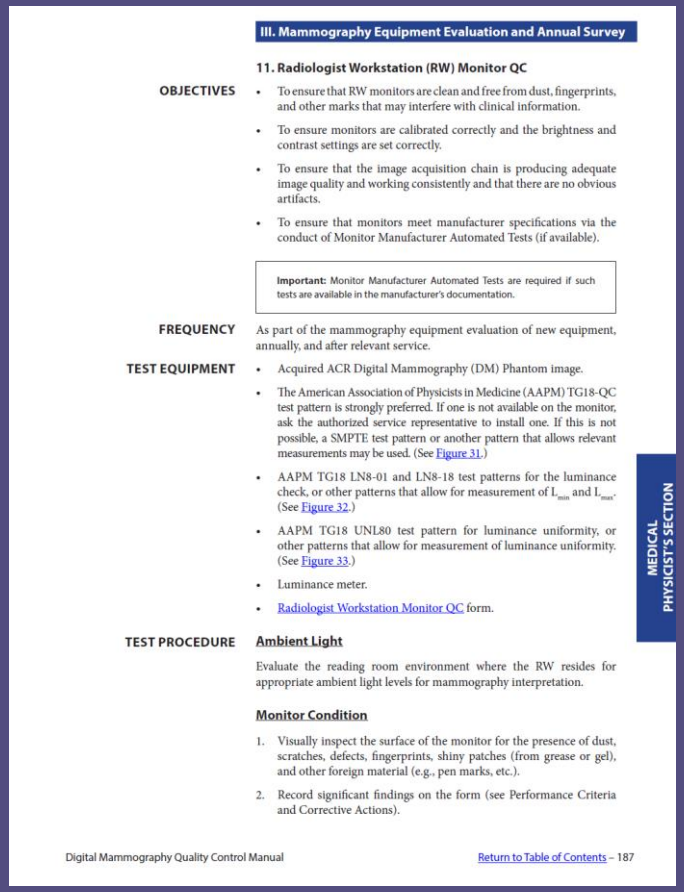
		Jan		Feb		Mar		Apr		May		Jun		Jul		Aug		Sep		Oct		Nov		Dec	
Year																									
Month																									
Date																									
Tech Initials																									
Monitor		R*	L*	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L	R	L
Monitor Condition P/F *(significant findings)*																									
ACR DM Phantom	Artifacts P/F																								
	Fiber score																								
	Speck group score																								
	Mass score																								
	Phantom P/F																								
Test Pattern Image Quality	0%-5% contrast boxes visible																								
	95%-100% contrast																								
	Line-pair images distinct (center)																								
	Line-pair images distinct (corners)																								
	Test pattern P/F																								
Monthly Check - Mfr Automated Test P/F *(if avail)*																									
Overall Pass/Fail																									

P = Pass F = Fail

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. Test pattern image quality must pass all visual tests. Manufacturer's automated tests, if available, must pass mfr specifications (if 1 test fails, indicate F). **Timeframe:** Phantom must pass and significant monitor cleanliness defects must be corrected before clinical use; all other tests must be corrected within 30 days.	** R and L - right and left monitors; if only 1 monitor, use "R" column*

RWS MP QC

- 9 MP QC Tests
  - Ambient Light
  - Monitor Condition
  - ACR DM Phantom
  - Distance Measurement
  - Test Pattern IQ
  - Luminance Checks
  - Luminance Uniformity
  - DICOM GSDF Evaluation
  - Monitor Manufacturer Automated Tests (if Avail)



III. Mammography Equipment Evaluation and Annual Survey

11. Radiologist Workstation (RW) Monitor QC

OBJECTIVES

- To ensure that RW monitors are clean and free from dust, fingerprints, and other marks that may interfere with clinical information.
- To ensure monitors are calibrated correctly and the brightness and contrast settings are set correctly.
- To ensure that the image acquisition chain is producing adequate image quality and working consistently and that there are no obvious artifacts.
- To ensure that monitors meet manufacturer specifications via the conduct of Monitor Manufacturer Automated Tests (if available).

Important: Monitor Manufacturer Automated Tests are required if such tests are available in the manufacturer's documentation.

FREQUENCY

As part of the mammography equipment evaluation of new equipment, annually, and after relevant service.

TEST EQUIPMENT

- Acquired ACR Digital Mammography (DM) Phantom image.
- The American Association of Physicists in Medicine (AAPM) TG18-QC test pattern is strongly preferred. If one is not available on the monitor, ask the authorized service representative to install one. If this is not possible, a SMPTE test pattern or another pattern that allows relevant measurements may be used. (See Figure 31.)
- AAPM TG18 LN8-01 and LN8-18 test patterns for the luminance check, or other patterns that allow for measurement of L_{min} and L_{max}. (See Figure 32.)
- AAPM TG18 UNL80 test pattern for luminance uniformity, or other patterns that allow for measurement of luminance uniformity. (See Figure 33.)
- Luminance meter.
- Radiologist Workstation Monitor QC form.

MEDICAL PHYSICIST'S SECTION

TEST PROCEDURE

Ambient Light

Evaluate the reading room environment where the RW resides for appropriate ambient light levels for mammography interpretation.

Monitor Condition

1. Visually inspect the surface of the monitor for the presence of dust, scratches, defects, fingerprints, shiny patches (from grease or gel), and other foreign material (e.g., pen marks, etc.).
2. Record significant findings on the form (see Performance Criteria and Corrective Actions).

Digital Mammography Quality Control Manual — Return to Table of Contents – 187

ACR DM MP QC
RWS QC Test Form

11. Radiologist Workstation (RW) Monitor QC

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

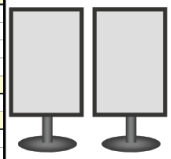
Workstation ID _____ **Survey Date** _____

Medical Physicist _____ **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: TG18 LN8-01, LN8-18 & TG18 UNL80 test patterns or other relevant test patterns

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

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		
Upper L		
Upper R		
Lower L		
Lower R		
Max		
Min		
% Diff		
P/F		

Luminance Matching

P/F	

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.

ACR DM MP QC
Tech RWS QC Review Test Form

14. Evaluation of Display Device Technologist QC Program

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

Medical Physicist _____ **Display Device Location** _____

Signature _____ **Survey Date** _____

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
Corrective Action Log documentation adequate?									

Overall Pass/Fail for Performance of Display Device Technologist QC Program

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.

Why use ACR DM QC Manual?

- Increase in violations due to improper RWS QC noted during MQSA inspections
  - ACR Standardizes QC for all manufacturer's of FFDM/DBT units and RWS/Monitors
    - Tests
    - Frequencies
  - MEE requirements
    - What's required?

Mammography Equipment Evaluation (MEE)

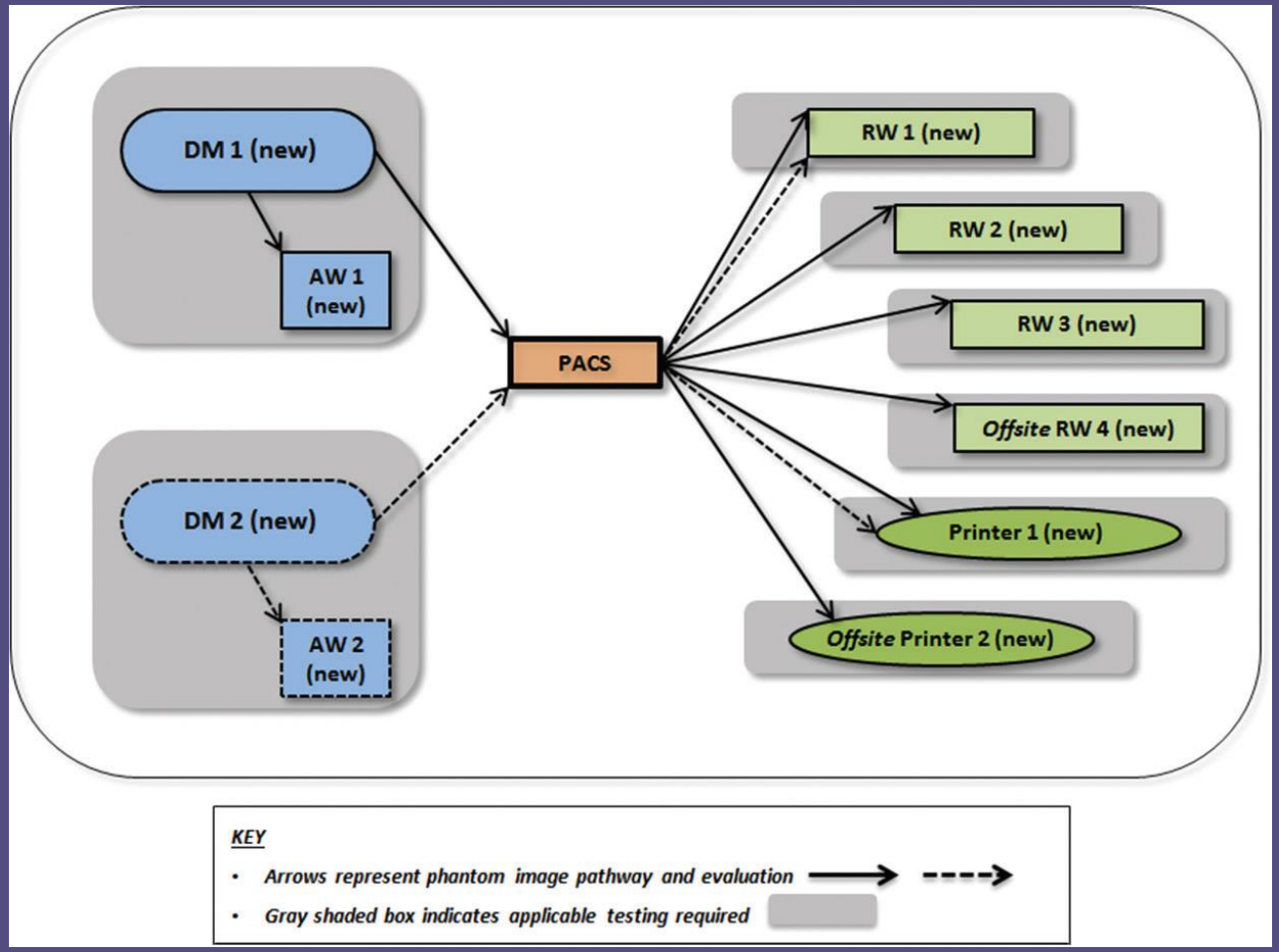
II. Introduction

Table 3. Medical Physicist Involvement in Equipment Adjustments, Changes, or Repairs

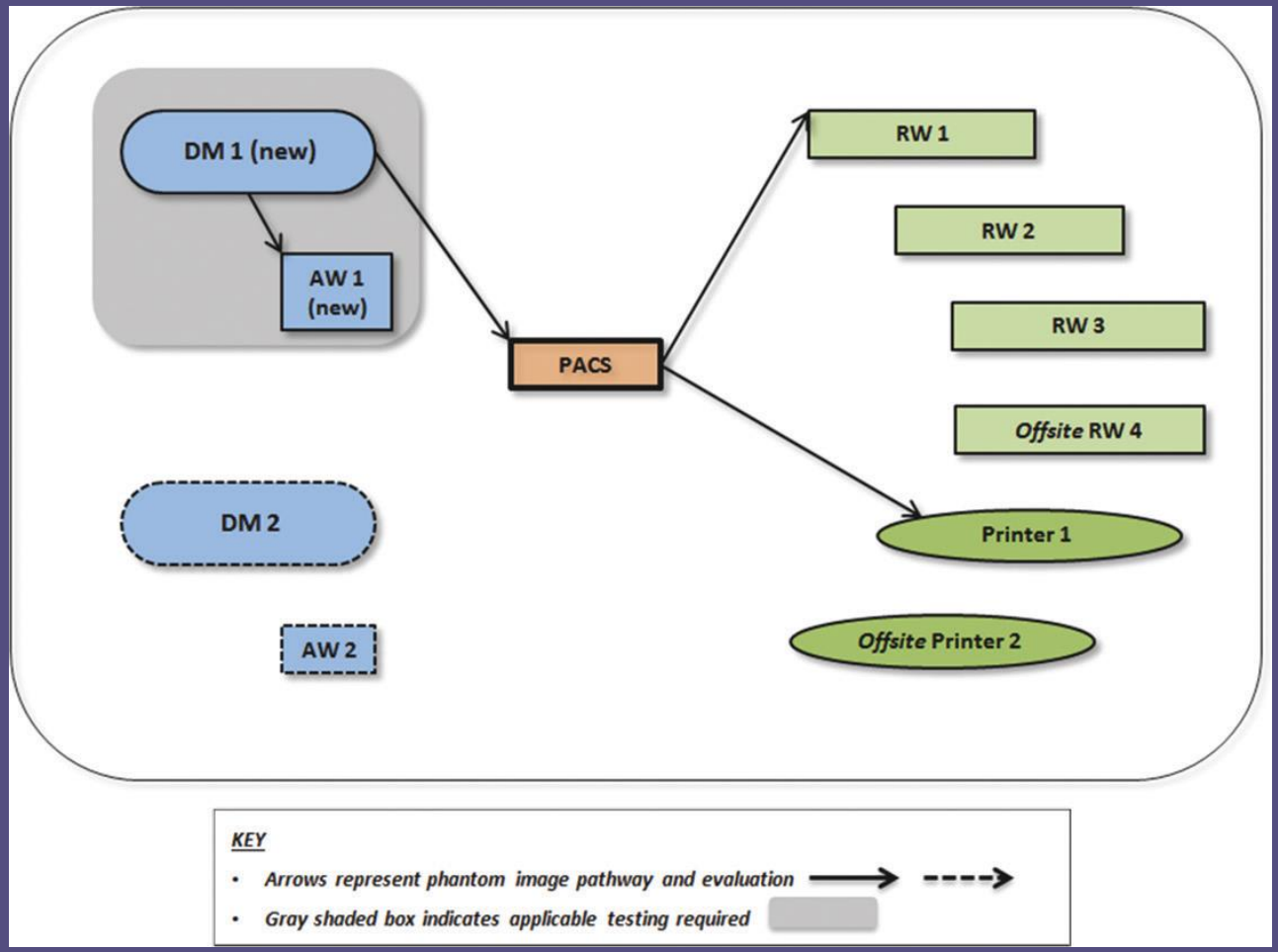
Item	Component	Major Repair	Medical Physicist Involvement
Automatic Exposure Control (AEC)	***AEC replacement***	***Y***	***On-site***
	AEC recalibration that affects dose	***Y***	***On-site***
	AEC sensor replacement	***Y***	***On-site***
	AEC circuit board replacement	***Y***	***On-site***
	Density control - internal adjustment*	N	Oversight
	Thickness compensation - internal* adjustment	N	Oversight
Bucky Replacement	***AEC sensor also replaced***	***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.*

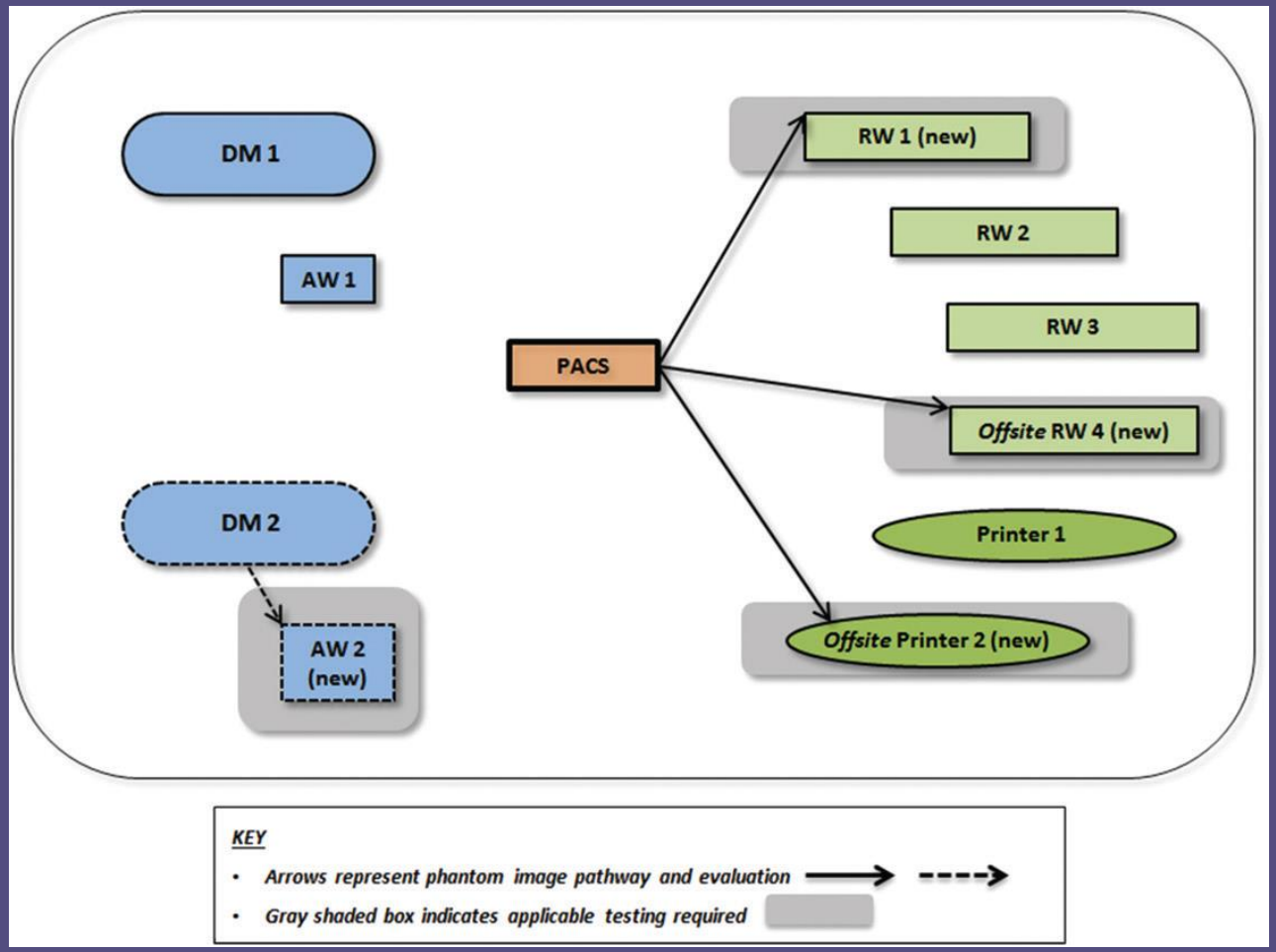
MEE for All New DM units and Display Devices



MEE for New DM unit and Existing Display Devices



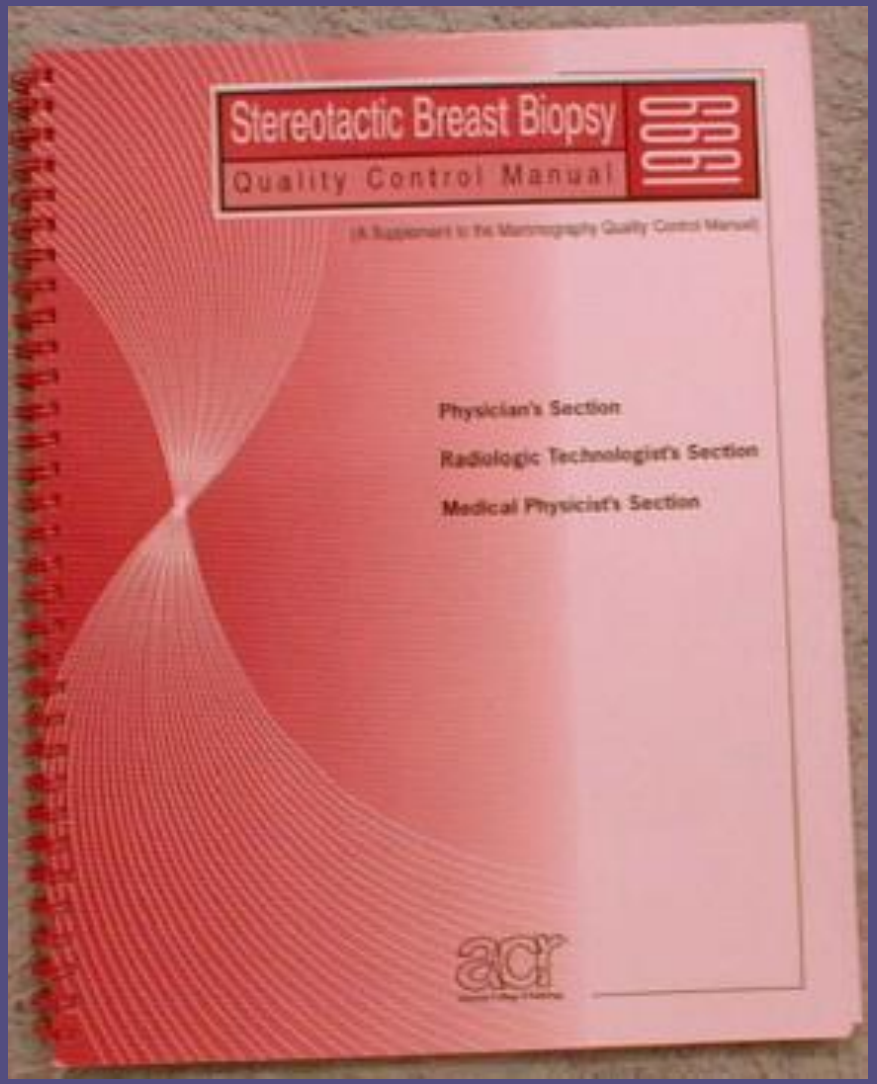
MEE for New Display Devices and Existing DM Units



SBB Accreditation Program Update

1999 ACR Stereotactic Breast Biopsy Quality Control Manual

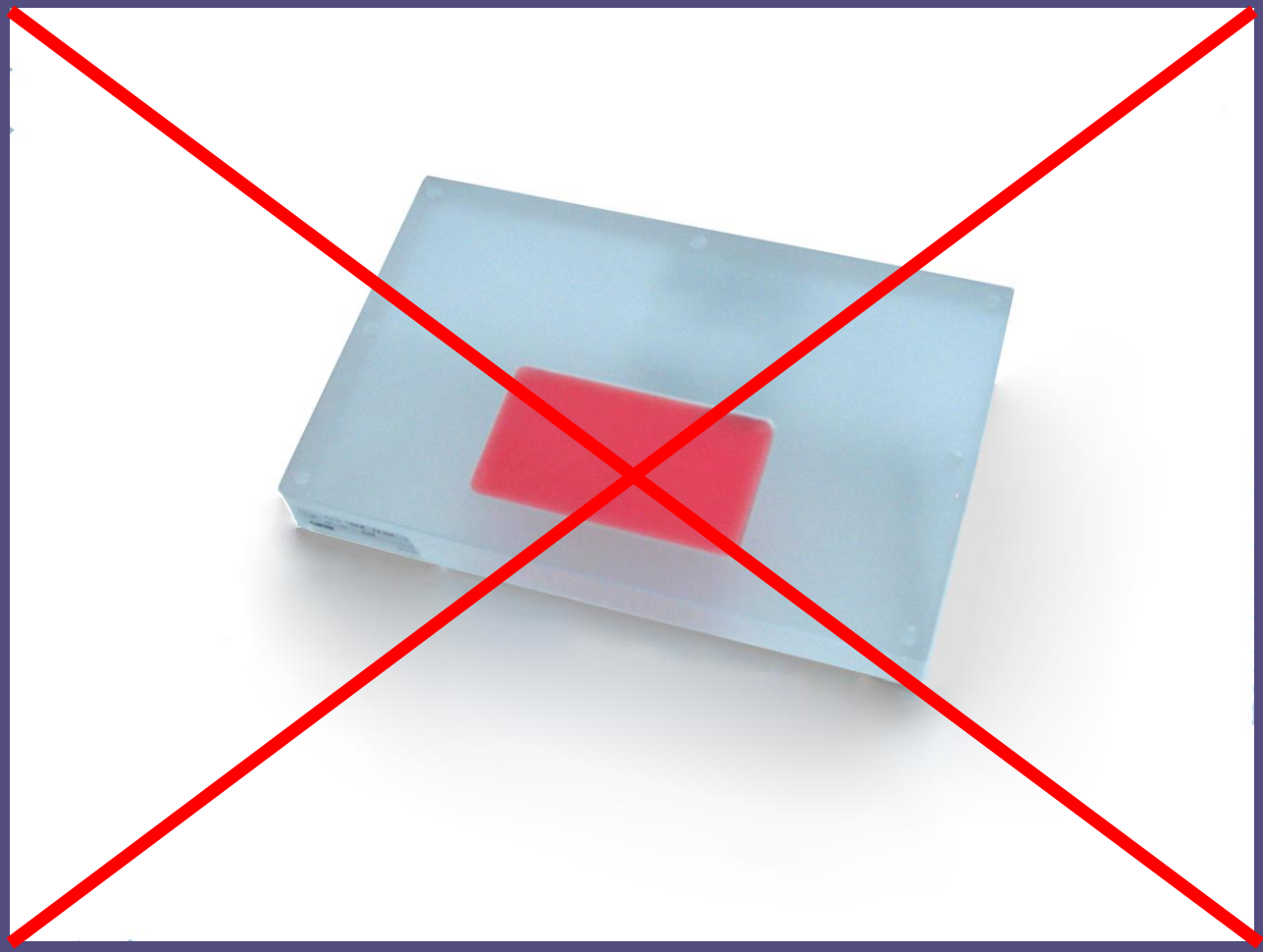
SBBAP QC Requirements



SBBAP Program Requirements

- https://accreditationsupport.acr.org/support/solutions/articles/11000064161-quality-control-stereotactic-breast-biopsy-revised-12-12-19-
- The required QC Testing for ACR accredited SBB Units is defined by the SBBAP Program Requirements.
- Detailed instructions for each of the tests are outlined in the SBBAP QC manual. Updates found on website.

ACR Digital Mammography Phantom
Not for SBBAP Submission



ACR Digital Mammography Phantom

- ACR does not currently allow the large phantom to be used for SBBAP accreditation purposes.
- Working toward future implementation.
- Permitted for onsite QC
  - Use correct criteria (ACR DM QC manual)
  - Use when applicable
    - Not recommended on prone units

New Add on Units

- Follow manufacturer's guidance, if available
- May be able to use 2D/3D QC for some tests
  - kVp accuracy and Reproducibility
  - Collimation
  - Volume coverage for 3D/DBT
    - If same set up other than compression paddle

New Add on Units

- *HVL
  - Compression paddle window
- AEC or Manual Exposure Performance
  - Same detector?
  - Same calibration?
    - Add on Affirm uses separate calibration
- *Breast Entrance Exposure and AGD
  - Compression paddle window
  - Geometry
    - Different breast support
    - Different SID

- *QC performed even if performed in 2D or 3D

New Add on Units

- *Image Quality
- *Spatial Resolution
- *Artifact Evaluation
- Volume coverage for 3D/DBT units
  - *If SBB configuration differs from 3D/DBT FFDM QC
- Localization Accuracy
  - Different Configurations
    - Vertical Approach
    - Lateral Approach
      - Left/Right

*QC performed even if performed in 2D or 3D

New Add on Units

- ACR Website
  - https://accreditationsupport.acr.org/support/solutions/articles/11000072242-special-cases-in-stereotactic-breast-biopsy-quality-control
- If using ACR DM QC manual for 2D/DBT
  - Localization Accuracy
  - Image Quality Evaluation
    - Small ACR phantom
    - Mini Digital Stereotactic Phantom

Future SBB QC Testing Guidance

- ACR Website Guidance
- **ACR–AAPM TECHNICAL STANDARD FOR DIAGNOSTIC MEDICAL PHYSICS PERFORMANCE MONITORING OF STEREOTACTIC / TOMOSYNTHESIS-GUIDED BREAST BIOPSY SYSTEMS**
  - Approved at Annual ACR meeting in May 2020
- "New "ACR SBB QC Manual Update

Resources

ACR Accreditation Information:

https://www.acraccreditation.org/Modalities/Mammography

https://www.acraccreditation.org/Modalities/Stereotactic-Breast-Biopsy

ACR QC Forms in PDF format:

- **ACR Digital Mammography QC Manual**
- Download the Manual
- ACR Digital Mammography QC Manual FAQ
- ACR Digital Mammography Phantom Scoring Key

https://www.acraccreditation.org/Modalities/Stereotactic-Breast-Biopsy