

## DICOM Correction Item

Correction Number CP-797	
Log Summary: Measurement references to Segments	
Type of Modification Addition	Name of Standard PS 3.16 - 2009
<p>Rationale for Correction:</p> <p>References are added to the measurement templates to allow measurements to be inferred from a feature as segmented in a particular Segmentation, rather than replicating an outline in an SCOOD. Note that Referenced Segment Number (0062,000B) is part of the IMAGE Content Item Macro.</p> <p>When TID 1401 and 1402 are invoked from the Mammo CAD Templates, use of segmentation references is prohibited; only SCOOD with reference to the original MG images is allowed.</p>	
Sections of documents affected PS 3.16 Annex A, D	
Correction Wording:	
<i>Modify PS3.16 Section A</i>	

**TID 1401  
AREA MEASUREMENT  
Type: Extensible**

NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		NUM	DCID_(7471) "Area Measurements"	1	M		Value shall be > 0 UNITS = DCID_(7461) "Units of Area Measurement"
2	>	INFERRED FROM	EV (121056, DCM, "Area Outline")	1	MC	<del>Shall be present</del> <b>iff</b> concept name of Row 1 is (G-A16A, SRT, "Area of defined region"), <b>and iff Row 5 or 6 not present. May be present otherwise.</b>	GRAPHIC TYPE = not {MULTIPOINT}
3	>>	R-SELECTED FROM		1	MC	XOR Row 4	
4	>>	SELECTED FROM		1	MC	XOR Row 3	
5	>	<b>INFERRED FROM</b>	<b>EV (121214, DCM, "Referenced Segmentation Frame")</b>	<b>1</b>	<b>MC</b>	<b>IF concept name of Row 1 is (G-A16A, SRT, "Area of defined region"), and iff Row 2 or 6 not present.</b>	<b>Reference shall be to a Segmentation Image, with a single value specified in Referenced Frame Number</b>
6	>	<b>R- INFERRED FROM</b>		<b>1</b>	<b>MC</b>	<b>IF concept name of Row 1 is (G-A16A, SRT, "Area of defined region"), and iff Row 2 or 5 not present.</b>	<b>Reference shall be to a Segmentation Image, with a single value specified in Referenced Frame Number</b>
57	>	HAS PROPERTIES	EV (G-C036, SRT, "Measurement Method")	1	U		DCID (7473) General Area Calculation Methods

**Content Item Descriptions**

Row 2 "Area Outline"	A Graphic Type of POINT implies that the object is a single pixel and the object's area is the area of the pixel. Otherwise the type shall be a closed POLYLINE (start and end point the same) or a CIRCLE or an ELLIPSE.
Rows 5,6	<p><b>Referenced Frame Number (0008,1160) is an attribute of the IMAGE Content Item.</b></p> <p><b>If the Referenced Segmentation SOP Instance has Segmentation Type (0062,0001) value BINARY, it identifies the area of defined (measured) region by pixel values in the referenced frame with value 1. For Segmentation Type value FRACTIONAL, the area is computed by an implementation dependent method.</b></p> <p><b>Frame number shall be specified even if the Segmentation SOP Instance has only a single frame.</b></p>

**TID 1402**  
**VOLUME MEASUREMENT**  
Type: Extensible

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			NUM	DCID_(7472) "Volume Measurements"	1	M		Value shall be > 0 UNITS = DCID_(7462) "Units of Volume Measurement"
2	>	INFERRED FROM	SCOORD	EV (121057, DCM, "Perimeter Outline")	1-n	UC	<b>XOR row 5, 6</b>	GRAPHIC TYPE = not {MULTIPOINT}
3	>>	R-SELECTED FROM	IMAGE		1	MC	XOR Row 4	
4	>>	SELECTED FROM	IMAGE		1	MC	XOR Row 3	
5	>	<b>INFERRED FROM</b>	<b>IMAGE</b>	<b>EV (121191, DCM, "Referenced Segment")</b>	<b>1</b>	<b>UC</b>	<b>XOR row 2, 6</b>	<b>Reference shall be to a Segmentation Image, with a value specified in Referenced Segment Number</b>
6	>	<b>R- INFERRED FROM</b>	<b>IMAGE</b>		<b>1</b>	<b>UC</b>	<b>XOR row 2, 5</b>	<b>Reference shall be to a Segmentation Image, with a value specified in Referenced Segment Number</b>
57	>	HAS PROPERTIES	CODE	EV (G-C036, SRT, "Measurement Method")	1	U		DCID (7474) General Volume Calculation Methods

**Content Item Descriptions**

Row 2 "Perimeter Outline"	The two dimensional perimeter of the volume's intersection with or projection into the image. A Graphic Type of POINT implies that the volume's intersection or projection in a plane is a single pixel. A single pixel projection perimeter cannot cause a volume calculation to become 0. Otherwise the type shall be a closed POLYLINE (start and end point the same) or a CIRCLE or an ELLIPSE.
Rows 5,6	<p><b>Referenced Segment Number (0062,000B) is an attribute of the IMAGE Content Item.</b></p> <p><b>If the Referenced Segmentation SOP Instance has Segmentation Type (0062,0001) value BINARY, it identifies the defined (measured) volume by pixel/voxel values in the frames of the referenced segment with value 1. For Segmentation Type value FRACTIONAL, the volume is computed by an implementation dependent method.</b></p> <p><b>Segment number shall be specified even if the Segmentation SOP Instance has only a single segment.</b></p>

**TID 4005**  
**MAMMOGRAPHY CAD COMPOSITE FEATURE BODY**  
**Type: Non-Extensible**

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
...								
7			INCLUDE	DTID (1400) Linear Measurement	1-n	U		<b>If the measured path is encoded, t</b> The <b>SCOORD and its</b> by-reference relationship to the IMAGE in TID (1400) Linear Measurement shall be used.
8			INCLUDE	DTID (1401) Area Measurement	1-n	U		<b>If the measured area outline is encoded, t</b> The <b>SCOORD and its</b> by-reference relationship to the IMAGE in TID (1401) Area Measurement shall be used.
9			INCLUDE	DTID (1402) Volume Measurement	1-n	U		<b>If the measured volume perimeter outline is encoded, t</b> The <b>SCOORD and its</b> by-reference relationship to the IMAGE in TID (1402) Volume Measurement shall be used.
...								

**TID 4009**  
**MAMMOGRAPHY CAD INDIVIDUAL CALCIFICATION**  
**Type: Non-Extensible**

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CODE	EV (111009, DCM, "Calcification Type")	1-n	MC	At least one of rows 1, 2, 3 shall be present	DCID (6010) Mammography Calcification Types
2			INCLUDE	DTID (1400) Linear Measurement	1-n	MC	At least one of rows 1, 2, 3 shall be present	<b>If the measured path is encoded, t</b> The <b>SCOORD and its</b> by-reference relationship to the IMAGE in TID (1400) Linear Measurement shall be used.
3			INCLUDE	DTID (1401) Area Measurement	1-n	MC	At least one of rows 1, 2, 3 shall be present	<b>If the measured area outline is encoded, t</b> The <b>SCOORD and its</b> by-reference relationship to the IMAGE in TID (1401) Area Measurement shall be used.
4			INCLUDE	DTID (1402) Volume Measurement	1-n	U		<b>If the measured volume perimeter outline is encoded, t</b> The <b>SCOORD and its</b> by-reference relationship to the IMAGE in TID (1402) Volume Measurement shall be used.

**TID 4010**  
**MAMMOGRAPHY CAD CALCIFICATION CLUSTER**  
**Type: Non-Extensible**

NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		CODE	EV (111009, DCM, "Calcification Type")	1-n	MC	At least one of rows 1, 2, 3, 4, 5 shall be present	DCID (6010) Mammography Calcification Types
2		CODE	EV (111008, DCM, "Calcification Distribution")	1	MC	At least one of rows 1, 2, 3, 4, 5 shall be present	DCID (6012) Calcification Distribution Modifier
3		NUM	EV (111038, DCM, "Number of calcifications")	1	MC	At least one of rows 1, 2, 3, 4, 5 shall be present	UNITS = (1, UCUM, no units) Value = Integer >= 1
4		INCLUDE	DTID (1400) Linear Measurement	1-n	MC	At least one of rows 1, 2, 3, 4, 5 shall be present	<b>If the measured path is encoded, t</b> The <b>SCOORD and its</b> by-reference relationship to the IMAGE in TID (1400) Linear Measurement shall be used.
5		INCLUDE	DTID (1401) Area Measurement	1-n	MC	At least one of rows 1, 2, 3, 4, 5 shall be present	<b>If the measured area outline is encoded, t</b> The <b>SCOORD and its</b> by-reference relationship to the IMAGE in TID (1401) Area Measurement shall be used.
6		INCLUDE	DTID (1402) Volume Measurement	1-n	U		<b>If the measured volume perimeter outline is encoded, t</b> The <b>SCOORD and its</b> by-reference relationship to the IMAGE in TID (1402) Volume Measurement shall be used.

**TID 4011**  
**MAMMOGRAPHY CAD DENSITY**  
**Type: Non-Extensible**

NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		CODE	EV (111035, DCM, "Lesion Density")	1	MC	At least one of rows 1, 2, 3, 4, 5 shall be present	DCID (6008) Density Modifier
2		CODE	EV (M-020F9, SRT, "Shape")	1	MC	At least one of rows 1, 2, 3, 4, 5 shall be present	DCID (6004) Mammography Characteristics of Shape
3		CODE	EV (111037, DCM, "Margins")	1-n	MC	At least one of rows 1, 2, 3, 4, 5 shall be present	DCID (6006) Mammography Characteristics of Margin
4		INCLUDE	DTID (1400) Linear Measurement	1-n	MC	At least one of rows 1, 2, 3, 4, 5 shall be present	<b>If the measured path is encoded, t</b> The <b>SCOORD and its</b> by-reference relationship to the IMAGE in TID (1400) Linear Measurement shall be used.
5		INCLUDE	DTID (1401) Area Measurement	1-n	MC	At least one of rows 1, 2, 3, 4, 5 shall be present	<b>If the measured area outline is encoded, t</b> The <b>SCOORD and its</b> by-reference relationship to the IMAGE in TID (1401) Area Measurement shall be used.
6		INCLUDE	DTID (1402) Volume Measurement	1-n	U		<b>If the measured volume perimeter outline is encoded, t</b> The <b>SCOORD and</b>

NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
							<u>its</u> by-reference relationship to the IMAGE in TID (1402) Volume Measurement shall be used.

**TID 4012**  
**MAMMOGRAPHY CAD NON-LESION**  
**Type: Non-Extensible**

NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		CODE	(111039, DCM, "Object type")	1	M		DCID (6040) Non-Lesion Object Type
2		INCLUDE	DTID (1400) Linear Measurement	1-n	U		<b>If the measured path is encoded, t</b> <del>The SCOORD and its</del> by-reference relationship to the IMAGE in TID (1400) Linear Measurement shall be used.
3		INCLUDE	DTID (1401) Area Measurement	1-n	U		<b>If the measured area outline is encoded, t</b> <del>The SCOORD and its</del> by-reference relationship to the IMAGE in TID (1401) Area Measurement shall be used.
4		INCLUDE	DTID (1402) Volume Measurement	1-n	U		<b>If the measured volume perimeter outline is encoded, t</b> <del>The SCOORD and its</del> by-reference relationship to the IMAGE in TID (1402) Volume Measurement shall be used.

**TID 4013**  
**MAMMOGRAPHY CAD SELECTED REGION**  
**Type: Non-Extensible**

NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		TEXT	EV (111058, DCM, "Selected Region Description")	1	M		
2		INCLUDE	DTID (1400) Linear Measurement	1-n	U		<b>If the measured path is encoded, t</b> <del>The SCOORD and its</del> by-reference relationship to the IMAGE in TID (1400) Linear Measurement shall be used.
3		INCLUDE	DTID (1401) Area Measurement	1-n	U		<b>If the measured area outline is encoded, t</b> <del>The SCOORD and its</del> by-reference relationship to the IMAGE in TID (1401) Area Measurement shall be used.

4		INCLUDE	DTID (1402) Volume Measurement	1-n	U		<b>If the measured volume perimeter outline is encoded, the SCOORD and its</b> by-reference relationship to the IMAGE in TID (1402) Volume Measurement shall be used.
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Modify PS 3.16, Annex D

**DICOM Code Definitions**  
**(Coding Scheme Designator “DCM” Coding Scheme Version “01”)**

<b>Code Value</b>	<b>Code Meaning</b>	<b>Definition</b>
...		
121191	Referenced Segment	Segment <del>number</del> selected as a subset of a segmentation image, <b>specifically the pixels/voxels identified as belonging to the classification of the identified segment</b>
...		
<u>121214</u>	<u>Referenced Segmentation Frame</u>	<b>Frame selected from a segmentation image, specifically the pixels/voxels identified as belonging to the classification of the segment encompassing the identified frame</b>

*Note to editor: In PS 3.16 Annex D, codes 121190 and 121191 are in the “11219x” section, please move to proper ordinal location*