

DICOM Correction Item

Correction Number		CP-951
Log Summary: CT pixel weighing factor for dual energy image composition		
Type of Modification	Name of Standard	
Addition	PS3.3, 3.6, 3.16 – 2008	
Rationale for Correction		
<p>Dual Energy is a CT acquisition method to improve the qualitative diagnostic possibilities. The intended use is to generate a composed image with optimized contour and noise by means of weighted pixel values of each spectrum and energy. The resulting image has the information of the whole applied dose.</p> <p>DICOM attributes on image level shall be defined to hold the weighting factor for each energy.</p>		
Sections of documents affected		
<p>PS 3.3 Sections 2, C.8.2.1 CT Image Module, Table C.8-3: CT IMAGE MODULE ATTRIBUTES</p> <p>PS 3.3. C.8.15.3.9 CT X-Ray Details Macro, Table C.8-125 CT X-RAY DETAILS SEQUENCE MACRO ATTRIBUTES</p> <p>PS 3.3. C.8.15.3.11 CT X-Ray Details Macro, Table C.8-126b CT ADDITIONAL X-RAY SOURCE MACRO ATTRIBUTES</p> <p>PS 3.3. C.8.15.2.1.1.4 Derived Pixel Contrast, Table C.8-116 IMAGE TYPE AND FRAME TYPE VALUE 4 FOR CT</p> <p>PS 3.6, Section 6, Registry of DICOM data elements</p> <p>PS 3.16, Annex B and D, Add new code in CID 7203 and add new code definition</p>		
Correction Wording:		

Add to PS 3.3, Table C.8-3

C.8.2.1 CT Image Module

The table in this Section contains IOD Attributes that describe CT images

**Table C.8-3
 CT IMAGE MODULE ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
.....			
Calcium Scoring Mass Factor Device	(0018,9352)	3	The calibration factors for the calcium mass score of the device....
<u>Energy Weighting Factor</u>	<u>(0018,9353)</u>	<u>1C</u>	<p><u>The weighting factor of the data from the primary source in a multiple energy composition image. This factor incorporates the effects of</u></p> <ul style="list-style-type: none"> • <u>the specific X-ray source and kV value</u> • <u>examination specific characteristics.</u>

			<u>Required if one Derivation Code Sequence (0008,9215) Item value is (113097, DCM, “Multi-energy proportional weighting”). May be present otherwise.</u>
.....			
CT Additional X-Ray Source Sequence	(0018,9360)	3	Contains the attributes <u>defining the data acquisition describing additional acquisition parameters beyond the primary source</u> in a multiple X-Ray source system <u>or a multi-energy acquisition beyond the primary source.</u> The primary X-Ray source is specified in other attributes of this module. One or more items may be present.
.....			
>Filter Material	(0018,7050)	1	The X-Ray absorbing material used in the filter.
<u>>Exposure in mAs</u>	<u>(0018,9332)</u>	<u>3</u>	<u>The exposure expressed in milliamperere seconds, for example calculated from exposure time and X-Ray tube current.</u>
<u>>Energy Weighting Factor</u>	<u>(0018,9353)</u>	<u>1C</u>	<u>The weighting factor of the data from this additional source in a multiple energy composition image. This factor incorporates the effects of</u> <ul style="list-style-type: none"> • <u>the specific X-ray source and kV value</u> • <u>examination specific characteristics.</u> <u>Required if one Derivation Code Sequence (0008,9215) Item value is (113097, DCM, “Multi-energy proportional weighting”). May be present otherwise.</u>
...			

Add to PS 3.3, Table C.8-116

C.8.15.2.1.1.4 Derived Pixel Contrast

Table C.8-116 specifies the Defined Terms for CT additional to those defined in C.8.16.1.4...

**Table C.8-116
 IMAGE TYPE AND FRAME TYPE VALUE 4 FOR CT**

Defined Term Name	Defined Term Description
....	
MEDIAN	Pixel by pixel median
<u>ENERGY PROP WT</u>	<u>Image pixels created through proportional weighting of multiple acquisitions at distinct X-ray energies.</u>

Add to PS 3.3, Table C.8-125

C.8.15.3.9 CT X-ray Details Macro

Table C.8-125 specifies the attributes of the CT X-ray Details Functional Group macro.

**Table C.8-125
 CT X-RAY DETAILS SEQUENCE MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
CT X-Ray Details Sequence	(0018,9325)	1	Contains the attributes defining the x-ray information. Only...
...			
>Calcium Scoring Mass Factor Device	(0018,9352)	3	The calibration factors for the calcium mass score of the device....
<u>>Energy Weighting Factor</u>	<u>(0018,9353)</u>	<u>1C</u>	<u>The weighting factor of the data from the primary source in a multiple energy composition image. This factor incorporates the effects of</u> <ul style="list-style-type: none"> • <u>the specific X-ray source and kV value</u> • <u>examination specific characteristics.</u> <u>Required if Required if Frame Type (0008,9007) Value 4 of this frame is ENERGY PROP WT. May be present otherwise.</u>
...			

Add to PS 3.3, Table C.8-126b

C.8.15.3.11 CT Additional X-Ray Source Macro

Table C.8-126b specifies the attributes of the CT Additional X-Ray Source Macro...

**Table C.8-126b
 CT ADDITIONAL X-RAY SOURCE MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
CT Additional X-Ray Source Sequence	(0018,9360)	1	Contains the attributes defining the data acquisition <u>describing additional acquisition parameters beyond the primary source</u> in a multiple X-Ray source system <u>or a multi-energy acquisition beyond the primary source</u> . The primary X-Ray source is specified in the CT X-Ray Details Sequence. One or more items may be present.
...			
>X-Ray Tube Current in mA	(0018,0060)		Nominal X-Ray tube current in milliamperes.
<u>>Exposure in mAs</u>	<u>(0018,9332)</u>	<u>1</u>	<u>The exposure expressed in milliamperere seconds, for example calculated from exposure time and X-Ray tube current.</u>
<u>>Energy Weighting Factor</u>	<u>(0018,9353)</u>	<u>1C</u>	<u>The weighting factor of the data from this additional source in a multiple energy composition image. This factor incorporates the effects of</u> <ul style="list-style-type: none"> • <u>the specific X-ray source and kV value</u> • <u>examination specific characteristics.</u> <u>Required if Required if Frame Type (0008,9007) Value 4 of this frame is ENERGY PROP WT. May be present otherwise.</u>

Add to PS 3.6, Section 6

6 Registry of DICOM data elements

Tag	Name	VR	VM
...			
<u>(0018,9353)</u>	<u>Energy Weighting Factor</u>	<u>FL</u>	<u>1</u>

Add to PS 3.16, Annex B

CID 7203 Image Derivation

Context ID 7203
Image Derivation

Type: Extensible Version: 2005082220091029

Coding Scheme Designator (0008,0102)	Code Value (0008,0100)	Code Meaning (0008,0104)
...		
DCM	113090	Image stitching
<u>DCM</u>	<u>113097</u>	<u>Multi-energy proportional weighting</u>

Add to PS 3.16, Annex D

DICOM Code Definitions (Coding Scheme Designator "DCM" Coding Scheme Version "01")

Code Value	Code Meaning	Definition	Notes
<u>113097</u>	<u>Multi-energy proportional weighting</u>	<u>Image pixels created through proportional weighting of multiple acquisitions at distinct X-ray energies.</u>	