# DICOM Change Proposal

| | |
|---|---|
| STATUS | In work |
| Date of Last Update | 2026-05-29 |
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| Submission Date | 2026-01-08 |

| | |
|---|---|
| Change Number | CP-2604 |
| Log Summary: | Clarification on TID Value Set Constraint UNITS |
| Name of Standard<br>PS3.16 | |

Rationale for Change:

PS3.16 extensively uses units in these ways:

a) TIDs naming the unit in column “Value Set Constraint” as Enumerated Value
Examples:

| | | |
|---|---|---|
| `UNITS = EV (mGy, UCUM, "mGy")` | TID 10003, Row 21 | (505 similar usages) |
| `UNIT = EV (cm, UCUM, "cm")` | TID 5104, Row 9 | (24 similar usages) |
| `Units = EV (deg, UCUM, "deg")` | TID 15308, Row | (15 similar usages) |

b) TIDs naming the unit in column “Value Set Constraint” as Defined Term

| | | |
|---|---|---|
| `Unit = DT ({H.B.}/min, UCUM, "BPM")` | TID 3206, Row 13 | (13 similar usages) |
| `UNITS = DT (min, UCUM, "min")` | TID 3806, Row 6 | (103 similar usages) |

c) TIDs, INCLUDING TID, using variable like $Units in column “Value Set Constraint”, Defined Term

| | | |
|---|---|---|
| `$Units = DT (ml, UCUM, "ml")` | TID 3206, Row 12 | (154 similar)´ |

d) TIDs, INCLUDING TID, using variable like $Units in column “Value Set Constraint”, Enumerated Value

| | | |
|---|---|---|
| `$Units = EV (dB, UCUM, "dB")` | TID 2121, Row 11 | (47 similar) |
| `$NumUnits = EV ({false positives}, UCUM, "false positives")` | Row 14 | |
| `$DenomUnits = EV ({trials}, UCUM, "trials")` | Row 14 | |

e) TIDs, with column ValueSetConstraint referencing a CID in form `UNITS = BCID` (not used)

f) TIDs, with column ValueSetConstraint referencing a CID in form `UNITS = DCID` (42 cases)

g) TIDs, with column ValueSetConstraint referencing a CID in form `$Units = BCID` (12 cases)

h) TIDs, with column ValueSetConstraint referencing a CID in form `$Units = DCID` (24 cases)

From PS3.5, section “3 Definitions”, it is understood that:
- in the case of EV (Enumerated Values) the specified unit shall be used (Type 2 applies).
- in the case of DT (Defined Term) the specified unit should be used, but using a different unit is acceptable.

From PS3.16 section “3 Definitions”, it is understood that:

- In the case of DCID, a unit from the specified CID shall be used.
    - In case the specified CID is non-extensible this restricts that other units must not be used.
    - In case the specified CID is extensible other units may be used.

In the case of BCID a unit from the specified CID should be used (suggested),
but using a different unit is acceptable

**Issue 1:** There are TIDs, where it is not clear if the given unit is mandatory to be used,
or using a different unit is allowed:

| | |
|---|---|
| `UNITS = (T, UCUM, "Tesla")` | TID 1606, Row 2 |
| `UNITS = (s/mm2, UCUM, "s/mm2")` | TID 1606, Row 6 |
| `UNITS = (s, UCUM, "second")` | TID 1608, Row 3 |
| `UNITS = (1, UCUM, "no units")` | TID 3750, Row 10 |
| `UNITS = (1, UCUM, "no units")` | TID 3757, Row 2 |
| `UNITS = (Hz, UCUM, "Hz")` | TID 3757, Row 4 |
| | |
| `$Units = (mm2, UCUM, "mm2")` | TID 3215, Row 18, Row 19, Row 20 |

**Issue 2:** As can be seen in examples for a) and b) the syntax is not consistently used.
Variants `UNITS` / `UNIT` / `Units` / `Unit` exist.

PS3.16, section “6.1.9.1 NUM Units Constraint” gives “`UNITS`” as examples. This should be favoured.
It is suggested to change the other variants as editorial change.

Change Wording:

***Change PS3.16, section 3.6 DICOM Data Structures and Encoding, add DT and EV***

**3.6 DICOM Data Structures and Encoding**

This Part of the Standard makes use of the following terms defined in PS3.5:

| | |
|---|---|
| Data Set | See Data Set in PS3.5. |
| **Defined Term (DT)** | **See Defined Term in PS3.5 .** |
| **Enumerated Value (EV)** | **See Enumerated Value in PS3.5 .** |
| Item | See Item in PS3.5. |
| Value | See Value in PS3.5. |

***Change PS3.16, TID 1606 Image Library Entry Descriptors for MR***

*Editorial Note: This change may be seen as potentially breaking change, but it is highly unlikely that other units have been used.*

**TID 1606 Image Library Entry Descriptors for MR**

This Template contains selected attributes for a MR image or group of such images. The descriptive information may be copied from images or derived. Specialized coded Content Items allow more precise description of imaging sequences used for interpretation of multiparametric prostate MRI.

**Type: Extensible**

**Order: Non-Significant**

**Root: No**

**Table TID 1606. Image Library Entry Descriptors for MR**

| | NL | Rel with Parent | VT | Concept Name | VM | Req Type | Condition | Value Set Constraint |
|---|---|---|---|---|---|---|---|---|
| 1 | | HAS ACQ CONTEXT | TEXT | EV (128230, DCM, "Pulse Sequence Name") | 1 | U | | |
| 2 | | HAS ACQ CONTEXT | NUM | EV (130542, DCM, "Magnetic field strength") | 1 | U | | UNITS = EV (T, UCUM, "Tesla") |
| 3 | | HAS ACQ CONTEXT | NUM | EV (RID10813, RADLEX, "MR coil") | 1-n | U | | DCID 6349 “MR Coil Type” |
| 4 | | HAS ACQ CONTEXT | NUM | EV (110852, DCM, "MR signal intensity") | 1 | U | | BCID 6311 “MR Signal Intensity” |
| 5 | | HAS ACQ CONTEXT | NUM | EV (130546, DCM, "Cross-sectional scan plane orientation") | 1 | U | | BCID 6312 “Cross-sectional Scan Plane Orientation” |
| 6 | | HAS ACQ CONTEXT | NUM | EV (113240, DCM, "Source image diffusion b-value") | 1-n | U | | UNITS = EV (s/mm2, UCUM, "s/mm2") |
| 7 | | HAS ACQ CONTEXT | INCLUDE | DTID 1608 “Image Library Entry Descriptors for Prostate Multiparametric MR” | 1 | U | | |

***Change PS3.16, TID 1608 Image Library Entry Descriptors for Prostate Multiparametric MR***

*Editorial Note: This change may be seen as potentially breaking change, but it is highly unlikely that other units have been used.*

This Template includes attributes for image library entries that define the type of the sequence, as needed for PI-RADS interpretation of multiparametric MRI, specify most important sequence-specific attributes, and provide a location for reporting prostate imaging and sequence-specific technical characteristics of the acquisition.

Note

A descriptor specific to prostate MRI and PI-RADS is provided to record Prostate DCE temporal resolution. This term follows the conventions used in the PI-RADS guidelines.

**Type: Extensible**

**Order: Non-Significant**

**Root: No**

**Table TID 1608. Image Library Entry Descriptors for Prostate Multiparametric MR**

| | NL | Rel with Parent | VT | Concept Name | VM | Req Type | Condition | Value Set Constraint |
|---|---|---|---|---|---|---|---|---|
| 1 | | HAS ACQ CONTEXT | TEXT | EV (130544, DCM, "Endorectal coil type") | 1 | U | | |
| 2 | | HAS ACQ CONTEXT | CODE | EV (130545, DCM, "Inflatable endorectal coil fill substance") | 1 | U | | DCID 6350 “Endorectal Coil Fill Substance” |
| 3 | | HAS ACQ CONTEXT | NUM | EV (130547, DCM, "Dynamic contrast-enhanced temporal resolution") | 1-n | U | | UNITS = EV (s, UCUM, "second") |

***Change PS3.16, TID 3750 Waveform Annotations***

*Editorial Note: This change may be seen as potentially breaking change, but it is highly unlikely that other units have been used.*

**TID 3750 Waveform Annotations**

This Root Template encodes a list of annotations for waveform data consisting of measurements or observations added at recording time or later provided either by a human reviewer (such as a cardiologist, neurologist, or technologist) or by an automated analysis algorithm.

**Type: Extensible**

**Order: Non-Significant**

**Root: Yes**

**Table TID 3750. Waveform Annotations**

| | NL | Rel with Parent | VT | Concept Name | VM | Req Type | Condition | Value Set Constraint |
|---|---|---|---|---|---|---|---|---|
| | | […] | | | | | | |
| 9 | >> | CONTAINS | CONTAINER | EV (130872, DCM, "Waveform Annotation Group") | 1-n | M | | |
| 10 | >>> | HAS OBS CONTEXT | NUM | EV (130873, DCM, "Waveform Annotation Group Number") | 1 | M | | UNITS = EV (1, UCUM, "no units") |
| 11 | >>> | HAS OBS CONTEXT | TEXT | EV (130874, DCM, "Waveform Annotation Group Label") | 1 | U | | |
| | | […] | | | | | | |

***Change PS3.16, TID 3757 Waveform Library Entry Multiplex Group Descriptors***

*Editorial Note: This change may be seen as potentially breaking change, but it is highly unlikely that other units have been used.*

**TID 3757 Waveform Library Entry Multiplex Group Descriptors**

This Template contains selected attributes for a waveform multiplex group within a waveform object or a group of waveform objects. The descriptive information may be copied from the waveform objects or derived.

**Type: Extensible**

**Order: Non-Significant**

**Root: No**

**Table TID 3757. Waveform Library Entry Multiplex Group Descriptors**

| | NL | Rel with Parent | VT | Concept Name | VM | Req Type | Condition | Value Set Constraint |
|---|---|---|---|---|---|---|---|---|
| 1 | | | CONTAINER | EV (130879, DCM, "Waveform Library Entry Multiplex Group Descriptors") | 1-n | M | | |
| 2 | > | HAS ACQ CONTEXT | NUM | EV (130880, DCM, "Multiplex Group Number") | 1 | U | | UNITS = EV (1, UCUM, "no units") |
| 3 | > | HAS ACQ CONTEXT | UIDREF | EV (130881, DCM, "Multiplex Group UID") | 1 | U | | |
| 4 | > | HAS ACQ CONTEXT | NUM | EV (130882, DCM, "Sampling Frequency") | 1 | U | | UNITS = EV (Hz, UCUM, "Hz") |
| 5 | > | HAS ACQ CONTEXT | NUM | EV (130883, DCM, "Number of Channels") | 1 | U | | UNITS = EV ({channels}, UCUM, "channels") |

***Change PS3.16, TID 3757 Waveform Library Entry Multiplex Group Descriptors***

*Editorial Note: The variant "UNITS = DT" has been chosen, as similar measurements same have "DT". Measurements in other units, like "cm2", or non-metric units, may have been used, although this is unlikely.*

**TID 3215 Angiographic Lesion Analysis**

The Angiographic Lesion Analysis Template consists of a CONTAINER providing quantitative arterial analysis measurements derived for an obstruction in a total analyzed segment.

**Type: Extensible**

**Order: Significant**

**Root: No**

**Table TID 3215. Angiographic Lesion Analysis**

| | NL | Rel with Parent | VT | Concept Name | VM | Req Type | Condition | Value Set Constraint |
|---|---|---|---|---|---|---|---|---|
| | | […] | | | | | | |
| 17 | >> | CONTAINS | NUM | EV (122511, DCM, "Graph Increment") | 1 | M | | Value = 1<br><br>UNITS = DT ({pixels}, UCUM, "pixels") |
| 18 | >> | CONTAINS | INCLUDE | DTID 300 "Measurement" | 1-n | M | | $Measurement = EV (397415007, SCT, "Vessel Lumen Cross-Sectional Area")<br><br>$Units = DT (mm2, UCUM, "mm2") |
| 19 | > | CONTAINS | INCLUDE | DTID 300 "Measurement" | 1 | U | | $Measurement = EV (397415007, SCT, "Vessel Lumen Cross-Sectional Area")<br><br>$Derivation = EV (258090004, SCT, "Calculated")<br><br>$Method = EV (122474, DCM, "Densitometric method")<br><br>$TargetSite = EV (122481, DCM, "Contour Start")<br><br>$Units = DT (mm2, UCUM, "mm2") |
| 20 | > | CONTAINS | INCLUDE | DTID 300 "Measurement" | 1 | U | | $Measurement = EV (397415007, SCT, "Vessel Lumen Cross-Sectional Area")<br><br>$Derivation = EV (258090004, SCT, "Calculated") |

| | NL | Rel with Parent | VT | Concept Name | VM | Req Type | Condition | Value Set Constraint |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | $Method = EV (122474, DCM, "Densitometric method")<br><br>$TargetSite = EV (122482, DCM, "Contour End")<br><br>$Units = DT (mm2, UCUM, "mm2") |
| 21 | > | CONTAINS | INCLUDE | DTID 300 “Measurement” | 1 | M | | $Measurement = EV (408716009, SCT, "Stenotic Lesion Length")<br><br>$Units = DT (mm, UCUM, "mm") |
| 22 | > | CONTAINS | INCLUDE | DTID 300 “Measurement” | 1 | M | | $Measurement = EV (408715008, SCT, "Lumen Diameter Stenosis")<br><br>$Units = DT (%, UCUM, "%") |
| 23 | > | CONTAINS | INCLUDE | DTID 300 “Measurement” | 1-n | U | | $Measurement = EV (408714007, SCT, "Lumen Area Stenosis")<br><br>$Method = DCID 3470 “Vessel Lumen Cross-sectional Area Calculation Method”<br><br>$Units = DT (%, UCUM, "%") |
| 24 | > | CONTAINS | INCLUDE | DTID 300 “Measurement” | 1-n | U | | $Measurement = EV (122372, DCM, "Lumen Volume")<br><br>$Method = DCID 3470 “Vessel Lumen Cross-sectional Area Calculation Method”<br><br>$Units = DT (mm3, UCUM, "mm3") |
| 25 | > | CONTAINS | INCLUDE | DTID 300 “Measurement” | 1 | U | | $Measurement = EV (122542, DCM, "Plaque Area")<br><br>$Units = DT (mm2, UCUM, "mm2") |
| 26 | > | CONTAINS | INCLUDE | DTID 300 “Measurement” | 1 | U | | $Measurement = EV (122376, DCM, "Total Plaque Volume")<br><br>$Units = DT (mm3, UCUM, "mm3") |
| 27 | > | CONTAINS | INCLUDE | DTID 300 “Measurement” | 1 | U | | $Measurement = EV (122544, DCM, "Diameter Symmetry")<br><br>$Units = DT ({ratio}, UCUM, "ratio") |
| 28 | > | CONTAINS | INCLUDE | DTID 300 “Measurement” | 1 | U | | $Measurement = EV (122545, DCM, "Area Symmetry") |

| | NL | Rel with Parent | VT | Concept Name | VM | Req Type | Condition | Value Set Constraint |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | $Units = DT ({ratio}, UCUM, "ratio") |
| 29 | > | CONTAINS | INCLUDE | DTID 300 “Measurement” | 1 | U | | $Measurement = EV (122546, DCM, "Inflow Angle")<br><br>$Units = DT (deg, UCUM, "deg") |
| 30 | > | CONTAINS | INCLUDE | DTID 300 “Measurement” | 1 | U | | $Measurement = EV (122547, DCM, "Outflow Angle")<br><br>$Units = DT (deg, UCUM, "deg") |
| | | […] | | | | | | |

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***Editorial Change PS3.16, search and replace in the full text in the XML source (DocBOOK):***

*To Editor:*
*Change #1 is done to avoid that “$X-AxisUnit” is changed. It is reverted by change #5.*
*Changes are intended to be carried out in sequential order 1 to 5.*

| # | Search | Replace | Comment |
|---|---|---|---|
| 1 | `AxisUnit = DT` | `AxisUnitXXX = DT` | Done to avoid unwanted changes.<br>Not to be changed are:<br>`$X-AxisUnit = DT`<br>`$Y-AxisUnit = DT`<br>4 changes |
| 2 | `UNIT = EV (` | `UNITS = EV (` | 24 changes |
| 3 | `~~>Units~~ = EV (` | `>UNITS = EV (` | 15 changes |
| 4 | `~~Unit~~ = DT (` | `UNITS = DT (` | 13 changes |
| 5 | `UNITS = EV(` | `UNITS = EV (` | 1 change |
| 6 | `AxisUnitXXX = DT` | `AxisUnit = DT` | Revert the change of line 1,<br>restore:<br>`$X-AxisUnit = DT`<br>`$Y-AxisUnit = DT`<br>4 changes |

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