

# SIEMENS

## ACOM.Rec<sup>®</sup> VA01A

**AX**

## DICOM Conformance Statement

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## **1. Introduction**

### **1.1 Overview**

The Conformance Statement describes the DICOM interface for the Siemens ACOM.Rec® VA01A application in terms of part 2 of [DICOM].

This introduction describes the application's implemented DICOM functionality in general terms.

### **1.2 Scope and Field**

The Siemens product ACOM.Rec® is an application to write images from the Siemens ACOM.PC® product onto DICOM CDs.

The ACOM.Rec® supports the storage of images utilizing the DICOM XA IOD.

### **1.3 Audience**

This document is intended for hospital staff, health system integrators, software designers or implementers. It is assumed that the reader has a working understanding of DICOM.

### **1.4 Remarks**

DICOM, by itself, does not guarantee interoperability. However, the Conformance Statement facilitates a first-level validation for interoperability between different applications supporting the same DICOM functionality as SCU and SCP, respectively.

This Conformance Statement is not intended to replace validation with other DICOM equipment to ensure proper exchange of information intended.

The scope of this Conformance Statement is to facilitate communication with Siemens and other vendors' Medical equipment. The Conformance Statement should be read and understood in conjunction with the DICOM 3.0 Standard [DICOM]. However, by itself it is not guaranteed to ensure the desired interoperability and a successful interconnectivity.

The User should be aware of the following important issues:

The comparison of different conformance statements is the first step towards assessing interconnectivity between Siemens and non-Siemens equipment.

Test procedures should be defined and tests should be performed by the user to validate the connectivity desired. DICOM itself and the conformance parts do not specify this.

The standard will evolve to meet the users' future requirements. Siemens is actively involved in developing the standard further and therefore reserves the right to make changes to its products or to discontinue its delivery.

## 1.5 Definitions, Terms and Abbreviations

Definitions, terms and abbreviations used in this document are defined within the different parts of the DICOM standard.

Additional Abbreviations are as follows

AE	DICOM Application Entity
FSE	Field Service Engineer
FSC	File Set Creator
FSR	File Set Reader
FSU	File Set Updater
IOD	DICOM Information Object Definition
PDU	DICOM Protocol Data Unit

## 1.6 References

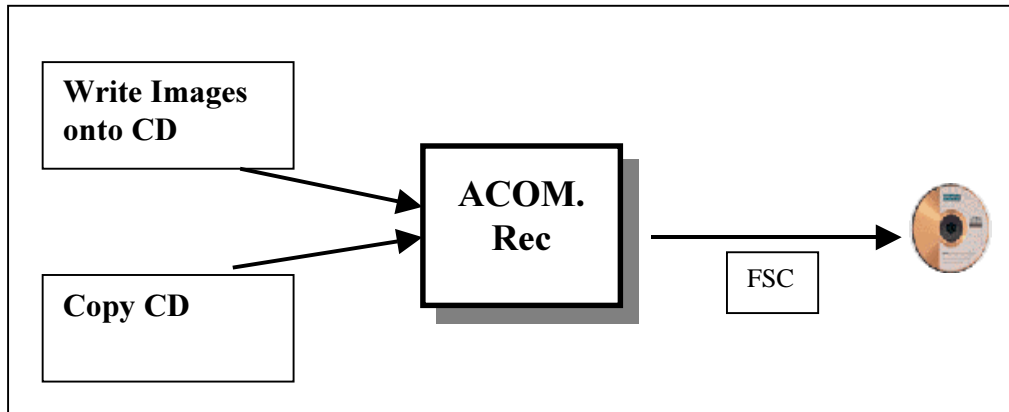
[DICOM] Digital Imaging and Communications in Medicine (DICOM), NEMA PS 3.1-3.13, 1998

## 2. Media Storage

The ACOM.Rec® DICOM off-line media storage service implementation acts as FSC, FSU and FSR for the specified application profiles and the related SOP Class instances.

### 2.1 Implementation Model

#### 2.1.1 Application Data Flow Diagram



The ACOM.Rec® application will serve as an interface to the CD-R off-line medium device for the ACOM.PC® application to create interchange media. It can write SOP instances to an empty medium or copy a DICOM CD directly onto an empty CD-R medium.

#### 2.1.2 Functional Definition of AE

The ACOM.Rec® product DICOM off-line media storage application consists all interfaces to access off-line media. It is capable of

- creating a new File-set onto an unwritten CD-R medium.

#### 2.1.3 Sequencing of Real World Activities

The ACOM.Rec® VA01A application will not perform updates of the Directory information of the DICOMDIR.

#### 2.1.4 File Meta Information Options

Implementation Class UID	" 1.3.12.2.1107.5.4.3.2"
Implementation Version Name	"Siemens_DICOM_10"

## 2.2 AE Specification

### 2.2.1 DICOM Archive Specification

The ACOM.Rec® Application provides Standard conformance to Media Storage Service Class (Interchange Option).

*Application profiles, Activities, and Roles for DICOM Archive*

Application Profiles Supported	Real World Activity	Role	SC Option
STD-XABC-CD AUG-XABC-DYNAMIC-CD	Export to local archive media	FSC	Interchange

The STD-XABC-CD application profile is used when writing images from the ACOM.PC® local directory onto a CD-R or also when copying a CD written in STD-XABC-CD profile. The augmented AUG-XABC-DYNAMIC-CD profile is only used when copying CDs written in AUG-XABC-DYNAMIC-CD profile (for example by an ACOM.M® product).

#### 2.2.1.1 File Meta Information for the Application Entity

The Source Application Entity Title is set to that of the ACOM.PC® application as ACOM.Rec® only provides the CD-Burning option to ACOM.PC®.

#### 2.2.1.2 Real-World Activities for this Application Entity

##### 2.2.1.2.1 Real-World Activity: Export to local Archive Media

The ACOM.Rec® application acts as an FSC when requested to write Images to the local archive medium (only CD-R supported). It will create a DICOMDIR file on the empty medium.

The ACOM.Rec® application will not close the CD-R medium.

### 2.2.1.3 Application profiles

#### 2.2.1.4 DICOMDIR keys

The DICOMDIR file will contain the following attributes for the levels Patient – Study – Series – Image/Private for the new SOP instances written by ACOM.Rec® application :

*DICOMDIR keys:*

Attribute Name	Tag	Type	Notes
<b>File-Set Meta information</b>			
File Meta Information Version	(0002,0001)	1	00 01
Media Storage SOP Class UID	(0002,0002)	1	Media Storage Directory SOP Class
Media Storage SOP Instance UID	(0002,0003)	1	Currently Media Storage SOP class UID cannot be used for media identification (will be fixed in next version)
Transfer Syntax UID	(0002,0010)	1	Explicit VR Little Endian
Implementation Class UID	(0002,0012)	1	
Implementation Version Name	(0002,0013)	3	
Source Application Entity Title	(0002,0016)	3	
<b>File-Set identification</b>			
File-set ID	(0004,1130)	2	ACOMPC 2_2
<b>Directory information</b>			
Offset of the First Directory Record of the Root Directory Entry	(0004,1200)	1	
Offset of the Last Directory Record of the Root Directory Entity	(0004,1202)	1	
File-set Consistency Flag	(0004,1212)	1	0000H
Directory Record Sequence	(0004,1220)	2	
> Offset of the Next Directory Record	(0004,1400)	1C	
> Record In-use flag	(0004,1410)	1C	FFFFH
> Offset of Referenced Lower-Level Directory Entity	(0004,1420)	1C	
> Directory Record Type	(0004,1430)	1C	PATIENT, STUDY, SERIES, IMAGE, PRIVATE
> Private Record UID	(0004,1432)	1C	Required for Directory Record type PRIVATE
> Referenced File ID	(0004,1500)	1C	contains the filename on media for the Directory Record of Type IMAGE or PRIVATE
> Referenced SOP Class UID in File	(0004,1510)	1C	for the Directory Record of Type IMAGE or PRIVATE currently missing in some cases, but will be fixed with next version

> Referenced SOP Instance UID in File	(0004,1511)	1C	for the Directory Record of Type IMAGE or PRIVATE
> Referenced Transfer Syntax UID in File	(0004,1512)	1C	for the Directory Record of Type IMAGE or PRIVATE
> Record Selection Keys	see below		
<b>Patient Keys</b>			<b>Directory Record Type PATIENT</b>
Specific Character Set	(0008,0005)	1C	“ISO_IR 100”
Patient’s Name	(0010,0010)	2	
Patient ID	(0010,0020)	1	
Date Of Birth	(0010,0030)	2	
Patient’s Sex	(0010,0040)	2	
<b>Study Keys</b>			<b>Directory Record Type STUDY</b>
Study Date	(0008,0020)	1	
Study Time	(0008,0030)	1	
Accession Number	(0008,0050)	2	
Referring Physician’s Name	(0008,0090)	3	
Study Description	(0008,1030)	2	
Study Instance UID	(0020,000D)	1	
Study ID	(0020,0010)	1	Must be filled on HICOR/ACOM.M side
<b>Series Keys</b>			<b>Directory Record Type SERIES</b>
Modality	(0008,0060)	1	
Institution name	(0008,0080)	2	
Institution Address	(0008,0081)	2	Required by STD-XABC-CD profile Currently missing, but will be fixed in next version
Performing Physician’s Name	(0008,1050)	2	
Series Instance UID	(0020,000E)	1	
Series Number	(0020,0011)	1	
<b>Image Keys</b>			<b>Directory Record Type IMAGE</b>
Image Type	(0008,0008)	1	
Referenced Image Sequence	(0008,1140)	1C	Required if associated Biplane image exists
> Referenced SOP Class UID	(0008,1150)	1C	
> Referenced SOP Instance UID	(0008,1155)	1C	
SOP Class UID	(0008,1150)	3	
SOP Instance UID	(0008,1155)	3	
Private Creator	(0009,0010)	1C	“CARDIO-D.R. 1.0” required if Alternate Image Sequence is present



Alternate Image Sequence	(0009,xx40)	1C	Required by AUG-XABC-DYNAMIC-CD profile if associated Lossy Directory Record exists
> Referenced SOP Class UID	(0008,1150)	1C	
> Referenced SOP Instance UID	(0008,1155)	1C	
Frame Time	(0018,1063)	3	
Positioner Motion	(0018,1500)	3	Used in AUG-XABC-DYNAMIC-CD profile
Positioner Primary Angle	(0018, 1510)	3	
Positioner Secondary Angle	(0018, 1511)	3	
Image Number	(0020,0013)	1	
Number of Frames	(0028,0008)	3	
Frame Increment Pointer	(0028,0009)	3	
Calibration image	(0050,0004)	2	Required by STD-XABC-CD profile Currently missing, but will be fixed in next version
Icon Image Sequence	(0088,0200)	1	required for STD-XABC-CD Application profile
> Samples per Pixel	(0028,0002)		1
> Photometric Interpretation	(0028,0004)		MONOCHROME2
> Rows	(0028,0010)		128
> Columns	(0028,0011)		128
> Bits Allocated	(0028,0100)		8
> Bits Stored	(0028,0101)		8
> High Bit	(0028,0102)		7
> Pixel Representation	(0028,0103)		0 (unsigned)
> Pixel Data	(7FE0,0010)		Icon Image pixel data
<b>Dynaview Image Keys</b>			<b>Directory Record Type PRIVATE</b>
Image Type	(0008,0008)	1	
Referenced Image Sequence	(0008,1140)	1C	Required if associated Biplane image exists
> Referenced SOP Class UID	(0008,1150)	1C	
> Referenced SOP Instance UID	(0008,1155)	1C	
Source Image Sequence	(0008,2112)	1	Required by AUG-XABC-DYNAMIC-CD profile for lossy Dynaview image to reference the corresponding JPEG lossless compressed image
> Referenced SOP Class UID	(0008,1150)	1C	
> Referenced SOP Instance UID	(0008,1155)	1C	
Frame Time	(0018,1063)	3	
Positioner Motion	(0018,1500)	3	
Positioner Primary Angle	(0018, 1510)	3	
Positioner Secondary Angle	(0018, 1511)	3	

Image Number	(0020,0013)	1	
Number of Frames	(0028,0008)	3	
Icon Image Sequence	(0088,0200)	3	Optional in AUG-XABC-DYNAMIC-CD Application profile
> Samples per Pixel	(0028,0002)		1
> Photometric Interpretation	(0028,0004)		MONOCHROME2
> Rows	(0028,0010)		128
> Columns	(0028,0011)		128
> Bits Allocated	(0028,0100)		8
> Bits Stored	(0028,0101)		8
> High Bit	(0028,0102)		7
> Pixel Representation	(0028,0103)		0 (unsigned)
> Pixel Data	(7FE0,0010)		Icon Image pixel data
<b>HICOR/ACOM Report Keys</b>			<b>Directory Record Type PRIVATE</b>
Image Type	(0008,0008)	1	“ORIGINAL\PRIMARY\SINGLE PLANE\SINGLE A”
Positioner Motion	(0018,1500)	3	NULL length
Positioner Primary Angle	(0018, 1510)	3	
Positioner Secondary Angle	(0018, 1511)	3	
Image Number	(0020,0013)	1	
Number of Frames	(0028,0008)	3	“1” (stored as XA IOD with only one frame)

The AUG-XABC-DYNAMIC-CD Augmented Application Profile utilizes the same requirements for the Directory information in DICOMDIR as the STD-XABC-CD Application Profile with the addition that Directory Records associated with Lossy Image IODs shall exist as Private Directory Records.

### 2.2.1.5 STD-XABC-CD

For media conforming to the STD-XABC-CD Profile the following SOP classes will be supported as an FSC

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
XA Image	1.2.840.10008.5.1.4.1.1.12.1	JPEG lossless Process 14 1.2.840.10008.1.2.4.70	yes	no	no

Standalone IODs (Standalone Overlay, Standalone Curve, ..) and Detached Patient Management IODs are not supported.

This profile is used if patient data (including Images or HICOR®/ACOM® Reports) are stored from the ACOM.PC® Local directory onto CD-R.

## 2.2.2 Augmented and Private Profiles

### 2.2.2.1 Augmented Application Profiles

This profile extends the STD-XABC-CD application profile to store XA SOP Instances also in JPEG lossy transfer syntax. It is used by HICOR®/ACOM® when writing a patient with Dynaview images onto CD-R. ACOM.Rec® only used this profile when copying a CD already written in this profile.

#### 2.2.2.2 AUG-XABC-DYNAMIC-CD

For media conforming to the AUG-XABC-DYNAMIC-CD Profile the following SOP classes will be supported as an FSC:

Information Object Definitions	SOP Class UID	Transfer Syntax and UID	FSC	FSR	FSU
XA Image	1.2.840.10008.5.1.4.1.1.12.1	JPEG lossless Process 14 1.2.840.10008.1.2.4.70	yes	no	no
		JPEG lossy Process 1 1.2.840.10008.1.2.4.50			

### 2.2.2.3 Private Application Profiles

There are no private Application profiles being supported.

## 2.3 Extensions, Specializations and Privatizations of SOP Classes and Transfer Syntaxes

### 2.3.1 Standard Extensions of all SOP classes

When exchanged under the AUG-XABC-DYNAMIC-CD Augmented Application Profile, the lossless and lossy image IODs shall contain, in addition to the attributes required for the image IOD in the STD-XABC-CD application profile, the attributes listed in the following table:

Attribute Name	Tag	Type (lossless)	Type (lossy)	Notes
<b>Edge Enhancement Sequence</b>	(0029,xx00)	1	1	Private Creator "CARDIO-D.R. 1.0"
> Private Creator	(0029,00xx)	1	1	"CARDIO-D.R. 1.0"
> Convolution Kernel Size	(0029,xx01)	1	1	Number of rows\columns in the convolution kernel
> Convolution Kernel coefficients	(0029,xx02)	1	1	The coefficients organized by row from left to right starting with the top row.
> Edge Enhancement Gain	(0029,xx03)	1	1	
<b>Alternate Image Sequence</b>	(0009,xx40)	1	-	Used in lossless image to reference the corresponding lossy image
> Referenced SOP Class UID	(0008,1150)	1		
> Referenced SOP Instance UID	(0008,1155)	1		
<b>Source Image Sequence</b>	(0008,2112)	-	1	Used in lossy image to reference the corresponding lossless image
> Referenced SOP Class UID	(0008,1150)		1	
> Referenced SOP Instance UID	(0008,1155)		1	

## 2.4 Configuration

### 2.4.1 AE Title Mapping

The ACOM.Rec® application provides the DICOM Application Entity Title:  
"ACOM.Rec"

## 2.5 Support of Extended Character Sets

ISO-IR 100 (ISO 8859-1:1987 Latin Alphabet N 1. supplementary set)