

**AGFA MEDICAL IMAGING  
DICOM Conformance Statement**

→ **SCU CR Storage Service Class**

***PS5000***

7 September, 2000

Document No. 000108, Revision 3.1



## Document Information

---

Author	Willy Rosé	
Editing & Layout	Allan Morris	
For questions regarding the technical content of this document, please contact:	Willy Rosé	tel: +32 3 444 8239 fax: +32 3 455 8211

Issued by:  
Agfa Medical Imaging  
Septestraat 27  
B-2640 Mortsel  
Belgium

tel: +32 3 444 8221  
fax: +32 3 444 8211  
email: [eduard.crits.ec@belgium.agfa.com](mailto:eduard.crits.ec@belgium.agfa.com)

Agfa shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this publication. Agfa reserves the right to revise this publication and to make changes to its content at any time, without obligation to notify any person or entity of such revisions and changes. This publication may only be used in connection with the promotion, sales, installation and use of Agfa equipment by Agfa personnel. The information presented herein is sensitive and is classified Company Confidential. Without written authority from the proprietor, further distribution outside the company is not allowed.

**Copyright © September, 00**  
**Agfa Medical Imaging**  
**All rights reserved**

A ]

---



---

# Table of Contents

- 1 Introduction ..... 6
  - 1.1 Intended Audience ..... 6
    - 1.1.1 Integration ..... 6
    - 1.1.2 Validation ..... 6
    - 1.1.3 Future Evolution ..... 6
  - 1.2 Purpose of this Document ..... 6
  
- 2 Implementation Model ..... 7
  - 2.1 Application Data Flow Diagram ..... 7
  - 2.2 PS5000 Workstation SCU ..... 7
  
- 3 AE Specifications ..... 7
  - 3.1 Supported Role ..... 7
  - 3.2 Supported SOP Class ..... 7
  - 3.3 Association Establishment ..... 7
    - 3.3.1.1 General ..... 7
    - 3.3.2 Asynchronous Nature ..... 8
    - 3.3.3 Association Initiation ..... 8
    - 3.3.4 Transfer Syntax ..... 8
  - 3.4 List of Transmitted DICOM Items ..... 8
    - 3.4.1 Patient Information Entity ..... 9
      - 3.4.1.1 Patient Module ..... 9
    - 3.4.2 Study Information Entity ..... 9
      - 3.4.2.1 General Study Module ..... 9
    - 3.4.3 Series Information Entity ..... 9
      - 3.4.3.1 General Series Module ..... 9
    - 3.4.4 Equipment Information Entity ..... 10
      - 3.4.4.1 General Equipment Module ..... 10
    - 3.4.5 Image Information Entity ..... 10
      - 3.4.5.1 General Image Module ..... 10
      - 3.4.5.2 Image Pixel Module ..... 10
      - 3.4.5.3 CR Image Module ..... 11
      - 3.4.5.4 Overlay Plane Module (Note 1) ..... 11
      - 3.4.5.5 Modality LUT Module ..... 12
      - 3.4.5.6 VOI LUT Module (Note 1) ..... 13
      - 3.4.5.7 SOP Common Module ..... 13
    - 3.4.6 Added Standard Element ..... 13
    - 3.4.7 Private Elements ..... 14
  
- 4 Communication Profiles ..... 14
  
- 5 Support for Extended Character Sets ..... 15

6 Acronyms and Abbreviations..... 15



## Revision Record

---

Revision Number	Date	Author	Reason for Change
3.7.0	2/12/96	Lhayen	???
3.7.1	27/01/99	Amorris	Company name changed
3.7.2	9/07/99	Amorris	New introduction incorporated
1.0	21/12/99	Amorris	New style implemented
1.1	18/1/00	Amorris	Returned to old style
2.0	15/02/00	Amorris	To be re-imported into mPower
2.1	15/02/00	Amorris	Re-imported into mPower
2.2	16/02/00	Amorris	Author name added; Released 16.2.00
2.3	8/03/00	Amorris	Date/Time field updated
3.0	7/09/00	Cweise	New conventions to be implemented
3.1	7/09/00	Cweise	New conventions implemented

# 1 INTRODUCTION

## 1.1 Intended Audience

The user of this document is involved with system integration and/or software design. We assume that the reader is familiar with the terminology and concepts that are used in the DICOM 3.0 standard.

Readers not familiar with DICOM 3.0 terminology should first read the appropriate parts of the DICOM standard itself, prior to reading this conformance statement.

Although the use of this conformance statement in conjunction with the DICOM 3.0 standard is intended to facilitate communication with other medical imaging equipment, it is not sufficient to guarantee, by itself, the inter-operation of the connection. The following issues need to be considered:

### 1.1.1 Integration

The integration of any device into a system of interconnected devices goes beyond the scope of the DICOM 3.0 standard and this conformance statement when *interoperability* is desired. The responsibility for analyzing the applications requirements and developing a solution that integrates the Agfa equipment with other vendors' systems is the user's responsibility and should not be underestimated.

### 1.1.2 Validation

Testing the complete range of possibilities between the Agfa equipment and non-Agfa devices, before the connection is declared operational, is deemed to be a necessity. The user should ensure that any non-Agfa provider accepts full responsibility for all validation required for their connection with the Agfa equipment. The accuracy of image data once it has crossed the interface between the Agfa equipment and the non-Agfa device as well as the stability of the image data for the intended applications is the responsibility of the non-Agfa provider.

### 1.1.3 Future Evolution

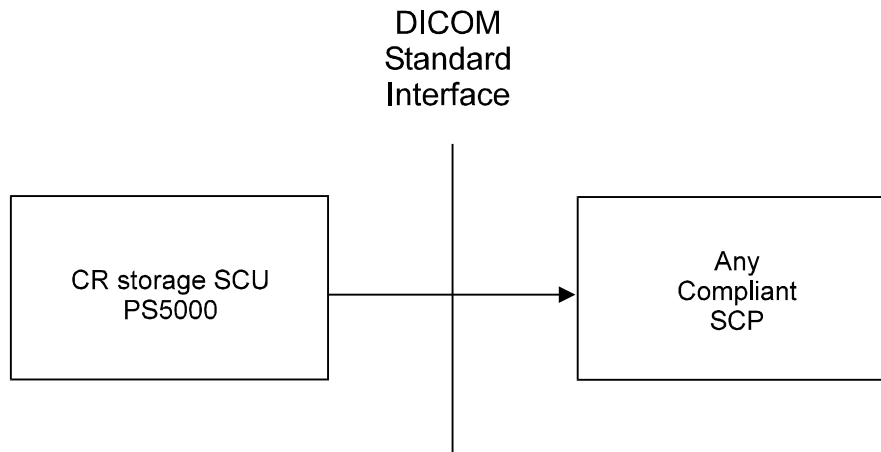
As the DICOM 3.0 standard evolves to meet the user's growing requirements and to incorporate new features and technologies, Agfa will follow the evolution of the standard. This evolution of the standard may require changes to devices that have implemented DICOM 3.0. The user should ensure that any non-Agfa provider who connects with Agfa devices also plans future evolution of the DICOM standard. A refusal to do so may reflect in the loss of functionality and/or connectivity between the different products.

## 1.2 Purpose of this Document

The PS5000 Workstation CR Storage Service Class component is an implementation of the DICOM V3.0 standard for CR image storage. The PS5000 performs the SCU role.

## 2 IMPLEMENTATION MODEL

### 2.1 Application Data Flow Diagram



*Figure 2.1 Implementation model.*

### 2.2 PS5000 Workstation SCU

The PS5000 Workstation will only perform the role of SCU. Only the SOP Class Computed Radiography Image Storage is supported. The supported SOP Class conforms to a Standard Extended SOP Class as defined in Part 2 of the DICOM 3.0 document. Thus the standard SOP Class UID for Computed Radiography Image Storage can still be employed.

## 3 AE SPECIFICATIONS

### 3.1 Supported Role

Only SCU functionality.

### 3.2 Supported SOP Class

SOP Class: Computed Radiography Image Storage.

SOP Class UID: 1.2.840.10008.5.1.4.1.1.1

### 3.3 Association Establishment

#### 3.3.1.1 General

- ▶ Protocol Version 1
- ▶ Default Calling AE title PS5000 (configurable per system)
- ▶ DICOM Application Context UID 1.2.840.10008.3.1.1.1
- ▶ Maximum PDU length 65536 bytes (64 Kbytes)
- ▶ Implementation Version Name PS5000-SW3.1

- ▶ Implementation UID 1.3.51.0.7.6290.3.1

### 3.3.2 Asynchronous Nature

The AE will never send any data in an asynchronous fashion.

Receiving asynchronous transmissions will result in the association being aborted.

### 3.3.3 Association Initiation

The PS5000 will initiate a separate association for each CR image to be transmitted.

Extended Negotiation is not called for.

### 3.3.4 Transfer Syntax

The AE will offer the following transfer syntaxes for the SCP to choose from:

Transfer Syntax	UID
* DICOM Implicit VR Little Endian	1.2.840.10008.1.2
* DICOM Explicit VR Little Endian	1.2.840.10008.1.2.1
* DICOM Explicit VR Big Endian	1.2.840.10008.1.2.2

*Table 3.1 Transfer syntaxes.*

## 3.4 List of Transmitted DICOM Items

- ▶ Group = group number (HEX notation)
- ▶ Elem = element number (HEX notation)
- ▶ VR = Value Representation

\* UI: Unique Identifier (max 64)  
 \* US: Unsigned short  
 \* AE: Application entity name  
 \* DA: Date string  
 \* IS: Integer string  
 \* LO: Long string (max 64)  
 \* SH: Short string (max 16)  
 \* SQ: Sequenced item

\* UL: Unsigned long  
 \* CS: Code string (both max 16)  
 \* TM: Time string  
 \* DS: Decimal string  
 \* LT: Long text (max 10240)  
 \* ST: Short text (max 1024)  
 \* FD: Double precision binary

- ▶ TE = Type element.
- ▶ VM = Value Multiplicity.

For type 2 elements preceded by \*\* there is presently no information available; these elements will be sent with length zero.

### 3.4.1 Patient Information Entity

#### 3.4.1.1 Patient Module

Group	Element	VR	TE	Name
0010	0010	PN	2	Patient's name
0010	0020	LO	2	Patient ID
0010	0030	DA	2	Patient's birth date
0010	0040	CS	2	Patient's sex

### 3.4.2 Study Information Entity

#### 3.4.2.1 General Study Module

Group	Element	VR	TE	Name
0020	000D	UI	1	Study instance UID
0008	0020	DA	2	Study date (1)
0008	0030	TM	2	Study time (1)
**0008	0090	PN	2	Referring physician's name
0020	0010	SH	2	Study ID (2)
0008	0050	SH	2	Accession number (RIS ID)
0008	1030	LO	3	Study description (Exam type)
0008	1060	PN	3	Name of physician reading study (Radiologist)

#### Notes:

1. Information not available; a copy of Acquisition data/time is inserted.
2. Format: <One character ID-station-ID><ID-station-session-nr>.

### 3.4.3 Series Information Entity

#### 3.4.3.1 General Series Module

Group	Element	VR	TE	Name
**0018	0015	CS	2	Body part examined
0018	5101	CS	2	View position
0018	1260	SH	3	Screen type (Plate type)

### 3.4.4 Equipment Information Entity

#### 3.4.4.1 General Equipment Module

Group	Element	VR	TE	Name
0008	0070	LO	2	Manufacturer (fixed AGFA)
0008	0080	LO	3	Institution's name (Institution ID, Hospital name)
0008	1010	SH	3	Station name (see Note)
0008	1040	LO	3	Department
0008	1090	LO	3	Manufacturer's model name (fixed 5140)
0018	1000	LO	3	Device serial number

**Note:**

Format <User-Defined-Digitizer-Name>^<One character ID-Station-ID>

### 3.4.5 Image Information Entity

#### 3.4.5.1 General Image Module

Group	Element	VR	TE	Name
0008	0008	CS	3	Image type (fixed DERIVED\PRIMARY)
0020	0013	IS	2	Image number (always 1)
0020	1002	IS	3	Images in acquisition (always 1)
0008	0022	DA	3	Acquisition date (Identification date)
0008	0032	TM	3	Acquisition time (Identification time)
0020	4000	LT	3	Image comment (see Note)

**Note:**

Format <Comment-proper>^<User-info>

#### 3.4.5.2 Image Pixel Module

Group	Element	VR	TE	Name
0028	0002	US	1	Samples per pixel / Number of planes (always 1)
0028	0004	CS	1	Photometric interpretation (fixed MONOCHROME1)
0028	0010	US	1	Rows
0028	0011	US	1	Columns
0028	0100	US	1	Bits allocated
0028	0101	US	1	Bits stored
0028	0102	US	1	High bit
0028	0103	US	1	Pixel representation (0 for unsigned, 1 for signed)
7FE0	0010	??	1	Pixel data (?? can be OB or OW)

### 3.4.5.3 CR Image Module

Group	Element	VR	TE	Name
0018	1004	LO	3	Plate ID (Cassette number)
0018	1401	LO	3	DIG Acquisition Device Processing Code (ID menu number)
0018	1402	CS	3	Cassette orientation
0018	1403	CS	3	Cassette size (Plate size)
0018	1404	US	3	Exposures on plate (Usage count)
0018	6000	DS	3	Sensitivity (Exposure class)

### 3.4.5.4 Overlay Plane Module (Note 1)

Group	Element	VR	TE	Name
6000	0010	US	1C	Rows in overlay
6000	0011	US	1C	Columns in overlay
6000	0040	CS	1C	Overlay type (fixed G for graphics)
6000	0050	SS	1C	Origin (VM is 2: always 0 0)
6000	0100	US	1C	Bits allocated
6000	0102	US	1C	Bit position
6000	3000	OW	1C	Overlay data (required if overlay data not in image)

**Note:**

Optional module; presently not used.

### 3.4.5.5 Modality LUT Module

Group	Element	VR	TE	Name
0028	1052	DS	1C	Rescale intercept
0028	1053	DS	1C	Rescale slope
0028	1054	LO	1C	Rescale type; must be US (Note 1), OD (Note 2), LOG_E REL (Note 3) or OD REL (Note 4)

#### Notes:

1. US: unspecified; used only if data for one of the other types is missing or invalid; in that case, no VOI module is added.
2. OD: DICOM optical densities in multiples of 0.001 density; a VOI module is present, containing a window center and width.
3. LOG\_E REL: pixel values are linearly related to the Log Exposure on the image plate; the maximum pixel value corresponds to a delta LogE of 3.2767 above the LogE for the minimum pixel value; in this case, a VOI module (Sequenced item) is present, containing a lookup table.
4. OD REL: the pixel data are strictly proportional to optical densities; the exact relationship is NOT specified, but is guaranteed of the form:  
 $d = h.p. + z$  with  $h > 0.0$ , where:  
d: density value  
p: pixel value  
h: slope  
z: offset

A VOI module is present, containing a window center and width.

### 3.4.5.6 VOI LUT Module (Note 1)

Group	Element	VR	TE	Name
0028	3010	SQ	3	VOI LUT sequence (Note 2)
>0028	3002	US	1C	LUT descriptor (table-size, table-zero, table-depth) (Note 3)
>0028	3003	LO	3	LUT explanation
>0028	3006	US	1C	LUT data
>0028	1050	DS	3	Window center (Notes 2 and 4)
>0028	1051	DS	3	Window width (Notes 2 and 4)

#### Notes:

1. Not present for rescale type US images.
2. Either the sequenced item 0028,3010 or Window center/width is present if rescale type is not US (see Modality LUT Module description).
3. table-size: number of entries in LUT table (interpretation is US).  
table-zero: input pixel value for first element in LUT table (interpretation is US or SS depending on image).  
table-depth: number of bits per table entry (8 or 16).
4. If window center and width are specified, the data are such that no pixel values are discarded.

### 3.4.5.7 SOP Common Module

Group	Element	VR	TE	Name
0008	0016	UI	1	SOP Class UID (fixed 1.2.840.10008.5.1.4.1.1)
0008	0018	UI	1	SOP Instance UID (Unique identifier)
0008	0005	CS	1	Character set (fixed ISO_IR 100)
0008	0012	DA	3	Instance creation date
0008	0013	TM	3	Instance creation time

### 3.4.6 Added Standard Element

Group	Element	VR	TE	Name
0018	1164	DS	3	Imager pixel spacing (Note 1)
0028	0030	DS	3	Pixel spacing in patient (Note 2)

#### Notes:

1. <row spacing>\<column spacing> in millimeters.  
Standard element in X-Ray Angiographic Image Object.
2. <row spacing>\<column spacing> in millimeters.  
Standard element in CT Image Object.  
Contains the same data as 0018,1164.

### 3.4.7 Private Elements

Group	Element	VR	TE	Name
0019	0010	LO	1	Private Identification Code ( fixed AGFA)
0019	1010	LO	3	Image Processing Parameters (Note 1)
0019	1011	LO	3	Identification Data (Note 2)
0019	1013	LO	3	Sensitometry Name
0019	1014	ST	3	Window/Level List (Note 3)
0019	1015	LO	3	Dose Monitoring List (Note 4)
0019	1016	LO	3	Other Info (Note 5)

#### Notes:

1. has the form MENU=menu CC=cc MC=mc EC=ec LR=lr NR=nr, where:

menu is an integer image processing number.

cc is an integer specifying the collimation configuration.

mc is a real number specifying the musica contrast.

ec is a real number specifying the edge contrast.

lr is a real number specifying the latitude reduction.

nr is a real number specifying the noise reduction.

\*All real numbers are written with 2 digits after the decimal point.

\*All above undescribed parts must be literally included.

2. has the form x name, where:

x is a one-character ID station identification.

Name is an image-identifying string consisting of either pyramidname\_version0 or spooling-ID.

3. has the form W1/L1,W2/L2,...,Wi/Li,Wn/Ln, where:

Wi is the i-th window width specification as a real number

Li is the i-th window level specification as a real number

\*i is an integer number in the interval (1,n), n being the total number of window/level specifications.

\*All real numbers are written with 2 digits after the decimal point.

\*All above undescribed parts must be literally included.

\*The notation ... means any number of specifications.

4. has the form D1,D2,...,Di,...,Db, where:

Di is the i-th LgM (dos) specification as a real number.

\*i is an integer number in the interval [1,n], n being the total number of LgM (dose) specifications.

\*All real numbers are written with 2 digits after the decimal point.

\*All above undescribed parts must be literally included.

\*The notation ... means any number of specifications.

5. Reserved for future extensions.

## 4 COMMUNICATION PROFILES

The PS5000 Workstation provides DICOM V3.0 TCP/IP Network Communication Support as defined in Part 8 of the DICOM Standard.

## 5 SUPPORT FOR EXTENDED CHARACTER SETS

The AE specifies ISO\_IR 100 as extended character set. Any character sent with the high bit ON must be interpreted by the SCP as a Latin Alphabet 1 character (ISO 8859-1).

## 6 ACRONYMS AND ABBREVIATIONS

The following symbols and abbreviations are used in this conformance statement:

AE	Application Entity
DICOM	Digital Imaging and Communications in Medicine
SCP	Service Class Provider
SCU	Service Class User
SCP	Service Class Provider
SOP	Service-Object Pair
TCP/IP	Transmission Control Protocol/Internet Protocol
UID	Unique Identifier