RAYPLAN 1

DICOM Conformance Statement

RayPlan

RayStation 4

Disclaimer

This DICOM Conformance Statement specifies the DICOM interface for the complete RayStation treatment planning system.

RayPlan is a version of RayStation where some of the described DICOM interfaces are not available, e.g., RT Ion Plans, arc plans (where gantry rotation != NONE), 4DCT, cones and MLCY.

1 Overview

This document specifies the DICOM interface for the treatment planning system RayStation. RayStation can import CT, MR and PET images, RT Structure Sets, RT Plans, RT Ion Plans, RT Doses and Spatial Registration objects and can export all of the aforementioned plus DRR Images (RT Image) for setup and treatment beams.

RayStation supports import either from disc or over the DICOM network protocol. The latter can be performed either via either Query/Retrieve (typically from PACS) or by accepting data pushed to RayStation via a separate Storage SCP service. RayStation can export either to disk or over the DICOM network protocol.

1.1 Network services

SOP Class Name	SOP Class UID	Provider of Service (SCP)	User of Service (SCU)
Transfer			
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Yes	Yes
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Yes	Yes
Spatial Registration (REG) Storage	1.2.840.10008.5.1.4.1.1.66.1	Yes	Yes
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Yes	Yes
RT Image Storage	1.2.840.10008.5.1.4.1.1.481.1	No	Yes
RT Dose Storage	1.2.840.10008.5.1.4.1.1.481.2	Yes	Yes
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3	Yes	Yes
RT Plan Storage	1.2.840.10008.5.1.4.1.1.481.5	Yes	Yes
RT Ion Plan Storage	1.2.840.10008.5.1.4.1.1.481.8	Yes	Yes
Query/Retrieve			
Patient Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.1.1	No	Yes
Study Root Query/Retrieve Information Model – FIND	1.2.840.10008.5.1.4.1.2.2.1	No	Yes
Patient Root Query/Retrieve Information Model – MOVE	1.2.840.10008.5.1.4.1.2.1.2	No	Yes

2 Table of Content

3 Introduction

3.1 Revision History

Date	Version	Comment
2016-06-10	1.0	First version

3.2 Audience

This document is written for users that need to understand how RayPlan will integrate into their healthcare facility. This includes both those responsible for overall imaging network policy and architecture, as well as integrators who need to have a detailed understanding of the DICOM features of the product. This document contains some basic DICOM definitions so that any reader may understand how this product implements DICOM features. However, integrators are expected to fully understand all the DICOM terminology, how the tables in this document relate to the product's functionality, and how that functionality integrates with other devices that support compatible DICOM features.

3.3 Remarks

The scope of this DICOM Conformance Statement is to facilitate integration between RayPlan and other DICOM products. The Conformance Statement should be read and understood in conjunction with the DICOM Standard. DICOM by itself does not guarantee interoperability. The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality.

This Conformance Statement is not supposed to replace validation with other DICOM equipment to ensure proper exchange of intended information. In fact, the user should be aware of the following important issues:

- The comparison of different Conformance Statements is just the first step towards assessing interconnectivity and interoperability between the product and other DICOM conformant equipment.
- Test procedures should be defined and executed to validate the required level of interoperability with specific compatible DICOM equipment, as established by the healthcare facility.

3.3.1 Interoperability validation needed

When using RayPlan together with other software, the DICOM conformance statements must be compared and relevant validation tests run. The DICOM standard by itself does not guarantee interoperability. The Conformance Statement does, however, facilitate a first-level comparison for interoperability between different applications supporting compatible DICOM functionality. RaySearch is also active within the IHE-RO. Contact RaySearch for more info regarding adherence to IHE-RO profiles.

3.3.2 DICOM revision

The module tables listed in the last two chapters are based on part 3 of the DICOM-standard revision 2009. For extra clarity all attributes in the referenced modules have been listed, even the ones that are not used by RayPlan.

3.4 Terms and definitions

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitons of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples : Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – the externally known name of an Application Entity, used to identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between Application Entities. Example: DICOM network protocol.

Association – a network communication channel set up between Application Entities.

Attribute – a unit of information in an object definition; a data element identified by a tag. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010,0020), Accession Number (0008,0050), Photometric Interpretation (0028,0004), Procedure Code Sequence (0008,1032).

Information Object Definition (IOD) – the specified set of Attributes that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The Attributes may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Module – a set of Attributes within an Information Object Definition that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of Association establishment that allows Application Entities to agree on the types of data to be exchanged and how that data will be encoded.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Service Class Provider (SCP) – role of an Application Entity that provides a DICOM network service; typically, a server that performs operations requested by another Application Entity (Service Class User). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an Application Entity that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – an information object; a specific occurrence of information exchanged in a SOP Class. Examples: a specific x-ray image.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the “group” and the “element”. If the “group” number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010,0020) [Patient ID], (07FE,0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: JPEG compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique “dotted decimal” string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data element.

3.5 Basics of DICOM communication

This section describes terminology used in this Conformance Statement for the non-specialist. This section is not a substitute for training about DICOM, and it makes many simplifications about the meanings of DICOM terms.

Two Application Entities (devices) that want to communicate with each other over a network using DICOM protocol must first agree on several things during an intial network "handshake". One of the two devices must initiate an Association (a connection to the other device), and ask if specific services, information, and encoding can be supported by the other device (Negotiation).

DICOM specifes a number of network services and types of information objects, each of which is called an Abstract Syntax for the Negotiation. DICOM also specifes a variety of methods for encoding data, denoted Transfer Syntaxes. The Negotiation allows the initiating Application Entity to propose combinations of Abstract Syntax and Transfer Syntax to be used on the Association; these combinations are called Presentation Contexts. The receiving Application Entity accepts the Presentation Contexts it supports.

For each Presentation Context, the Association Negotiation also allows the devices to agree on Roles – which one is the Service Class User (SCU - client) and which is the Service Class Provider (SCP - server). Normally the device initiating the connection is the SCU, i.e., the client system calls the server, but not always.

The Association Negotiation finally enables exchange of maximum network packet (PDU) size, security information, and network service options (called Extended Negotiation information). The Application Entities, having negotiated the Association parameters, may now commence exchanging data. Common data exchanges include queries for worklists and lists of stored images, transfer of image objects and analyses (structured reports), and sending images to film printers. Each exchangeable unit of data is formatted by the sender in accordance with the appropriate Information Object Definition, and sent using the negotiated Transfer Syntax. There is a Default Transfer Syntax that all systems must accept, but it may not be the most efficient for some use cases. Each transfer is explicitly acknowledged by the receiver with a Response Status indicating success, failure, or that query or retrieve operations are still in process.

Two Application Entities may also communicate with each other by exchanging media (such as a CD-R). Since there is no Association Negotiation possible, they both use a Media Application Profile that specifies "pre-negotiated" exchange media format, Abstract Syntax, and Transfer Syntax.

3.6 Abbreviations

Name	Meaning
AE	Application Entity
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
IHE / IHE-RO	Integrating the Healthcare Enterprise. IHE-RO deals with integrating Radiation Oncology.
IOD	Information Object Definition
JPEG	Joint Photographic Experts Group
MR	Magnetic Resonance Imaging
PACS	Picture Archiving and Communication System
PET	Positron Emission Tomography
PTS	Proton Planning System (used by IBA)
RT	Radiotherapy
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
TPS	Treatment Planning System

3.7 References

- NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/

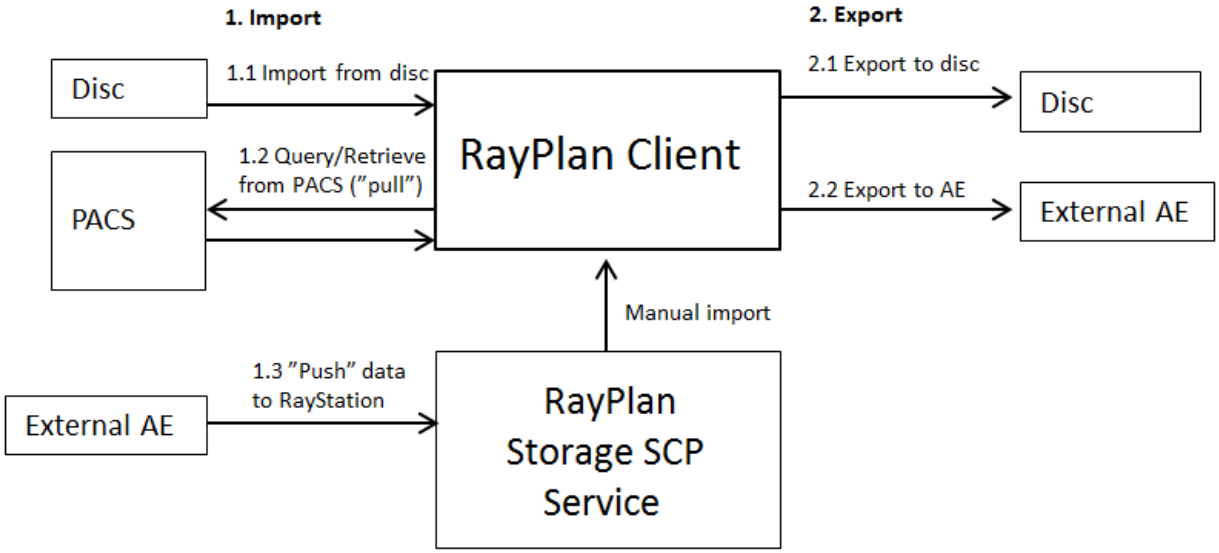
4 Networking

RayPlan supports both file-based and network-based data transfer. The network communication involves datasets pushed to and from RayPlan via C-STORE commands and Query/Retrieve.

4.1 Implementation model

4.2 Application data flow

RayPlan is a treatment planning system, i.e. a software program for planning and analysis of radiation therapy plans. Typically, a treatment plan is created by importing patient images obtained from a CT scanner, importing and/or defining regions of interest (possibly with the help of MR and PET-images), deciding on a treatment setup and objectives, optimizing the treatment parameters, comparing rival plans to find the best compromise, computing the clinical dose distribution, approving the plan and finally exporting the data. The diagram below describes how RayPlan interacts with the DICOM world. RayPlan consists of two AE Titles, the client and the standalone Storage SCP service.



There are three ways of importing into RayPlan (file based, Query/Retrieve a.k.a "pull" and Storage SCP a.ka. "push") and two ways of exporting (to file or over network to an external AE)

4.2.1 Functional Definition of AEs

4.2.1.1 Functional Definition of "RayPlan Application Entity"

RayPlan can act both as an SCU and SCP. When RayPlan performs import using Query/Retrieve an internal Storage SCP temporarily is invoked automatically when quering the PACS. AE settings for RayPlan are done in the separate ClinicSettings application.

4.2.1.1 Functional Definition of "RayPlan Storage SCP Service"

For transfers when the RayPlan client is not running the RayPlan Storage SCP Service is provided. This is a standalone Storage SCP service accepting incoming DICOM transfers and saving the files to a network share. The user then manually imports the data to the RayPlan database using a version of the file-based import in the RayPlan client. Settings for RayPlan Storage SCP Service are located in an separate .xml-file. They can be entered automatically during installation.

4.2.2 Transfer syntax

All data exported from RayPlan, both via file and network, uses implicit VR. This is due to the inherit limits of DICOM, where explicit VR limits the length of attributes like ROI contour data in RT Structs and block data in RT Plans or RT Ion

Plans.

4.3 Importing data to RayPlan

There are three ways to import DICOM datasets into RayPlan, File-based, Query/Retrieve and via RayPlan's Storage SCP Service. When importing to a currently open patient, datasets that are detected as already imported are greyed out in the GUI.

File based

RayPlan will search recursively through all folders for DICOM datasets in the specified path. The patient information is retrieved from the found datasets and a list of found patients is displayed for the user, regardless of folder structure. When the user selects a patient, RayPlan will list importable datasets (CT, MR, PET, RT Struct, RT Plan, RT Ion Plan, and RT Dose) that can be selected for import to the RayPlan patient database.

Query/Retrieve

When DICOM import using Query/Retrieve is selected, the user selects a pre-defined AE-title. RayPlan will then query the server for all patients available or a specific patients if the search criteria is provided, using the C-FIND service with a query on Patient level, root set to Patient and with Patient ID set to "*" (wildcard). Note that some PACS require the Patient ID-field to be blank, in which case try quering again with an empty Patient ID. The list of patients is presented to the user.

When the user expands a patient, first a new C-FIND is sent to the remote server, this time on Series level, root set to Study and with the specified patient as search criteria. Next C-FIND (for all image series) and C-MOVE (for all other modalities) requests are performed for each found series. These are recieved over a separate DICOM association, running in RayPlan on port 104. This is done to obtain more information about each series, helping the user to select what series to import into the RayPlan database. When the information has been obtained all series that supported are listed. The user can then select whole studies or individual series for import, but only from one patient at the time.

By clicking on the import button, the user initiates new C-MOVE requests on series level, with root set to Patient for each of the series selected.

Storage SCP

RayPlan provides a separate Storeage SCP service that can be run either locally or on a separate machine. This service is designed to listen to C-MOVE-requests and save incoming datasets to a "DICOM Inbox". Sending datasets to the Storage SCP does in other words not automatically store them in the RayPlan database. All incoming datasets are saved as files with implicit VR and separated into folders depending on Patient ID and transfer date. If the service is unable to save the incoming files (e.g. disc full), the network assocation is aborted. As the DICOM Inbox is only regarded as a temporary storage location, the service is setup to delete the folders in the DICOM Inbox after a defined number of days.

If the location of the DICOM Inbox has been setup in RayPlan a third import option, SCP, will appear in the GUI. This option shows the folders located in the DICOM Inbox and allows the user to choose from which folder to list the data sets that are available for import to the RayPlan database. The user also has the option of automatically deleting the files from the DICOM Inbox after succesful import.

4.4 Exporting data from RayPlan

RayPlan supports exporting data either to files or via C-STORE requests to a Storage SCP (e.g. a PACS).

All images (CT, MR and PET) are always exported identically as imported to the RayPlan patient database. No tags are added or removed by RayPlan. Note however that if RayPlan's import filters have modified the files, the modified

version will be exported and not the original.

RayPlan always generates new RT Structs, RT Ion Plans, and RT Plans, with new SOP Instance UID's, even if the data is originally imported to RayPlan. Each BeamSet in RayPlan is exported as one RT Plan or RT Ion Plan.

Calculated dose distribution will be exported as RT Dose datasets.

DRR's will be exported as RT Images.

4.5 RayPlan DICOM UID's

DICOM UID's generated by RayPlan follow the following pattern:
1.2.826.0.1.3680043.8.176.YYYY.MM.DDhh.mm.ss.ms.ii.rr

YYYY = Year
MM = Month
DD = Day
hh = Hour (24h)
mm = Minute
ss = Second
ms = Millisecond
ii = Sequence number
rr = 10 digit random number

For each modality generated by RayPlan, the Series Instance UID is the same as the SOP Instance UID, followed by a ".1". For example, if the RT Plan or RT Ion Plan SOP Instance UID is 1.2.826.0.1.3680043.8.176.2011.11.2911.22.33.44.1.1234567890, then the Series Instance UID will be 1.2.826.0.1.3680043.8.176.2011.11.2911.22.33.44.1.1234567890.1. For RT Dose of type Beam, the Series Instance UID is based on the SOP Instance UID for the first beam.

5 Support for character sets

RayPlan currently supports DICOM import and export of ISO_IR 100 (ISO 8859-1 / Latin 1) and ISO_IR 192 (Unicode in UTF-8). This is controlled via the RayPlan configuration file. RayPlan will replace characters that are not included in the specific character set with a question mark during export.

6 Security profiles

Currently no security profiles are supported during network communication.

7 Import IOD definitions

7.1 CT Image storage SOP class

Image datasets are stored in the system exactly as imported. The only exception to this is if an Import Filter modified the file or the Patient ID (MRN) is overriden at import. The definitions below refer only to whether the attribute is actively used by the system or not. The General Image Module is not used since the modality-specific image module contains all needed attributes.

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	General Series	Yes
	Clinical Trial Series	No
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Image	General Image	No
	Image Plane	Yes
	Image Pixel	Yes
	Contrast/Bolus	No
	Device	No
	Specimen	No
	CT Image	Yes
	Overlay Plane	No
	VOI LUT	No
	SOP Common	Yes

7.1.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Read	Cannot be empty. When importing a new patient with the same Patient ID and Patient Name as an existing patient, a suffix is added to the name of the new patient. When adding data to a current patient, the names may differ.
Patient ID	(0010,0020)	2	Read	Unique identifier for patient. Patients are separated based on the Patient ID. When data is imported, the content in this attribute assure that different patients are not mixed.
Issuer of Patient ID	(0010,0021)	3	Not Read	

Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Read	
Patient's Birth Date	(0010,0030)	2	Read	Attribute is not validated during import. Patient's Birth Date is set in the patient database based on the first imported dataset.
Patient's Sex	(0010,0040)	2	Read	Attribute is not validated during import. Patient's Sex is set in the patient database based on the first imported dataset. If Patient's Sex is not encoded, the default value of "O" is used. Supported values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Read	
Patient's Birth Time	(0010,0032)	3	Not Read	
Other Patient IDs	(0010,1000)	3	Not Read	
Other Patient IDs Sequence	(0010,1002)	3	Not Read	
Other Patient Names	(0010,1001)	3	Not Read	
Ethnic Group	(0010,2160)	3	Not Read	
Patient Comments	(0010,4000)	3	Not Read	
Patient Species Description	(0010,2201)	1C	Not Read	
Patient Species Code Sequence	(0010,2202)	1C	Not Read	
Patient Breed Description	(0010,2292)	2C	Not Read	
Patient Breed Code Sequence	(0010,2293)	2C	Not Read	
Breed Registration Sequence	(0010,2294)	2C	Not Read	
Responsible Person	(0010,2297)	2C	Not Read	
Responsible Person Role	(0010,2298)	1C	Not Read	
Responsible Organization	(0010,2299)	2C	Not Read	
Patient Identity Removed	(0012,0062)	3	Not Read	
De-identification Method	(0012,0063)	1C	Not Read	
De-identification Method Code Sequence	(0012,0064)	1C	Not Read	

7.1.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Read	During import, studies are separated based on the Study Instance UID. All data imported to a patient is placed in one internal equivalent to a DICOM study (i.e. Study Instance UID do not separate clinical data internally). The Study Instance UID is stored from the first imported dataset to be used

				at a future export.
Study Date	(0008,0020)	2	Read	
Study Time	(0008,0030)	2	Read	
Referring Physician's Name	(0008,0090)	2	Read	
Referring Physician Identification Sequence	(0008,0096)	3	Not Read	
Study ID	(0020,0010)	2	Read	
Accession Number	(0008,0050)	2	Read	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Read	
Study Description	(0008,1030)	3	Not Read	
Physician(s) of Record	(0008,1048)	3	Not Read	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Read	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Read	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Read	
Requesting Service Code Sequence	(0032,1034)	3	Not Read	
Referenced Study Sequence	(0008,1110)	3	Not Read	
Procedure Code Sequence	(0008,1032)	3	Not Read	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Read	

7.1.3 General Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Read	Supported value: CT. Unsupported value: OT.
Series Instance UID	(0020,000E)	1	Read	During import, series are separated based on the Series Instance UID. If a series is imported, all data in that series is imported.
Series Number	(0020,0011)	2	Read	
Laterality	(0020,0060)	2C	Not Read	
Series Date	(0008,0021)	3	Read	
Series Time	(0008,0031)	3	Read	
Performing Physicians' Name	(0008,1050)	3	Not Read	
Performing Physician Identification Sequence	(0008,1052)	3	Not Read	
Protocol Name	(0018,1030)	3	Read	Used to identify the protocol during import.
Series Description	(0008,103E)	3	Read	Used to identify series during import.
Series Description Code Sequence	(0008,103F)	3	Not Read	

Operators' Name	(0008,1070)	3	Read	
Operator Identification Sequence	(0008,1072)	3	Not Read	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Read	
Related Series Sequence	(0008,1250)	3	Not Read	
Body Part Examined	(0018,0015)	3	Not Read	
Patient Position	(0018,5100)	2C	Read	Supported values: HFS, HFP, FFS, FFP.
Smallest Pixel Value in Series	(0028,0108)	3	Not Read	
Largest Pixel Value in Series	(0028,0109)	3	Not Read	
Request Attributes Sequence	(0040,0275)	3	Not Read	
Performed Procedure Step ID	(0040,0253)	3	Not Read	
Performed Procedure Step Start Date	(0040,0244)	3	Not Read	
Performed Procedure Step Start Time	(0040,0245)	3	Not Read	
Performed Procedure Step Description	(0040,0254)	3	Not Read	
Performed Protocol Code Sequence	(0040,0260)	3	Not Read	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Read	
Anatomical Orientation Type	(0010,2210)	1C	Not Read	

7.1.4 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Read	Frame of Reference UID is required to be the same for all images in the same series.
Position Reference Indicator	(0020,1040)	2	Read	

7.1.5 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Not Read	
Institution Name	(0008,0080)	3	Not Read	
Institution Address	(0008,0081)	3	Not Read	
Station Name	(0008,1010)	3	Read	Used to get the correct CT to Density table inside RayPlan.
Institutional Department Name	(0008,1040)	3	Not Read	
Manufacturer's Model Name	(0008,1090)	3	Not Read	
Device Serial Number	(0018,1000)	3	Not Read	
Software Versions	(0018,1020)	3	Not Read	
Gantry ID	(0018,1008)	3	Not Read	
Spatial Resolution	(0018,1050)	3	Not Read	

Date of Last Calibration	(0018,1200)	3	Not Read	
Time of Last Calibration	(0018,1201)	3	Not Read	
Pixel Padding Value	(0028,0120)	1C	Read	If pixel padding is present within the region used for dose computation, the resulting dose may be wrong.

7.1.6 Image Plane Module

Attribute name	Tag	Type	Usage	Comment
Pixel Spacing	(0028,0030)	1	Read	Cannot be greater than 5 mm.
Image Orientation (Patient)	(0020,0037)	1	Read	Image orientation must be transversal.
Image Position (Patient)	(0020,0032)	1	Read	Converted to internal image corner. Used to find slice direction, which must be constant througout the series and along the Z-axis.
Slice Thickness	(0018,0050)	2	Not Read	If there are missing slices in the image set, RayPlan will extrapolate the neighboring slice so that the gap will not be visible.
Slice Location	(0020,1041)	3	Not Read	

7.1.7 Image Pixel Module

Attribute name	Tag	Type	Usage	Comment
Samples per Pixel	(0028,0002)	1	Read	Specialized in modality specific Image Module. Supported value: 1.
Photometric Interpretation	(0028,0004)	1	Read	Specialized in modality specific Image Module. Supported value: MONOCHROME2. Unsupported value: MONOCHROME1.
Rows	(0028,0010)	1	Read	Number of rows. Read from first imported dataset in image series and is required to be consistent for all datasets in the series.
Columns	(0028,0011)	1	Read	Number of columns. Read from first imported dataset in image series and is required to be consistent for all datasets in the series.
Bits Allocated	(0028,0100)	1	Read	Specialized in modality specific Image Module Supported value: 16.
Bits Stored	(0028,0101)	1	Read	Must be equal to or less than Bits Allocated. Specialized in modality specific Image Module.
High Bit	(0028,0102)	1	Read	Specialized in modality specific Image Module.
Pixel Representation	(0028,0103)	1	Read	Is required to be consistent for all datasets in the same series. Supported values: 0, 1.
Pixel Data	(7FE0,0010)	1C	Read	

Planar Configuration	(0028,0006)	1C	Not Read	
Pixel Aspect Ratio	(0028,0034)	1C	Not Read	
Smallest Image Pixel Value	(0028,0106)	3	Not Read	
Largest Image Pixel Value	(0028,0107)	3	Not Read	
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	Not Read	
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Not Read	
Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Not Read	
Red Palette Color Lookup Table Data	(0028,1201)	1C	Not Read	
Green Palette Color Lookup Table Data	(0028,1202)	1C	Not Read	
Blue Palette Color Lookup Table Data	(0028,1203)	1C	Not Read	
ICC Profile	(0028,2000)	3	Not Read	
Pixel Data Provider URL	(0028,7FE0)	1C	Not Read	
Pixel Padding Range Limit	(0028,0121)	1C	Read	
Pixel Data 32	(7FE0,0010)	1C	Read	Alternative view of Pixel Data.
Pixel Data Float	(7FE0,0010)	1C	Read	Alternative view of Pixel Data.

7.1.8 CT Image Module

Attribute name	Tag	Type	Usage	Comment
Image Type	(0008,0008)	1	Read	Supported values: ORIGINAL, PRIMARY, SECONDARY, AXIAL. Unsupported values: LOCALIZER, SCREEN SAVE.
Samples per Pixel	(0028,0002)	1	Read	Supported value: 1.
Photometric Interpretation	(0028,0004)	1	Read	Supported value: MONOCHROME2. Unsupported value: MONOCHROME1.
Bits Allocated	(0028,0100)	1	Read	Supported value: 16.
Bits Stored	(0028,0101)	1	Read	Must be greater than 0 and less than or equal to Bits Allocated. Is required to be consistent for all datasets in the same CT series. Supported values: 12, 13, 14, 15, 16.
High Bit	(0028,0102)	1	Read	HighBit must be equal to Bits Stored - 1. Is required to be consistent for all datasets in the same CT series.
Rescale Intercept	(0028,1052)	1	Read	Must be the same for all images in the image stack.
Rescale Slope	(0028,1053)	1	Read	Must be the same for all images in the image stack.
Rescale Type	(0028,1054)	1C	Read	Supported value: HU.

KVP	(0018,0060)	2	Not Read	
Acquisition Number	(0020,0012)	2	Read	
Scan Options	(0018,0022)	3	Not Read	
Data Collection Diameter	(0018,0090)	3	Not Read	
Data Collection Center (Patient)	(0018,9313)	3	Not Read	
Reconstruction Diameter	(0018,1100)	3	Not Read	
Reconstruction Target Center (Patient)	(0018,9318)	3	Not Read	
Distance Source to Detector	(0018,1110)	3	Not Read	
Distance Source to Patient	(0018,1111)	3	Not Read	
Gantry/Detector Tilt	(0018,1120)	3	Not Read	
Table Height	(0018,1130)	3	Not Read	
Rotation Direction	(0018,1140)	3	Not Read	
Exposure Time	(0018,1150)	3	Not Read	
X-Ray Tube Current	(0018,1151)	3	Not Read	
Exposure	(0018,1152)	3	Not Read	
Exposure in µAs	(0018,1153)	3	Not Read	
Filter Type	(0018,1160)	3	Not Read	
Generator Power	(0018,1170)	3	Not Read	
Focal Spot	(0018,1190)	3	Not Read	
Convolution Kernel	(0018,1210)	3	Not Read	
Revolution Time	(0018,9305)	3	Not Read	
Single Collimation Width	(0018,9306)	3	Not Read	
Total Collimation Width	(0018,9307)	3	Not Read	
Table Speed	(0018,9309)	3	Not Read	
Table Feed per Rotation	(0018,9310)	3	Not Read	
Spiral Pitch Factor	(0018,9311)	3	Not Read	
Exposure Modulation Type	(0018,9323)	3	Not Read	
Estimated Dose Saving	(0018,9324)	3	Not Read	
CTDIvol	(0018,9345)	3	Not Read	
CTDI Phantom Type Code Sequence	(0018,9346)	3	Not Read	
Anatomic Region Sequence	(0008,2218)	3	Not Read	
Primary Anatomic Structure Sequence	(0008,2228)	3	Not Read	
Calcium Scoring Mass Factor Patient	(0018,9351)	3	Not Read	
Calcium Scoring Mass Factor Device	(0018,9352)	3	Not Read	
Energy Weighting Factor	(0018,9353)	1C	Not Read	

CT Additional X-Ray Source Sequence	(0018,9360)	3	Not Read	

7.1.9 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Read	Supported value: 1.2.840.10008.5.1.4.1.1.2.
SOP Instance UID	(0008,0018)	1	Read	Stored internally to be used if referenced from other dataset.
Specific Character Set	(0008,0005)	1C	Read	Specific character sets are supported. If this attribute is not set, characters in the US ASCII table will be read correctly. Characters outside the US ASCII table will be replaced by a question mark if the specific character set is not encoded. Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Read	
Instance Creation Time	(0008,0013)	3	Read	
Instance Creator UID	(0008,0014)	3	Not Read	
Related General SOP Class UID	(0008,001A)	3	Not Read	
Original Specialized SOP Class UID	(0008,001B)	3	Not Read	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Read	
Timezone Offset From UTC	(0008,0201)	3	Not Read	
Contributing Equipment Sequence	(0018,A001)	3	Not Read	
Instance Number	(0020,0013)	3	Not Read	
SOP Instance Status	(0100,0410)	3	Not Read	
SOP Authorization Date and Time	(0100,0420)	3	Not Read	
SOP Authorization Comment	(0100,0424)	3	Not Read	
Authorization Equipment Certification Number	(0100,0426)	3	Not Read	
MAC Parameters Sequence	(4FFE,0001)	3	Not Read	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Read	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Read	
Original Attributes Sequence	(0400,0561)	3	Not Read	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Read	

7.2 MR Image storage SOP class

Image datasets are stored in the system exactly as imported, no changes are made. The definitions below refer only to whether the attribute is actively used by the system or not. The General Image Module is not used since the modality specific image module contains all needed attributes. Note however that if RayPlan's import filters have modified the files, the modified version will be stored and not the original.

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	General Series	Yes
	Clinical Trial Series	No
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Image	General Image	No
	Image Plane	Yes
	Image Pixel	Yes
	Contrast/Bolus	No
	Device	No
	Specimen	No
	MR Image	Yes
	Overlay Plane	No
	VOI LUT	No
	SOP Common	Yes

7.2.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Read	Cannot be empty. When importing a new patient with the same Patient ID and Patient Name as an existing patient, a suffix is added to the name of the new patient. When adding data to a current patient, the names may differ.
Patient ID	(0010,0020)	2	Read	Unique identifier for patient. Patients are separated based on the Patient ID. When data is imported, the content in this attribute assure that different patients are not mixed.
Issuer of Patient ID	(0010,0021)	3	Not Read	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Read	
Patient's Birth Date	(0010,0030)	2	Read	Attribute is not validated during import. Patient's Birth Date is set in the patient database based on the first imported dataset.
Patient's Sex	(0010,0040)	2	Read	Attribute is not validated during import. Patient's Sex is set in the patient database based on the first imported dataset. If Patient's Sex is not encoded, the default

				value of "O" is used. Supported values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Read	
Patient's Birth Time	(0010,0032)	3	Not Read	
Other Patient IDs	(0010,1000)	3	Not Read	
Other Patient IDs Sequence	(0010,1002)	3	Not Read	
Other Patient Names	(0010,1001)	3	Not Read	
Ethnic Group	(0010,2160)	3	Not Read	
Patient Comments	(0010,4000)	3	Not Read	
Patient Species Description	(0010,2201)	1C	Not Read	
Patient Species Code Sequence	(0010,2202)	1C	Not Read	
Patient Breed Description	(0010,2292)	2C	Not Read	
Patient Breed Code Sequence	(0010,2293)	2C	Not Read	
Breed Registration Sequence	(0010,2294)	2C	Not Read	
Responsible Person	(0010,2297)	2C	Not Read	
Responsible Person Role	(0010,2298)	1C	Not Read	
Responsible Organization	(0010,2299)	2C	Not Read	
Patient Identity Removed	(0012,0062)	3	Not Read	
De-identification Method	(0012,0063)	1C	Not Read	
De-identification Method Code Sequence	(0012,0064)	1C	Not Read	

7.2.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Read	During import, studies are separated based on the Study Instance UID. All data imported to a patient is placed in one internal equivalent to a DICOM study (i.e. Study Instance UID do not separate clinical data internally). The Study Instance UID is stored from the first imported dataset to be used at a future export.
Study Date	(0008,0020)	2	Read	
Study Time	(0008,0030)	2	Read	
Referring Physician's Name	(0008,0090)	2	Read	
Referring Physician Identification Sequence	(0008,0096)	3	Not Read	
Study ID	(0020,0010)	2	Read	
Accession Number	(0008,0050)	2	Read	

Issuer of Accession Number Sequence	(0008,0051)	3	Not Read	
Study Description	(0008,1030)	3	Not Read	
Physician(s) of Record	(0008,1048)	3	Not Read	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Read	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Read	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Read	
Requesting Service Code Sequence	(0032,1034)	3	Not Read	
Referenced Study Sequence	(0008,1110)	3	Not Read	
Procedure Code Sequence	(0008,1032)	3	Not Read	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Read	

7.2.3 General Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Read	Supported value: MR. Unsupported value: OT.
Series Instance UID	(0020,000E)	1	Read	During import, series are separated based on the Series Instance UID. If a series is imported, all data in that series is imported.
Series Number	(0020,0011)	2	Read	
Laterality	(0020,0060)	2C	Not Read	
Series Date	(0008,0021)	3	Read	
Series Time	(0008,0031)	3	Read	
Performing Physicians' Name	(0008,1050)	3	Not Read	
Performing Physician Identification Sequence	(0008,1052)	3	Not Read	
Protocol Name	(0018,1030)	3	Read	Used to identify the protocol during import.
Series Description	(0008,103E)	3	Read	Used to identify series during import.
Series Description Code Sequence	(0008,103F)	3	Not Read	
Operators' Name	(0008,1070)	3	Read	
Operator Identification Sequence	(0008,1072)	3	Not Read	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Read	
Related Series Sequence	(0008,1250)	3	Not Read	
Body Part Examined	(0018,0015)	3	Not Read	
Patient Position	(0018,5100)	2C	Read	Supported values: HFS, HFP, FFS, FFP.
Smallest Pixel Value in Series	(0028,0108)	3	Not Read	

Largest Pixel Value in Series	(0028,0109)	3	Not Read	
Request Attributes Sequence	(0040,0275)	3	Not Read	
Performed Procedure Step ID	(0040,0253)	3	Not Read	
Performed Procedure Step Start Date	(0040,0244)	3	Not Read	
Performed Procedure Step Start Time	(0040,0245)	3	Not Read	
Performed Procedure Step Description	(0040,0254)	3	Not Read	
Performed Protocol Code Sequence	(0040,0260)	3	Not Read	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Read	
Anatomical Orientation Type	(0010,2210)	1C	Not Read	

7.2.4 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Read	Frame of Reference UID is required to be the same for all images in the same series.
Position Reference Indicator	(0020,1040)	2	Read	

7.2.5 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Not Read	
Institution Name	(0008,0080)	3	Not Read	
Institution Address	(0008,0081)	3	Not Read	
Station Name	(0008,1010)	3	Not Read	
Institutional Department Name	(0008,1040)	3	Not Read	
Manufacturer's Model Name	(0008,1090)	3	Not Read	
Device Serial Number	(0018,1000)	3	Not Read	
Software Versions	(0018,1020)	3	Not Read	
Gantry ID	(0018,1008)	3	Not Read	
Spatial Resolution	(0018,1050)	3	Not Read	
Date of Last Calibration	(0018,1200)	3	Not Read	
Time of Last Calibration	(0018,1201)	3	Not Read	
Pixel Padding Value	(0028,0120)	1C	Read	If pixel padding is present within the region used for dose computation, the resulting dose may be wrong.

7.2.6 Image Plane Module

Attribute name	Tag	Type	Usage	Comment
Pixel Spacing	(0028,0030)	1	Read	Cannot be greater than 5 mm.

Image Orientation (Patient)	(0020,0037)	1	Read	All image orientations are supported, as long as row and column directions are orthogonal.
Image Position (Patient)	(0020,0032)	1	Read	Converted to internal image corner. Used to find slice direction, which must be constant throughout the series.
Slice Thickness	(0018,0050)	2	Not Read	If there are missing slices in the image set, RayPlan will extrapolate the neighboring slice so that the gap will not be visible.
Slice Location	(0020,1041)	3	Not Read	

7.2.7 Image Pixel Module

Attribute name	Tag	Type	Usage	Comment
Samples per Pixel	(0028,0002)	1	Read	Specialized in modality specific Image Module. Supported value: 1.
Photometric Interpretation	(0028,0004)	1	Read	Specialized in modality specific Image Module. Supported value: MONOCHROME2. Unsupported value: MONOCHROME1.
Rows	(0028,0010)	1	Read	Number of rows. Read from first imported dataset in image series and is required to be consistent for all datasets in the series.
Columns	(0028,0011)	1	Read	Number of columns. Read from first imported dataset in image series and is required to be consistent for all datasets in the series.
Bits Allocated	(0028,0100)	1	Read	Specialized in modality specific Image Module Supported value: 16.
Bits Stored	(0028,0101)	1	Read	Must be equal to or less than Bits Allocated. Specialized in modality specific Image Module.
High Bit	(0028,0102)	1	Read	Specialized in modality specific Image Module.
Pixel Representation	(0028,0103)	1	Read	Is required to be consistent for all datasets in the same series. Supported values: 0, 1.
Pixel Data	(7FE0,0010)	1C	Read	
Planar Configuration	(0028,0006)	1C	Not Read	
Pixel Aspect Ratio	(0028,0034)	1C	Not Read	
Smallest Image Pixel Value	(0028,0106)	3	Not Read	
Largest Image Pixel Value	(0028,0107)	3	Not Read	
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	Not Read	
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Not Read	

Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Not Read	
Red Palette Color Lookup Table Data	(0028,1201)	1C	Not Read	
Green Palette Color Lookup Table Data	(0028,1202)	1C	Not Read	
Blue Palette Color Lookup Table Data	(0028,1203)	1C	Not Read	
ICC Profile	(0028,2000)	3	Not Read	
Pixel Data Provider URL	(0028,7FE0)	1C	Not Read	
Pixel Padding Range Limit	(0028,0121)	1C	Read	
Pixel Data 32	(7FE0,0010)	1C	Read	Alternative view of Pixel Data.
Pixel Data Float	(7FE0,0010)	1C	Read	Alternative view of Pixel Data.

7.2.8 MR Image Module

Attribute name	Tag	Type	Usage	Comment
Image Type	(0008,0008)	1	Read	Supported values: ORIGINAL, PRIMARY, SECONDARY, AXIAL. Unsupported value: LOCALIZER.
Samples per Pixel	(0028,0002)	1	Read	Supported value: 1.
Photometric Interpretation	(0028,0004)	1	Read	Supported value: MONOCHROME2. Unsupported value: MONOCHROME1.
Bits Allocated	(0028,0100)	1	Read	Supported value: 16.
Scanning Sequence	(0018,0020)	1	Not Read	
Sequence Variant	(0018,0021)	1	Not Read	
Scan Options	(0018,0022)	2	Not Read	
MR Acquisition Type	(0018,0023)	2	Not Read	
Repetition Time	(0018,0080)	2C	Not Read	
Echo Time	(0018,0081)	2	Not Read	
Echo Train Length	(0018,0091)	2	Not Read	
Inversion Time	(0018,0082)	2C	Not Read	
Trigger Time	(0018,1060)	2C	Not Read	
Sequence Name	(0018,0024)	3	Not Read	
Angio Flag	(0018,0025)	3	Not Read	
Number of Averages	(0018,0083)	3	Not Read	
Imaging Frequency	(0018,0084)	3	Not Read	
Imaged Nucleus	(0018,0085)	3	Not Read	
Echo Number	(0018,0086)	3	Not Read	
Magnetic Field Strength	(0018,0087)	3	Not Read	
Spacing Between Slices	(0018,0088)	3	Not Read	
Number of Phase Encoding Steps	(0018,0089)	3	Not Read	

Percent Sampling	(0018,0093)	3	Not Read	
Percent Phase Field of View	(0018,0094)	3	Not Read	
Pixel Bandwidth	(0018,0095)	3	Not Read	
Nominal Interval	(0018,1062)	3	Not Read	
Beat Rejection Flag	(0018,1080)	3	Not Read	
Low R-R Value	(0018,1081)	3	Not Read	
High R-R Value	(0018,1082)	3	Not Read	
Intervals Acquired	(0018,1083)	3	Not Read	
Intervals Rejected	(0018,1084)	3	Not Read	
PVC Rejection	(0018,1085)	3	Not Read	
Skip Beats	(0018,1086)	3	Not Read	
Heart Rate	(0018,1088)	3	Not Read	
Cardiac Number of Images	(0018,1090)	3	Not Read	
Trigger Window	(0018,1094)	3	Not Read	
Reconstruction Diameter	(0018,1100)	3	Not Read	
Receive Coil Name	(0018,1250)	3	Not Read	
Transmit Coil Name	(0018,1251)	3	Not Read	
Acquisition Matrix	(0018,1310)	3	Not Read	
In-plane Phase Encoding Direction	(0018,1312)	3	Not Read	
Flip Angle	(0018,1314)	3	Not Read	
SAR	(0018,1316)	3	Not Read	
Variable Flip Angle Flag	(0018,1315)	3	Not Read	
dB/dt	(0018,1318)	3	Not Read	
Temporal Position Identifier	(0020,0100)	3	Not Read	
Number of Temporal Positions	(0020,0105)	3	Not Read	
Temporal Resolution	(0020,0110)	3	Not Read	
Anatomic Region Sequence	(0008,2218)	3	Not Read	
Primary Anatomic Structure Sequence	(0008,2228)	3	Not Read	

7.2.9 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Read	Supported value: 1.2.840.10008.5.1.4.1.1.4.
SOP Instance UID	(0008,0018)	1	Read	Stored internally to be used if referenced from other dataset.
Specific Character Set	(0008,0005)	1C	Read	Specific character sets are supported. If this attribute is not set, characters in the US ASCII table will be read correctly. Characters outside the US ASCII table will be replaced by a question mark if the specific character set is not encoded.

				Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Read	
Instance Creation Time	(0008,0013)	3	Read	
Instance Creator UID	(0008,0014)	3	Not Read	
Related General SOP Class UID	(0008,001A)	3	Not Read	
Original Specialized SOP Class UID	(0008,001B)	3	Not Read	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Read	
Timezone Offset From UTC	(0008,0201)	3	Not Read	
Contributing Equipment Sequence	(0018,A001)	3	Not Read	
Instance Number	(0020,0013)	3	Not Read	
SOP Instance Status	(0100,0410)	3	Not Read	
SOP Authorization Date and Time	(0100,0420)	3	Not Read	
SOP Authorization Comment	(0100,0424)	3	Not Read	
Authorization Equipment Certification Number	(0100,0426)	3	Not Read	
MAC Parameters Sequence	(4FFE,0001)	3	Not Read	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Read	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Read	
Original Attributes Sequence	(0400,0561)	3	Not Read	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Read	

7.3 PET Image storage SOP class

Image datasets are stored in the system exactly as imported, no changes are made. The definitions below refer only to whether the attribute is actively used by the system or not. The General Image Module is not used since the modality specific image module contains all needed attributes. Note however that if RayPlan's import filters have modified the files, the modified version will be stored and not the original. A warning is shown after import if the system does not support SUV calculation for this image series.

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	Yes
	Clinical Trial Study	No
Series	General Series	Yes
	Clinical Trial Series	No
	PET Series	Yes
	PET Isotope	Yes
	PET Multi-gated Acquisition	No

	NM/PET Patient Orientation	No
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Image	General Image	No
	Image Plane	Yes
	Image Pixel	Yes
	Device	No
	Specimen	No
	PET Image	Yes
	Overlay Plane	No
	VOI LUT	No
	Ascquistion contect	No
	SOP Common	Yes
Private tags	Private PET tags	Yes

7.3.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Read	Cannot be empty. When importing a new patient with the same Patient ID and Patient Name as an existing patient, a suffix is added to the name of the new patient. When adding data to a current patient, the names may differ.
Patient ID	(0010,0020)	2	Read	Unique identifier for patient. Patients are separated based on the Patient ID. When data is imported, the content in this attribute assure that different patients are not mixed.
Issuer of Patient ID	(0010,0021)	3	Not Read	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Read	
Patient's Birth Date	(0010,0030)	2	Read	Attribute is not validated during import. Patient's Birth Date is set in the patient database based on the first imported dataset.
Patient's Sex	(0010,0040)	2	Read	Attribute is not validated during import. Patient's Sex is set in the patient database based on the first imported dataset. If Patient's Sex is not encoded, the default value of "O" is used. Supported values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Read	

Patient's Birth Time	(0010,0032)	3	Not Read	
Other Patient IDs	(0010,1000)	3	Not Read	
Other Patient IDs Sequence	(0010,1002)	3	Not Read	
Other Patient Names	(0010,1001)	3	Not Read	
Ethnic Group	(0010,2160)	3	Not Read	
Patient Comments	(0010,4000)	3	Not Read	
Patient Species Description	(0010,2201)	1C	Not Read	
Patient Species Code Sequence	(0010,2202)	1C	Not Read	
Patient Breed Description	(0010,2292)	2C	Not Read	
Patient Breed Code Sequence	(0010,2293)	2C	Not Read	
Breed Registration Sequence	(0010,2294)	2C	Not Read	
Responsible Person	(0010,2297)	2C	Not Read	
Responsible Person Role	(0010,2298)	1C	Not Read	
Responsible Organization	(0010,2299)	2C	Not Read	
Patient Identity Removed	(0012,0062)	3	Not Read	
De-identification Method	(0012,0063)	1C	Not Read	
De-identification Method Code Sequence	(0012,0064)	1C	Not Read	

7.3.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Read	During import, studies are separated based on the Study Instance UID. All data imported to a patient is placed in one internal equivalent to a DICOM study (i.e. Study Instance UID do not separate clinical data internally). The Study Instance UID is stored from the first imported dataset to be used at a future export.
Study Date	(0008,0020)	2	Read	
Study Time	(0008,0030)	2	Read	
Referring Physician's Name	(0008,0090)	2	Read	
Referring Physician Identification Sequence	(0008,0096)	3	Not Read	
Study ID	(0020,0010)	2	Read	
Accession Number	(0008,0050)	2	Read	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Read	
Study Description	(0008,1030)	3	Not Read	
Physician(s) of Record	(0008,1048)	3	Not Read	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Read	

Name of Physician(s) Reading Study	(0008,1060)	3	Not Read	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Read	
Requesting Service Code Sequence	(0032,1034)	3	Not Read	
Referenced Study Sequence	(0008,1110)	3	Not Read	
Procedure Code Sequence	(0008,1032)	3	Not Read	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Read	

7.3.3 Patient Study Module

Attribute name	Tag	Type	Usage	Comment
Admitting Diagnoses Description	(0008,1080)	3	Not Read	
Admitting Diagnoses Code Sequence	(0008,1084)	3	Not Read	
Patient's Age	(0010,1010)	3	Not Read	
Patient's Size	(0010,1020)	3	Not Read	
Patient's Weight	(0010,1030)	3	Read	Used for SUV calculation.
Occupation	(0010,2180)	3	Not Read	
Additional Patient's History	(0010,21B0)	3	Not Read	
Admission ID	(0038,0010)	3	Not Read	
Issuer of Admission ID	(0038,0011)	3	Not Read	
Service Episode ID	(0038,0060)	3	Not Read	
Issuer of Service Episode ID	(0038,0061)	3	Not Read	
Service Episode Description	(0038,0062)	3	Not Read	
Patient's Sex Neutered	(0010,2203)	2C	Not Read	

7.3.4 General Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Read	Supported value: PT. Unsupported value: OT.
Series Instance UID	(0020,000E)	1	Read	During import, series are separated based on the Series Instance UID. If a series is imported, all data in that series is imported.
Series Number	(0020,0011)	2	Read	
Laterality	(0020,0060)	2C	Not Read	
Series Date	(0008,0021)	3	Read	
Series Time	(0008,0031)	3	Read	
Performing Physicians' Name	(0008,1050)	3	Not Read	
Performing Physician Identification Sequence	(0008,1052)	3	Not Read	

Protocol Name	(0018,1030)	3	Read	Used to identify the protocol during import.
Series Description	(0008,103E)	3	Read	Used to identify series during import.
Series Description Code Sequence	(0008,103F)	3	Not Read	
Operators' Name	(0008,1070)	3	Read	
Operator Identification Sequence	(0008,1072)	3	Not Read	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Read	
Related Series Sequence	(0008,1250)	3	Not Read	
Body Part Examined	(0018,0015)	3	Not Read	
Patient Position	(0018,5100)	2C	Read	Supported values: HFS, HFP, FFS, FFP.
Smallest Pixel Value in Series	(0028,0108)	3	Not Read	
Largest Pixel Value in Series	(0028,0109)	3	Not Read	
Request Attributes Sequence	(0040,0275)	3	Not Read	
Performed Procedure Step ID	(0040,0253)	3	Not Read	
Performed Procedure Step Start Date	(0040,0244)	3	Not Read	
Performed Procedure Step Start Time	(0040,0245)	3	Not Read	
Performed Procedure Step Description	(0040,0254)	3	Not Read	
Performed Protocol Code Sequence	(0040,0260)	3	Not Read	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Read	
Anatomical Orientation Type	(0010,2210)	1C	Not Read	

7.3.5 PET Series Module

Attribute name	Tag	Type	Usage	Comment
Series Date	(0008,0021)	1	Read	
Series Time	(0008,0031)	1	Read	
Units	(0054,1001)	1	Read	Supported values: CNTS, NONE, CM2, PCNT, CPS, BQML, MGMINML, UMOLMINML, MLMING, MLG, UMOLML, PROPCNTS, PROPCPS, MLMINML, MLML, GML, STDDEV.
Counts Source	(0054,1002)	1	Not Read	
Series Type	(0054,1000)	1	Not Read	
Reprojection Method	(0054,1004)	2C	Not Read	
Number of R-R Intervals	(0054,0061)	1C	Not Read	
Number of Time Slots	(0054,0071)	1C	Not Read	
Number of Time Slices	(0054,0101)	1C	Not Read	
Number of Slices	(0054,0081)	1	Not Read	
Corrected Image	(0028,0051)	2	Read	Supported values: DECY, ATTN, SCAT, DTIM,

				MOTN, PMOT, CLN, RAN, RADL, DCAL, NORM.
Randoms Correction Method	(0054,1100)	3	Not Read	
Attenuation Correction Method	(0054,1101)	3	Not Read	
Scatter Correction Method	(0054,1105)	3	Not Read	
Decay Correction	(0054,1102)	1	Read	Supported values: NONE, START, ADMIN.
Reconstruction Diameter	(0018,1100)	3	Not Read	
Convolution Kernel	(0018,1210)	3	Not Read	
Reconstruction Method	(0054,1103)	3	Not Read	
Detector Lines of Response Used	(0054,1104)	3	Not Read	
Acquisition Start Condition	(0018,0073)	3	Not Read	
Acquisition Start Condition Data	(0018,0074)	3	Not Read	
Acquisition Termination Condition	(0018,0071)	3	Not Read	
Acquisition Termination Condition Data	(0018,0075)	3	Not Read	
Field of View Shape	(0018,1147)	3	Not Read	
Field of View Dimensions	(0018,1149)	3	Not Read	
Gantry/Detector Tilt	(0018,1120)	3	Not Read	
Gantry/Detector Slew	(0018,1121)	3	Not Read	
Type of Detector Motion	(0054,0202)	3	Not Read	
Collimator Type	(0018,1181)	2	Not Read	
Collimator/Grid Name	(0018,1180)	3	Not Read	
Axial Acceptance	(0054,1200)	3	Not Read	
Axial Mash	(0054,1201)	3	Not Read	
Transverse Mash	(0054,1202)	3	Not Read	
Detector Element Size	(0054,1203)	3	Not Read	
Coincidence Window Width	(0054,1210)	3	Not Read	
Energy Window Range Sequence	(0054,0013)	3	Not Read	
Secondary Counts Type	(0054,1220)	3	Not Read	

7.3.6 PET Isotope Module

Attribute name	Tag	Type	Usage	Comment
Radiopharmaceutical Information Sequence	(0054,0016)	2	Read	
>Radionuclide Code Sequence	(0054,0300)	2	Not Read	
>Radiopharmaceutical Route	(0018,1070)	3	Not Read	
>Administration Route Code Sequence	(0054,0302)	3	Not Read	
>Radiopharmaceutical Volume	(0018,1071)	3	Not Read	
>Radiopharmaceutical Start Time	(0018,1072)	3	Read	

>Radiopharmaceutical Start DateTime	(0018,1078)	3	Not Read	
>Radiopharmaceutical Stop Time	(0018,1073)	3	Not Read	
>Radiopharmaceutical Stop DateTime	(0018,1079)	3	Not Read	
>Radionuclide Total Dose	(0018,1074)	3	Read	
>Radionuclide Half Life	(0018,1075)	3	Read	
>Radionuclide Positron Fraction	(0018,1076)	3	Not Read	
>Radiopharmaceutical Specific Activity	(0018,1077)	3	Not Read	
>Radiopharmaceutical	(0018,0031)	3	Not Read	
>Radiopharmaceutical Code Sequence	(0054,0304)	3	Not Read	
Intervention Drug Information Sequence	(0018,0026)	3	Not Read	

7.3.7 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Read	Frame of Reference UID is required to be the same for all images in the same series.
Position Reference Indicator	(0020,1040)	2	Read	

7.3.8 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Not Read	
Institution Name	(0008,0080)	3	Not Read	
Institution Address	(0008,0081)	3	Not Read	
Station Name	(0008,1010)	3	Not Read	
Institutional Department Name	(0008,1040)	3	Not Read	
Manufacturer's Model Name	(0008,1090)	3	Not Read	
Device Serial Number	(0018,1000)	3	Not Read	
Software Versions	(0018,1020)	3	Not Read	
Gantry ID	(0018,1008)	3	Not Read	
Spatial Resolution	(0018,1050)	3	Not Read	
Date of Last Calibration	(0018,1200)	3	Not Read	
Time of Last Calibration	(0018,1201)	3	Not Read	
Pixel Padding Value	(0028,0120)	1C	Read	If pixel padding is present within the region used for dose computation, the resulting dose may be wrong.

7.3.9 Image Plane Module

Attribute name	Tag	Type	Usage	Comment

Pixel Spacing	(0028,0030)	1	Read	Cannot be greater than 5 mm.
Image Orientation (Patient)	(0020,0037)	1	Read	Image orientation must be transversal.
Image Position (Patient)	(0020,0032)	1	Read	Converted to internal image corner. Used to find slice direction, which must be constant througout the series and along the Z-axis.
Slice Thickness	(0018,0050)	2	Not Read	If there are missing slices in the image set, RayPlan will extrapolate the neighboring slice so that the gap will not be visible.
Slice Location	(0020,1041)	3	Not Read	

7.3.10 Image Pixel Module

Attribute name	Tag	Type	Usage	Comment
Samples per Pixel	(0028,0002)	1	Read	Specialized in modality specific Image Module. Supported value: 1.
Photometric Interpretation	(0028,0004)	1	Read	Specialized in modality specific Image Module. Supported value: MONOCHROME2. Unsupported value: MONOCHROME1.
Rows	(0028,0010)	1	Read	Number of rows. Read from first imported dataset in image series and is required to be consistent for all datasets in the series.
Columns	(0028,0011)	1	Read	Number of columns. Read from first imported dataset in image series and is required to be consistent for all datasets in the series.
Bits Allocated	(0028,0100)	1	Read	Specialized in modality specific Image Module Supported value: 16.
Bits Stored	(0028,0101)	1	Read	Must be equal to or less than Bits Allocated. Specialized in modality specific Image Module.
High Bit	(0028,0102)	1	Read	Specialized in modality specific Image Module.
Pixel Representation	(0028,0103)	1	Read	Is required to be consistent for all datasets in the same series. Supported values: 0, 1.
Pixel Data	(7FE0,0010)	1C	Read	
Planar Configuration	(0028,0006)	1C	Not Read	
Pixel Aspect Ratio	(0028,0034)	1C	Not Read	
Smallest Image Pixel Value	(0028,0106)	3	Not Read	
Largest Image Pixel Value	(0028,0107)	3	Not Read	
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	Not Read	
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Not Read	

Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Not Read	
Red Palette Color Lookup Table Data	(0028,1201)	1C	Not Read	
Green Palette Color Lookup Table Data	(0028,1202)	1C	Not Read	
Blue Palette Color Lookup Table Data	(0028,1203)	1C	Not Read	
ICC Profile	(0028,2000)	3	Not Read	
Pixel Data Provider URL	(0028,7FE0)	1C	Not Read	
Pixel Padding Range Limit	(0028,0121)	1C	Read	
Pixel Data 32	(7FE0,0010)	1C	Read	Alternative view of Pixel Data.
Pixel Data Float	(7FE0,0010)	1C	Read	Alternative view of Pixel Data.

7.3.11 PET Image Module

Attribute name	Tag	Type	Usage	Comment
Image Type	(0008,0008)	1	Read	Supported values: ORIGINAL, PRIMARY, SECONDARY, AXIAL. Unsupported value: LOCALIZER.
Samples per Pixel	(0028,0002)	1	Read	Supported value: 1.
Photometric Interpretation	(0028,0004)	1	Read	Supported value: MONOCHROME2. Unsupported value: MONOCHROME1.
Bits Allocated	(0028,0100)	1	Read	Supported value: 16.
Bits Stored	(0028,0101)	1	Read	Must be greater than 0 and less than or equal to Bits Allocated. Is required to be consistent for all datasets in the same series.
High Bit	(0028,0102)	1	Read	HighBit must be equal to Bits Stored - 1. Is required to be consistent for all datasets in the same CT series.
Rescale Intercept	(0028,1052)	1	Read	Supported value: 1.
Rescale Slope	(0028,1053)	1	Read	
Frame Reference Time	(0054,1300)	1	Not Read	
Trigger Time	(0018,1060)	1C	Not Read	
Frame Time	(0018,1063)	1C	Not Read	
Low R-R Value	(0018,1081)	1C	Not Read	
High R-R Value	(0018,1082)	1C	Not Read	
Lossy Image Compression	(0028,2110)	1C	Not Read	
Image Index	(0054,1330)	1	Not Read	
Acquisition Date	(0008,0022)	2	Read	
Acquisition Time	(0008,0032)	2	Read	
Actual Frame Duration	(0018,1242)	2	Not Read	
Nominal Interval	(0018,1062)	3	Not Read	

Intervals Acquired	(0018,1083)	3	Not Read	
Intervals Rejected	(0018,1084)	3	Not Read	
Primary (Prompts) Counts Accumulated	(0054,1310)	3	Not Read	
Secondary Counts Accumulated	(0054,1311)	3	Not Read	
Slice Sensitivity Factor	(0054,1320)	3	Not Read	
Decay Factor	(0054,1321)	1C	Read	
Dose Calibration Factor	(0054,1322)	3	Not Read	
Scatter Fraction Factor	(0054,1323)	3	Not Read	
Dead Time Factor	(0054,1324)	3	Not Read	
Anatomic Region Sequence	(0008,2218)	3	Not Read	
Primary Anatomic Structure Sequence	(0008,2228)	3	Not Read	
Slice Progression Direction	(0054,0500)	3	Not Read	
View Code Sequence	(0054,0220)	3	Not Read	

7.3.12 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Read	Supported value: 1.2.840.10008.5.1.4.1.1.128.
SOP Instance UID	(0008,0018)	1	Read	Stored internally to be used if referenced from other dataset.
Specific Character Set	(0008,0005)	1C	Read	Specific character sets are supported. If this attribute is not set, characters in the US ASCII table will be read correctly. Characters outside the US ASCII table will be replaced by a question mark if the specific character set is not encoded. Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Read	
Instance Creation Time	(0008,0013)	3	Read	
Instance Creator UID	(0008,0014)	3	Not Read	
Related General SOP Class UID	(0008,001A)	3	Not Read	
Original Specialized SOP Class UID	(0008,001B)	3	Not Read	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Read	
Timezone Offset From UTC	(0008,0201)	3	Not Read	
Contributing Equipment Sequence	(0018,A001)	3	Not Read	
Instance Number	(0020,0013)	3	Not Read	
SOP Instance Status	(0100,0410)	3	Not Read	
SOP Authorization Date and Time	(0100,0420)	3	Not Read	
SOP Authorization Comment	(0100,0424)	3	Not Read	

Authorization Equipment Certification Number	(0100,0426)	3	Not Read	
MAC Parameters Sequence	(4FFE,0001)	3	Not Read	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Read	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Read	
Original Attributes Sequence	(0400,0561)	3	Not Read	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Read	

7.3.13 Private PET tags Module

Attribute name	Tag	Type	Usage	Comment
GE Private Creator	(0009,0010)	3	Read	Value must be 'GEMS_PETD_01'.
GE PET Scan Time	(0009,100D)	3	Read	Used for SUV calculation.
Philips Private Creator	(7053,0010)	3	Read	Value must be 'Philips PET Private Group'.
Philips SUV Scale Factor	(7053,1000)	3	Read	Used for SUV calculation.
Philips Activity Concentration Scale Factor	(7053,1009)	3	Read	Used for SUV calculation.

7.4 RT Structure Set storage SOP class

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	RT Series	Yes
Equipment	General Equipment	Yes
Structure Set	Structure Set	Yes
	ROI Contour	Yes
	RT ROI Observations	Yes
	Approval	Yes
	SOP Common	Yes

7.4.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Read	Cannot be empty. When importing a new patient with the same Patient ID and Patient Name as an existing patient, a suffix is added to the name of the new patient. When adding data to a current patient, the names may differ.

Patient ID	(0010,0020)	2	Read	Unique identifier for patient. Patients are separated based on the Patient ID. When data is imported, the content in this attribute assure that different patients are not mixed.
Issuer of Patient ID	(0010,0021)	3	Not Read	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Read	
Patient's Birth Date	(0010,0030)	2	Read	Attribute is not validated during import. Patient's Birth Date is set in the patient database based on the first imported dataset.
Patient's Sex	(0010,0040)	2	Read	Attribute is not validated during import. Patient's Sex is set in the patient database based on the first imported dataset. If Patient's Sex is not encoded, the default value of "O" is used. Supported values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Read	
Patient's Birth Time	(0010,0032)	3	Not Read	
Other Patient IDs	(0010,1000)	3	Not Read	
Other Patient IDs Sequence	(0010,1002)	3	Not Read	
Other Patient Names	(0010,1001)	3	Not Read	
Ethnic Group	(0010,2160)	3	Not Read	
Patient Comments	(0010,4000)	3	Not Read	
Patient Species Description	(0010,2201)	1C	Not Read	
Patient Species Code Sequence	(0010,2202)	1C	Not Read	
Patient Breed Description	(0010,2292)	2C	Not Read	
Patient Breed Code Sequence	(0010,2293)	2C	Not Read	
Breed Registration Sequence	(0010,2294)	2C	Not Read	
Responsible Person	(0010,2297)	2C	Not Read	
Responsible Person Role	(0010,2298)	1C	Not Read	
Responsible Organization	(0010,2299)	2C	Not Read	
Patient Identity Removed	(0012,0062)	3	Not Read	
De-identification Method	(0012,0063)	1C	Not Read	
De-identification Method Code Sequence	(0012,0064)	1C	Not Read	

7.4.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Read	During import, studies are separated based

				on the Study Instance UID. All data imported to a patient is placed in one internal equivalent to a DICOM study (i.e. Study Instance UID do not separate clinical data internally). The Study Instance UID is stored from the first imported dataset to be used at a future export.
Study Date	(0008,0020)	2	Read	
Study Time	(0008,0030)	2	Read	
Referring Physician's Name	(0008,0090)	2	Read	
Referring Physician Identification Sequence	(0008,0096)	3	Not Read	
Study ID	(0020,0010)	2	Read	
Accession Number	(0008,0050)	2	Read	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Read	
Study Description	(0008,1030)	3	Not Read	
Physician(s) of Record	(0008,1048)	3	Not Read	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Read	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Read	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Read	
Requesting Service Code Sequence	(0032,1034)	3	Not Read	
Referenced Study Sequence	(0008,1110)	3	Not Read	
Procedure Code Sequence	(0008,1032)	3	Not Read	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Read	

7.4.3 RT Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Read	Supported value: RTSTRUCT.
Series Instance UID	(0020,000E)	1	Read	During import, series are separated based on the Series Instance UID. If a series is imported, all clinical data in that series is imported.
Series Number	(0020,0011)	2	Read	
Series Description	(0008,103E)	3	Read	Used to identify series during import.
Series Description Code Sequence	(0008,103F)	3	Not Read	
Operators' Name	(0008,1070)	2	Read	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Read	

Request Attributes Sequence	(0040,0275)	3	Not Read	
Performed Procedure Step ID	(0040,0253)	3	Not Read	
Performed Procedure Step Start Date	(0040,0244)	3	Not Read	
Performed Procedure Step Start Time	(0040,0245)	3	Not Read	
Performed Procedure Step Description	(0040,0254)	3	Not Read	
Performed Protocol Code Sequence	(0040,0260)	3	Not Read	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Read	

7.4.4 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Read	Used to handle TomoTherapy HiArt and Nucletron's deviations from the DICOM standard for ROI Physical Properties.
Institution Name	(0008,0080)	3	Not Read	
Institution Address	(0008,0081)	3	Not Read	
Station Name	(0008,1010)	3	Not Read	
Institutional Department Name	(0008,1040)	3	Not Read	
Manufacturer's Model Name	(0008,1090)	3	Not Read	
Device Serial Number	(0018,1000)	3	Not Read	
Software Versions	(0018,1020)	3	Not Read	
Gantry ID	(0018,1008)	3	Not Read	
Spatial Resolution	(0018,1050)	3	Not Read	
Date of Last Calibration	(0018,1200)	3	Not Read	
Time of Last Calibration	(0018,1201)	3	Not Read	
Pixel Padding Value	(0028,0120)	1C	Read	

7.4.5 Structure Set Module

Attribute name	Tag	Type	Usage	Comment
Structure Set Label	(3006,0002)	1	Read	
Structure Set Name	(3006,0004)	3	Not Read	
Structure Set Description	(3006,0006)	3	Not Read	
Instance Number	(0020,0013)	3	Not Read	
Structure Set Date	(3006,0008)	2	Not Read	
Structure Set Time	(3006,0009)	2	Not Read	
Referenced Frame of Reference Sequence	(3006,0010)	3	Read	May contain more than one item. At least one of the referenced Examinations must be found in the system. ROI's contoured on

				examinations that are not found will be skipped.
>Frame of Reference UID	(0020,0052)	1	Read	Frame of Reference UID is required to match the Frame of Reference in the images referenced by the Contour Image Sequence.
>Frame of Reference Relationship Sequence	(3006,00C0)	3	Not Read	
>RT Referenced Study Sequence	(3006,0012)	3	Read	Must contain exactly one referenced study.
>>Referenced SOP Class UID	(0008,1150)	1	Not Read	
>>Referenced SOP Instance UID	(0008,1155)	1	Read	
>>RT Referenced Series Sequence	(3006,0014)	1	Read	Must contain exactly one referenced series.
>>>Series Instance UID	(0020,000E)	1	Read	
>>>Contour Image Sequence	(3006,0016)	1	Read	
>>>>Referenced SOP Class UID	(0008,1150)	1	Not Read	
>>>>Referenced SOP Instance UID	(0008,1155)	1	Read	Referenced image has to be imported to patient (prior or at the same time as the RTSTRUCT dataset is imported).
>>>>Referenced Frame Number	(0008,1160)	1C	Not Read	
>>>>Referenced Segment Number	(0062,000B)	1C	Not Read	
Structure Set ROI Sequence	(3006,0020)	3	Read	Number of elements must match number of elements in ROI Contour Sequence (3006,0039). At least one sequence must be defined.
>ROI Number	(3006,0022)	1	Read	
>Referenced Frame of Reference UID	(3006,0024)	1	Read	
>ROI Name	(3006,0026)	2	Read	ROI:s are shared internally between multiple structure sets. If a ROI with the same name is already contoured on the referenced examination these contours will be skipped.
>ROI Description	(3006,0028)	3	Not Read	
>ROI Volume	(3006,002C)	3	Not Read	
>ROI Generation Algorithm	(3006,0036)	2	Not Read	
>ROI Generation Description	(3006,0038)	3	Not Read	
>Derivation Code Sequence	(0008,9215)	3	Not Read	

7.4.6 ROI Contour Module

Attribute name	Tag	Type	Usage	Comment
ROI Contour Sequence	(3006,0039)	1	Read	
>Referenced ROI Number	(3006,0084)	1	Read	
>ROI Display Color	(3006,002A)	3	Read	Used for visualization.
>Contour Sequence	(3006,0040)	3	Read	Number of elements must match number of elements in Structure Set ROI Sequence (3006,0020). At least one sequence must be

				defined.
>>Contour Number	(3006,0048)	3	Not Read	
>>Attached Contours	(3006,0049)	3	Read	Information about attached contours are not imported.
>>Contour Image Sequence	(3006,0016)	3	Read	
>>>Referenced SOP Class UID	(0008,1150)	1	Not Read	
>>>Referenced SOP Instance UID	(0008,1155)	1	Read	Must be found in the referenced Examination.
>>>Referenced Frame Number	(0008,1160)	1C	Not Read	
>>>Referenced Segment Number	(0062,000B)	1C	Not Read	
>>Contour Geometric Type	(3006,0042)	1	Not Read	
>>Contour Slab Thickness	(3006,0044)	3	Not Read	
>>Contour Offset Vector	(3006,0045)	3	Not Read	
>>Number of Contour Points	(3006,0046)	1	Read	
>>Contour Data	(3006,0050)	1	Read	Converted to internal contour representation. All contour vertices are required to be located in the same slice.

7.4.7 RT ROI Observations Module

Attribute name	Tag	Type	Usage	Comment
RT ROI Observations Sequence	(3006,0080)	1	Read	
>Observation Number	(3006,0082)	1	Not Read	
>Referenced ROI Number	(3006,0084)	1	Read	
>ROI Observation Label	(3006,0085)	3	Read	If ROI Observation Label has value "Localization Poi" and ROI Interpreted Type is "MARKER", then the ROI is automatically converted to a localization point.
>ROI Observation Description	(3006,0088)	3	Not Read	
>RT Related ROI Sequence	(3006,0030)	3	Not Read	
>RT ROI Identification Code Sequence	(3006,0086)	3	Not Read	
>Related RT ROI Observations Sequence	(3006,00A0)	3	Not Read	
>RT ROI Interpreted Type	(3006,00A4)	2	Read	All types in the DICOM standard are supported and converted to internal equivalent. Furthermore if ROI Observation Label has value "Localization Poi" and ROI Interpreted Type is "MARKER", then the ROI is automatically converted to a localization point. Supported values: ACQ_ISOCENTER, AVOIDANCE, BOLUS, BRACHY_ACCESSORY, BRACHY_CHANNEL, BRACHY_CHNL_SHLD, BRACHY_SRC_APP, CAVITY, CONTRAST_AGENT, CONTROL, CTV, DOSE_REGION, EXTERNAL, FIXATION, GTV,

				INIT_LASER_ISO, INIT_MATCH_ISO, IRRAD_VOLUME, ISOCENTER, MARKER, ORGAN, PTV, REGISTRATION, SUPPORT, TREATED_VOLUME, NONE.
>ROI Interpreter	(3006,00A6)	2	Not Read	
>Material ID	(300A,00E1)	3	Read	Imported as material name. Note that different materials cannot have the same names.
>ROI Physical Properties Sequence	(3006,00B0)	3	Read	The values REL_MASS_DENSITY, REL_ELEC_DENSITY, EFFECTIVE_Z, EFF_Z_PER_A and ELEM_FRACTION are supported. However at least one of REL_MASS_DENSITY or REL_ELEC_DENSITY is needed to create a density override. If only one of these values exist, the physical properties of water is used (except that the mean excitation energy is set to zero) and the mass density is set primarily from REL_MASS_DENSITY and secondarily from REL_ELEC_DENSITY.
>>ROI Physical Property	(3006,00B2)	1	Read	Relative mass and electron densities must be between 0.0 - 22.7. MEAN_EXCI_ENERGY depicts the Mean Excitation Energy for a given material. Supported values: REL_MASS_DENSITY, REL_ELEC_DENSITY, EFFECTIVE_Z, EFF_Z_PER_A, ELEM_FRACTION, MEAN_EXCI_ENERGY. Unsupported value: REL_STOP_RATIO.
>>ROI Elemental Composition Sequence	(3006,00B6)	1C	Read	
>>>ROI Elemental Composition Atomic Number	(3006,00B7)	1	Read	
>>>ROI Elemental Composition Atomic Mass Fraction	(3006,00B8)	1	Read	
>>ROI Physical Property Value	(3006,00B4)	1	Read	
>RaySearch Private Creator	(4001,0010)	3	Read	Value must be 'RAYSEARCHLABS 2.0'.
>Tissue Name	(4001,1010)	3	Read	RaySearch Private Tag. Contains the tissue name given to this Region of Interest.

7.4.8 Approval Module

Attribute name	Tag	Type	Usage	Comment
Approval Status	(300E,0002)	1	Read	The approval status will be set in the imported Structure Set. If the RTSTRUCT is APPROVED, the imported Structure Set will be read-only. Supported values: • APPROVED = No changes allowed to imported Structure Set. • UNAPPROVED = Changes allowed to

				imported Structure Set. • REJECTED = Same rules as for UNAPPROVED.
Review Date	(300E,0004)	2C	Read	
Review Time	(300E,0005)	2C	Read	
Reviewer Name	(300E,0008)	2C	Read	

7.4.9 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Read	Supported value: 1.2.840.10008.5.1.4.1.1.481.3.
SOP Instance UID	(0008,0018)	1	Read	Stored internally to be used if referenced from other dataset.
Specific Character Set	(0008,0005)	1C	Read	Specific character sets are supported. If this attribute is not set, characters in the US ASCII table will be read correctly. Characters outside the US ASCII table will be replaced by a question mark if the specific character set is not encoded. Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Read	
Instance Creation Time	(0008,0013)	3	Read	
Instance Creator UID	(0008,0014)	3	Not Read	
Related General SOP Class UID	(0008,001A)	3	Not Read	
Original Specialized SOP Class UID	(0008,001B)	3	Not Read	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Read	
Timezone Offset From UTC	(0008,0201)	3	Not Read	
Contributing Equipment Sequence	(0018,A001)	3	Not Read	
Instance Number	(0020,0013)	3	Not Read	
SOP Instance Status	(0100,0410)	3	Not Read	
SOP Authorization Date and Time	(0100,0420)	3	Not Read	
SOP Authorization Comment	(0100,0424)	3	Not Read	
Authorization Equipment Certification Number	(0100,0426)	3	Not Read	
MAC Parameters Sequence	(4FFE,0001)	3	Not Read	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Read	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Read	
Original Attributes Sequence	(0400,0561)	3	Not Read	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Read	

7.5 RT Plan storage SOP class

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	RT Series	Yes
	Clinical Trial Series	No
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Plan	RT General Plan	Yes
	RT Prescription	Yes
	RT Tolerance Tables	No
	RT Patient Setup	Yes
	RT Fraction Scheme	Yes
	RT Beams	Yes
	RT Brachy Application Setups	No
	Approval	Yes
	SOP Common	Yes

7.5.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Read	Cannot be empty. When importing a new patient with the same Patient ID and Patient Name as an existing patient, a suffix is added to the name of the new patient. When adding data to a current patient, the names may differ.
Patient ID	(0010,0020)	2	Read	Unique identifier for patient. Patients are separated based on the Patient ID. When data is imported, the content in this attribute assure that different patients are not mixed.
Issuer of Patient ID	(0010,0021)	3	Not Read	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Read	
Patient's Birth Date	(0010,0030)	2	Read	Attribute is not validated during import. Patient's Birth Date is set in the patient database based on the first imported dataset.
Patient's Sex	(0010,0040)	2	Read	Attribute is not validated during import. Patient's Sex is set in the patient database based on the first imported dataset. If

				Patient's Sex is not encoded, the default value of "O" is used. Supported values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Read	
Patient's Birth Time	(0010,0032)	3	Not Read	
Other Patient IDs	(0010,1000)	3	Not Read	
Other Patient IDs Sequence	(0010,1002)	3	Not Read	
Other Patient Names	(0010,1001)	3	Not Read	
Ethnic Group	(0010,2160)	3	Not Read	
Patient Comments	(0010,4000)	3	Not Read	
Patient Species Description	(0010,2201)	1C	Not Read	
Patient Species Code Sequence	(0010,2202)	1C	Not Read	
Patient Breed Description	(0010,2292)	2C	Not Read	
Patient Breed Code Sequence	(0010,2293)	2C	Not Read	
Breed Registration Sequence	(0010,2294)	2C	Not Read	
Responsible Person	(0010,2297)	2C	Not Read	
Responsible Person Role	(0010,2298)	1C	Not Read	
Responsible Organization	(0010,2299)	2C	Not Read	
Patient Identity Removed	(0012,0062)	3	Not Read	
De-identification Method	(0012,0063)	1C	Not Read	
De-identification Method Code Sequence	(0012,0064)	1C	Not Read	

7.5.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Read	During import, studies are separated based on the Study Instance UID. All data imported to a patient is placed in one internal equivalent to a DICOM study (i.e. Study Instance UID do not separate clinical data internally). The Study Instance UID is stored from the first imported dataset to be used at a future export.
Study Date	(0008,0020)	2	Read	
Study Time	(0008,0030)	2	Read	
Referring Physician's Name	(0008,0090)	2	Read	
Referring Physician Identification Sequence	(0008,0096)	3	Not Read	
Study ID	(0020,0010)	2	Read	

Accession Number	(0008,0050)	2	Read	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Read	
Study Description	(0008,1030)	3	Not Read	
Physician(s) of Record	(0008,1048)	3	Not Read	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Read	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Read	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Read	
Requesting Service Code Sequence	(0032,1034)	3	Not Read	
Referenced Study Sequence	(0008,1110)	3	Not Read	
Procedure Code Sequence	(0008,1032)	3	Not Read	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Read	

7.5.3 RT Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Read	Supported value: RTPLAN.
Series Instance UID	(0020,000E)	1	Read	During import, series are separated based on the Series Instance UID. If a series is imported, all clinical data in that series is imported.
Series Number	(0020,0011)	2	Read	
Series Description	(0008,103E)	3	Read	Used to identify series during import.
Series Description Code Sequence	(0008,103F)	3	Not Read	
Operators' Name	(0008,1070)	2	Read	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Read	
Request Attributes Sequence	(0040,0275)	3	Not Read	
Performed Procedure Step ID	(0040,0253)	3	Not Read	
Performed Procedure Step Start Date	(0040,0244)	3	Not Read	
Performed Procedure Step Start Time	(0040,0245)	3	Not Read	
Performed Procedure Step Description	(0040,0254)	3	Not Read	
Performed Protocol Code Sequence	(0040,0260)	3	Not Read	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Read	

7.5.4 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Read	Is required to be the same as the Frame of Reference UID found in the plan's referenced RT Struct.
Position Reference Indicator	(0020,1040)	2	Read	

7.5.5 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Read	Used to detect fluence maps that are sometimes stored as compensators in plans from Varian.
Institution Name	(0008,0080)	3	Not Read	
Institution Address	(0008,0081)	3	Not Read	
Station Name	(0008,1010)	3	Not Read	
Institutional Department Name	(0008,1040)	3	Not Read	
Manufacturer's Model Name	(0008,1090)	3	Read	
Device Serial Number	(0018,1000)	3	Not Read	
Software Versions	(0018,1020)	3	Not Read	
Gantry ID	(0018,1008)	3	Not Read	
Spatial Resolution	(0018,1050)	3	Not Read	
Date of Last Calibration	(0018,1200)	3	Not Read	
Time of Last Calibration	(0018,1201)	3	Not Read	
Pixel Padding Value	(0028,0120)	1C	Read	

7.5.6 RT General Plan Module

Attribute name	Tag	Type	Usage	Comment
RT Plan Label	(300A,0002)	1	Read	Used as Radiation Set Name (and potentially Treatment Plan Name if RT Plan Name is empty). A suffix is added by RayPlan if name is not unique within the Treatment Plan.
RT Plan Name	(300A,0003)	3	Read	Used as Treatment Plan Name (RT Plan Label is used instead if this attribute is empty). A suffix is added by RayPlan if the name is not unique within the patient.
RT Plan Description	(300A,0004)	3	Not Read	
Instance Number	(0020,0013)	3	Not Read	
RT Plan Date	(300A,0006)	2	Not Read	
RT Plan Time	(300A,0007)	2	Not Read	
Treatment Protocols	(300A,0009)	3	Not Read	
Plan Intent	(300A,000A)	3	Read	
Treatment Sites	(300A,000B)	3	Not Read	

RT Plan Geometry	(300A,000C)	1	Read	Supported value: PATIENT. Unsupported value: TREATMENT_DEVICE.
Referenced Structure Set Sequence	(300C,0060)	1C	Read	Is required to contain one and only one item.
>Referenced SOP Class UID	(0008,1150)	1	Not Read	
>Referenced SOP Instance UID	(0008,1155)	1	Read	Referenced Structure Set has to be imported to patient (prior or at the same time as the RT Plan dataset is imported).
Referenced Dose Sequence	(300C,0080)	3	Not Read	
Referenced RT Plan Sequence	(300C,0002)	3	Not Read	

7.5.7 RT Prescription Module

Attribute name	Tag	Type	Usage	Comment
Prescription Description	(300A,000E)	3	Read	
Dose Reference Sequence	(300A,0010)	3	Read	Since only primary prescriptions are supported, this must have length 1.
>Dose Reference Number	(300A,0012)	1	Not Read	
>Dose Reference UID	(300A,0013)	3	Not Read	
>Dose Reference Structure Type	(300A,0014)	1	Read	Supported values: POINT, VOLUME. Unsupported values: COORDINATES, SITE.
>Dose Reference Description	(300A,0016)	3	Read	
>Referenced ROI Number	(3006,0084)	1C	Read	
>Dose Reference Point Coordinates	(300A,0018)	1C	Read	
>Nominal Prior Dose	(300A,001A)	3	Read	Must be null or 0.
>Dose Reference Type	(300A,0020)	1	Read	Supported value: TARGET. Unsupported value: ORGAN_AT_RISK.
>Constraint Weight	(300A,0021)	3	Read	
>Delivery Warning Dose	(300A,0022)	3	Not Read	
>Delivery Maximum Dose	(300A,0023)	3	Not Read	
>Target Minimum Dose	(300A,0025)	3	Read	
>Target Prescription Dose	(300A,0026)	3	Read	
>Target Maximum Dose	(300A,0027)	3	Read	
>Target Underdose Volume Fraction	(300A,0028)	3	Read	
>Organ at Risk Full-volume Dose	(300A,002A)	3	Read	
>Organ at Risk Limit Dose	(300A,002B)	3	Read	
>Organ at Risk Maximum Dose	(300A,002C)	3	Read	
>Organ at Risk Overdose Volume Fraction	(300A,002D)	3	Read	
>RaySearch Private Creator	(4001,0010)	3	Read	Value must be 'RAYSEARCHLABS 2.0'.
>Target Prescription Effective	(4001,1011)	3	Read	RaySearch Private Tag. Prescribed dose to

Dose				Dose Reference if Dose Reference Type (300A,0020) is TARGET. The dose is physical dose after correction for biological effect using user-defined modeling technique.

7.5.8 RT Patient Setup Module

Attribute name	Tag	Type	Usage	Comment
Patient Setup Sequence	(300A,0180)	1	Read	Must contain at least one entry.
>Patient Setup Number	(300A,0182)	1	Read	
>Patient Setup Label	(300A,0183)	3	Not Read	
>Patient Position	(0018,5100)	1C	Read	Must be compatible with the planning CT's patient position. i.e. cannot mix prone and supine. Supported values: HFS, HFP, FFS, FFP.
>Patient Additional Position	(300A,0184)	1C	Not Read	
>Referenced Setup Image Sequence	(300A,0401)	3	Not Read	
>Fixation Device Sequence	(300A,0190)	3	Not Read	
>Shielding Device Sequence	(300A,01A0)	3	Not Read	
>Setup Technique	(300A,01B0)	3	Not Read	
>Setup Technique Description	(300A,01B2)	3	Not Read	
>Setup Device Sequence	(300A,01B4)	3	Not Read	
>Table Top Vertical Setup Displacement	(300A,01D2)	3	Not Read	
>Table Top Longitudinal Setup Displacement	(300A,01D4)	3	Not Read	
>Table Top Lateral Setup Displacement	(300A,01D6)	3	Not Read	
>Motion Synchronization Sequence	(300A,0410)	3	Not Read	
medPhoton Private Creator	(30BB,0010)	3	Read	Value must be 'medPhoton 1.0'.
medPhoton Patient Setup ID	(30BB,1000)	3	Read	medPhoton Patient Setup ID
medPhoton Imaging Protocol ID	(30BB,1001)	3	Read	medPhoton Imaging Protocol ID

7.5.9 RT Fraction Scheme Module

Attribute name	Tag	Type	Usage	Comment
Fraction Group Sequence	(300A,0070)	1	Read	Multiple fraction groups are supported and are converted to separate Beam Sets in RayPlan. Dose cannot be imported to a plan with multiple Beam Sets.
>Fraction Group Number	(300A,0071)	1	Read	Used to identify fraction groups.
>Fraction Group Description	(300A,0072)	3	Not Read	
>Referenced Dose Sequence	(300C,0080)	3	Not Read	
>Referenced Dose Reference	(300C,0050)	3	Not Read	

Sequence				
>Number of Fractions Planned	(300A,0078)	2	Read	Used to create fraction schedule. If this value is 0 it is interpreted as a one-fraction plan.
>Number of Fraction Pattern Digits Per Day	(300A,0079)	3	Read	
>Repeat Fraction Cycle Length	(300A,007A)	3	Read	
>Fraction Pattern	(300A,007B)	3	Read	
>Number of Beams	(300A,0080)	1	Read	
>Referenced Beam Sequence	(300C,0004)	1C	Read	There must be at least one beam in the fraction group.
>>Referenced Beam Number	(300C,0006)	1C	Read	
>>Beam Dose Specification Point	(300A,0082)	3	Not Read	Since beam dose point information is currently not imported, this information will be lost when importing a plan exported from RayPlan.
>>Beam Dose	(300A,0084)	3	Not Read	
>>Beam Dose Point Depth	(300A,0088)	3	Not Read	
>>Beam Dose Point Equivalent Depth	(300A,0089)	3	Not Read	
>>Beam Dose Point SSD	(300A,008A)	3	Not Read	
>>Beam Meterset	(300A,0086)	3	Read	Must be defined in MU.
>Number of Brachy Application Setups	(300A,00A0)	1	Read	Must be 0.
>Referenced Brachy Application Setup Sequence	(300C,000A)	1C	Not Read	

7.5.10 RT Beams Module

Attribute name	Tag	Type	Usage	Comment
Beam Sequence	(300A,00B0)	1	Read	
>Beam Number	(300A,00C0)	1	Read	
>Beam Name	(300A,00C2)	3	Read	Non-unique beams names will be renamed.
>Beam Description	(300A,00C3)	3	Read	Non-unique beams descriptions will be renamed.
>Beam Type	(300A,00C4)	1	Read	Plans with Beam Type STATIC are converted to SMLC-plans. Plans with Beam Type DYNAMIC which have Gantry Rotation Direction != NONE are converted to Arc-plans. Otherwise the plans are considered to be DMLC-plans. Supported values: STATIC, DYNAMIC.
>Radiation Type	(300A,00C6)	2	Read	Supported values: PHOTON, ELECTRON. Unsupported values: NEUTRON, PROTON.
>Primary Fluence Mode Sequence	(3002,0050)	3	Read	
>>Fluence Mode	(3002,0051)	1	Not Read	

>>Fluence Mode ID	(3002,0052)	1C	Not Read	
>High-Dose Technique Type	(300A,00C7)	1C	Not Read	
>Treatment Machine Name	(300A,00B2)	2	Read	Used together with the private tag Commission Time to identify the correct treatment machine. Is required to be constant within a fraction group.
>Manufacturer	(0008,0070)	3	Not Read	
>Institution Name	(0008,0080)	3	Not Read	
>Institution Address	(0008,0081)	3	Not Read	
>Institutional Department Name	(0008,1040)	3	Not Read	
>Manufacturer's Model Name	(0008,1090)	3	Not Read	
>Device Serial Number	(0018,1000)	3	Not Read	
>Primary Dosimeter Unit	(300A,00B3)	3	Read	Supported value: MU.
>Referenced Tolerance Table Number	(300C,00A0)	3	Not Read	
>Source-Axis Distance	(300A,00B4)	3	Read	
>Beam Limiting Device Sequence	(300A,00B6)	1	Read	
>>RT Beam Limiting Device Type	(300A,00B8)	1	Read	Y or ASYMY is always required. Supported values: X, Y, ASYMX, ASYMY, MLCX, MLCY.
>>Source to Beam Limiting Device Distance	(300A,00BA)	3	Not Read	
>>Number of Leaf/Jaw Pairs	(300A,00BC)	1	Read	
>>Leaf Position Boundaries	(300A,00BE)	2C	Read	
>Referenced Patient Setup Number	(300C,006A)	3	Read	If this attribute is not set, the patient setup sequence must contain one patient setup. If multiple patient setups are defined in the patient setup sequence, this attribute must be set. All referenced patient setups must use the same patient position.
>Referenced Reference Image Sequence	(300C,0042)	3	Not Read	
>Planned Verification Image Sequence	(300A,00CA)	3	Not Read	
>Treatment Delivery Type	(300A,00CE)	3	Read	If the Treatment Delivery type is null, beam is assumed to be of type TREATMENT. Supported value: TREATMENT. Unsupported values: OPEN_PORTFILM, TRMT_PORTFILM, CONTINUATION, SETUP.
>Referenced Dose Sequence	(300C,0080)	3	Read	
>>Referenced SOP Class UID	(0008,1150)	1	Read	
>>Referenced SOP Instance UID	(0008,1155)	1	Read	
>Number of Wedges	(300A,00D0)	1	Read	
>Wedge Sequence	(300A,00D1)	1C	Read	

>>Wedge Number	(300A,00D2)	1	Read	
>>Wedge Type	(300A,00D3)	2	Read	Supported values: STANDARD, DYNAMIC, MOTORIZED.
>>Wedge ID	(300A,00D4)	3	Read	
>>Accessory Code	(300A,00F9)	3	Not Read	
>>Wedge Angle	(300A,00D5)	2	Read	
>>Wedge Factor	(300A,00D6)	2	Read	
>>Wedge Orientation	(300A,00D8)	2	Read	Supported values: 0, 90, 180, 270.
>>Source to Wedge Tray Distance	(300A,00DA)	3	Read	
>Number of Compensators	(300A,00E0)	1	Read	
>Total Compensator Tray Factor	(300A,00E2)	3	Not Read	
>Compensator Sequence	(300A,00E3)	1C	Read	
>>Compensator Description	(300A,02EB)	3	Read	
>>Compensator Number	(300A,00E4)	1C	Read	
>>Compensator Type	(300A,00EE)	3	Read	
>>Material ID	(300A,00E1)	2C	Read	
>>Compensator ID	(300A,00E5)	3	Read	
>>Accessory Code	(300A,00F9)	3	Not Read	
>>Source to Compensator Tray Distance	(300A,00E6)	2	Read	
>>Compensator Divergence	(300A,02E0)	3	Read	Supported values: ABSENT, PRESENT.
>>Compensator Mounting Position	(300A,02E1)	3	Read	Supported values: PATIENT_SIDE, SOURCE_SIDE, DOUBLE_SIDED.
>>Compensator Rows	(300A,00E7)	1	Read	
>>Compensator Columns	(300A,00E8)	1	Read	
>>Compensator Pixel Spacing	(300A,00E9)	1	Read	
>>Compensator Position	(300A,00EA)	1	Read	
>>Compensator Transmission Data	(300A,00EB)	1C	Read	
>>Compensator Thickness Data	(300A,00EC)	1C	Read	
>>Source to Compensator Distance	(300A,02E2)	1C	Not Read	
>Number of Boli	(300A,00ED)	1	Read	
>Referenced Bolus Sequence	(300C,00B0)	1C	Read	
>>Referenced ROI Number	(3006,0084)	1	Read	
>>Bolus ID	(300A,00DC)	3	Read	
>>Bolus Description	(300A,00DD)	3	Not Read	
>>Accessory Code	(300A,00F9)	3	Not Read	
>Number of Blocks	(300A,00F0)	1	Read	
>Total Block Tray Factor	(300A,00F2)	3	Read	Must be 0.9 - 1.0.

>Block Sequence	(300A,00F4)	1C	Read	Compensators are not yet supported. If Manufacturer (0008,0070) in General Equipment Module equals 'Varian Medical Systems' or 'VARIAN Medical Systems' and Compensator Type (300A,00EE) equals 'OPTIMAL', 'TOTAL ACTUAL' or 'TOTAL_ACTUAL', this compensator will be ignored by the DICOM import.
>>Block Tray ID	(300A,00F5)	3	Read	
>>Accessory Code	(300A,00F9)	3	Not Read	
>>Source to Block Tray Distance	(300A,00F6)	2	Read	
>>Block Type	(300A,00F8)	1	Read	Supported values: SHIELDING, APERTURE.
>>Block Divergence	(300A,00FA)	2	Read	Supported value: PRESENT. Unsupported value: ABSENT.
>>Block Mounting Position	(300A,00FB)	3	Read	Supported values: PATIENT_SIDE, SOURCE_SIDE.
>>Block Number	(300A,00FC)	1	Read	
>>Block Name	(300A,00FE)	3	Read	
>>Material ID	(300A,00E1)	2	Read	Must be null.
>>Block Thickness	(300A,0100)	2C	Read	Must be null.
>>Block Transmission	(300A,0102)	2C	Read	Must be between 0.0 - 0.2.
>>Block Number of Points	(300A,0104)	2	Read	
>>Block Data	(300A,0106)	2	Read	
>Applicator Sequence	(300A,0107)	3	Read	Interpreted as Electron applicator or Photon cone depending on Radiation Type.
>>Applicator ID	(300A,0108)	1	Read	
>>Accessory Code	(300A,00F9)	3	Not Read	
>>Applicator Type	(300A,0109)	1	Read	Supported values: ELECTRON_SQUARE, ELECTRON_RECT, ELECTRON_CIRC, ELECTRON_SHORT, ELECTRON_OPEN, PHOTON_CIRC, STEREOTACTIC. Unsupported values: PHOTON_SQUARE, PHOTON_RECT, INTRAOPERATIVE.
>>Applicator Geometry Sequence	(300A,0431)	3	Read	Only used for photon cones, not electron applicators.
>>>Applicator Aperture Shape	(300A,0432)	1	Read	Supported value: SYM_CIRCULAR. Unsupported values: SYM_SQUARE, SYM_RECTANGLE.
>>>Applicator Opening	(300A,0433)	1C	Read	
>>Applicator Description	(300A,010A)	3	Read	
>General Accessory Sequence	(300A,0420)	3	Not Read	
>Final Cumulative Meterset Weight	(300A,010E)	1C	Read	
>Number of Control Points	(300A,0110)	1	Read	Must be exactly 2 if Radiation Type (300A, 00C6) is ELECTRON.

>Control Point Sequence	(300A,0111)	1	Read	
>>Control Point Index	(300A,0112)	1	Read	
>>Cumulative Meterset Weight	(300A,0134)	2	Read	
>>Referenced Dose Reference Sequence	(300C,0050)	3	Not Read	
>>Referenced Dose Sequence	(300C,0080)	1C	Not Read	
>>Nominal Beam Energy	(300A,0114)	3	Read	Required for the first control point. Is assumed to be constant throughout beam. Nominal Beam Energy will be mapped against nominal energy of a RayPlan machine beam quality when assigning imported beams to a machine. The nominal energy can differ from the energy used internally for dose calculation.
>>Dose Rate Set	(300A,0115)	3	Read	
>>Wedge Position Sequence	(300A,0116)	3	Read	
>>>Referenced Wedge Number	(300C,00C0)	1	Read	
>>>Wedge Position	(300A,0118)	1	Read	Supported values: IN, OUT.
>>Beam Limiting Device Position Sequence	(300A,011A)	1C	Read	Leaf/jaw positions are required to be constant within a control point pair for an SMLC plan.
>>>RT Beam Limiting Device Type	(300A,00B8)	1	Read	Supported values: X, Y, ASYMX, ASYMY, MLCX, MLCY.
>>>Leaf/Jaw Positions	(300A,011C)	1	Read	
>>Gantry Angle	(300A,011E)	1C	Read	Required for the first control point and required to not change for SMLC and DMLC. See Beam Type (300A,00C4) for more information.
>>Gantry Rotation Direction	(300A,011F)	1C	Read	Required for the first control point and required to not be "NONE" for SMLC and DMLC. See Beam Type (300A,00C4) for more information. Supported values: NONE, CW, CC.
>>Gantry Pitch Angle	(300A,014A)	3	Read	Must be null or 0.
>>Gantry Pitch Rotation Direction	(300A,014C)	3	Read	Supported values: NONE, CW, CC.
>>Beam Limiting Device Angle	(300A,0120)	1C	Read	Required for the first control point, must be empty for subsequent control points or have the same value as in the first control point.
>>Beam Limiting Device Rotation Direction	(300A,0121)	1C	Read	Required for the first control point. Supported values: NONE, CW, CC.
>>Patient Support Angle	(300A,0122)	1C	Read	Required for the first control point, must be empty for subsequent control points or have the same value as in the first control point.
>>Patient Support Rotation Direction	(300A,0123)	1C	Read	Required for the first control point. Supported values: NONE, CW, CC.

>>Table Top Eccentric Axis Distance	(300A,0124)	3	Read	
>>Table Top Eccentric Angle	(300A,0125)	1C	Read	Required for the first control point. Supported value: 0.
>>Table Top Eccentric Rotation Direction	(300A,0126)	1C	Read	Required for the first control point. Supported values: NONE, CW, CC.
>>Table Top Pitch Angle	(300A,0140)	1C	Read	Supported value: 0.
>>Table Top Pitch Rotation Direction	(300A,0142)	1C	Read	Supported values: NONE, CW, CC.
>>Table Top Roll Angle	(300A,0144)	1C	Read	Supported value: 0.
>>Table Top Roll Rotation Direction	(300A,0146)	1C	Read	Supported values: NONE, CW, CC.
>>Table Top Vertical Position	(300A,0128)	2C	Read	
>>Table Top Longitudinal Position	(300A,0129)	2C	Read	
>>Table Top Lateral Position	(300A,012A)	2C	Read	
>>Isocenter Position	(300A,012C)	2C	Read	Required for the first control point. Must be constant throughout beam.
>>Surface Entry Point	(300A,012E)	3	Not Read	
>>Source to Surface Distance	(300A,0130)	3	Not Read	
>Brainlab Private Creator	(320B,0010)	3	Not Read	
>Dynamic Tracking	(320B,1001)	3	Not Read	
>RaySearch Private Creator	(4001,0010)	3	Read	Value must be 'RAYSEARCHLABS 2.0'.
>Treatment Machine Commission Time	(4001,1001)	3	Read	The commission time of the treatment machine. Used together with Treatment Machine Name to determine the correct machine. Type "DT".

7.5.11 Approval Module

Attribute name	Tag	Type	Usage	Comment
Approval Status	(300E,0002)	1	Read	The approval status will be set in the created treatment plan. If the plan is APPROVED, the imported treatment plan will be read-only. Supported values: • APPROVED = No changes allowed to imported treatment plan. If the plan is approved, the Structure Set for the referenced image series will be approved too. • UNAPPROVED = Changes allowed to imported treatment plan. • REJECTED = Same rules as for UNAPPROVED.
Review Date	(300E,0004)	2C	Read	
Review Time	(300E,0005)	2C	Read	

Reviewer Name	(300E,0008)	2C	Read	

7.5.12 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Read	Supported value: 1.2.840.10008.5.1.4.1.1.481.5.
SOP Instance UID	(0008,0018)	1	Read	Stored internally to be used if referenced from other dataset.
Specific Character Set	(0008,0005)	1C	Read	Specific character sets are supported. If this attribute is not set, characters in the US ASCII table will be read correctly. Characters outside the US ASCII table will be replaced by a question mark if the specific character set is not encoded. Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Read	
Instance Creation Time	(0008,0013)	3	Read	
Instance Creator UID	(0008,0014)	3	Not Read	
Related General SOP Class UID	(0008,001A)	3	Not Read	
Original Specialized SOP Class UID	(0008,001B)	3	Not Read	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Read	
Timezone Offset From UTC	(0008,0201)	3	Not Read	
Contributing Equipment Sequence	(0018,A001)	3	Not Read	
Instance Number	(0020,0013)	3	Not Read	
SOP Instance Status	(0100,0410)	3	Not Read	
SOP Authorization Date and Time	(0100,0420)	3	Not Read	
SOP Authorization Comment	(0100,0424)	3	Not Read	
Authorization Equipment Certification Number	(0100,0426)	3	Not Read	
MAC Parameters Sequence	(4FFE,0001)	3	Not Read	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Read	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Read	
Original Attributes Sequence	(0400,0561)	3	Not Read	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Read	

7.6 RT Ion Plan storage SOP class

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes

	Patient Study	No
	Clinical Trial Study	No
Series	RT Series	Yes
	Clinical Trial Series	No
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Ion Plan	RT General Plan	Yes
	RT Prescription	Yes
	RT Ion Tolerance Tables	No
	RT Patient Setup	Yes
	RT Fraction Scheme	Yes
	RT Ion Beams	Yes
	Approval	Yes
	SOP Common	Yes

7.6.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Read	Cannot be empty. When importing a new patient with the same Patient ID and Patient Name as an existing patient, a suffix is added to the name of the new patient. When adding data to a current patient, the names may differ.
Patient ID	(0010,0020)	2	Read	Unique identifier for patient. Patients are separated based on the Patient ID. When data is imported, the content in this attribute assure that different patients are not mixed.
Issuer of Patient ID	(0010,0021)	3	Not Read	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Read	
Patient's Birth Date	(0010,0030)	2	Read	Attribute is not validated during import. Patient's Birth Date is set in the patient database based on the first imported dataset.
Patient's Sex	(0010,0040)	2	Read	Attribute is not validated during import. Patient's Sex is set in the patient database based on the first imported dataset. If Patient's Sex is not encoded, the default value of "O" is used. Supported values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Read	

Patient's Birth Time	(0010,0032)	3	Not Read	
Other Patient IDs	(0010,1000)	3	Not Read	
Other Patient IDs Sequence	(0010,1002)	3	Not Read	
Other Patient Names	(0010,1001)	3	Not Read	
Ethnic Group	(0010,2160)	3	Not Read	
Patient Comments	(0010,4000)	3	Not Read	
Patient Species Description	(0010,2201)	1C	Not Read	
Patient Species Code Sequence	(0010,2202)	1C	Not Read	
Patient Breed Description	(0010,2292)	2C	Not Read	
Patient Breed Code Sequence	(0010,2293)	2C	Not Read	
Breed Registration Sequence	(0010,2294)	2C	Not Read	
Responsible Person	(0010,2297)	2C	Not Read	
Responsible Person Role	(0010,2298)	1C	Not Read	
Responsible Organization	(0010,2299)	2C	Not Read	
Patient Identity Removed	(0012,0062)	3	Not Read	
De-identification Method	(0012,0063)	1C	Not Read	
De-identification Method Code Sequence	(0012,0064)	1C	Not Read	

7.6.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Read	During import, studies are separated based on the Study Instance UID. All data imported to a patient is placed in one internal equivalent to a DICOM study (i.e. Study Instance UID do not separate clinical data internally). The Study Instance UID is stored from the first imported dataset to be used at a future export.
Study Date	(0008,0020)	2	Read	
Study Time	(0008,0030)	2	Read	
Referring Physician's Name	(0008,0090)	2	Read	
Referring Physician Identification Sequence	(0008,0096)	3	Not Read	
Study ID	(0020,0010)	2	Read	
Accession Number	(0008,0050)	2	Read	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Read	
Study Description	(0008,1030)	3	Not Read	
Physician(s) of Record	(0008,1048)	3	Not Read	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Read	

Name of Physician(s) Reading Study	(0008,1060)	3	Not Read	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Read	
Requesting Service Code Sequence	(0032,1034)	3	Not Read	
Referenced Study Sequence	(0008,1110)	3	Not Read	
Procedure Code Sequence	(0008,1032)	3	Not Read	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Read	

7.6.3 RT Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Read	Supported value: RTPLAN.
Series Instance UID	(0020,000E)	1	Read	During import, series are separated based on the Series Instance UID. If a series is imported, all clinical data in that series is imported.
Series Number	(0020,0011)	2	Read	
Series Description	(0008,103E)	3	Read	Used to identify series during import.
Series Description Code Sequence	(0008,103F)	3	Not Read	
Operators' Name	(0008,1070)	2	Read	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Read	
Request Attributes Sequence	(0040,0275)	3	Not Read	
Performed Procedure Step ID	(0040,0253)	3	Not Read	
Performed Procedure Step Start Date	(0040,0244)	3	Not Read	
Performed Procedure Step Start Time	(0040,0245)	3	Not Read	
Performed Procedure Step Description	(0040,0254)	3	Not Read	
Performed Protocol Code Sequence	(0040,0260)	3	Not Read	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Read	

7.6.4 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Read	Is required to be the same as the Frame of Reference UID found in the plan's referenced RT Struct.
Position Reference Indicator	(0020,1040)	2	Read	

7.6.5 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Read	Used to detect fluence maps that are sometimes stored as compensators in plans from Varian.
Institution Name	(0008,0080)	3	Not Read	
Institution Address	(0008,0081)	3	Not Read	
Station Name	(0008,1010)	3	Not Read	
Institutional Department Name	(0008,1040)	3	Not Read	
Manufacturer's Model Name	(0008,1090)	3	Read	
Device Serial Number	(0018,1000)	3	Not Read	
Software Versions	(0018,1020)	3	Not Read	
Gantry ID	(0018,1008)	3	Not Read	
Spatial Resolution	(0018,1050)	3	Not Read	
Date of Last Calibration	(0018,1200)	3	Not Read	
Time of Last Calibration	(0018,1201)	3	Not Read	
Pixel Padding Value	(0028,0120)	1C	Read	

7.6.6 RT General Plan Module

Attribute name	Tag	Type	Usage	Comment
RT Plan Label	(300A,0002)	1	Read	Used as Radiation Set Name (and potentially Treatment Plan Name if RT Plan Name is empty). A suffix is added by RayPlan if name is not unique within the Treatment Plan.
RT Plan Name	(300A,0003)	3	Read	Used as Treatment Plan Name (RT Plan Label is used instead if this attribute is empty). A suffix is added by RayPlan if the name is not unique within the patient.
RT Plan Description	(300A,0004)	3	Not Read	
Instance Number	(0020,0013)	3	Not Read	
RT Plan Date	(300A,0006)	2	Not Read	
RT Plan Time	(300A,0007)	2	Not Read	
Treatment Protocols	(300A,0009)	3	Not Read	
Plan Intent	(300A,000A)	3	Read	
Treatment Sites	(300A,000B)	3	Not Read	
RT Plan Geometry	(300A,000C)	1	Read	Supported value: PATIENT. Unsupported value: TREATMENT_DEVICE.
Referenced Structure Set Sequence	(300C,0060)	1C	Read	Is required to contain one and only one item.
>Referenced SOP Class UID	(0008,1150)	1	Not Read	
>Referenced SOP Instance UID	(0008,1155)	1	Read	Referenced Structure Set has to be imported to patient (prior or at the same time as the RT Plan dataset is imported).

Referenced Dose Sequence	(300C,0080)	3	Not Read	
Referenced RT Plan Sequence	(300C,0002)	3	Not Read	

7.6.7 RT Prescription Module

Attribute name	Tag	Type	Usage	Comment
Prescription Description	(300A,000E)	3	Read	
Dose Reference Sequence	(300A,0010)	3	Read	Since only primary prescriptions are supported, this must have length 1.
>Dose Reference Number	(300A,0012)	1	Not Read	
>Dose Reference UID	(300A,0013)	3	Not Read	
>Dose Reference Structure Type	(300A,0014)	1	Read	Supported values: POINT, VOLUME. Unsupported values: COORDINATES, SITE.
>Dose Reference Description	(300A,0016)	3	Read	
>Referenced ROI Number	(3006,0084)	1C	Read	
>Dose Reference Point Coordinates	(300A,0018)	1C	Read	
>Nominal Prior Dose	(300A,001A)	3	Read	Must be null or 0.
>Dose Reference Type	(300A,0020)	1	Read	Supported value: TARGET. Unsupported value: ORGAN_AT_RISK.
>Constraint Weight	(300A,0021)	3	Read	
>Delivery Warning Dose	(300A,0022)	3	Not Read	
>Delivery Maximum Dose	(300A,0023)	3	Not Read	
>Target Minimum Dose	(300A,0025)	3	Read	
>Target Prescription Dose	(300A,0026)	3	Read	
>Target Maximum Dose	(300A,0027)	3	Read	
>Target Underdose Volume Fraction	(300A,0028)	3	Read	
>Organ at Risk Full-volume Dose	(300A,002A)	3	Read	
>Organ at Risk Limit Dose	(300A,002B)	3	Read	
>Organ at Risk Maximum Dose	(300A,002C)	3	Read	
>Organ at Risk Overdose Volume Fraction	(300A,002D)	3	Read	
>RaySearch Private Creator	(4001,0010)	3	Read	Value must be 'RAYSEARCHLABS 2.0'.
>Target Prescription Effective Dose	(4001,1011)	3	Read	RaySearch Private Tag. Prescribed dose to Dose Reference if Dose Reference Type (300A,0020) is TARGET. The dose is physical dose after correction for biological effect using user-defined modeling technique.

7.6.8 RT Patient Setup Module

Attribute name	Tag	Type	Usage	Comment
Patient Setup Sequence	(300A,0180)	1	Read	Must contain at least one entry.

>Patient Setup Number	(300A,0182)	1	Read	
>Patient Setup Label	(300A,0183)	3	Not Read	
>Patient Position	(0018,5100)	1C	Read	Must be compatible with the planning CT's patient position. i.e. cannot mix prone and supine. Supported values: HFS, HFP, FFS, FFP.
>Patient Additional Position	(300A,0184)	1C	Not Read	
>Referenced Setup Image Sequence	(300A,0401)	3	Not Read	
>Fixation Device Sequence	(300A,0190)	3	Not Read	
>Shielding Device Sequence	(300A,01A0)	3	Not Read	
>Setup Technique	(300A,01B0)	3	Not Read	
>Setup Technique Description	(300A,01B2)	3	Not Read	
>Setup Device Sequence	(300A,01B4)	3	Not Read	
>Table Top Vertical Setup Displacement	(300A,01D2)	3	Not Read	
>Table Top Longitudinal Setup Displacement	(300A,01D4)	3	Not Read	
>Table Top Lateral Setup Displacement	(300A,01D6)	3	Not Read	
>Motion Synchronization Sequence	(300A,0410)	3	Not Read	
medPhoton Private Creator	(30BB,0010)	3	Read	Value must be 'medPhoton 1.0'.
medPhoton Patient Setup ID	(30BB,1000)	3	Read	medPhoton Patient Setup ID
medPhoton Imaging Protocol ID	(30BB,1001)	3	Read	medPhoton Imaging Protocol ID

7.6.9 RT Fraction Scheme Module

Attribute name	Tag	Type	Usage	Comment
Fraction Group Sequence	(300A,0070)	1	Read	Multiple fraction groups are supported and are converted to separate Beam Sets in RayPlan. Dose cannot be imported to a plan with multiple Beam Sets.
>Fraction Group Number	(300A,0071)	1	Read	Used to identify fraction groups.
>Fraction Group Description	(300A,0072)	3	Not Read	
>Referenced Dose Sequence	(300C,0080)	3	Not Read	
>Referenced Dose Reference Sequence	(300C,0050)	3	Not Read	
>Number of Fractions Planned	(300A,0078)	2	Read	Used to create fraction schedule. If this value is 0 it is interpreted as a one-fraction plan.
>Number of Fraction Pattern Digits Per Day	(300A,0079)	3	Read	
>Repeat Fraction Cycle Length	(300A,007A)	3	Read	
>Fraction Pattern	(300A,007B)	3	Read	

>Number of Beams	(300A,0080)	1	Read	
>Referenced Beam Sequence	(300C,0004)	1C	Read	There must be at least one beam in the fraction group.
>>Referenced Beam Number	(300C,0006)	1C	Read	
>>Beam Dose Specification Point	(300A,0082)	3	Not Read	Since beam dose point information is currently not imported, this information will be lost when importing a plan exported from RayPlan.
>>Beam Dose	(300A,0084)	3	Not Read	
>>Beam Dose Point Depth	(300A,0088)	3	Not Read	
>>Beam Dose Point Equivalent Depth	(300A,0089)	3	Not Read	
>>Beam Dose Point SSD	(300A,008A)	3	Not Read	
>>Beam Meterset	(300A,0086)	3	Read	Must be defined in MU.
>Number of Brachy Application Setups	(300A,00A0)	1	Read	Must be 0.
>Referenced Brachy Application Setup Sequence	(300C,000A)	1C	Not Read	

7.6.10 RT Ion Beams Module

Attribute name	Tag	Type	Usage	Comment
Ion Beam Sequence	(300A,03A2)	1	Read	
>Beam Number	(300A,00C0)	1	Read	
>Beam Name	(300A,00C2)	1	Read	Non-unique beams names will be renamed.
>Beam Description	(300A,00C3)	3	Read	Non-unique beams descriptions will be renamed.
>Beam Type	(300A,00C4)	1	Read	Supported values: STATIC, DYNAMIC.
>Radiation Type	(300A,00C6)	1	Read	Supported values: PROTON, ION. Unsupported value: PHOTON.
>Radiation Mass Number	(300A,0302)	1C	Read	Supported value: 12.
>Radiation Atomic Number	(300A,0304)	1C	Read	Supported value: 6.
>Radiation Charge State	(300A,0306)	1C	Read	Supported value: 6.
>Scan Mode	(300A,0308)	1	Read	If value is NONE, the private tag IBA Scattered Mode (300D, 1002) depicts if the beam delivery type is Single Scattering or Double Scattering. Supported values: NONE, UNIFORM, MODULATED, LINE, WOBBLING.
>Treatment Machine Name	(300A,00B2)	2	Read	Only a single treatment machine is allowed per plan.
>Manufacturer	(0008,0070)	3	Read	
>Institution Name	(0008,0080)	3	Not Read	
>Institution Address	(0008,0081)	3	Not Read	

>Institutional Department Name	(0008,1040)	3	Not Read	
>Manufacturer's Model Name	(0008,1090)	3	Not Read	
>Device Serial Number	(0018,1000)	3	Not Read	
>Primary Dosimeter Unit	(300A,00B3)	1	Read	Supported values: MU, NP.
>Referenced Tolerance Table Number	(300C,00A0)	3	Not Read	
>Virtual Source-Axis Distances	(300A,030A)	1	Read	
>Ion Beam Limiting Device Sequence	(300A,03A4)	3	Read	Only used for Sumitomo plans. Private SOBP Width and Depth tags are used to communicate nozzle settings for IBA and Mevion plans.
>>RT Beam Limiting Device Type	(300A,00B8)	1	Read	
>>Isocenter to Beam Limiting Device Distance	(300A,00BB)	2	Read	
>>Number of Leaf/Jaw Pairs	(300A,00BC)	1	Read	
>>Leaf Position Boundaries	(300A,00BE)	1C	Read	
>Referenced Patient Setup Number	(300C,006A)	3	Read	
>Referenced Reference Image Sequence	(300C,0042)	3	Read	
>>Referenced SOP Class UID	(0008,1150)	1	Read	
>>Referenced SOP Instance UID	(0008,1155)	1	Read	
>>Reference Image Number	(300A,00C8)	1	Read	
>Treatment Delivery Type	(300A,00CE)	1	Read	If the Treatment Delivery type is null, beam is assumed to be of type TREATMENT. Supported value: TREATMENT. Unsupported values: OPEN_PORTFILM, TRMT_PORTFILM, CONTINUATION, SETUP.
>Referenced Dose Sequence	(300C,0080)	3	Not Read	
>Number of Wedges	(300A,00D0)	1	Read	Must be 0.
>Total Wedge Tray Water-Equivalent Thickness	(300A,00D7)	3	Not Read	
>Ion Wedge Sequence	(300A,03AA)	1C	Not Read	Not supported.
>Number of Compensators	(300A,00E0)	1	Read	Must be 0 or 1.
>Total Compensator Tray Water-Equivalent Thickness	(300A,02E3)	3	Not Read	
>Ion Range Compensator Sequence	(300A,02EA)	1C	Read	
>>Compensator Description	(300A,02EB)	3	Not Read	
>>Compensator Number	(300A,00E4)	1	Read	
>>Material ID	(300A,00E1)	2	Read	
>>Compensator ID	(300A,00E5)	3	Read	
>>Accessory Code	(300A,00F9)	3	Not Read	

>>Isocenter to Compensator Tray Distance	(300A,02E4)	1C	Read	
>>Compensator Divergence	(300A,02E0)	1	Read	Supported values: ABSENT, PRESENT.
>>Compensator Mounting Position	(300A,02E1)	1	Read	Supported values: PATIENT_SIDE, SOURCE_SIDE. Unsupported value: DOUBLE_SIDED.
>>Compensator Rows	(300A,00E7)	1	Read	
>>Compensator Columns	(300A,00E8)	1	Read	
>>Compensator Pixel Spacing	(300A,00E9)	1	Read	
>>Compensator Position	(300A,00EA)	1	Read	
>>Compensator Column Offset	(300A,02E5)	1C	Read	
>>Compensator Thickness Data	(300A,00EC)	1	Read	
>>Isocenter to Compensator Distances	(300A,02E6)	1C	Not Read	
>>Compensator Relative Stopping Power Ratio	(300A,02E7)	3	Not Read	
>>Compensator Milling Tool Diameter	(300A,02E8)	3	Read	
>Number of Boli	(300A,00ED)	1	Read	Must be 0.
>Referenced Bolus Sequence	(300C,00B0)	1C	Not Read	Not supported.
>Number of Blocks	(300A,00F0)	1	Read	Must be 0 or 1.
>Total Block Tray Water-Equivalent Thickness	(300A,00F3)	3	Not Read	
>Ion Block Sequence	(300A,03A6)	1C	Read	
>>Block Tray ID	(300A,00F5)	3	Not Read	
>>Accessory Code	(300A,00F9)	3	Not Read	
>>Isocenter to Block Tray Distance	(300A,00F7)	1	Read	
>>Block Type	(300A,00F8)	1	Read	Supported values: SHIELDING, APERTURE.
>>Block Divergence	(300A,00FA)	1	Read	Supported values: PRESENT, ABSENT.
>>Block Mounting Position	(300A,00FB)	1	Read	Supported values: PATIENT_SIDE, SOURCE_SIDE.
>>Block Number	(300A,00FC)	1	Read	
>>Block Name	(300A,00FE)	3	Read	
>>Material ID	(300A,00E1)	2	Read	
>>Block Thickness	(300A,0100)	1	Read	
>>Block Number of Points	(300A,0104)	1	Read	
>>Block Data	(300A,0106)	1	Read	
>Snout Sequence	(300A,030C)	3	Read	Maximum one Snout is supported.
>>Snout ID	(300A,030F)	1	Read	
>>Accessory Code	(300A,00F9)	3	Not Read	

>Applicator Sequence	(300A,0107)	3	Not Read	
>General Accessory Sequence	(300A,0420)	3	Not Read	
>Number of Range Shifters	(300A,0312)	1	Read	Must be 0 or 1.
>Range Shifter Sequence	(300A,0314)	1C	Read	Maximum one Range Shifter is supported, and only when Scan Mode (300A, 0308) is MODULATED.
>>Range Shifter Number	(300A,0316)	1	Read	
>>Range Shifter ID	(300A,0318)	1	Read	
>>Accessory Code	(300A,00F9)	3	Not Read	
>>Range Shifter Type	(300A,0320)	1	Read	Supported values: ANALOG, BINARY.
>>Range Shifter Description	(300A,0322)	3	Not Read	
>Number of Lateral Spreading Devices	(300A,0330)	1	Read	Must be 0 if Scan Mode (300A, 0308) is MODULATED and otherwise 0 - 2.
>Lateral Spreading Device Sequence	(300A,0332)	1C	Read	Only used for Sumitomo plans. Private SOBP Width and Depth tags are used to communicate nozzle settings for IBA and Mevion plans.
>>Lateral Spreading Device Number	(300A,0334)	1	Read	
>>Lateral Spreading Device ID	(300A,0336)	1	Read	
>>Accessory Code	(300A,00F9)	3	Not Read	
>>Lateral Spreading Device Type	(300A,0338)	1	Read	Supported value: SCATTERER. Unsupported value: MAGNET.
>>Lateral Spreading Device Description	(300A,033A)	3	Not Read	
>Number of Range Modulators	(300A,0340)	1	Read	
>Range Modulator Sequence	(300A,0342)	1C	Read	Only used for Sumitomo plans. Private SOBP Width and Depth tags are used to communicate nozzle settings for IBA and Mevion plans.
>>Range Modulator Number	(300A,0344)	1	Read	
>>Range Modulator ID	(300A,0346)	1	Read	
>>Accessory Code	(300A,00F9)	3	Not Read	
>>Range Modulator Type	(300A,0348)	1	Read	Supported values: FIXED, WHL_FIXEDWEIGHTS, WHL_MODWEIGHTS.
>>Range Modulator Description	(300A,034A)	3	Read	
>>Beam Current Modulation ID	(300A,034C)	1C	Not Read	
>Patient Support Type	(300A,0350)	1	Read	Supported value: TABLE. Unsupported value: CHAIR.
>Patient Support ID	(300A,0352)	3	Not Read	
>Patient Support Accessory Code	(300A,0354)	3	Not Read	
>Fixation Light Azimuthal Angle	(300A,0356)	3	Not Read	
>Fixation Light Polar Angle	(300A,0358)	3	Not Read	

>Final Cumulative Meterset Weight	(300A,010E)	1C	Read	
>Number of Control Points	(300A,0110)	1	Read	Must be 2 for Single Scattering, Double Scattering, and Uniform Scanning. Must be equal or greater than 2 for Pencil Beam Scanning.
>Ion Control Point Sequence	(300A,03A8)	1	Read	
>>Control Point Index	(300A,0112)	1	Read	
>>Cumulative Meterset Weight	(300A,0134)	2	Read	
>>Referenced Dose Reference Sequence	(300C,0050)	3	Not Read	
>>Nominal Beam Energy	(300A,0114)	1C	Read	
>>KVp	(0018,0060)	1C	Not Read	
>>Meterset Rate	(300A,035A)	3	Read	
>>Ion Wedge Position Sequence	(300A,03AC)	1C	Not Read	
>>Range Shifter Settings Sequence	(300A,0360)	1C	Not Read	Not read. A range shifter is assumed to be used if a range shifter exists in the current beam.
>>Lateral Spreading Device Settings Sequence	(300A,0370)	1C	Read	Only used for Sumitomo plans. Private SOBP Width and Depth tags are used to communicate nozzle settings for IBA and Mevion plans.
>>>Referenced Lateral Spreading Device Number	(300C,0102)	1	Read	
>>>Lateral Spreading Device Setting	(300A,0372)	1	Read	Supported value: IN.
>>>Isocenter to Lateral Spreading Device Distance	(300A,0374)	3	Read	
>>>Lateral Spreading Device Water Equivalent Thickness	(300A,033C)	3	Read	
>>Range Modulator Settings Sequence	(300A,0380)	1C	Read	Only for Sumitomo plans.
>>>Referenced Range Modulator Number	(300C,0104)	1	Read	
>>>Range Modulator Gating Start Value	(300A,0382)	1C	Not Read	
>>>Range Modulator Gating Stop Value	(300A,0384)	1C	Not Read	
>>>Range Modulator Gating Start Water Equivalent Thickness	(300A,0386)	3	Read	
>>>Range Modulator Gating Stop Water Equivalent Thickness	(300A,0388)	3	Read	
>>>Isocenter to Range Modulator Distance	(300A,038A)	3	Not Read	
>>Beam Limiting Device Position	(300A,011A)	1C	Read	Only for Sumitomo plans.

Sequence				
>>>RT Beam Limiting Device Type	(300A,00B8)	1	Read	
>>>Leaf/Jaw Positions	(300A,011C)	1	Read	
>>Gantry Angle	(300A,011E)	1C	Read	
>>Gantry Rotation Direction	(300A,011F)	1C	Read	Supported value: NONE. Unsupported values: CW, CC.
>>Gantry Pitch Angle	(300A,014A)	2C	Read	
>>Gantry Pitch Rotation Direction	(300A,014C)	2C	Read	Supported value: NONE. Unsupported values: CW, CC.
>>Beam Limiting Device Angle	(300A,0120)	1C	Read	
>>Beam Limiting Device Rotation Direction	(300A,0121)	1C	Read	Supported value: NONE. Unsupported values: CW, CC.
>>Scan Spot Tune ID	(300A,0390)	1C	Read	
>>Number of Scan Spot Positions	(300A,0392)	1C	Read	
>>Scan Spot Position Map	(300A,0394)	1C	Read	
>>Scan Spot Meterset Weights	(300A,0396)	1C	Read	
>>Scanning Spot Size	(300A,0398)	3	Read	
>>Number of Paintings	(300A,039A)	1C	Read	
>>Patient Support Angle	(300A,0122)	1C	Read	Must be constant within beam.
>>Patient Support Rotation Direction	(300A,0123)	1C	Read	Supported value: NONE. Unsupported values: CW, CC.
>>Table Top Pitch Angle	(300A,0140)	2C	Read	Supported: 0
>>Table Top Pitch Rotation Direction	(300A,0142)	2C	Read	Supported value: NONE. Unsupported values: CW, CC.
>>Table Top Roll Angle	(300A,0144)	2C	Read	Supported: 0
>>Table Top Roll Rotation Direction	(300A,0146)	2C	Read	Supported value: NONE. Unsupported values: CW, CC.
>>Head Fixation Angle	(300A,0148)	3	Not Read	
>>Table Top Vertical Position	(300A,0128)	2C	Read	Supported: 0
>>Table Top Longitudinal Position	(300A,0129)	2C	Read	Supported: 0
>>Table Top Lateral Position	(300A,012A)	2C	Read	Supported: 0
>>Snout Position	(300A,030D)	2C	Read	
>>Isocenter Position	(300A,012C)	2C	Read	
>>Surface Entry Point	(300A,012E)	3	Not Read	
>>Nominal Beam Energy Unit	(300A,0015)	3	Not Read	
>>IMPAC Private Creator	(300B,0010)	3	Read	Value must be 'IMPAC'.
>>Line Spot Tune ID	(300B,1090)	3	Read	Private tag. Used for Sumitomo Line Scanning.
>>Number of Line Scan Spot Positions	(300B,1092)	3	Read	Private tag. Used for Sumitomo Line Scanning.
>>Line Scan Position Map	(300B,1094)	3	Read	Private tag. Used for Sumitomo Line

				Scanning.
>>Line Scan Meterset Weights	(300B,1096)	3	Read	Private tag. Used for Sumitomo Line Scanning.
>>Line Scanning Spot Size	(300B,1098)	3	Read	Private tag. Used for Sumitomo Line Scanning.
>>Number of Line Scan Spot Paintings	(300B,109A)	3	Read	Private tag. Used for Sumitomo Line Scanning.
>>RaySearch Private Creator	(4001,0010)	3	Read	Value must be 'RAYSEARCHLABS 2.0'.
>>Spill Length	(4001,1005)	3	Read	RaySearch Private tag. The synchrotron spill length in seconds.
>>Degrader	(4001,1006)	3	Read	RaySearch Private tag. The degradation applied by the degrader before the synchrotron.
>>Particles Per Spill	(4001,1007)	3	Read	RaySearch Private tag. Number of particles delivered during a spill for synchrotrons.
>>CNAO Nominal Beam Energy	(4001,1008)	3	Read	RaySearch Private tag. Nominal Beam Energy in MeV/nucleon. This value is copied to "Nominal Beam Energy" if not existing.
>>CNAO Nominal Beam Energy Scale Factor	(4001,1009)	3	Not Read	
>IMPAC Private Creator	(300B,0010)	3	Read	Value must be 'IMPAC'.
>Maximum Collimated Field Diameter	(300B,1002)	3	Read	Private tag. The maximum diameter (in mm) of a circle, centered about the beam axis, which contains the collimated field.
>Nominal SOBP Width	(300B,100E)	3	Read	Private tag. Distance (in mm) between maximal Water-Equivalent distance to distal border of target and minimal Water-Equivalent Distance to proximal border of target. Required for passive plans. Supported values: [0,320]
>Planned Distal Target Distance	(300B,1004)	3	Read	Private tag. Maximal Water-Equivalent distance (in mm) to distal border of target. Required for passive plans. Supported values: [35,320].
>IBA Private Creator	(300D,0010)	3	Read	Value must be 'IBA'.
>IBA Scattered Mode	(300D,1002)	3	Read	Private tag. Used to depict the scattering mode. Only used when Scan Mode (300A, 0308) is NONE. Supported values: SINGLE, DOUBLE.
>RaySearch Private Creator	(4001,0010)	3	Read	Value must be 'RAYSEARCHLABS 2.0'.
>Treatment Machine Commission Time	(4001,1001)	3	Read	RaySearch Private tag. The commission time of the treatment machine. Used together with Treatment Machine Name to determine the correct machine.
>RBE Model Name	(4001,1002)	3	Read	RaySearch Private tag. The RBE Model Name. Used to determine the correct RBE Model.
>RBE Model Commission Time	(4001,1003)	3	Read	RaySearch Private tag. The commission time

				of the RBE Model. Used together with RBE Model Name to determine the correct RBE Model.
>Block Milling Tool Diameter	(4001,1004)	3	Read	RaySearch Private tag. The block milling tool diameter in mm.
>Internal Treatment Machine Name	(4001,1012)	3	Not Read	RaySearch Private tag. The internal treatment machine name. This value will differ from Treatment Machine Name (300A,00B2) if a treatment machine name alias have been specified on the ion beam quality.

7.6.11 Approval Module

Attribute name	Tag	Type	Usage	Comment
Approval Status	(300E,0002)	1	Read	The approval status will be set in the created treatment plan. If the plan is APPROVED, the imported treatment plan will be read-only. Supported values: • APPROVED = No changes allowed to imported treatment plan. If the plan is approved, the Structure Set for the referenced image series will be approved too. • UNAPPROVED = Changes allowed to imported treatment plan. • REJECTED = Same rules as for UNAPPROVED.
Review Date	(300E,0004)	2C	Read	
Review Time	(300E,0005)	2C	Read	
Reviewer Name	(300E,0008)	2C	Read	

7.6.12 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Read	Supported value: 1.2.840.10008.5.1.4.1.1.481.5.
SOP Instance UID	(0008,0018)	1	Read	Stored internally to be used if referenced from other dataset.
Specific Character Set	(0008,0005)	1C	Read	Specific character sets are supported. If this attribute is not set, characters in the US ASCII table will be read correctly. Characters outside the US ASCII table will be replaced by a question mark if the specific character set is not encoded. Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Read	
Instance Creation Time	(0008,0013)	3	Read	
Instance Creator UID	(0008,0014)	3	Not Read	

Related General SOP Class UID	(0008,001A)	3	Not Read	
Original Specialized SOP Class UID	(0008,001B)	3	Not Read	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Read	
Timezone Offset From UTC	(0008,0201)	3	Not Read	
Contributing Equipment Sequence	(0018,A001)	3	Not Read	
Instance Number	(0020,0013)	3	Not Read	
SOP Instance Status	(0100,0410)	3	Not Read	
SOP Authorization Date and Time	(0100,0420)	3	Not Read	
SOP Authorization Comment	(0100,0424)	3	Not Read	
Authorization Equipment Certification Number	(0100,0426)	3	Not Read	
MAC Parameters Sequence	(4FFE,0001)	3	Not Read	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Read	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Read	
Original Attributes Sequence	(0400,0561)	3	Not Read	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Read	

7.7 RT Dose storage SOP class

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	RT Series	Yes
	Clinical Trial Series	No
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Dose	General Image	No
	Image Plane	Yes
	Image Pixel	Yes
	Multi-Frame	No
	Overlay Plane	No
	Multi-Frame Overlay	No
	Modality LUT	No
	RT Dose	Yes
	RT DVH	No

	Structure Set	No
	ROI Contour	No
	RT Dose ROI	No
	SOP Common	Yes
	Frame Extraction	No

7.7.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Read	Cannot be empty. When importing a new patient with the same Patient ID and Patient Name as an existing patient, a suffix is added to the name of the new patient. When adding data to a current patient, the names may differ.
Patient ID	(0010,0020)	2	Read	Unique identifier for patient. Patients are separated based on the Patient ID. When data is imported, the content in this attribute assure that different patients are not mixed.
Issuer of Patient ID	(0010,0021)	3	Not Read	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Read	
Patient's Birth Date	(0010,0030)	2	Read	Attribute is not validated during import. Patient's Birth Date is set in the patient database based on the first imported dataset.
Patient's Sex	(0010,0040)	2	Read	Attribute is not validated during import. Patient's Sex is set in the patient database based on the first imported dataset. If Patient's Sex is not encoded, the default value of "O" is used. Supported values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Read	
Patient's Birth Time	(0010,0032)	3	Not Read	
Other Patient IDs	(0010,1000)	3	Not Read	
Other Patient IDs Sequence	(0010,1002)	3	Not Read	
Other Patient Names	(0010,1001)	3	Not Read	
Ethnic Group	(0010,2160)	3	Not Read	
Patient Comments	(0010,4000)	3	Not Read	
Patient Species Description	(0010,2201)	1C	Not Read	
Patient Species Code Sequence	(0010,2202)	1C	Not Read	
Patient Breed Description	(0010,2292)	2C	Not Read	

Patient Breed Code Sequence	(0010,2293)	2C	Not Read	
Breed Registration Sequence	(0010,2294)	2C	Not Read	
Responsible Person	(0010,2297)	2C	Not Read	
Responsible Person Role	(0010,2298)	1C	Not Read	
Responsible Organization	(0010,2299)	2C	Not Read	
Patient Identity Removed	(0012,0062)	3	Not Read	
De-identification Method	(0012,0063)	1C	Not Read	
De-identification Method Code Sequence	(0012,0064)	1C	Not Read	

7.7.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Read	During import, studies are separated based on the Study Instance UID. All data imported to a patient is placed in one internal equivalent to a DICOM study (i.e. Study Instance UID do not separate clinical data internally). The Study Instance UID is stored from the first imported dataset to be used at a future export.
Study Date	(0008,0020)	2	Read	
Study Time	(0008,0030)	2	Read	
Referring Physician's Name	(0008,0090)	2	Read	
Referring Physician Identification Sequence	(0008,0096)	3	Not Read	
Study ID	(0020,0010)	2	Read	
Accession Number	(0008,0050)	2	Read	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Read	
Study Description	(0008,1030)	3	Not Read	
Physician(s) of Record	(0008,1048)	3	Not Read	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Read	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Read	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Read	
Requesting Service Code Sequence	(0032,1034)	3	Not Read	
Referenced Study Sequence	(0008,1110)	3	Not Read	
Procedure Code Sequence	(0008,1032)	3	Not Read	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Read	

7.7.3 RT Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Read	Supported value: RTDOSE.
Series Instance UID	(0020,000E)	1	Read	During import, series are separated based on the Series Instance UID. If a series is imported, all clinical data in that series is imported.
Series Number	(0020,0011)	2	Read	
Series Description	(0008,103E)	3	Read	Used to identify series during import.
Series Description Code Sequence	(0008,103F)	3	Not Read	
Operators' Name	(0008,1070)	2	Read	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Read	
Request Attributes Sequence	(0040,0275)	3	Not Read	
Performed Procedure Step ID	(0040,0253)	3	Not Read	
Performed Procedure Step Start Date	(0040,0244)	3	Not Read	
Performed Procedure Step Start Time	(0040,0245)	3	Not Read	
Performed Procedure Step Description	(0040,0254)	3	Not Read	
Performed Protocol Code Sequence	(0040,0260)	3	Not Read	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Read	

7.7.4 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Read	Is required to be the same as the Frame of Reference UID found in the referenced plan.
Position Reference Indicator	(0020,1040)	2	Read	

7.7.5 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Not Read	
Institution Name	(0008,0080)	3	Not Read	
Institution Address	(0008,0081)	3	Not Read	
Station Name	(0008,1010)	3	Not Read	
Institutional Department Name	(0008,1040)	3	Not Read	
Manufacturer's Model Name	(0008,1090)	3	Not Read	
Device Serial Number	(0018,1000)	3	Not Read	
Software Versions	(0018,1020)	3	Not Read	

Gantry ID	(0018,1008)	3	Not Read	
Spatial Resolution	(0018,1050)	3	Not Read	
Date of Last Calibration	(0018,1200)	3	Not Read	
Time of Last Calibration	(0018,1201)	3	Not Read	
Pixel Padding Value	(0028,0120)	1C	Read	If pixel padding is present within the region used for dose computation, the resulting dose may be wrong.

7.7.6 Image Plane Module

Attribute name	Tag	Type	Usage	Comment
Pixel Spacing	(0028,0030)	1	Read	
Image Orientation (Patient)	(0020,0037)	1	Read	All non-oblique image orientations are supported (i.e. row and column directions must be along an axis) .
Image Position (Patient)	(0020,0032)	1	Read	Note that this is the center of the first pixel, i.e. the corner of the image offset by half a pixel.
Slice Thickness	(0018,0050)	2	Not Read	
Slice Location	(0020,1041)	3	Not Read	

7.7.7 Image Pixel Module

Attribute name	Tag	Type	Usage	Comment
Samples per Pixel	(0028,0002)	1	Read	Supported value: 1.
Photometric Interpretation	(0028,0004)	1	Read	Supported value: MONOCHROME2. Unsupported value: MONOCHROME1.
Rows	(0028,0010)	1	Read	
Columns	(0028,0011)	1	Read	
Bits Allocated	(0028,0100)	1	Read	Supported values: 16, 32.
Bits Stored	(0028,0101)	1	Read	Must be equal to Bits Allocated.
High Bit	(0028,0102)	1	Read	HighBit must be BitsStored-1.
Pixel Representation	(0028,0103)	1	Read	Is required to be consistent for all datasets in the same series. Supported value: 0. Unsupported value: 1.
Pixel Data	(7FE0,0010)	1C	Read	
Planar Configuration	(0028,0006)	1C	Not Read	
Pixel Aspect Ratio	(0028,0034)	1C	Not Read	
Smallest Image Pixel Value	(0028,0106)	3	Not Read	
Largest Image Pixel Value	(0028,0107)	3	Not Read	
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	Not Read	
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Not Read	

Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Not Read	
Red Palette Color Lookup Table Data	(0028,1201)	1C	Not Read	
Green Palette Color Lookup Table Data	(0028,1202)	1C	Not Read	
Blue Palette Color Lookup Table Data	(0028,1203)	1C	Not Read	
ICC Profile	(0028,2000)	3	Not Read	
Pixel Data Provider URL	(0028,7FE0)	1C	Not Read	
Pixel Padding Range Limit	(0028,0121)	1C	Read	
Pixel Data 32	(7FE0,0010)	1C	Read	Alternative view of Pixel Data.
Pixel Data Float	(7FE0,0010)	1C	Read	Alternative view of Pixel Data.

7.7.8 RT Dose Module

Attribute name	Tag	Type	Usage	Comment
Samples per Pixel	(0028,0002)	1C	Read	Supported value: 1.
Photometric Interpretation	(0028,0004)	1C	Read	Supported value: MONOCHROME2. Unsupported value: MONOCHROME1.
Bits Allocated	(0028,0100)	1C	Read	Supported values: 16, 32.
Bits Stored	(0028,0101)	1C	Read	Bits Stored must be equal to Bits Allocated.
High Bit	(0028,0102)	1C	Read	High Bit must be Bits Stored - 1.
Pixel Representation	(0028,0103)	1C	Read	Supported value: 0.
Dose Units	(3004,0002)	1	Read	Supported value: GY.
Dose Type	(3004,0004)	1	Read	Supported values: PHYSICAL, EFFECTIVE.
Instance Number	(0020,0013)	3	Not Read	
Dose Comment	(3004,0006)	3	Not Read	
Normalization Point	(3004,0008)	3	Not Read	
Dose Summation Type	(3004,000A)	1	Read	Note: Summation type BEAM is interpreted as the dose contribution from this beam over the entire treatment course, not per fraction. Supported values: PLAN, BEAM, FRACTION.
Referenced RT Plan Sequence	(300C,0002)	1C	Read	Is required to contain only one item. For doses with summation type BEAM the referenced plan must be found and all beam doses must be imported together. For doses with summation type PLAN a dummy plan will be created if the referenced plan couldn't be found but an examination with a matching Frame of Reference UID is found.
>Referenced SOP Class UID	(0008,1150)	1	Not Read	
>Referenced SOP Instance UID	(0008,1155)	1	Read	Plan UID, used to establish references.
>Referenced Fraction Group	(300C,0020)	1C	Read	

Sequence				
>>Referenced Fraction Group Number	(300C,0022)	1	Not Read	Identifies fraction group within plan
>>Referenced Beam Sequence	(300C,0004)	1C	Read	
>>>Referenced Beam Number	(300C,0006)	1	Read	Identify a beam within a plan
>>>Referenced Control Point Sequence	(300C,00F2)	1C	Not Read	
>>Referenced Brachy Application Setup Sequence	(300C,000A)	1C	Not Read	
Grid Frame Offset Vector	(3004,000C)	1C	Read	If the first element of the Grid Frame Offset Vector is zero, the vector should be interpreted as relative positive offsets in the direction of the cross product of the row and column directions. This means that if Image Orientation (Patient) (0020,0037) is for example (1,0,0,0,-1,0), the cross product will be negative and hence the elements in the Grid Frame Offset Vector should be read/written with opposite sign. It should be noted that some manufacturers are non-compliant regarding this and do not change the sign of the elements in the Grid Frame Offset Vector. If RTDose files exported from such a system are imported into RayPlan, the dose grid will not be positioned correctly around the patient.
Dose Grid Scaling	(3004,000E)	1C	Read	
Tissue Heterogeneity Correction	(3004,0014)	3	Read	Supported values: WATER, IMAGE, ROI_OVERRIDE.
Nucletron Private Creator	(3007,0010)	3	Read	Identifies Nucletron "beam doses" that are only dose grids. DCMRTDOSEINPUT doses are ignored. Supported value: DCMRTDOSEINPUT.

7.7.9 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Read	Supported value: 1.2.840.10008.5.1.4.1.1.481.2.
SOP Instance UID	(0008,0018)	1	Read	Stored internally to be used if referenced from other dataset.
Specific Character Set	(0008,0005)	1C	Read	Specific character sets are supported. If this attribute is not set, characters in the US ASCII table will be read correctly. Characters outside the US ASCII table will be replaced by a question mark if the specific character set is not encoded. Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Read	
Instance Creation Time	(0008,0013)	3	Read	

Instance Creator UID	(0008,0014)	3	Not Read	
Related General SOP Class UID	(0008,001A)	3	Not Read	
Original Specialized SOP Class UID	(0008,001B)	3	Not Read	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Read	
Timezone Offset From UTC	(0008,0201)	3	Not Read	
Contributing Equipment Sequence	(0018,A001)	3	Not Read	
Instance Number	(0020,0013)	3	Not Read	
SOP Instance Status	(0100,0410)	3	Not Read	
SOP Authorization Date and Time	(0100,0420)	3	Not Read	
SOP Authorization Comment	(0100,0424)	3	Not Read	
Authorization Equipment Certification Number	(0100,0426)	3	Not Read	
MAC Parameters Sequence	(4FFE,0001)	3	Not Read	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Read	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Read	
Original Attributes Sequence	(0400,0561)	3	Not Read	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Read	

7.8 Spatial Registration storage SOP class

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	General Series	Yes
	Clinical Trial Series	No
	Spatial Registration Series	Yes
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Spatial Registration	Spatial Registration	Yes
	SOP Common	Yes
	Common Instance Reference	Yes

7.8.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Read	Cannot be empty. When importing a new

				patient with the same Patient ID and Patient Name as an existing patient, a suffix is added to the name of the new patient. When adding data to a current patient, the names may differ.
Patient ID	(0010,0020)	2	Read	Unique identifier for patient. Patients are separated based on the Patient ID. When data is imported, the content in this attribute assure that different patients are not mixed.
Issuer of Patient ID	(0010,0021)	3	Not Read	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Read	
Patient's Birth Date	(0010,0030)	2	Read	Attribute is not validated during import. Patient's Birth Date is set in the patient database based on the first imported dataset.
Patient's Sex	(0010,0040)	2	Read	Attribute is not validated during import. Patient's Sex is set in the patient database based on the first imported dataset. If Patient's Sex is not encoded, the default value of "O" is used. Supported values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Read	
Patient's Birth Time	(0010,0032)	3	Not Read	
Other Patient IDs	(0010,1000)	3	Not Read	
Other Patient IDs Sequence	(0010,1002)	3	Not Read	
Other Patient Names	(0010,1001)	3	Not Read	
Ethnic Group	(0010,2160)	3	Not Read	
Patient Comments	(0010,4000)	3	Not Read	
Patient Species Description	(0010,2201)	1C	Not Read	
Patient Species Code Sequence	(0010,2202)	1C	Not Read	
Patient Breed Description	(0010,2292)	2C	Not Read	
Patient Breed Code Sequence	(0010,2293)	2C	Not Read	
Breed Registration Sequence	(0010,2294)	2C	Not Read	
Responsible Person	(0010,2297)	2C	Not Read	
Responsible Person Role	(0010,2298)	1C	Not Read	
Responsible Organization	(0010,2299)	2C	Not Read	
Patient Identity Removed	(0012,0062)	3	Not Read	
De-identification Method	(0012,0063)	1C	Not Read	
De-identification Method Code Sequence	(0012,0064)	1C	Not Read	

7.8.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Read	During import, studies are separated based on the Study Instance UID. All data imported to a patient is placed in one internal equivalent to a DICOM study (i.e. Study Instance UID do not separate clinical data internally). The Study Instance UID is stored from the first imported dataset to be used at a future export.
Study Date	(0008,0020)	2	Read	
Study Time	(0008,0030)	2	Read	
Referring Physician's Name	(0008,0090)	2	Read	
Referring Physician Identification Sequence	(0008,0096)	3	Not Read	
Study ID	(0020,0010)	2	Read	
Accession Number	(0008,0050)	2	Read	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Read	
Study Description	(0008,1030)	3	Not Read	
Physician(s) of Record	(0008,1048)	3	Not Read	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Read	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Read	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Read	
Requesting Service Code Sequence	(0032,1034)	3	Not Read	
Referenced Study Sequence	(0008,1110)	3	Not Read	
Procedure Code Sequence	(0008,1032)	3	Not Read	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Read	

7.8.3 General Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Read	Supported value: REG.
Series Instance UID	(0020,000E)	1	Read	
Series Number	(0020,0011)	2	Read	
Laterality	(0020,0060)	2C	Not Read	
Series Date	(0008,0021)	3	Read	
Series Time	(0008,0031)	3	Read	
Performing Physicians' Name	(0008,1050)	3	Not Read	

Performing Physician Identification Sequence	(0008,1052)	3	Not Read	
Protocol Name	(0018,1030)	3	Read	
Series Description	(0008,103E)	3	Read	
Series Description Code Sequence	(0008,103F)	3	Not Read	
Operators' Name	(0008,1070)	3	Read	
Operator Identification Sequence	(0008,1072)	3	Not Read	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Read	
Related Series Sequence	(0008,1250)	3	Not Read	
Body Part Examined	(0018,0015)	3	Not Read	
Patient Position	(0018,5100)	2C	Read	
Smallest Pixel Value in Series	(0028,0108)	3	Not Read	
Largest Pixel Value in Series	(0028,0109)	3	Not Read	
Request Attributes Sequence	(0040,0275)	3	Not Read	
Performed Procedure Step ID	(0040,0253)	3	Not Read	
Performed Procedure Step Start Date	(0040,0244)	3	Not Read	
Performed Procedure Step Start Time	(0040,0245)	3	Not Read	
Performed Procedure Step Description	(0040,0254)	3	Not Read	
Performed Protocol Code Sequence	(0040,0260)	3	Not Read	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Read	
Anatomical Orientation Type	(0010,2210)	1C	Not Read	

7.8.4 Spatial Registration Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Read	Supported value: REG.

7.8.5 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Read	
Position Reference Indicator	(0020,1040)	2	Read	

7.8.6 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Not Read	
Institution Name	(0008,0080)	3	Not Read	

Institution Address	(0008,0081)	3	Not Read	
Station Name	(0008,1010)	3	Not Read	
Institutional Department Name	(0008,1040)	3	Not Read	
Manufacturer's Model Name	(0008,1090)	3	Not Read	
Device Serial Number	(0018,1000)	3	Not Read	
Software Versions	(0018,1020)	3	Not Read	
Gantry ID	(0018,1008)	3	Not Read	
Spatial Resolution	(0018,1050)	3	Not Read	
Date of Last Calibration	(0018,1200)	3	Not Read	
Time of Last Calibration	(0018,1201)	3	Not Read	
Pixel Padding Value	(0028,0120)	1C	Read	If pixel padding is present within the region used for dose computation, the resulting dose may be wrong.

7.8.7 Spatial Registration Module

Attribute name	Tag	Type	Usage	Comment
Content Date	(0008,0023)	1	Read	
Content Time	(0008,0033)	1	Read	
Instance Number	(0020,0013)	1	Read	
Content Label	(0070,0080)	1	Read	
Content Description	(0070,0081)	2	Read	
Content Creator's Name	(0070,0084)	2	Read	
Content Creator's Identification Code Sequence	(0070,0086)	3	Not Read	
Registration Sequence	(0070,0308)	1	Read	
>Frame of Reference UID	(0020,0052)	1C	Read	
>Referenced Image Sequence	(0008,1140)	1C	Read	
>>Referenced SOP Class UID	(0008,1150)	1	Read	
>>Referenced SOP Instance UID	(0008,1155)	1	Read	
>>Referenced Frame Number	(0008,1160)	1C	Not Read	
>>Referenced Segment Number	(0062,000B)	1C	Not Read	
>Matrix Registration Sequence	(0070,0309)	1	Read	
>>Frame of Reference Transformation Comment	(3006,00C8)	3	Not Read	
>>Registration Type Code Sequence	(0070,030D)	2	Read	
>>Matrix Sequence	(0070,030A)	1	Read	
>>>Frame of Reference Transformation Matrix	(3006,00C6)	1	Read	
>>>Frame of Reference Transformation Matrix Type	(0070,030C)	1	Read	Supported value: RIGID. Unsupported values: RIGID_SCALE, AFFINE.

>Used Fiducials Sequence	(0070,0314)	3	Not Read	

7.8.8 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Read	
SOP Instance UID	(0008,0018)	1	Read	Stored internally to be used if referenced from other dataset.
Specific Character Set	(0008,0005)	1C	Read	Specific character sets are supported. If this attribute is not set, characters in the US ASCII table will be read correctly. Characters outside the US ASCII table will be replaced by a question mark if the specific character set is not encoded. Supported values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Read	
Instance Creation Time	(0008,0013)	3	Read	
Instance Creator UID	(0008,0014)	3	Not Read	
Related General SOP Class UID	(0008,001A)	3	Not Read	
Original Specialized SOP Class UID	(0008,001B)	3	Not Read	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Read	
Timezone Offset From UTC	(0008,0201)	3	Not Read	
Contributing Equipment Sequence	(0018,A001)	3	Not Read	
Instance Number	(0020,0013)	3	Not Read	
SOP Instance Status	(0100,0410)	3	Not Read	
SOP Authorization Date and Time	(0100,0420)	3	Not Read	
SOP Authorization Comment	(0100,0424)	3	Not Read	
Authorization Equipment Certification Number	(0100,0426)	3	Not Read	
MAC Parameters Sequence	(4FFE,0001)	3	Not Read	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Read	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Read	
Original Attributes Sequence	(0400,0561)	3	Not Read	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Read	

7.8.9 Common Instance Reference Module

Attribute name	Tag	Type	Usage	Comment
Referenced Series Sequence	(0008,1115)	1	Read	
>Series Instance UID	(0020,000E)	1	Read	
>Referenced Instance Sequence	(0008,114A)	1	Read	
>>Referenced SOP Class UID	(0008,1150)	1	Read	

>>Referenced SOP Instance UID	(0008,1155)	1	Read	
Studies Containing Other Referenced Instances Sequence	(0008,1200)	1C	Read	If referenced images are located in a Study different from the REG object.
>Study Instance UID	(0020,000D)	1	Read	
>Referenced Series Sequence	(0008,1115)	1	Read	
>>Series Instance UID	(0020,000E)	1	Read	
>>Referenced Instance Sequence	(0008,114A)	1	Read	
>>>Referenced SOP Class UID	(0008,1150)	1	Read	
>>>Referenced SOP Instance UID	(0008,1155)	1	Read	

8 Export IOD definitions

8.1 CT Image storage SOP class

Imported CT Image datasets are stored and exported without any modifications. Note however that if RayPlan's import filters have modified the files or the Patient ID (MRN) was overriden at import, the modified version will be exported and not the original. The following applies to 4DCT projections created inside RayPlan.

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	General Series	Yes
	Clinical Trial Series	No
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Image	General Image	No
	Image Plane	Yes
	Image Pixel	Yes
	Contrast/Bolus	No
	Device	No
	Specimen	No
	CT Image	Yes
	Overlay Plane	No
	VOI LUT	No
	SOP Common	Yes

8.1.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Written	Exported identical as the Patient's Name in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient's Name is provided by the user.
Patient ID	(0010,0020)	2	Written	Exported identical as the Patient's ID in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient ID is provided by the user.
Issuer of Patient ID	(0010,0021)	3	Not Written	
Issuer of Patient ID Qualifiers	(0010,0024)	3	Not Written	

Sequence				
Patient's Birth Date	(0010,0030)	2	Written	Exported identical as the Patient's Birth Date in the dataset that was first imported to the patient. Note: If the Patient's Birth Date is set and the data is exported anonymized, a new Patient's Birth Date is set to the time when the export was started.
Patient's Sex	(0010,0040)	2	Written	Note: If data is exported anonymized, the new Patient's Sex is set to "O" Possible values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Written	
Patient's Birth Time	(0010,0032)	3	Not Written	
Other Patient IDs	(0010,1000)	3	Not Written	
Other Patient IDs Sequence	(0010,1002)	3	Not Written	
Other Patient Names	(0010,1001)	3	Not Written	
Ethnic Group	(0010,2160)	3	Not Written	
Patient Comments	(0010,4000)	3	Not Written	
Patient Species Description	(0010,2201)	1C	Not Written	
Patient Species Code Sequence	(0010,2202)	1C	Not Written	
Patient Breed Description	(0010,2292)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Patient Breed Code Sequence	(0010,2293)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Breed Registration Sequence	(0010,2294)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person	(0010,2297)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person Role	(0010,2298)	1C	Not Written	
Responsible Organization	(0010,2299)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Patient Identity Removed	(0012,0062)	3	Not Written	
De-identification Method	(0012,0063)	1C	Not Written	
De-identification Method Code Sequence	(0012,0064)	1C	Not Written	

8.1.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Written	Generated by RaySearch.
Study Date	(0008,0020)	2	Written	Date when 4DCT projection was created.

Study Time	(0008,0030)	2	Written	Time when 4DCT projection was created.
Referring Physician's Name	(0008,0090)	2	Written	Always NULL.
Referring Physician Identification Sequence	(0008,0096)	3	Not Written	
Study ID	(0020,0010)	2	Written	Always NULL.
Accession Number	(0008,0050)	2	Written	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Written	
Study Description	(0008,1030)	3	Written	Always: "4DCT Projection".
Physician(s) of Record	(0008,1048)	3	Not Written	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Written	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Written	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Written	
Requesting Service Code Sequence	(0032,1034)	3	Not Written	
Referenced Study Sequence	(0008,1110)	3	Not Written	
Procedure Code Sequence	(0008,1032)	3	Not Written	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Written	

8.1.3 General Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Written	Always CT.
Series Instance UID	(0020,000E)	1	Written	Created by RaySearch.
Series Number	(0020,0011)	2	Written	
Laterality	(0020,0060)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Series Date	(0008,0021)	3	Written	
Series Time	(0008,0031)	3	Written	
Performing Physicians' Name	(0008,1050)	3	Not Written	
Performing Physician Identification Sequence	(0008,1052)	3	Not Written	
Protocol Name	(0018,1030)	3	Written	
Series Description	(0008,103E)	3	Written	Always: "Projection method: [projection method used]".
Series Description Code Sequence	(0008,103F)	3	Not Written	
Operators' Name	(0008,1070)	3	Written	
Operator Identification Sequence	(0008,1072)	3	Not Written	
Referenced Performed Procedure	(0008,1111)	3	Not Written	

Step Sequence				
Related Series Sequence	(0008,1250)	3	Not Written	
Body Part Examined	(0018,0015)	3	Not Written	
Patient Position	(0018,5100)	2C	Written	
Smallest Pixel Value in Series	(0028,0108)	3	Not Written	
Largest Pixel Value in Series	(0028,0109)	3	Not Written	
Request Attributes Sequence	(0040,0275)	3	Not Written	
Performed Procedure Step ID	(0040,0253)	3	Not Written	
Performed Procedure Step Start Date	(0040,0244)	3	Not Written	
Performed Procedure Step Start Time	(0040,0245)	3	Not Written	
Performed Procedure Step Description	(0040,0254)	3	Not Written	
Performed Protocol Code Sequence	(0040,0260)	3	Not Written	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Written	
Anatomical Orientation Type	(0010,2210)	1C	Not Written	

8.1.4 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Written	Same as in image stacks used for projection.
Position Reference Indicator	(0020,1040)	2	Written	Always NULL.

8.1.5 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Written	Always 'RaySearch Laboratories'.
Institution Name	(0008,0080)	3	Not Written	
Institution Address	(0008,0081)	3	Not Written	
Station Name	(0008,1010)	3	Not Written	
Institutional Department Name	(0008,1040)	3	Not Written	
Manufacturer's Model Name	(0008,1090)	3	Written	Always RayPlan.
Device Serial Number	(0018,1000)	3	Not Written	
Software Versions	(0018,1020)	3	Written	Always written as the current software version of RayPlan.
Gantry ID	(0018,1008)	3	Not Written	
Spatial Resolution	(0018,1050)	3	Not Written	
Date of Last Calibration	(0018,1200)	3	Not Written	
Time of Last Calibration	(0018,1201)	3	Not Written	
Pixel Padding Value	(0028,0120)	1C	Not Written	

8.1.6 Image Plane Module

Attribute name	Tag	Type	Usage	Comment
Pixel Spacing	(0028,0030)	1	Written	
Image Orientation (Patient)	(0020,0037)	1	Written	
Image Position (Patient)	(0020,0032)	1	Written	Note that this is the center of the first pixel, i.e. the corner of the image offset by half a pixel.
Slice Thickness	(0018,0050)	2	Written	Always NULL.
Slice Location	(0020,1041)	3	Not Written	

8.1.7 Image Pixel Module

Attribute name	Tag	Type	Usage	Comment
Samples per Pixel	(0028,0002)	1	Written	Always 1.
Photometric Interpretation	(0028,0004)	1	Written	Always MONOCHROME2.
Rows	(0028,0010)	1	Written	
Columns	(0028,0011)	1	Written	
Bits Allocated	(0028,0100)	1	Written	Always 16.
Bits Stored	(0028,0101)	1	Written	Always 16.
High Bit	(0028,0102)	1	Written	Always 15.
Pixel Representation	(0028,0103)	1	Written	Always 1.
Pixel Data	(7FE0,0010)	1C	Written	
Planar Configuration	(0028,0006)	1C	Not Written	
Pixel Aspect Ratio	(0028,0034)	1C	Not Written	
Smallest Image Pixel Value	(0028,0106)	3	Not Written	
Largest Image Pixel Value	(0028,0107)	3	Not Written	
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	Not Written	
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Not Written	
Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Not Written	
Red Palette Color Lookup Table Data	(0028,1201)	1C	Not Written	
Green Palette Color Lookup Table Data	(0028,1202)	1C	Not Written	
Blue Palette Color Lookup Table Data	(0028,1203)	1C	Not Written	
ICC Profile	(0028,2000)	3	Not Written	
Pixel Data Provider URL	(0028,7FE0)	1C	Not Written	
Pixel Padding Range Limit	(0028,0121)	1C	Written	
Pixel Data 32	(7FE0,0010)	1C	Written	Alternative view of Pixel Data.

Pixel Data Float	(7FE0,0010)	1C	Written	Alternative view of Pixel Data.

8.1.8 CT Image Module

Attribute name	Tag	Type	Usage	Comment
Image Type	(0008,0008)	1	Written	Always: DERIVED, SECONDARY
Samples per Pixel	(0028,0002)	1	Written	Always 1.
Photometric Interpretation	(0028,0004)	1	Written	Always MONOCHROME2.
Bits Allocated	(0028,0100)	1	Written	Always 16.
Bits Stored	(0028,0101)	1	Written	Always: 16
High Bit	(0028,0102)	1	Written	Always: 16
Rescale Intercept	(0028,1052)	1	Written	Always: 0.0
Rescale Slope	(0028,1053)	1	Written	Always: 1.0
Rescale Type	(0028,1054)	1C	Written	Always HU.
KVP	(0018,0060)	2	Written	Always NULL.
Acquisition Number	(0020,0012)	2	Written	
Scan Options	(0018,0022)	3	Not Written	
Data Collection Diameter	(0018,0090)	3	Not Written	
Data Collection Center (Patient)	(0018,9313)	3	Not Written	
Reconstruction Diameter	(0018,1100)	3	Not Written	
Reconstruction Target Center (Patient)	(0018,9318)	3	Not Written	
Distance Source to Detector	(0018,1110)	3	Not Written	
Distance Source to Patient	(0018,1111)	3	Not Written	
Gantry/Detector Tilt	(0018,1120)	3	Not Written	
Table Height	(0018,1130)	3	Not Written	
Rotation Direction	(0018,1140)	3	Not Written	
Exposure Time	(0018,1150)	3	Not Written	
X-Ray Tube Current	(0018,1151)	3	Not Written	
Exposure	(0018,1152)	3	Not Written	
Exposure in µAs	(0018,1153)	3	Not Written	
Filter Type	(0018,1160)	3	Not Written	
Generator Power	(0018,1170)	3	Not Written	
Focal Spot	(0018,1190)	3	Not Written	
Convolution Kernel	(0018,1210)	3	Not Written	
Revolution Time	(0018,9305)	3	Not Written	
Single Collimation Width	(0018,9306)	3	Not Written	
Total Collimation Width	(0018,9307)	3	Not Written	
Table Speed	(0018,9309)	3	Not Written	
Table Feed per Rotation	(0018,9310)	3	Not Written	

Spiral Pitch Factor	(0018,9311)	3	Not Written	
Exposure Modulation Type	(0018,9323)	3	Not Written	
Estimated Dose Saving	(0018,9324)	3	Not Written	
CTDIvol	(0018,9345)	3	Not Written	
CTDI Phantom Type Code Sequence	(0018,9346)	3	Not Written	
Anatomic Region Sequence	(0008,2218)	3	Not Written	
Primary Anatomic Structure Sequence	(0008,2228)	3	Not Written	
Calcium Scoring Mass Factor Patient	(0018,9351)	3	Not Written	
Calcium Scoring Mass Factor Device	(0018,9352)	3	Not Written	
Energy Weighting Factor	(0018,9353)	1C	Not Written	
CT Additional X-Ray Source Sequence	(0018,9360)	3	Not Written	

8.1.9 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Written	Always '1.2.840.10008.5.1.4.1.1.2'
SOP Instance UID	(0008,0018)	1	Written	Generated from the RaySearch UID-series, see introduction for more details.
Specific Character Set	(0008,0005)	1C	Written	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Written	
Instance Creation Time	(0008,0013)	3	Written	
Instance Creator UID	(0008,0014)	3	Not Written	
Related General SOP Class UID	(0008,001A)	3	Not Written	
Original Specialized SOP Class UID	(0008,001B)	3	Not Written	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Written	
Timezone Offset From UTC	(0008,0201)	3	Not Written	
Contributing Equipment Sequence	(0018,A001)	3	Not Written	
Instance Number	(0020,0013)	3	Not Written	
SOP Instance Status	(0100,0410)	3	Not Written	
SOP Authorization Date and Time	(0100,0420)	3	Not Written	
SOP Authorization Comment	(0100,0424)	3	Not Written	
Authorization Equipment Certification Number	(0100,0426)	3	Not Written	
MAC Parameters Sequence	(4FFE,0001)	3	Not Written	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Written	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Written	

Original Attributes Sequence	(0400,0561)	3	Not Written	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Written	

8.2 MR Image storage SOP class

Imported MR Image datasets are stored and exported without any modifications. Note however that if RayPlan's import filters have modified the files or if you have overridden the Patient ID (MRN) at import, the modified version will be exported and not the original.

8.3 PET Image storage SOP class

Imported PET Image datasets are stored and exported without any modifications. Note however that if RayPlan's import filters have modified the files or if you have overridden the Patient ID (MRN) at import, the modified version will be exported and not the original.

8.4 RT Structure Set storage SOP class

RT Structure Set datasets are stored when imported and if no changes are made that affects the RT Structure Set; it is exported exactly as imported. If the RT Structure Set is changed, or if it is created in RayPlan 2.0, the information module described in this chapter is used.

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	RT Series	Yes
Equipment	General Equipment	Yes
Structure Set	Structure Set	Yes
	ROI Contour	Yes
	RT ROI Observations	Yes
	Approval	Yes
	SOP Common	Yes

8.4.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Written	Exported identical as the Patient's Name in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient's Name is provided by the user.
Patient ID	(0010,0020)	2	Written	Exported identical as the Patient's ID in the dataset that was first imported to the patient.

				Note: If data is exported anonymized, the new Patient ID is provided by the user.
Issuer of Patient ID	(0010,0021)	3	Not Written	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Written	
Patient's Birth Date	(0010,0030)	2	Written	Exported identical as the Patient's Birth Date in the dataset that was first imported to the patient. Note: If the Patient's Birth Date is set and the data is exported anonymized, a new Patient's Birth Date is set to the time when the export was started.
Patient's Sex	(0010,0040)	2	Written	Note: If data is exported anonymized, the new Patient's Sex is set to "O" Possible values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Written	
Patient's Birth Time	(0010,0032)	3	Not Written	
Other Patient IDs	(0010,1000)	3	Not Written	
Other Patient IDs Sequence	(0010,1002)	3	Not Written	
Other Patient Names	(0010,1001)	3	Not Written	
Ethnic Group	(0010,2160)	3	Not Written	
Patient Comments	(0010,4000)	3	Not Written	
Patient Species Description	(0010,2201)	1C	Not Written	
Patient Species Code Sequence	(0010,2202)	1C	Not Written	
Patient Breed Description	(0010,2292)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Patient Breed Code Sequence	(0010,2293)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Breed Registration Sequence	(0010,2294)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person	(0010,2297)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person Role	(0010,2298)	1C	Not Written	
Responsible Organization	(0010,2299)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Patient Identity Removed	(0012,0062)	3	Not Written	
De-identification Method	(0012,0063)	1C	Not Written	
De-identification Method Code Sequence	(0012,0064)	1C	Not Written	

8.4.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Written	Exported identical as specified in the referenced image series.
Study Date	(0008,0020)	2	Written	Exported identical as specified in the referenced image series.
Study Time	(0008,0030)	2	Written	Exported identical as specified in the referenced image series.
Referring Physician's Name	(0008,0090)	2	Written	
Referring Physician Identification Sequence	(0008,0096)	3	Not Written	
Study ID	(0020,0010)	2	Written	Exported identical as specified in the referenced image series.
Accession Number	(0008,0050)	2	Written	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Written	
Study Description	(0008,1030)	3	Written	Contains the study diagnosis.
Physician(s) of Record	(0008,1048)	3	Not Written	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Written	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Written	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Written	
Requesting Service Code Sequence	(0032,1034)	3	Not Written	
Referenced Study Sequence	(0008,1110)	3	Not Written	
Procedure Code Sequence	(0008,1032)	3	Not Written	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Written	

8.4.3 RT Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Written	Always RTSTRUCT.
Series Instance UID	(0020,000E)	1	Written	Generated from the RaySearch UID-series, see introduction for more details.
Series Number	(0020,0011)	2	Written	
Series Description	(0008,103E)	3	Not Written	
Series Description Code Sequence	(0008,103F)	3	Not Written	
Operators' Name	(0008,1070)	2	Written	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Written	
Request Attributes Sequence	(0040,0275)	3	Not Written	
Performed Procedure Step ID	(0040,0253)	3	Not Written	

Performed Procedure Step Start Date	(0040,0244)	3	Not Written	
Performed Procedure Step Start Time	(0040,0245)	3	Not Written	
Performed Procedure Step Description	(0040,0254)	3	Not Written	
Performed Protocol Code Sequence	(0040,0260)	3	Not Written	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Written	

8.4.4 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Written	Always 'RaySearch Laboratories'.
Institution Name	(0008,0080)	3	Not Written	
Institution Address	(0008,0081)	3	Not Written	
Station Name	(0008,1010)	3	Not Written	
Institutional Department Name	(0008,1040)	3	Not Written	
Manufacturer's Model Name	(0008,1090)	3	Written	Possible values: RayPlan, RayPhysics.
Device Serial Number	(0018,1000)	3	Not Written	
Software Versions	(0018,1020)	3	Written	Always written as the current software version of RayPlan.
Gantry ID	(0018,1008)	3	Not Written	
Spatial Resolution	(0018,1050)	3	Not Written	
Date of Last Calibration	(0018,1200)	3	Not Written	
Time of Last Calibration	(0018,1201)	3	Not Written	
Pixel Padding Value	(0028,0120)	1C	Not Written	

8.4.5 Structure Set Module

Attribute name	Tag	Type	Usage	Comment
Structure Set Label	(3006,0002)	1	Written	Always 'RS: [approval status of the ROIs]'.
Structure Set Name	(3006,0004)	3	Not Written	
Structure Set Description	(3006,0006)	3	Not Written	
Instance Number	(0020,0013)	3	Not Written	
Structure Set Date	(3006,0008)	2	Written	The date of last modification to the structure set.
Structure Set Time	(3006,0009)	2	Written	The time of last modification to the structure set.
Referenced Frame of Reference Sequence	(3006,0010)	3	Written	
>Frame of Reference UID	(0020,0052)	1	Written	Always same as the image series frame of reference for which the structure set is created.

>Frame of Reference Relationship Sequence	(3006,00C0)	3	Not Written	
>RT Referenced Study Sequence	(3006,0012)	3	Written	Always contains one referenced study.
>>Referenced SOP Class UID	(0008,1150)	1	Written	RT Detached Study Storage UID.
>>Referenced SOP Instance UID	(0008,1155)	1	Written	Study UID from the image series for which the structure set is created.
>>RT Referenced Series Sequence	(3006,0014)	1	Written	Always contains one referenced series.
>>>Series Instance UID	(0020,000E)	1	Written	Series UID from the image series for which the structure set is created.
>>>Contour Image Sequence	(3006,0016)	1	Written	All images from the image series for which the structure set is created is added to the sequence. Images for which there is no contour defined are also added.
>>>>Referenced SOP Class UID	(0008,1150)	1	Written	
>>>>Referenced SOP Instance UID	(0008,1155)	1	Written	
>>>>Referenced Frame Number	(0008,1160)	1C	Not Written	
>>>>Referenced Segment Number	(0062,000B)	1C	Not Written	
Structure Set ROI Sequence	(3006,0020)	3	Written	All ROI:s and POI:s for which there exists a contour/point on the referenced image series are added to the sequence.
>ROI Number	(3006,0022)	1	Written	
>Referenced Frame of Reference UID	(3006,0024)	1	Written	Always same as the image series frame of reference for which the structure set is created.
>ROI Name	(3006,0026)	2	Written	
>ROI Description	(3006,0028)	3	Not Written	
>ROI Volume	(3006,002C)	3	Not Written	
>ROI Generation Algorithm	(3006,0036)	2	Written	Always SEMIAUTOMATIC.
>ROI Generation Description	(3006,0038)	3	Not Written	
>Derivation Code Sequence	(0008,9215)	3	Not Written	

8.4.6 ROI Contour Module

Attribute name	Tag	Type	Usage	Comment
ROI Contour Sequence	(3006,0039)	1	Written	
>Referenced ROI Number	(3006,0084)	1	Written	
>ROI Display Color	(3006,002A)	3	Written	
>Contour Sequence	(3006,0040)	3	Written	
>>Contour Number	(3006,0048)	3	Written	
>>Attached Contours	(3006,0049)	3	Not Written	
>>Contour Image Sequence	(3006,0016)	3	Written	May contain one or no contour image. If there is an image in the referenced image series that that is positioned on the same z-

				coordinate as the contour, that image will be referenced in this sequence. If no image is found, the sequence will be empty.
>>>Referenced SOP Class UID	(0008,1150)	1	Written	
>>>Referenced SOP Instance UID	(0008,1155)	1	Written	
>>>Referenced Frame Number	(0008,1160)	1C	Not Written	
>>>Referenced Segment Number	(0062,000B)	1C	Not Written	
>>Contour Geometric Type	(3006,0042)	1	Written	Possible values: POINT, CLOSED_PLANAR.
>>Contour Slab Thickness	(3006,0044)	3	Not Written	
>>Contour Offset Vector	(3006,0045)	3	Not Written	
>>Number of Contour Points	(3006,0046)	1	Written	
>>Contour Data	(3006,0050)	1	Written	

8.4.7 RT ROI Observations Module

Attribute name	Tag	Type	Usage	Comment
RT ROI Observations Sequence	(3006,0080)	1	Written	All ROIs and POIs that are included in the Structure Set Module (Structure Set ROI Sequence) will be included in this sequence.
>Observation Number	(3006,0082)	1	Written	Starts at 1 for first RT ROI Observation.
>Referenced ROI Number	(3006,0084)	1	Written	
>ROI Observation Label	(3006,0085)	3	Written	Same as the name of the referenced ROI, except if the ROI is of type Localization Poi, in which case the label is set to "Localization Poi". Note that DICOM limits this tag to 16 charactersr and longer names will therefore be truncated.
>ROI Observation Description	(3006,0088)	3	Not Written	
>RT Related ROI Sequence	(3006,0030)	3	Not Written	
>RT ROI Identification Code Sequence	(3006,0086)	3	Not Written	
>Related RT ROI Observations Sequence	(3006,00A0)	3	Not Written	
>RT ROI Interpreted Type	(3006,00A4)	2	Written	All types in the DICOM standard are supported in RayPlan and are exported as the DICOM equivalent. Localization Poi's are exported as type "MARKER".
>ROI Interpreter	(3006,00A6)	2	Written	Always NULL.
>Material ID	(300A,00E1)	3	Written	Exported from material name.
>ROI Physical Properties Sequence	(3006,00B0)	3	Written	The values REL_MASS_DENSITY, REL_ELEC_DENSITY, EFFECTIVE_Z, EFF_Z_PER_A and ELEM_FRACTION are supported. However at least one of REL_MASS_DENSITY or REL_ELEC_DENSITY is needed to create a density override. If only one of these values exist, the physical properties of water is used and mass density

				is set primarily from REL_MASS_DENSITY and secondarily from REL_ELEC_DENSITY.
>>ROI Physical Property	(3006,00B2)	1	Written	MEAN_EXCI_ENERGY depicts the Mean Excitation Energy for a given material. Possible values: REL_MASS_DENSITY, REL_ELEC_DENSITY, EFFECTIVE_Z, EFF_Z_PER_A, ELEM_FRACTION, MEAN_EXCI_ENERGY.
>>ROI Elemental Composition Sequence	(3006,00B6)	1C	Written	
>>>ROI Elemental Composition Atomic Number	(3006,00B7)	1	Written	
>>>ROI Elemental Composition Atomic Mass Fraction	(3006,00B8)	1	Written	
>>ROI Physical Property Value	(3006,00B4)	1	Written	
>RaySearch Private Creator	(4001,0010)	3	Written	Always 'RAYSEARCHLABS 2.0'.
>Tissue Name	(4001,1010)	3	Written	RaySearch Private Tag. Contains the tissue name given to this Region of Interest.

8.4.8 Approval Module

Attribute name	Tag	Type	Usage	Comment
Approval Status	(300E,0002)	1	Written	Possible values: • APPROVED = Structure set is approved in RayPlan. • UNAPPROVED = Structure set is not approved in RayPlan.
Review Date	(300E,0004)	2C	Written	
Review Time	(300E,0005)	2C	Written	
Reviewer Name	(300E,0008)	2C	Written	

8.4.9 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Written	Always '1.2.840.10008.5.1.4.1.1.481.3'
SOP Instance UID	(0008,0018)	1	Written	Generated from the RaySearch UID-series, see introduction for more details.
Specific Character Set	(0008,0005)	1C	Written	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Written	
Instance Creation Time	(0008,0013)	3	Written	
Instance Creator UID	(0008,0014)	3	Not Written	
Related General SOP Class UID	(0008,001A)	3	Not Written	
Original Specialized SOP Class UID	(0008,001B)	3	Not Written	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Written	

Timezone Offset From UTC	(0008,0201)	3	Not Written	
Contributing Equipment Sequence	(0018,A001)	3	Not Written	
Instance Number	(0020,0013)	3	Not Written	
SOP Instance Status	(0100,0410)	3	Not Written	
SOP Authorization Date and Time	(0100,0420)	3	Not Written	
SOP Authorization Comment	(0100,0424)	3	Not Written	
Authorization Equipment Certification Number	(0100,0426)	3	Not Written	
MAC Parameters Sequence	(4FFE,0001)	3	Not Written	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Written	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Written	
Original Attributes Sequence	(0400,0561)	3	Not Written	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Written	

8.5 RT Plan storage SOP class

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	RT Series	Yes
	Clinical Trial Series	No
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Plan	RT General Plan	Yes
	RT Prescription	Yes
	RT Tolerance Tables	No
	RT Patient Setup	Yes
	RT Fraction Scheme	Yes
	RT Beams	Yes
	RT Brachy Application Setups	No
	Approval	Yes
	SOP Common	Yes

8.5.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Written	Exported identical as the Patient's Name in

				the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient's Name is provided by the user.
Patient ID	(0010,0020)	2	Written	Exported identical as the Patient's ID in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient ID is provided by the user.
Issuer of Patient ID	(0010,0021)	3	Not Written	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Written	
Patient's Birth Date	(0010,0030)	2	Written	Exported identical as the Patient's Birth Date in the dataset that was first imported to the patient. Note: If the Patient's Birth Date is set and the data is exported anonymized, a new Patient's Birth Date is set to the time when the export was started.
Patient's Sex	(0010,0040)	2	Written	Note: If data is exported anonymized, the new Patient's Sex is set to "O" Possible values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Written	
Patient's Birth Time	(0010,0032)	3	Not Written	
Other Patient IDs	(0010,1000)	3	Not Written	
Other Patient IDs Sequence	(0010,1002)	3	Not Written	
Other Patient Names	(0010,1001)	3	Not Written	
Ethnic Group	(0010,2160)	3	Not Written	
Patient Comments	(0010,4000)	3	Not Written	
Patient Species Description	(0010,2201)	1C	Not Written	
Patient Species Code Sequence	(0010,2202)	1C	Not Written	
Patient Breed Description	(0010,2292)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Patient Breed Code Sequence	(0010,2293)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Breed Registration Sequence	(0010,2294)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person	(0010,2297)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person Role	(0010,2298)	1C	Not Written	
Responsible Organization	(0010,2299)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.

Patient Identity Removed	(0012,0062)	3	Not Written	
De-identification Method	(0012,0063)	1C	Not Written	
De-identification Method Code Sequence	(0012,0064)	1C	Not Written	

8.5.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Written	Exported identical as specified in the referenced image series.
Study Date	(0008,0020)	2	Written	Exported identical as specified in the referenced image series.
Study Time	(0008,0030)	2	Written	Exported identical as specified in the referenced image series.
Referring Physician's Name	(0008,0090)	2	Written	
Referring Physician Identification Sequence	(0008,0096)	3	Not Written	
Study ID	(0020,0010)	2	Written	Exported identical as specified in the referenced image series.
Accession Number	(0008,0050)	2	Written	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Written	
Study Description	(0008,1030)	3	Written	Contains the study diagnosis.
Physician(s) of Record	(0008,1048)	3	Not Written	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Written	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Written	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Written	
Requesting Service Code Sequence	(0032,1034)	3	Not Written	
Referenced Study Sequence	(0008,1110)	3	Not Written	
Procedure Code Sequence	(0008,1032)	3	Not Written	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Written	

8.5.3 RT Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Written	Always RTPLAN.
Series Instance UID	(0020,000E)	1	Written	Generated from the RaySearch UID-series, see introduction for more details.
Series Number	(0020,0011)	2	Written	
Series Description	(0008,103E)	3	Not Written	

Series Description Code Sequence	(0008,103F)	3	Not Written	
Operators' Name	(0008,1070)	2	Written	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Written	
Request Attributes Sequence	(0040,0275)	3	Not Written	
Performed Procedure Step ID	(0040,0253)	3	Not Written	
Performed Procedure Step Start Date	(0040,0244)	3	Not Written	
Performed Procedure Step Start Time	(0040,0245)	3	Not Written	
Performed Procedure Step Description	(0040,0254)	3	Not Written	
Performed Protocol Code Sequence	(0040,0260)	3	Not Written	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Written	

8.5.4 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Written	Always same as the referenced image series frame of reference.
Position Reference Indicator	(0020,1040)	2	Written	

8.5.5 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Written	Always 'RaySearch Laboratories'.
Institution Name	(0008,0080)	3	Not Written	
Institution Address	(0008,0081)	3	Not Written	
Station Name	(0008,1010)	3	Not Written	
Institutional Department Name	(0008,1040)	3	Not Written	
Manufacturer's Model Name	(0008,1090)	3	Written	Possible values: RayPlan, RayPhysics.
Device Serial Number	(0018,1000)	3	Not Written	
Software Versions	(0018,1020)	3	Written	Always written as the current software version of RayPlan.
Gantry ID	(0018,1008)	3	Not Written	
Spatial Resolution	(0018,1050)	3	Not Written	
Date of Last Calibration	(0018,1200)	3	Not Written	
Time of Last Calibration	(0018,1201)	3	Not Written	
Pixel Padding Value	(0028,0120)	1C	Not Written	

8.5.6 RT General Plan Module

Attribute name	Tag	Type	Usage	Comment

RT Plan Label	(300A,0002)	1	Written	Exported from Radiation Set Name.
RT Plan Name	(300A,0003)	3	Written	Exported from from Treatment Plan Name.
RT Plan Description	(300A,0004)	3	Not Written	
Instance Number	(0020,0013)	3	Not Written	
RT Plan Date	(300A,0006)	2	Written	
RT Plan Time	(300A,0007)	2	Written	
Treatment Protocols	(300A,0009)	3	Written	Exported as plan delivery technique. Possible values: SMLC, DMLC, Arc.
Plan Intent	(300A,000A)	3	Written	Treatment plans created in RayPlan always have the value CURATIVE. QA plans created in RayPlan always have the value VERIFICATION. Plans created in Rayhysics have the value RESEARCH Possible values: CURATIVE, RESEARCH, VERIFICATION, MACHINE_QA.
Treatment Sites	(300A,000B)	3	Not Written	
RT Plan Geometry	(300A,000C)	1	Written	Always PATIENT.
Referenced Structure Set Sequence	(300C,0060)	1C	Written	The structure set for the image series for which the plan is created is always referenced.
>Referenced SOP Class UID	(0008,1150)	1	Written	
>Referenced SOP Instance UID	(0008,1155)	1	Written	
Referenced Dose Sequence	(300C,0080)	3	Written	Written if doses are exported.
>Referenced SOP Class UID	(0008,1150)	1	Written	
>Referenced SOP Instance UID	(0008,1155)	1	Written	
Referenced RT Plan Sequence	(300C,0002)	3	Written	
>Referenced SOP Class UID	(0008,1150)	1	Written	
>Referenced SOP Instance UID	(0008,1155)	1	Written	
>RT Plan Relationship	(300A,0055)	1	Written	Possible values: VERIFIED_PLAN, EQUIVALENT.
>Brainlab Private Creator	(300B,0012)	3	Written	Always 'Brainlab - ONC - Beam Parameters'.
>Referenced Beam List	(300B,1210)	3	Written	Only used for Brainlab plans.

8.5.7 RT Prescription Module

Attribute name	Tag	Type	Usage	Comment
Prescription Description	(300A,000E)	3	Written	
Dose Reference Sequence	(300A,0010)	3	Written	
>Dose Reference Number	(300A,0012)	1	Written	Always 1.
>Dose Reference UID	(300A,0013)	3	Written	Based on the plan's SOP Instance UID.
>Dose Reference Structure Type	(300A,0014)	1	Written	Possible values: POINT, VOLUME.
>Dose Reference Description	(300A,0016)	3	Written	
>Referenced ROI Number	(3006,0084)	1C	Written	

>Dose Reference Point Coordinates	(300A,0018)	1C	Written	
>Nominal Prior Dose	(300A,001A)	3	Written	
>Dose Reference Type	(300A,0020)	1	Written	Always TARGET.
>Constraint Weight	(300A,0021)	3	Written	
>Delivery Warning Dose	(300A,0022)	3	Not Written	
>Delivery Maximum Dose	(300A,0023)	3	Not Written	
>Target Minimum Dose	(300A,0025)	3	Written	
>Target Prescription Dose	(300A,0026)	3	Written	
>Target Maximum Dose	(300A,0027)	3	Written	
>Target Underdose Volume Fraction	(300A,0028)	3	Written	Written for prescriptions of type Dose At Volume, Median Dose (always 50) and Near Minimum Dose (always 2).
>Organ at Risk Full-volume Dose	(300A,002A)	3	Written	
>Organ at Risk Limit Dose	(300A,002B)	3	Written	
>Organ at Risk Maximum Dose	(300A,002C)	3	Written	
>Organ at Risk Overdose Volume Fraction	(300A,002D)	3	Written	
>RaySearch Private Creator	(4001,0010)	3	Written	Always 'RAYSEARCHLABS 2.0'.
>Target Prescription Effective Dose	(4001,1011)	3	Written	RaySearch Private Tag. Prescribed dose to Dose Reference if Dose Reference Type (300A,0020) is TARGET. The dose is physical dose after correction for biological effect using user-defined modeling technique.

8.5.8 RT Patient Setup Module

Attribute name	Tag	Type	Usage	Comment
Patient Setup Sequence	(300A,0180)	1	Written	
>Patient Setup Number	(300A,0182)	1	Written	
>Patient Setup Label	(300A,0183)	3	Not Written	
>Patient Position	(0018,5100)	1C	Written	Possible values: HFS, HFP, FFS, FFP.
>Patient Additional Position	(300A,0184)	1C	Not Written	
>Referenced Setup Image Sequence	(300A,0401)	3	Not Written	
>Fixation Device Sequence	(300A,0190)	3	Not Written	
>Shielding Device Sequence	(300A,01A0)	3	Not Written	
>Setup Technique	(300A,01B0)	3	Not Written	
>Setup Technique Description	(300A,01B2)	3	Not Written	
>Setup Device Sequence	(300A,01B4)	3	Not Written	
>Table Top Vertical Setup Displacement	(300A,01D2)	3	Written	Vertical displacement in IEC TABLE TOP coordinate system (in mm) relative to Localization Poi. Value is only written if the Localization Poi is defined on the planning

				CT. The displacement is defined as (Localization Poi - isocenter). Export of table top displacement can be disabled in the RayPhysics per machine.
>Table Top Longitudinal Setup Displacement	(300A,01D4)	3	Written	Longitudinal displacement in IEC TABLE TOP coordinate system (in mm) relative to Localization Poi. Value is only written if the Localization Poi is defined on the planning CT. The displacement is defined as (Localization Poi - isocenter). Export of table top displacement can be disabled in the RayPhysics per machine.
>Table Top Lateral Setup Displacement	(300A,01D6)	3	Written	Lateral displacement in IEC TABLE TOP coordinate system (in mm) relative to Localization Poi. Value is only written if the Localization Poi is defined on the planning CT. The displacement is defined as (Localization Poi - isocenter). Export of table top displacement can be disabled in the RayPhysics per machine.
>Motion Synchronization Sequence	(300A,0410)	3	Not Written	
medPhoton Private Creator	(30BB,0010)	3	Written	Always 'medPhoton 1.0'.
medPhoton Patient Setup ID	(30BB,1000)	3	Written	medPhoton Patient Setup ID
medPhoton Imaging Protocol ID	(30BB,1001)	3	Written	medPhoton Imaging Protocol ID

8.5.9 RT Fraction Scheme Module

Attribute name	Tag	Type	Usage	Comment
Fraction Group Sequence	(300A,0070)	1	Written	This sequence will always contain one item. Multiple fraction groups are not supported.
>Fraction Group Number	(300A,0071)	1	Written	Always 1.
>Fraction Group Description	(300A,0072)	3	Not Written	
>Referenced Dose Sequence	(300C,0080)	3	Not Written	
>Referenced Dose Reference Sequence	(300C,0050)	3	Not Written	
>Number of Fractions Planned	(300A,0078)	2	Written	
>Number of Fraction Pattern Digits Per Day	(300A,0079)	3	Not Written	
>Repeat Fraction Cycle Length	(300A,007A)	3	Not Written	
>Fraction Pattern	(300A,007B)	3	Written	
>Number of Beams	(300A,0080)	1	Written	Alwayst the total number of defined beams in plan.
>Referenced Beam Sequence	(300C,0004)	1C	Written	All beams in plan are referenced.
>>Referenced Beam Number	(300C,0006)	1C	Written	
>>Beam Dose Specification Point	(300A,0082)	3	Written	Can be different for each beam.
>>Beam Dose	(300A,0084)	3	Written	

>>Beam Dose Point Depth	(300A,0088)	3	Written	Should be interpreted as the distance from the surface of the patient to the beam dose specification point, i.e. including support, fixture and boli.
>>Beam Dose Point Equivalent Depth	(300A,0089)	3	Written	The water equivalent depth of the beam dose specification point, including support, fixation and boli.
>>Beam Dose Point SSD	(300A,008A)	3	Written	Should be interpreted as the distance to the surface of the patient, including support, fixation and boli.
>>Beam Meterset	(300A,0086)	3	Written	Total MU for beam.
>Number of Brachy Application Setups	(300A,00A0)	1	Written	Always 0.
>Referenced Brachy Application Setup Sequence	(300C,000A)	1C	Not Written	

8.5.10 RT Beams Module

Attribute name	Tag	Type	Usage	Comment
Beam Sequence	(300A,00B0)	1	Written	
>Beam Number	(300A,00C0)	1	Written	Internal beam number. If plan is based on imported plan data, the beam numbers are not changed for the imported beams.
>Beam Name	(300A,00C2)	3	Written	
>Beam Description	(300A,00C3)	3	Written	Copied of Beam Name.
>Beam Type	(300A,00C4)	1	Written	Possible values: STATIC, DYNAMIC.
>Radiation Type	(300A,00C6)	2	Written	Possible values: PHOTON, ELECTRON.
>Primary Fluence Mode Sequence	(3002,0050)	3	Written	
>>Fluence Mode	(3002,0051)	1	Written	If the "Flattening filter free" checkbox is checked for the used machine this attribute will be set to NON_STANDARD. Otherwise this attribute is STANDARD Possible values: STANDARD, NON_STANDARD.
>>Fluence Mode ID	(3002,0052)	1C	Written	If the "Flattening filter free" checkbox is checked for the used machine this attribute will be set to "FFF". Otherwise this attribute is null. Possible values: FFF, null.
>High-Dose Technique Type	(300A,00C7)	1C	Not Written	
>Treatment Machine Name	(300A,00B2)	2	Written	
>Manufacturer	(0008,0070)	3	Not Written	
>Institution Name	(0008,0080)	3	Not Written	
>Institution Address	(0008,0081)	3	Not Written	
>Institutional Department Name	(0008,1040)	3	Not Written	
>Manufacturer's Model Name	(0008,1090)	3	Not Written	

>Device Serial Number	(0018,1000)	3	Not Written	
>Primary Dosimeter Unit	(300A,00B3)	3	Written	Always MU.
>Referenced Tolerance Table Number	(300C,00A0)	3	Not Written	
>Source-Axis Distance	(300A,00B4)	3	Written	
>Beam Limiting Device Sequence	(300A,00B6)	1	Written	
>>RT Beam Limiting Device Type	(300A,00B8)	1	Written	
>>Source to Beam Limiting Device Distance	(300A,00BA)	3	Not Written	
>>Number of Leaf/Jaw Pairs	(300A,00BC)	1	Written	
>>Leaf Position Boundaries	(300A,00BE)	2C	Written	
>Referenced Patient Setup Number	(300C,006A)	3	Written	
>Referenced Reference Image Sequence	(300C,0042)	3	Not Written	
>Planned Verification Image Sequence	(300A,00CA)	3	Not Written	
>Treatment Delivery Type	(300A,00CE)	3	Written	Always TREATMENT or SETUP.
>Referenced Dose Sequence	(300C,0080)	3	Written	
>>Referenced SOP Class UID	(0008,1150)	1	Written	
>>Referenced SOP Instance UID	(0008,1155)	1	Written	
>Number of Wedges	(300A,00D0)	1	Written	Always 0 or 1.
>Wedge Sequence	(300A,00D1)	1C	Written	
>>Wedge Number	(300A,00D2)	1	Written	Always 1.
>>Wedge Type	(300A,00D3)	2	Written	Possible values: STANDARD, DYNAMIC, MOTORIZED.
>>Wedge ID	(300A,00D4)	3	Written	
>>Accessory Code	(300A,00F9)	3	Not Written	
>>Wedge Angle	(300A,00D5)	2	Written	Always 60 for motorized wedges.
>>Wedge Factor	(300A,00D6)	2	Written	
>>Wedge Orientation	(300A,00D8)	2	Written	Possible values: 0, 90, 180, 270.
>>Source to Wedge Tray Distance	(300A,00DA)	3	Not Written	
>Number of Compensators	(300A,00E0)	1	Written	Always 0.
>Total Compensator Tray Factor	(300A,00E2)	3	Not Written	
>Compensator Sequence	(300A,00E3)	1C	Not Written	
>Number of Boli	(300A,00ED)	1	Written	
>Referenced Bolus Sequence	(300C,00B0)	1C	Written	
>>Referenced ROI Number	(3006,0084)	1	Written	
>>Bolus ID	(300A,00DC)	3	Written	
>>Bolus Description	(300A,00DD)	3	Not Written	

>>Accessory Code	(300A,00F9)	3	Not Written	
>Number of Blocks	(300A,00F0)	1	Written	Always 0.
>Total Block Tray Factor	(300A,00F2)	3	Written	
>Block Sequence	(300A,00F4)	1C	Written	If plan uses blocks.
>>Block Tray ID	(300A,00F5)	3	Written	
>>Accessory Code	(300A,00F9)	3	Not Written	
>>Source to Block Tray Distance	(300A,00F6)	2	Written	
>>Block Type	(300A,00F8)	1	Written	Possible values: SHIELDING, APERTURE.
>>Block Divergence	(300A,00FA)	2	Written	Always PRESENT.
>>Block Mounting Position	(300A,00FB)	3	Written	Possible values: PATIENT_SIDE, SOURCE_SIDE.
>>Block Number	(300A,00FC)	1	Written	
>>Block Name	(300A,00FE)	3	Written	
>>Material ID	(300A,00E1)	2	Written	Always NULL.
>>Block Thickness	(300A,0100)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
>>Block Transmission	(300A,0102)	2C	Written	
>>Block Number of Points	(300A,0104)	2	Written	
>>Block Data	(300A,0106)	2	Written	
>Applicator Sequence	(300A,0107)	3	Written	Used for Electron applicators or Photon cones.
>>Applicator ID	(300A,0108)	1	Written	
>>Accessory Code	(300A,00F9)	3	Not Written	
>>Applicator Type	(300A,0109)	1	Written	Possible values: ELECTRON_SQUARE, ELECTRON_RECT, ELECTRON_CIRC, ELECTRON_SHORT, ELECTRON_OPEN, PHOTON_CIRC, STEREOTACTIC.
>>Applicator Geometry Sequence	(300A,0431)	3	Written	Only used for photon cones, not electron applicators.
>>>Applicator Aperture Shape	(300A,0432)	1	Written	Always SYM_CIRCULAR.
>>>Applicator Opening	(300A,0433)	1C	Written	
>>Applicator Description	(300A,010A)	3	Written	
>General Accessory Sequence	(300A,0420)	3	Not Written	
>Final Cumulative Meterset Weight	(300A,010E)	1C	Written	Always 1.
>Number of Control Points	(300A,0110)	1	Written	
>Control Point Sequence	(300A,0111)	1	Written	
>>Control Point Index	(300A,0112)	1	Written	
>>Cumulative Meterset Weight	(300A,0134)	2	Written	Meterset weight at beginning of control point. Final control point will always have value 1.

>>Referenced Dose Reference Sequence	(300C,0050)	3	Written	
>>>Referenced Dose Reference Number	(300C,0051)	1	Written	
>>>Cumulative Dose Reference Coefficient	(300A,010C)	2	Written	Be aware these values are linearly interpolated from 0 to the final value and are not accurate.
>>>Beam Dose Point Depth	(300A,0088)	3	Not Written	
>>>Beam Dose Point Equivalent Depth	(300A,0089)	3	Not Written	
>>>Beam Dose Point SSD	(300A,008A)	3	Not Written	
>>Referenced Dose Sequence	(300C,0080)	1C	Not Written	
>>Nominal Beam Energy	(300A,0114)	3	Written	The Nominal Beam Energy will be written as the nominal energy of the RayPlan machine beam quality assigned to the beam. The energy used internally for dose calculation may differ from the nominal energy and will not be exported.
>>Dose Rate Set	(300A,0115)	3	Written	
>>Wedge Position Sequence	(300A,0116)	3	Written	If plan contains wedges.
>>>Referenced Wedge Number	(300C,00C0)	1	Written	
>>>Wedge Position	(300A,0118)	1	Written	Possible values: IN, OUT.
>>Beam Limiting Device Position Sequence	(300A,011A)	1C	Written	
>>>RT Beam Limiting Device Type	(300A,00B8)	1	Written	
>>>Leaf/Jaw Positions	(300A,011C)	1	Written	
>>Gantry Angle	(300A,011E)	1C	Written	
>>Gantry Rotation Direction	(300A,011F)	1C	Written	Possible values: NONE, CW, CC.
>>Gantry Pitch Angle	(300A,014A)	3	Not Written	
>>Gantry Pitch Rotation Direction	(300A,014C)	3	Written	Possible values: NONE, CW, CC.
>>Beam Limiting Device Angle	(300A,0120)	1C	Written	Same throughout entire beam.
>>Beam Limiting Device Rotation Direction	(300A,0121)	1C	Written	Always NONE (only written in first control point). Possible values: NONE, CW, CC.
>>Patient Support Angle	(300A,0122)	1C	Written	Same throughout entire beam except for Wave Arc plans.
>>Patient Support Rotation Direction	(300A,0123)	1C	Written	Always NONE (only written in first control point). Possible values: NONE, CW, CC.
>>Table Top Eccentric Axis Distance	(300A,0124)	3	Written	
>>Table Top Eccentric Angle	(300A,0125)	1C	Written	Always 0 (only written in first control point).
>>Table Top Eccentric Rotation Direction	(300A,0126)	1C	Written	Always NONE (only written in first control point).

				Possible values: NONE, CW, CC.
>>Table Top Pitch Angle	(300A,0140)	1C	Written	Always 0 (only written in first control point).
>>Table Top Pitch Rotation Direction	(300A,0142)	1C	Written	Always NONE (only written in first control point for SMLC, DMLC and Static Arc). Possible values: NONE, CW, CC.
>>Table Top Roll Angle	(300A,0144)	1C	Written	Always 0 (only written in first control point).
>>Table Top Roll Rotation Direction	(300A,0146)	1C	Written	Always NONE (only written in first control point for SMLC and DMLC). Possible values: NONE, CW, CC.
>>Table Top Vertical Position	(300A,0128)	2C	Written	Always 0 (only written in first control point).
>>Table Top Longitudinal Position	(300A,0129)	2C	Written	Always 0 (only written in first control point).
>>Table Top Lateral Position	(300A,012A)	2C	Written	Always 0 (only written in first control point).
>>Isocenter Position	(300A,012C)	2C	Written	Always written in first control point.
>>Surface Entry Point	(300A,012E)	3	Not Written	
>>Source to Surface Distance	(300A,0130)	3	Written	Should be interpreted as the distance to the surface of the patient, i.e. including support, fixation and boli.
>Brainlab Private Creator	(320B,0010)	3	Written	Always 'Brainlab - ONC - Multi-axial treatment machine'.
>Dynamic Tracking	(320B,1001)	3	Written	Dynamic Tracking for Vero. Possible values: ENABLED, DISABLED.
>RaySearch Private Creator	(4001,0010)	3	Written	Always 'RAYSEARCHLABS 2.0'.
>Treatment Machine Commission Time	(4001,1001)	3	Written	The commission time of the treatment machine. Used together with Treatment Machine Name to determine the correct machine. Type "DT".

8.5.11 Approval Module

Attribute name	Tag	Type	Usage	Comment
Approval Status	(300E,0002)	1	Written	Possible values: • APPROVED = Plan is approved in RayPlan. • UNAPPROVED = Plan is not approved in RayPlan.
Review Date	(300E,0004)	2C	Written	The date when the plan was approved in RayPlan.
Review Time	(300E,0005)	2C	Written	The time when the plan was approved in RayPlan.
Reviewer Name	(300E,0008)	2C	Written	

8.5.12 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Written	Always '1.2.840.10008.5.1.4.1.1.481.5'
SOP Instance UID	(0008,0018)	1	Written	Generated from the RaySearch UID-series,

				see introduction for more details.
Specific Character Set	(0008,0005)	1C	Written	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Written	
Instance Creation Time	(0008,0013)	3	Written	
Instance Creator UID	(0008,0014)	3	Not Written	
Related General SOP Class UID	(0008,001A)	3	Not Written	
Original Specialized SOP Class UID	(0008,001B)	3	Not Written	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Written	
Timezone Offset From UTC	(0008,0201)	3	Not Written	
Contributing Equipment Sequence	(0018,A001)	3	Not Written	
Instance Number	(0020,0013)	3	Not Written	
SOP Instance Status	(0100,0410)	3	Not Written	
SOP Authorization Date and Time	(0100,0420)	3	Not Written	
SOP Authorization Comment	(0100,0424)	3	Not Written	
Authorization Equipment Certification Number	(0100,0426)	3	Not Written	
MAC Parameters Sequence	(4FFE,0001)	3	Not Written	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Written	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Written	
Original Attributes Sequence	(0400,0561)	3	Not Written	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Written	

8.6 RT Ion Plan storage SOP class

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	RT Series	Yes
	Clinical Trial Series	No
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Ion Plan	RT General Plan	Yes
	RT Prescription	Yes
	RT Ion Tolerance Tables	No
	RT Patient Setup	Yes

	RT Fraction Scheme	Yes
	RT Ion Beams	Yes
	Approval	Yes
	SOP Common	Yes

8.6.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Written	Exported identical as the Patient's Name in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient's Name is provided by the user.
Patient ID	(0010,0020)	2	Written	Exported identical as the Patient's ID in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient ID is provided by the user.
Issuer of Patient ID	(0010,0021)	3	Not Written	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Written	
Patient's Birth Date	(0010,0030)	2	Written	Exported identical as the Patient's Birth Date in the dataset that was first imported to the patient. Note: If the Patient's Birth Date is set and the data is exported anonymized, a new Patient's Birth Date is set to the time when the export was started.
Patient's Sex	(0010,0040)	2	Written	Note: If data is exported anonymized, the new Patient's Sex is set to "O" Possible values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Written	
Patient's Birth Time	(0010,0032)	3	Not Written	
Other Patient IDs	(0010,1000)	3	Not Written	
Other Patient IDs Sequence	(0010,1002)	3	Not Written	
Other Patient Names	(0010,1001)	3	Not Written	
Ethnic Group	(0010,2160)	3	Not Written	
Patient Comments	(0010,4000)	3	Not Written	
Patient Species Description	(0010,2201)	1C	Not Written	
Patient Species Code Sequence	(0010,2202)	1C	Not Written	
Patient Breed Description	(0010,2292)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.

Patient Breed Code Sequence	(0010,2293)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Breed Registration Sequence	(0010,2294)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person	(0010,2297)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person Role	(0010,2298)	1C	Not Written	
Responsible Organization	(0010,2299)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Patient Identity Removed	(0012,0062)	3	Not Written	
De-identification Method	(0012,0063)	1C	Not Written	
De-identification Method Code Sequence	(0012,0064)	1C	Not Written	

8.6.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Written	Exported identical as specified in the referenced image series.
Study Date	(0008,0020)	2	Written	Exported identical as specified in the referenced image series.
Study Time	(0008,0030)	2	Written	Exported identical as specified in the referenced image series.
Referring Physician's Name	(0008,0090)	2	Written	
Referring Physician Identification Sequence	(0008,0096)	3	Not Written	
Study ID	(0020,0010)	2	Written	Exported identical as specified in the referenced image series.
Accession Number	(0008,0050)	2	Written	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Written	
Study Description	(0008,1030)	3	Written	Contains the study diagnosis.
Physician(s) of Record	(0008,1048)	3	Not Written	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Written	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Written	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Written	
Requesting Service Code Sequence	(0032,1034)	3	Not Written	
Referenced Study Sequence	(0008,1110)	3	Not Written	
Procedure Code Sequence	(0008,1032)	3	Not Written	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Written	

8.6.3 RT Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Written	Always RTPLAN.
Series Instance UID	(0020,000E)	1	Written	Generated from the RaySearch UID-series, see introduction for more details.
Series Number	(0020,0011)	2	Written	
Series Description	(0008,103E)	3	Not Written	
Series Description Code Sequence	(0008,103F)	3	Not Written	
Operators' Name	(0008,1070)	2	Written	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Written	
Request Attributes Sequence	(0040,0275)	3	Not Written	
Performed Procedure Step ID	(0040,0253)	3	Not Written	
Performed Procedure Step Start Date	(0040,0244)	3	Not Written	
Performed Procedure Step Start Time	(0040,0245)	3	Not Written	
Performed Procedure Step Description	(0040,0254)	3	Not Written	
Performed Protocol Code Sequence	(0040,0260)	3	Not Written	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Written	

8.6.4 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Written	Always same as the referenced image series frame of reference.
Position Reference Indicator	(0020,1040)	2	Written	

8.6.5 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Written	Always 'RaySearch Laboratories'.
Institution Name	(0008,0080)	3	Not Written	
Institution Address	(0008,0081)	3	Not Written	
Station Name	(0008,1010)	3	Not Written	
Institutional Department Name	(0008,1040)	3	Not Written	
Manufacturer's Model Name	(0008,1090)	3	Written	Always RayPlan.
Device Serial Number	(0018,1000)	3	Not Written	
Software Versions	(0018,1020)	3	Written	Always written as the current software version of RayPlan.

Gantry ID	(0018,1008)	3	Not Written	
Spatial Resolution	(0018,1050)	3	Not Written	
Date of Last Calibration	(0018,1200)	3	Not Written	
Time of Last Calibration	(0018,1201)	3	Not Written	
Pixel Padding Value	(0028,0120)	1C	Not Written	

8.6.6 RT General Plan Module

Attribute name	Tag	Type	Usage	Comment
RT Plan Label	(300A,0002)	1	Written	Exported from Radiation Set Name.
RT Plan Name	(300A,0003)	3	Written	Exported from from Treatment Plan Name.
RT Plan Description	(300A,0004)	3	Not Written	
Instance Number	(0020,0013)	3	Not Written	
RT Plan Date	(300A,0006)	2	Written	
RT Plan Time	(300A,0007)	2	Written	
Treatment Protocols	(300A,0009)	3	Written	Exported as plan delivery technique. Possible values: SMLC, DMLC, Arc.
Plan Intent	(300A,000A)	3	Written	Treatment plans created in RayPlan always have the value CURATIVE. QA plans created in RayPlan always have the value VERIFICATION. Plans created in Rayhysics have the value RESEARCH Possible values: CURATIVE, RESEARCH, VERIFICATION, MACHINE_QA.
Treatment Sites	(300A,000B)	3	Not Written	
RT Plan Geometry	(300A,000C)	1	Written	Always PATIENT.
Referenced Structure Set Sequence	(300C,0060)	1C	Written	The structure set for the image series for which the plan is created is always referenced.
>Referenced SOP Class UID	(0008,1150)	1	Written	
>Referenced SOP Instance UID	(0008,1155)	1	Written	
Referenced Dose Sequence	(300C,0080)	3	Written	Written if doses are exported.
>Referenced SOP Class UID	(0008,1150)	1	Written	
>Referenced SOP Instance UID	(0008,1155)	1	Written	
Referenced RT Plan Sequence	(300C,0002)	3	Written	
>Referenced SOP Class UID	(0008,1150)	1	Written	
>Referenced SOP Instance UID	(0008,1155)	1	Written	
>RT Plan Relationship	(300A,0055)	1	Written	Possible values: VERIFIED_PLAN, EQUIVALENT.
>Brainlab Private Creator	(300B,0012)	3	Written	Always 'Brainlab - ONC - Beam Parameters'.
>Referenced Beam List	(300B,1210)	3	Written	Only used for Brainlab plans.

8.6.7 RT Prescription Module

Attribute name	Tag	Type	Usage	Comment
Prescription Description	(300A,000E)	3	Written	
Dose Reference Sequence	(300A,0010)	3	Written	
>Dose Reference Number	(300A,0012)	1	Written	Always 1.
>Dose Reference UID	(300A,0013)	3	Written	Based on the plan's SOP Instance UID.
>Dose Reference Structure Type	(300A,0014)	1	Written	Possible values: POINT, VOLUME.
>Dose Reference Description	(300A,0016)	3	Written	
>Referenced ROI Number	(3006,0084)	1C	Written	
>Dose Reference Point Coordinates	(300A,0018)	1C	Written	
>Nominal Prior Dose	(300A,001A)	3	Written	
>Dose Reference Type	(300A,0020)	1	Written	Always TARGET.
>Constraint Weight	(300A,0021)	3	Written	
>Delivery Warning Dose	(300A,0022)	3	Not Written	
>Delivery Maximum Dose	(300A,0023)	3	Not Written	
>Target Minimum Dose	(300A,0025)	3	Written	
>Target Prescription Dose	(300A,0026)	3	Written	
>Target Maximum Dose	(300A,0027)	3	Written	
>Target Underdose Volume Fraction	(300A,0028)	3	Written	Written for prescriptions of type Dose At Volume, Median Dose (always 50) and Near Minimum Dose (always 2).
>Organ at Risk Full-volume Dose	(300A,002A)	3	Written	
>Organ at Risk Limit Dose	(300A,002B)	3	Written	
>Organ at Risk Maximum Dose	(300A,002C)	3	Written	
>Organ at Risk Overdose Volume Fraction	(300A,002D)	3	Written	
>RaySearch Private Creator	(4001,0010)	3	Written	Always 'RAYSEARCHLABS 2.0'.
>Target Prescription Effective Dose	(4001,1011)	3	Written	RaySearch Private Tag. Prescribed dose to Dose Reference if Dose Reference Type (300A,0020) is TARGET. The dose is physical dose after correction for biological effect using user-defined modeling technique.

8.6.8 RT Patient Setup Module

Attribute name	Tag	Type	Usage	Comment
Patient Setup Sequence	(300A,0180)	1	Written	
>Patient Setup Number	(300A,0182)	1	Written	
>Patient Setup Label	(300A,0183)	3	Not Written	
>Patient Position	(0018,5100)	1C	Written	Possible values: HFS, HFP, FFS, FFP.
>Patient Additional Position	(300A,0184)	1C	Not Written	
>Referenced Setup Image Sequence	(300A,0401)	3	Not Written	

>Fixation Device Sequence	(300A,0190)	3	Not Written	
>Shielding Device Sequence	(300A,01A0)	3	Not Written	
>Setup Technique	(300A,01B0)	3	Not Written	
>Setup Technique Description	(300A,01B2)	3	Not Written	
>Setup Device Sequence	(300A,01B4)	3	Not Written	
>Table Top Vertical Setup Displacement	(300A,01D2)	3	Written	Vertical displacement in IEC TABLE TOP coordinate system (in mm) relative to Localization Poi. Value is only written if the Localization Poi is defined on the planning CT. The displacement is defined as (Localization Poi - isocenter). Export of table top displacement can be disabled in the RayPhysics per machine.
>Table Top Longitudinal Setup Displacement	(300A,01D4)	3	Written	Longitudinal displacement in IEC TABLE TOP coordinate system (in mm) relative to Localization Poi. Value is only written if the Localization Poi is defined on the planning CT. The displacement is defined as (Localization Poi - isocenter). Export of table top displacement can be disabled in the RayPhysics per machine.
>Table Top Lateral Setup Displacement	(300A,01D6)	3	Written	Lateral displacement in IEC TABLE TOP coordinate system (in mm) relative to Localization Poi. Value is only written if the Localization Poi is defined on the planning CT. The displacement is defined as (Localization Poi - isocenter). Export of table top displacement can be disabled in the RayPhysics per machine.
>Motion Synchronization Sequence	(300A,0410)	3	Not Written	
medPhoton Private Creator	(30BB,0010)	3	Written	Always 'medPhoton 1.0'.
medPhoton Patient Setup ID	(30BB,1000)	3	Written	medPhoton Patient Setup ID
medPhoton Imaging Protocol ID	(30BB,1001)	3	Written	medPhoton Imaging Protocol ID

8.6.9 RT Fraction Scheme Module

Attribute name	Tag	Type	Usage	Comment
Fraction Group Sequence	(300A,0070)	1	Written	This sequence will always contain one item. Multiple fraction groups are not supported.
>Fraction Group Number	(300A,0071)	1	Written	Always 1.
>Fraction Group Description	(300A,0072)	3	Not Written	
>Referenced Dose Sequence	(300C,0080)	3	Not Written	
>Referenced Dose Reference Sequence	(300C,0050)	3	Not Written	
>Number of Fractions Planned	(300A,0078)	2	Written	
>Number of Fraction Pattern Digits Per Day	(300A,0079)	3	Not Written	

>Repeat Fraction Cycle Length	(300A,007A)	3	Not Written	
>Fraction Pattern	(300A,007B)	3	Written	
>Number of Beams	(300A,0080)	1	Written	Alwayst the total number of defined beams in plan.
>Referenced Beam Sequence	(300C,0004)	1C	Written	All beams in plan are referenced.
>>Referenced Beam Number	(300C,0006)	1C	Written	
>>Beam Dose Specification Point	(300A,0082)	3	Written	Can be different for each beam.
>>Beam Dose	(300A,0084)	3	Written	
>>Beam Dose Point Depth	(300A,0088)	3	Written	Should be interpreted as the distance from the surface of the patient to the beam dose specification point, i.e. including support, fixture and boli.
>>Beam Dose Point Equivalent Depth	(300A,0089)	3	Written	The water equivalent depth of the beam dose specification point, including support, fixation and boli.
>>Beam Dose Point SSD	(300A,008A)	3	Written	Should be interpreted as the distance to the surface of the patient, including support, fixation and boli.
>>Beam Meterset	(300A,0086)	3	Written	Empty for passive plans.
>Number of Brachy Application Setups	(300A,00A0)	1	Written	Always 0.
>Referenced Brachy Application Setup Sequence	(300C,000A)	1C	Not Written	

8.6.10 RT Ion Beams Module

Attribute name	Tag	Type	Usage	Comment
Ion Beam Sequence	(300A,03A2)	1	Written	
>Beam Number	(300A,00C0)	1	Written	
>Beam Name	(300A,00C2)	1	Written	
>Beam Description	(300A,00C3)	3	Written	
>Beam Type	(300A,00C4)	1	Written	Possible values: STATIC, DYNAMIC.
>Radiation Type	(300A,00C6)	1	Written	Possible values: PROTON, ION.
>Radiation Mass Number	(300A,0302)	1C	Written	Always 12.
>Radiation Atomic Number	(300A,0304)	1C	Written	Always 6.
>Radiation Charge State	(300A,0306)	1C	Written	Always 6.
>Scan Mode	(300A,0308)	1	Written	If value is NONE, the private tag IBA Scattered Mode (300D, 1002) depicts if the beam delivery type is Single Scattering or Double Scattering. Possible values: NONE, UNIFORM, MODULATED, LINE, WOBBLING.
>Treatment Machine Name	(300A,00B2)	2	Written	Only a single treatment machine is allowed per plan.
>Manufacturer	(0008,0070)	3	Written	

>Institution Name	(0008,0080)	3	Not Written	
>Institution Address	(0008,0081)	3	Not Written	
>Institutional Department Name	(0008,1040)	3	Not Written	
>Manufacturer's Model Name	(0008,1090)	3	Written	Only written if Treatment Delivery Type (300A,00CE) is SETUP
>Device Serial Number	(0018,1000)	3	Not Written	
>Primary Dosimeter Unit	(300A,00B3)	1	Written	Possible values: MU, NP.
>Referenced Tolerance Table Number	(300C,00A0)	3	Not Written	
>Virtual Source-Axis Distances	(300A,030A)	1	Written	
>Ion Beam Limiting Device Sequence	(300A,03A4)	3	Written	Only used for Sumitomo plans. Private SOBP Width and Depth tags are used to communicate nozzle settings for IBA and Mevion plans.
>>RT Beam Limiting Device Type	(300A,00B8)	1	Written	
>>Isocenter to Beam Limiting Device Distance	(300A,00BB)	2	Written	
>>Number of Leaf/Jaw Pairs	(300A,00BC)	1	Written	
>>Leaf Position Boundaries	(300A,00BE)	1C	Written	
>Referenced Patient Setup Number	(300C,006A)	3	Written	
>Referenced Reference Image Sequence	(300C,0042)	3	Written	
>>Referenced SOP Class UID	(0008,1150)	1	Written	
>>Referenced SOP Instance UID	(0008,1155)	1	Written	
>>Reference Image Number	(300A,00C8)	1	Written	
>Treatment Delivery Type	(300A,00CE)	1	Written	Possible values: TREATMENT, SETUP.
>Referenced Dose Sequence	(300C,0080)	3	Not Written	
>Number of Wedges	(300A,00D0)	1	Written	Always 0. Ion Wedges are not supported.
>Total Wedge Tray Water-Equivalent Thickness	(300A,00D7)	3	Not Written	
>Ion Wedge Sequence	(300A,03AA)	1C	Not Written	
>Number of Compensators	(300A,00E0)	1	Written	Always 0 or 1.
>Total Compensator Tray Water-Equivalent Thickness	(300A,02E3)	3	Not Written	
>Ion Range Compensator Sequence	(300A,02EA)	1C	Written	
>>Compensator Description	(300A,02EB)	3	Not Written	
>>Compensator Number	(300A,00E4)	1	Written	Always 0.
>>Material ID	(300A,00E1)	2	Written	
>>Compensator ID	(300A,00E5)	3	Written	
>>Accessory Code	(300A,00F9)	3	Not Written	

>>Isocenter to Compensator Tray Distance	(300A,02E4)	1C	Written	
>>Compensator Divergence	(300A,02E0)	1	Written	Possible values: ABSENT, PRESENT.
>>Compensator Mounting Position	(300A,02E1)	1	Written	Possible values: PATIENT_SIDE, SOURCE_SIDE.
>>Compensator Rows	(300A,00E7)	1	Written	
>>Compensator Columns	(300A,00E8)	1	Written	
>>Compensator Pixel Spacing	(300A,00E9)	1	Written	
>>Compensator Position	(300A,00EA)	1	Written	
>>Compensator Column Offset	(300A,02E5)	1C	Written	
>>Compensator Thickness Data	(300A,00EC)	1	Written	
>>Isocenter to Compensator Distances	(300A,02E6)	1C	Not Written	
>>Compensator Relative Stopping Power Ratio	(300A,02E7)	3	Not Written	
>>Compensator Milling Tool Diameter	(300A,02E8)	3	Written	
>Number of Boli	(300A,00ED)	1	Written	Always 0. Boli are not supported.
>Referenced Bolus Sequence	(300C,00B0)	1C	Not Written	
>Number of Blocks	(300A,00F0)	1	Written	
>Total Block Tray Water-Equivalent Thickness	(300A,00F3)	3	Not Written	
>Ion Block Sequence	(300A,03A6)	1C	Written	
>>Block Tray ID	(300A,00F5)	3	Not Written	
>>Accessory Code	(300A,00F9)	3	Not Written	
>>Isocenter to Block Tray Distance	(300A,00F7)	1	Written	
>>Block Type	(300A,00F8)	1	Written	Possible values: SHIELDING, APERTURE.
>>Block Divergence	(300A,00FA)	1	Written	Possible values: PRESENT, ABSENT.
>>Block Mounting Position	(300A,00FB)	1	Written	Possible values: PATIENT_SIDE, SOURCE_SIDE.
>>Block Number	(300A,00FC)	1	Written	Always 0.
>>Block Name	(300A,00FE)	3	Written	
>>Material ID	(300A,00E1)	2	Written	
>>Block Thickness	(300A,0100)	1	Written	
>>Block Number of Points	(300A,0104)	1	Written	
>>Block Data	(300A,0106)	1	Written	
>Snout Sequence	(300A,030C)	3	Written	
>>Snout ID	(300A,030F)	1	Written	
>>Accessory Code	(300A,00F9)	3	Not Written	
>Applicator Sequence	(300A,0107)	3	Not Written	

>General Accessory Sequence	(300A,0420)	3	Not Written	
>Number of Range Shifters	(300A,0312)	1	Written	Always 0 or 1.
>Range Shifter Sequence	(300A,0314)	1C	Written	Maximum one Range Shifter is supported, and only when Scan Mode (300A, 0308) is MODULATED.
>>Range Shifter Number	(300A,0316)	1	Written	Always 0.
>>Range Shifter ID	(300A,0318)	1	Written	
>>Accessory Code	(300A,00F9)	3	Not Written	
>>Range Shifter Type	(300A,0320)	1	Written	Possible values: ANALOG, BINARY.
>>Range Shifter Description	(300A,0322)	3	Not Written	
>Number of Lateral Spreading Devices	(300A,0330)	1	Written	2 for Mevion Double Scattering plans. Else 0.
>Lateral Spreading Device Sequence	(300A,0332)	1C	Written	Only exported for Mevion Double Scattering plans and Sumitomo plans. Private SOBP Width and Depth tags are used to communicate nozzle settings for IBA and Mevion plans.
>>Lateral Spreading Device Number	(300A,0334)	1	Written	
>>Lateral Spreading Device ID	(300A,0336)	1	Written	
>>Accessory Code	(300A,00F9)	3	Not Written	
>>Lateral Spreading Device Type	(300A,0338)	1	Written	Always SCATTERER.
>>Lateral Spreading Device Description	(300A,033A)	3	Not Written	
>Number of Range Modulators	(300A,0340)	1	Written	Always 0 or 1.
>Range Modulator Sequence	(300A,0342)	1C	Written	Only used for Sumitomo plans. Private SOBP Width and Depth tags are used to communicate nozzle settings for IBA and Mevion plans.
>>Range Modulator Number	(300A,0344)	1	Written	
>>Range Modulator ID	(300A,0346)	1	Written	
>>Accessory Code	(300A,00F9)	3	Not Written	
>>Range Modulator Type	(300A,0348)	1	Written	Possible values: FIXED, WHL_FIXEDWEIGHTS, WHL_MODWEIGHTS.
>>Range Modulator Description	(300A,034A)	3	Written	
>>Beam Current Modulation ID	(300A,034C)	1C	Not Written	
>Patient Support Type	(300A,0350)	1	Written	Always TABLE.
>Patient Support ID	(300A,0352)	3	Written	Hard coded to 'TABLE' at export for Aria support.
>Patient Support Accessory Code	(300A,0354)	3	Not Written	
>Fixation Light Azimuthal Angle	(300A,0356)	3	Not Written	
>Fixation Light Polar Angle	(300A,0358)	3	Not Written	
>Final Cumulative Meterset	(300A,010E)	1C	Written	

Weight				
>Number of Control Points	(300A,0110)	1	Written	
>Ion Control Point Sequence	(300A,03A8)	1	Written	
>>Control Point Index	(300A,0112)	1	Written	
>>Cumulative Meterset Weight	(300A,0134)	2	Written	
>>Referenced Dose Reference Sequence	(300C,0050)	3	Not Written	
>>Nominal Beam Energy	(300A,0114)	1C	Written	Always 0 for passive plans (IBA and Mevion). Private tags are used instead for communicating spread out brag peak width and depth.
>>KVp	(0018,0060)	1C	Not Written	
>>Meterset Rate	(300A,035A)	3	Written	
>>Ion Wedge Position Sequence	(300A,03AC)	1C	Not Written	
>>Range Shifter Settings Sequence	(300A,0360)	1C	Written	
>>>Referenced Range Shifter Number	(300C,0100)	1	Written	
>>>Range Shifter Setting	(300A,0362)	1	Written	Always 'IN'.
>>>Isocenter to Range Shiffter Distance	(300A,0364)	3	Not Written	
>>>Range Shifter Water Equivalent Thickness	(300A,0366)	3	Not Written	
>>Lateral Spreading Device Settings Sequence	(300A,0370)	1C	Written	Only exported for Mevion Double Scattering plans and Sumitomo plans. Private SOBP Width and Depth tags are used to communicate nozzle settings for IBA and Mevion plans.
>>>Referenced Lateral Spreading Device Number	(300C,0102)	1	Written	
>>>Lateral Spreading Device Setting	(300A,0372)	1	Written	Always IN.
>>>Isocenter to Lateral Spreading Device Distance	(300A,0374)	3	Written	
>>>Lateral Spreading Device Water Equivalent Thickness	(300A,033C)	3	Written	
>>Range Modulator Settings Sequence	(300A,0380)	1C	Written	Only for Sumitomo plans.
>>>Referenced Range Modulator Number	(300C,0104)	1	Written	
>>>Range Modulator Gating Start Value	(300A,0382)	1C	Not Written	
>>>Range Modulator Gating Stop Value	(300A,0384)	1C	Not Written	
>>>Range Modulator Gating Start Water Equivalent Thickness	(300A,0386)	3	Written	

>>>Range Modulator Gating Stop Water Equivalent Thickness	(300A,0388)	3	Written	
>>>Isocenter to Range Modulator Distance	(300A,038A)	3	Not Written	
>>Beam Limiting Device Position Sequence	(300A,011A)	1C	Written	Only for Sumitomo plans.
>>>RT Beam Limiting Device Type	(300A,00B8)	1	Written	
>>>Leaf/Jaw Positions	(300A,011C)	1	Written	
>>Gantry Angle	(300A,011E)	1C	Written	
>>Gantry Rotation Direction	(300A,011F)	1C	Written	Always NONE.
>>Gantry Pitch Angle	(300A,014A)	2C	Written	
>>Gantry Pitch Rotation Direction	(300A,014C)	2C	Written	Always NONE.
>>Beam Limiting Device Angle	(300A,0120)	1C	Written	
>>Beam Limiting Device Rotation Direction	(300A,0121)	1C	Written	Always NONE.
>>Scan Spot Tune ID	(300A,0390)	1C	Written	
>>Number of Scan Spot Positions	(300A,0392)	1C	Written	
>>Scan Spot Position Map	(300A,0394)	1C	Written	
>>Scan Spot Meterset Weights	(300A,0396)	1C	Written	
>>Scanning Spot Size	(300A,0398)	3	Written	
>>Number of Paintings	(300A,039A)	1C	Written	
>>Patient Support Angle	(300A,0122)	1C	Written	
>>Patient Support Rotation Direction	(300A,0123)	1C	Written	Always NONE.
>>Table Top Pitch Angle	(300A,0140)	2C	Written	Supported: 0
>>Table Top Pitch Rotation Direction	(300A,0142)	2C	Written	Always NONE.
>>Table Top Roll Angle	(300A,0144)	2C	Written	Supported: 0
>>Table Top Roll Rotation Direction	(300A,0146)	2C	Written	Always NONE.
>>Head Fixation Angle	(300A,0148)	3	Not Written	
>>Table Top Vertical Position	(300A,0128)	2C	Written	Supported: 0
>>Table Top Longitudinal Position	(300A,0129)	2C	Written	Supported: 0
>>Table Top Lateral Position	(300A,012A)	2C	Written	Supported: 0
>>Snout Position	(300A,030D)	2C	Written	
>>Isocenter Position	(300A,012C)	2C	Written	
>>Surface Entry Point	(300A,012E)	3	Not Written	
>>Nominal Beam Energy Unit	(300A,0015)	3	Written	Only exported for proton plans. Note: This attribute is not part of the DICOM standard. Nominal beam energy is always exported in MEV/nucleon in accordance with the DICOM standard.

				Possible values: MEV, KV.
>>IMPAC Private Creator	(300B,0010)	3	Written	Always 'IMPAC'.
>>Line Spot Tune ID	(300B,1090)	3	Written	Private tag. Used for Sumitomo Line Scanning.
>>Number of Line Scan Spot Positions	(300B,1092)	3	Written	Private tag. Used for Sumitomo Line Scanning.
>>Line Scan Position Map	(300B,1094)	3	Written	Private tag. Used for Sumitomo Line Scanning.
>>Line Scan Meterset Weights	(300B,1096)	3	Written	Private tag. Used for Sumitomo Line Scanning.
>>Line Scanning Spot Size	(300B,1098)	3	Written	Private tag. Used for Sumitomo Line Scanning.
>>Number of Line Scan Spot Paintings	(300B,109A)	3	Written	Private tag. Used for Sumitomo Line Scanning.
>>RaySearch Private Creator	(4001,0010)	3	Written	Always 'RAYSEARCHLABS 2.0'.
>>Spill Length	(4001,1005)	3	Written	RaySearch Private tag. The synchrotron spill length in seconds.
>>Degrader	(4001,1006)	3	Written	RaySearch Private tag. The degradation applied by the degrader before the synchrotron.
>>Particles Per Spill	(4001,1007)	3	Written	RaySearch Private tag. Number of particles delivered during a spill for synchrotrons.
>>CNAO Nominal Beam Energy	(4001,1008)	3	Written	RaySearch Private tag. Nominal Beam Energy in MeV/nucleon. This attribute is only written for CNAO machines
>>CNAO Nominal Beam Energy Scale Factor	(4001,1009)	3	Written	RaySearch Private tag. Scale Factor that should be applied to control point's Nominal Beam Energy to onvert it to MeV/u.. This attribute is only written for CNAO machines
>IMPAC Private Creator	(300B,0010)	3	Written	Always 'IMPAC'.
>Maximum Collimated Field Diameter	(300B,1002)	3	Written	Private tag. The maximum diameter (in mm) of a circle, centered about the beam axis, which contains the collimated field.
>Nominal SOBP Width	(300B,100E)	3	Written	Private tag. Distance (in mm) between maximal Water-Equivalent distance to distal border of target and minimal Water-Equivalent Distance to proximal border of target. Required for passive plans. Supported values: [0,320]
>Planned Distal Target Distance	(300B,1004)	3	Written	Private tag. Maximal Water-Equivalent distance (in mm) to distal border of target. Required for passive plans. Supported values: [35,320].
>IBA Private Creator	(300D,0010)	3	Written	Always 'IBA'.
>IBA Scattered Mode	(300D,1002)	3	Written	Private tag. Used to depict the scattering mode. Only used when Scan Mode (300A, 0308) is NONE. Possible values: SINGLE, DOUBLE.

>RaySearch Private Creator	(4001,0010)	3	Written	Always 'RAYSEARCHLABS 2.0'.
>Treatment Machine Commission Time	(4001,1001)	3	Written	RaySearch Private tag. The commission time of the treatment machine. Used together with Treatment Machine Name to determine the correct machine.
>RBE Model Name	(4001,1002)	3	Written	RaySearch Private tag. The RBE Model Name. Used to determine the correct RBE Model.
>RBE Model Commission Time	(4001,1003)	3	Written	RaySearch Private tag. The commission time of the RBE Model. Used together with RBE Model Name to determine the correct RBE Model.
>Block Milling Tool Diameter	(4001,1004)	3	Written	RaySearch Private tag. The block milling tool diameter in mm.
>Internal Treatment Machine Name	(4001,1012)	3	Written	RaySearch Private tag. The internal treatment machine name. This value will differ from Treatment Machine Name (300A,00B2) if a treatment machine name alias have been specified on the ion beam quality.

8.6.11 Approval Module

Attribute name	Tag	Type	Usage	Comment
Approval Status	(300E,0002)	1	Written	Possible values: • APPROVED = Plan is approved in RayPlan. • UNAPPROVED = Plan is not approved in RayPlan.
Review Date	(300E,0004)	2C	Written	The date when the plan was approved in RayPlan.
Review Time	(300E,0005)	2C	Written	The time when the plan was approved in RayPlan.
Reviewer Name	(300E,0008)	2C	Written	

8.6.12 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Written	Always '1.2.840.10008.5.1.4.1.1.481.5'
SOP Instance UID	(0008,0018)	1	Written	Generated from the RaySearch UID-series, see introduction for more details.
Specific Character Set	(0008,0005)	1C	Written	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Written	
Instance Creation Time	(0008,0013)	3	Written	
Instance Creator UID	(0008,0014)	3	Not Written	
Related General SOP Class UID	(0008,001A)	3	Not Written	
Original Specialized SOP Class UID	(0008,001B)	3	Not Written	

Coding Scheme Identification Sequence	(0008,0110)	3	Not Written	
Timezone Offset From UTC	(0008,0201)	3	Not Written	
Contributing Equipment Sequence	(0018,A001)	3	Not Written	
Instance Number	(0020,0013)	3	Not Written	
SOP Instance Status	(0100,0410)	3	Not Written	
SOP Authorization Date and Time	(0100,0420)	3	Not Written	
SOP Authorization Comment	(0100,0424)	3	Not Written	
Authorization Equipment Certification Number	(0100,0426)	3	Not Written	
MAC Parameters Sequence	(4FFE,0001)	3	Not Written	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Written	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Written	
Original Attributes Sequence	(0400,0561)	3	Not Written	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Written	

8.7 RT Dose storage SOP class

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	RT Series	Yes
	Clinical Trial Series	No
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Dose	General Image	No
	Image Plane	Yes
	Image Pixel	Yes
	Multi-Frame	Yes
	Overlay Plane	No
	Multi-Frame Overlay	No
	Modality LUT	No
	RT Dose	Yes
	RT DVH	No
	Structure Set	No

	ROI Contour	No
	RT Dose ROI	No
	SOP Common	Yes
	Frame Extraction	No

8.7.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Written	Exported identical as the Patient's Name in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient's Name is provided by the user.
Patient ID	(0010,0020)	2	Written	Exported identical as the Patient's ID in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient ID is provided by the user.
Issuer of Patient ID	(0010,0021)	3	Not Written	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Written	
Patient's Birth Date	(0010,0030)	2	Written	Exported identical as the Patient's Birth Date in the dataset that was first imported to the patient. Note: If the Patient's Birth Date is set and the data is exported anonymized, a new Patient's Birth Date is set to the time when the export was started.
Patient's Sex	(0010,0040)	2	Written	Note: If data is exported anonymized, the new Patient's Sex is set to "O" Possible values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Written	
Patient's Birth Time	(0010,0032)	3	Not Written	
Other Patient IDs	(0010,1000)	3	Not Written	
Other Patient IDs Sequence	(0010,1002)	3	Not Written	
Other Patient Names	(0010,1001)	3	Not Written	
Ethnic Group	(0010,2160)	3	Not Written	
Patient Comments	(0010,4000)	3	Not Written	
Patient Species Description	(0010,2201)	1C	Not Written	
Patient Species Code Sequence	(0010,2202)	1C	Not Written	
Patient Breed Description	(0010,2292)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Patient Breed Code Sequence	(0010,2293)	2C		Always NULL if required based on condition.

				If not required, this attribute is not encoded.
Breed Registration Sequence	(0010,2294)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person	(0010,2297)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person Role	(0010,2298)	1C	Not Written	
Responsible Organization	(0010,2299)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Patient Identity Removed	(0012,0062)	3	Not Written	
De-identification Method	(0012,0063)	1C	Not Written	
De-identification Method Code Sequence	(0012,0064)	1C	Not Written	

8.7.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Written	Exported identical as specified in the referenced image series.
Study Date	(0008,0020)	2	Written	Exported identical as specified in the referenced image series.
Study Time	(0008,0030)	2	Written	Exported identical as specified in the referenced image series.
Referring Physician's Name	(0008,0090)	2	Written	
Referring Physician Identification Sequence	(0008,0096)	3	Not Written	
Study ID	(0020,0010)	2	Written	Exported identical as specified in the referenced image series.
Accession Number	(0008,0050)	2	Written	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Written	
Study Description	(0008,1030)	3	Written	Contains the study diagnosis.
Physician(s) of Record	(0008,1048)	3	Not Written	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Written	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Written	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Written	
Requesting Service Code Sequence	(0032,1034)	3	Not Written	
Referenced Study Sequence	(0008,1110)	3	Not Written	
Procedure Code Sequence	(0008,1032)	3	Not Written	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Written	

8.7.3 RT Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Written	Always RTDOSE.
Series Instance UID	(0020,000E)	1	Written	Generated from the RaySearch UID-series, see introduction for more details.
Series Number	(0020,0011)	2	Written	
Series Description	(0008,103E)	3	Not Written	
Series Description Code Sequence	(0008,103F)	3	Not Written	
Operators' Name	(0008,1070)	2	Written	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Written	
Request Attributes Sequence	(0040,0275)	3	Not Written	
Performed Procedure Step ID	(0040,0253)	3	Not Written	
Performed Procedure Step Start Date	(0040,0244)	3	Not Written	
Performed Procedure Step Start Time	(0040,0245)	3	Not Written	
Performed Procedure Step Description	(0040,0254)	3	Not Written	
Performed Protocol Code Sequence	(0040,0260)	3	Not Written	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Written	

8.7.4 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Written	Always same as the referenced image series frame of reference.
Position Reference Indicator	(0020,1040)	2	Written	

8.7.5 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Written	Always 'RaySearch Laboratories'.
Institution Name	(0008,0080)	3	Not Written	
Institution Address	(0008,0081)	3	Not Written	
Station Name	(0008,1010)	3	Not Written	
Institutional Department Name	(0008,1040)	3	Not Written	
Manufacturer's Model Name	(0008,1090)	3	Written	Possible values: RayPlan, RayPhysics.
Device Serial Number	(0018,1000)	3	Not Written	
Software Versions	(0018,1020)	3	Written	Always written as the current software version of RayPlan.
Gantry ID	(0018,1008)	3	Not Written	

Spatial Resolution	(0018,1050)	3	Not Written	
Date of Last Calibration	(0018,1200)	3	Not Written	
Time of Last Calibration	(0018,1201)	3	Not Written	
Pixel Padding Value	(0028,0120)	1C	Not Written	

8.7.6 Image Plane Module

Attribute name	Tag	Type	Usage	Comment
Pixel Spacing	(0028,0030)	1	Written	
Image Orientation (Patient)	(0020,0037)	1	Written	Always '1\0\0\0\1\0' for 3D doses. Plane dependant for 2D doses.
Image Position (Patient)	(0020,0032)	1	Written	Note that this is the center of the first pixel, i.e. the corner of the image offset by half a pixel.
Slice Thickness	(0018,0050)	2	Written	Null for 2D doses.
Slice Location	(0020,1041)	3	Not Written	

8.7.7 Image Pixel Module

Attribute name	Tag	Type	Usage	Comment
Samples per Pixel	(0028,0002)	1	Written	Always 1.
Photometric Interpretation	(0028,0004)	1	Written	Always MONOCHROME2.
Rows	(0028,0010)	1	Written	
Columns	(0028,0011)	1	Written	
Bits Allocated	(0028,0100)	1	Written	Always 16.
Bits Stored	(0028,0101)	1	Written	Always 16.
High Bit	(0028,0102)	1	Written	Always 15.
Pixel Representation	(0028,0103)	1	Written	Always 0.
Pixel Data	(7FE0,0010)	1C	Written	
Planar Configuration	(0028,0006)	1C	Not Written	
Pixel Aspect Ratio	(0028,0034)	1C	Not Written	
Smallest Image Pixel Value	(0028,0106)	3	Not Written	
Largest Image Pixel Value	(0028,0107)	3	Not Written	
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	Not Written	
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Not Written	
Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Not Written	
Red Palette Color Lookup Table Data	(0028,1201)	1C	Not Written	
Green Palette Color Lookup Table Data	(0028,1202)	1C	Not Written	
Blue Palette Color Lookup Table	(0028,1203)	1C	Not Written	

Data				
ICC Profile	(0028,2000)	3	Not Written	
Pixel Data Provider URL	(0028,7FE0)	1C	Not Written	
Pixel Padding Range Limit	(0028,0121)	1C	Written	
Pixel Data 32	(7FE0,0010)	1C	Written	Alternative view of Pixel Data.
Pixel Data Float	(7FE0,0010)	1C	Written	Alternative view of Pixel Data.

8.7.8 Multi-Frame Module

Attribute name	Tag	Type	Usage	Comment
Number of Frames	(0028,0008)	1	Written	Only used for 3D doses. Always equal the number of dose slices in z-direction.
Frame Increment Pointer	(0028,0009)	1	Written	Only used for 3D doses. Always '(3004,000c)'.

8.7.9 RT Dose Module

Attribute name	Tag	Type	Usage	Comment
Samples per Pixel	(0028,0002)	1C	Written	Always 1.
Photometric Interpretation	(0028,0004)	1C	Written	Always MONOCHROME2.
Bits Allocated	(0028,0100)	1C	Written	Always 16.
Bits Stored	(0028,0101)	1C	Written	Always 16.
High Bit	(0028,0102)	1C	Written	Always 15.
Pixel Representation	(0028,0103)	1C	Written	Always 0.
Dose Units	(3004,0002)	1	Written	Always GY.
Dose Type	(3004,0004)	1	Written	Possible values: PHYSICAL, EFFECTIVE.
Instance Number	(0020,0013)	3	Not Written	
Dose Comment	(3004,0006)	3	Not Written	
Normalization Point	(3004,0008)	3	Not Written	
Dose Summation Type	(3004,000A)	1	Written	Always PLAN or BEAM. Dose Summation Type FRACTION is not exported. Summation type BEAM referes to the dose contribution from this beam over the entire treatment course, not per fraction. Possible values: PLAN, BEAM, FRACTION.
Referenced RT Plan Sequence	(300C,0002)	1C	Written	
>Referenced SOP Class UID	(0008,1150)	1	Written	Always '1.2.840.10008.5.1.4.1.1.481.5'.
>Referenced SOP Instance UID	(0008,1155)	1	Written	SOP Instance UID for the referenced plan. For evaluation doses a new UID is generated that does not reference an existing plan.
>Referenced Fraction Group Sequence	(300C,0020)	1C	Written	Not exported if dose summation type is PLAN.
>>Referenced Fraction Group Number	(300C,0022)	1	Written	Always 1.
>>Referenced Beam Sequence	(300C,0004)	1C	Written	

>>>Referenced Beam Number	(300C,0006)	1	Written	
>>>Referenced Control Point Sequence	(300C,00F2)	1C	Not Written	
>>Referenced Brachy Application Setup Sequence	(300C,000A)	1C	Not Written	
Grid Frame Offset Vector	(3004,000C)	1C	Written	Only written for 3D doses.
Dose Grid Scaling	(3004,000E)	1C	Written	Dose Grid Scaling is always maximized for highest possible resolution.
Tissue Heterogeneity Correction	(3004,0014)	3	Not Written	
Nucletron Private Creator	(3007,0010)	3	Not Written	

8.7.10 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Written	Always '1.2.840.10008.5.1.4.1.1.481.2'.
SOP Instance UID	(0008,0018)	1	Written	Generated from the RaySearch UID-series, see introduction for more details.
Specific Character Set	(0008,0005)	1C	Written	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Written	
Instance Creation Time	(0008,0013)	3	Written	
Instance Creator UID	(0008,0014)	3	Not Written	
Related General SOP Class UID	(0008,001A)	3	Not Written	
Original Specialized SOP Class UID	(0008,001B)	3	Not Written	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Written	
Timezone Offset From UTC	(0008,0201)	3	Not Written	
Contributing Equipment Sequence	(0018,A001)	3	Not Written	
Instance Number	(0020,0013)	3	Not Written	
SOP Instance Status	(0100,0410)	3	Not Written	
SOP Authorization Date and Time	(0100,0420)	3	Not Written	
SOP Authorization Comment	(0100,0424)	3	Not Written	
Authorization Equipment Certification Number	(0100,0426)	3	Not Written	
MAC Parameters Sequence	(4FFE,0001)	3	Not Written	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Written	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Written	
Original Attributes Sequence	(0400,0561)	3	Not Written	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Written	

8.8 RT Image storage SOP class

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	RT Series	Yes
	Clinical Trial Series	No
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Image	General Image	Yes
	Image Pixel	Yes
	Contrast/Bolus	No
	Cine	No
	Multi-Frame	No
	Device	No
	RT Image	Yes
	Modality LUT	No
	VOI LUT	Yes
	Approval	No
	SOP Common	Yes
	Frame Extraction	No

8.8.1 Patient Module

Attribute name	Tag	Type	Usage	Comment
Patient's Name	(0010,0010)	2	Written	Exported identical as the Patient's Name in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient's Name is provided by the user.
Patient ID	(0010,0020)	2	Written	Exported identical as the Patient's ID in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient ID is provided by the user.
Issuer of Patient ID	(0010,0021)	3	Not Written	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Written	
Patient's Birth Date	(0010,0030)	2	Written	Exported identical as the Patient's Birth Date in the dataset that was first imported to the patient. Note: If the Patient's Birth Date is set and the data is exported anonymized, a new

				Patient's Birth Date is set to the time when the export was started.
Patient's Sex	(0010,0040)	2	Written	Note: If data is exported anonymized, the new Patient's Sex is set to "O" Possible values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Written	
Patient's Birth Time	(0010,0032)	3	Not Written	
Other Patient IDs	(0010,1000)	3	Not Written	
Other Patient IDs Sequence	(0010,1002)	3	Not Written	
Other Patient Names	(0010,1001)	3	Not Written	
Ethnic Group	(0010,2160)	3	Not Written	
Patient Comments	(0010,4000)	3	Not Written	
Patient Species Description	(0010,2201)	1C	Not Written	
Patient Species Code Sequence	(0010,2202)	1C	Not Written	
Patient Breed Description	(0010,2292)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Patient Breed Code Sequence	(0010,2293)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Breed Registration Sequence	(0010,2294)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person	(0010,2297)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person Role	(0010,2298)	1C	Not Written	
Responsible Organization	(0010,2299)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Patient Identity Removed	(0012,0062)	3	Not Written	
De-identification Method	(0012,0063)	1C	Not Written	
De-identification Method Code Sequence	(0012,0064)	1C	Not Written	

8.8.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Written	Exported identical as specified in the referenced image series.
Study Date	(0008,0020)	2	Written	Exported identical as specified in the referenced image series.
Study Time	(0008,0030)	2	Written	Exported identical as specified in the referenced image series.
Referring Physician's Name	(0008,0090)	2	Written	
Referring Physician Identification	(0008,0096)	3	Not Written	

Sequence				
Study ID	(0020,0010)	2	Written	Exported identical as specified in the referenced image series.
Accession Number	(0008,0050)	2	Written	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Written	
Study Description	(0008,1030)	3	Written	Contains the study diagnosis.
Physician(s) of Record	(0008,1048)	3	Not Written	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Written	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Written	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Written	
Requesting Service Code Sequence	(0032,1034)	3	Not Written	
Referenced Study Sequence	(0008,1110)	3	Not Written	
Procedure Code Sequence	(0008,1032)	3	Not Written	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Written	

8.8.3 RT Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Written	Always RTIMAGE.
Series Instance UID	(0020,000E)	1	Written	Generated from the RaySearch UID-series, see introduction for more details.
Series Number	(0020,0011)	2	Written	
Series Description	(0008,103E)	3	Not Written	
Series Description Code Sequence	(0008,103F)	3	Not Written	
Operators' Name	(0008,1070)	2	Written	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Written	
Request Attributes Sequence	(0040,0275)	3	Not Written	
Performed Procedure Step ID	(0040,0253)	3	Not Written	
Performed Procedure Step Start Date	(0040,0244)	3	Not Written	
Performed Procedure Step Start Time	(0040,0245)	3	Not Written	
Performed Procedure Step Description	(0040,0254)	3	Not Written	
Performed Protocol Code Sequence	(0040,0260)	3	Not Written	
Comments on the Performed	(0040,0280)	3	Not Written	

Procedure Step				

8.8.4 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Written	Always same as the referenced image series frame of reference.
Position Reference Indicator	(0020,1040)	2	Written	

8.8.5 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Written	Always 'RaySearch Laboratories'.
Institution Name	(0008,0080)	3	Not Written	
Institution Address	(0008,0081)	3	Not Written	
Station Name	(0008,1010)	3	Not Written	
Institutional Department Name	(0008,1040)	3	Not Written	
Manufacturer's Model Name	(0008,1090)	3	Written	Always RayPlan.
Device Serial Number	(0018,1000)	3	Not Written	
Software Versions	(0018,1020)	3	Written	Always written as the current software version of RayPlan.
Gantry ID	(0018,1008)	3	Not Written	
Spatial Resolution	(0018,1050)	3	Not Written	
Date of Last Calibration	(0018,1200)	3	Not Written	
Time of Last Calibration	(0018,1201)	3	Not Written	
Pixel Padding Value	(0028,0120)	1C	Not Written	

8.8.6 General Image Module

Attribute name	Tag	Type	Usage	Comment
Instance Number	(0020,0013)	2	Written	Refers to the beam number the DRR is generated from.
Patient Orientation	(0020,0020)	2C	Written	
Content Date	(0008,0023)	2C	Written	Only written for DRR images. Treatment plan last save time is used.
Content Time	(0008,0033)	2C	Written	Only written for DRR images. Treatment plan last save time is used.
Image Type	(0008,0008)	3	Not Written	
Acquisition Number	(0020,0012)	3	Written	
Acquisition Date	(0008,0022)	3	Not Written	
Acquisition Time	(0008,0032)	3	Not Written	
Acquisition DateTime	(0008,002A)	3	Not Written	
Referenced Image Sequence	(0008,1140)	3	Not Written	
Derivation Description	(0008,2111)	3	Not Written	

Derivation Code Sequence	(0008,9215)	3	Not Written	
Source Image Sequence	(0008,2112)	3	Not Written	
Referenced Instance Sequence	(0008,114A)	3	Not Written	
Images in Acquisition	(0020,1002)	3	Not Written	
Image Comments	(0020,4000)	3	Not Written	
Quality Control Image	(0028,0300)	3	Not Written	
Burned In Annotation	(0028,0301)	3	Written	Possible values: YES, NO.
Lossy Image Compression	(0028,2110)	3	Not Written	
Lossy Image Compression Ratio	(0028,2112)	3	Not Written	
Lossy Image Compression Method	(0028,2114)	3	Not Written	
Icon Image Sequence	(0088,0200)	3	Not Written	
Presentation LUT Shape	(2050,0020)	3	Not Written	
Irradiation Event UID	(0008,3010)	3	Not Written	

8.8.7 Image Pixel Module

Attribute name	Tag	Type	Usage	Comment
Samples per Pixel	(0028,0002)	1	Written	Always 1.
Photometric Interpretation	(0028,0004)	1	Written	Always MONOCHROME2.
Rows	(0028,0010)	1	Written	
Columns	(0028,0011)	1	Written	
Bits Allocated	(0028,0100)	1	Written	Always 16.
Bits Stored	(0028,0101)	1	Written	Always 16.
High Bit	(0028,0102)	1	Written	Always 15.
Pixel Representation	(0028,0103)	1	Written	
Pixel Data	(7FE0,0010)	1C	Written	
Planar Configuration	(0028,0006)	1C	Not Written	
Pixel Aspect Ratio	(0028,0034)	1C	Not Written	
Smallest Image Pixel Value	(0028,0106)	3	Not Written	
Largest Image Pixel Value	(0028,0107)	3	Not Written	
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	Not Written	
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	Not Written	
Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	Not Written	
Red Palette Color Lookup Table Data	(0028,1201)	1C	Not Written	
Green Palette Color Lookup Table Data	(0028,1202)	1C	Not Written	
Blue Palette Color Lookup Table Data	(0028,1203)	1C	Not Written	

ICC Profile	(0028,2000)	3	Not Written	
Pixel Data Provider URL	(0028,7FE0)	1C	Not Written	
Pixel Padding Range Limit	(0028,0121)	1C	Written	
Pixel Data 32	(7FE0,0010)	1C	Written	Alternative view of Pixel Data.
Pixel Data Float	(7FE0,0010)	1C	Written	Alternative view of Pixel Data.

8.8.8 RT Image Module

Attribute name	Tag	Type	Usage	Comment
Samples per Pixel	(0028,0002)	1	Written	Always 1.
Photometric Interpretation	(0028,0004)	1	Written	Always MONOCHROME2.
Bits Allocated	(0028,0100)	1	Written	Always 16.
Bits Stored	(0028,0101)	1	Written	Always 16.
High Bit	(0028,0102)	1	Written	Always 15.
Pixel Representation	(0028,0103)	1	Written	Always 0.
Pixel Intensity Relationship	(0028,1040)	3	Not Written	
Pixel Intensity Relationship Sign	(0028,1041)	1C	Not Written	
RT Image Label	(3002,0002)	1	Written	Taken from the beam number.
RT Image Name	(3002,0003)	3	Written	Taken from the beam number.
RT Image Description	(3002,0004)	3	Written	Taken from the beam name and beam description.
Image Type	(0008,0008)	1	Written	Possible values: DERIVED, SECONDARY, DRR.
Conversion Type	(0008,0064)	2	Written	Always WSD.
Reported Values Origin	(3002,000A)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
RT Image Plane	(3002,000C)	1	Written	Always NORMAL.
X-Ray Image Receptor Translation	(3002,000D)	3	Not Written	
X-Ray Image Receptor Angle	(3002,000E)	2	Written	Always 0.
RT Image Orientation	(3002,0010)	2C	Written	
Image Plane Pixel Spacing	(3002,0011)	2	Written	
RT Image Position	(3002,0012)	2	Written	
Radiation Machine Name	(3002,0020)	2	Written	Name of treatment machine.
Primary Dosimeter Unit	(300A,00B3)	2	Written	Always NULL.
Radiation Machine SAD	(3002,0022)	2	Written	
Radiation Machine SSD	(3002,0024)	3	Not Written	
RT Image SID	(3002,0026)	2	Written	
Source to Reference Object Distance	(3002,0028)	3	Not Written	
Referenced RT Plan Sequence	(300C,0002)	3	Written	
>Referenced SOP Class UID	(0008,1150)	1	Written	

>Referenced SOP Instance UID	(0008,1155)	1	Written	
Referenced Beam Number	(300C,0006)	3	Written	Only if DRR does not belong to a setup beam.
Referenced Fraction Group Number	(300C,0022)	3	Not Written	
Fraction Number	(3002,0029)	3	Not Written	
Start Cumulative Meterset Weight	(300C,0008)	3	Not Written	
End Cumulative Meterset Weight	(300C,0009)	3	Not Written	
Exposure Sequence	(3002,0030)	3	Not Written	
Fluence Map Sequence	(3002,0040)	1C	Not Written	
Gantry Angle	(300A,011E)	3	Written	
Gantry Pitch Angle	(300A,014A)	3	Not Written	
Beam Limiting Device Angle	(300A,0120)	3	Written	
Patient Support Angle	(300A,0122)	3	Written	
Table Top Eccentric Axis Distance	(300A,0124)	3	Not Written	
Table Top Eccentric Angle	(300A,0125)	3	Not Written	
Table Top Pitch Angle	(300A,0140)	3	Not Written	
Table Top Roll Angle	(300A,0144)	3	Not Written	
Table Top Vertical Position	(300A,0128)	3	Not Written	
Table Top Longitudinal Position	(300A,0129)	3	Not Written	
Table Top Lateral Position	(300A,012A)	3	Not Written	
Isocenter Position	(300A,012C)	3	Written	
Patient Position	(0018,5100)	1C	Written	

8.8.9 VOI LUT Module

Attribute name	Tag	Type	Usage	Comment
VOI LUT Sequence	(0028,3010)	1C	Not Written	
Window Center	(0028,1050)	1C	Written	
Window Width	(0028,1051)	1C	Written	
Window Center & Width Explanation	(0028,1055)	3	Not Written	
VOI LUT Function	(0028,1056)	3	Not Written	

8.8.10 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Written	Always '1.2.840.10008.5.1.4.1.1.481.2'.
SOP Instance UID	(0008,0018)	1	Written	Generated from the RaySearch UID-series, see introduction for more details.
Specific Character Set	(0008,0005)	1C	Written	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Written	

Instance Creation Time	(0008,0013)	3	Written	
Instance Creator UID	(0008,0014)	3	Not Written	
Related General SOP Class UID	(0008,001A)	3	Not Written	
Original Specialized SOP Class UID	(0008,001B)	3	Not Written	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Written	
Timezone Offset From UTC	(0008,0201)	3	Not Written	
Contributing Equipment Sequence	(0018,A001)	3	Not Written	
Instance Number	(0020,0013)	3	Not Written	
SOP Instance Status	(0100,0410)	3	Not Written	
SOP Authorization Date and Time	(0100,0420)	3	Not Written	
SOP Authorization Comment	(0100,0424)	3	Not Written	
Authorization Equipment Certification Number	(0100,0426)	3	Not Written	
MAC Parameters Sequence	(4FFE,0001)	3	Not Written	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Written	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Written	
Original Attributes Sequence	(0400,0561)	3	Not Written	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Written	

8.9 Spatial Registration storage SOP class

IE	Module	Used
Patient	Patient	Yes
	Clinical Trial Subject	No
Study	General Study	Yes
	Patient Study	No
	Clinical Trial Study	No
Series	General Series	Yes
	Clinical Trial Series	No
	Spatial Registration Series	Yes
Frame of Reference	Frame of Reference	Yes
Equipment	General Equipment	Yes
Spatial Registration	Spatial Registration	Yes
	SOP Common	Yes
	Common Instance Reference	Yes

8.9.1 Patient Module

Attribute name	Tag	Type	Usage	Comment

Patient's Name	(0010,0010)	2	Written	Exported identical as the Patient's Name in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient's Name is provided by the user.
Patient ID	(0010,0020)	2	Written	Exported identical as the Patient's ID in the dataset that was first imported to the patient. Note: If data is exported anonymized, the new Patient ID is provided by the user.
Issuer of Patient ID	(0010,0021)	3	Not Written	
Issuer of Patient ID Qualifiers Sequence	(0010,0024)	3	Not Written	
Patient's Birth Date	(0010,0030)	2	Written	Exported identical as the Patient's Birth Date in the dataset that was first imported to the patient. Note: If the Patient's Birth Date is set and the data is exported anonymized, a new Patient's Birth Date is set to the time when the export was started.
Patient's Sex	(0010,0040)	2	Written	Note: If data is exported anonymized, the new Patient's Sex is set to "O" Possible values: • M = Male • F = Female • O = Other
Referenced Patient Sequence	(0008,1120)	3	Not Written	
Patient's Birth Time	(0010,0032)	3	Not Written	
Other Patient IDs	(0010,1000)	3	Not Written	
Other Patient IDs Sequence	(0010,1002)	3	Not Written	
Other Patient Names	(0010,1001)	3	Not Written	
Ethnic Group	(0010,2160)	3	Not Written	
Patient Comments	(0010,4000)	3	Not Written	
Patient Species Description	(0010,2201)	1C	Not Written	
Patient Species Code Sequence	(0010,2202)	1C	Not Written	
Patient Breed Description	(0010,2292)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Patient Breed Code Sequence	(0010,2293)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Breed Registration Sequence	(0010,2294)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person	(0010,2297)	2C		Always NULL if required based on condition. If not required, this attribute is not encoded.
Responsible Person Role	(0010,2298)	1C	Not Written	
Responsible Organization	(0010,2299)	2C		Always NULL if required based on condition.

				If not required, this attribute is not encoded.
Patient Identity Removed	(0012,0062)	3	Not Written	
De-identification Method	(0012,0063)	1C	Not Written	
De-identification Method Code Sequence	(0012,0064)	1C	Not Written	

8.9.2 General Study Module

Attribute name	Tag	Type	Usage	Comment
Study Instance UID	(0020,000D)	1	Written	Exported identical as specified in the referenced image series.
Study Date	(0008,0020)	2	Written	Exported identical as specified in the referenced image series.
Study Time	(0008,0030)	2	Written	Exported identical as specified in the referenced image series.
Referring Physician's Name	(0008,0090)	2	Written	
Referring Physician Identification Sequence	(0008,0096)	3	Not Written	
Study ID	(0020,0010)	2	Written	Exported identical as specified in the referenced image series.
Accession Number	(0008,0050)	2	Written	
Issuer of Accession Number Sequence	(0008,0051)	3	Not Written	
Study Description	(0008,1030)	3	Written	Contains the study diagnosis.
Physician(s) of Record	(0008,1048)	3	Not Written	
Physician(s) of Record Identification Sequence	(0008,1049)	3	Not Written	
Name of Physician(s) Reading Study	(0008,1060)	3	Not Written	
Physician(s) Reading Study Identification Sequence	(0008,1062)	3	Not Written	
Requesting Service Code Sequence	(0032,1034)	3	Not Written	
Referenced Study Sequence	(0008,1110)	3	Not Written	
Procedure Code Sequence	(0008,1032)	3	Not Written	
Reason For Performed Procedure Code Sequence	(0040,1012)	3	Not Written	

8.9.3 General Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Written	Always REG.
Series Instance UID	(0020,000E)	1	Written	
Series Number	(0020,0011)	2	Written	
Laterality	(0020,0060)	2C		Always NULL if required based on condition.

				If not required, this attribute is not encoded.
Series Date	(0008,0021)	3	Written	
Series Time	(0008,0031)	3	Written	
Performing Physicians' Name	(0008,1050)	3	Not Written	
Performing Physician Identification Sequence	(0008,1052)	3	Not Written	
Protocol Name	(0018,1030)	3	Written	
Series Description	(0008,103E)	3	Written	
Series Description Code Sequence	(0008,103F)	3	Not Written	
Operators' Name	(0008,1070)	3	Written	
Operator Identification Sequence	(0008,1072)	3	Not Written	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Not Written	
Related Series Sequence	(0008,1250)	3	Not Written	
Body Part Examined	(0018,0015)	3	Not Written	
Patient Position	(0018,5100)	2C	Written	
Smallest Pixel Value in Series	(0028,0108)	3	Not Written	
Largest Pixel Value in Series	(0028,0109)	3	Not Written	
Request Attributes Sequence	(0040,0275)	3	Not Written	
Performed Procedure Step ID	(0040,0253)	3	Not Written	
Performed Procedure Step Start Date	(0040,0244)	3	Not Written	
Performed Procedure Step Start Time	(0040,0245)	3	Not Written	
Performed Procedure Step Description	(0040,0254)	3	Not Written	
Performed Protocol Code Sequence	(0040,0260)	3	Not Written	
Comments on the Performed Procedure Step	(0040,0280)	3	Not Written	
Anatomical Orientation Type	(0010,2210)	1C	Not Written	

8.9.4 Spatial Registration Series Module

Attribute name	Tag	Type	Usage	Comment
Modality	(0008,0060)	1	Written	Always REG.

8.9.5 Frame of Reference Module

Attribute name	Tag	Type	Usage	Comment
Frame of Reference UID	(0020,0052)	1	Written	Always same as the referenced image series frame of reference.
Position Reference Indicator	(0020,1040)	2	Written	

8.9.6 General Equipment Module

Attribute name	Tag	Type	Usage	Comment
Manufacturer	(0008,0070)	2	Written	Always 'RaySearch Laboratories'.
Institution Name	(0008,0080)	3	Not Written	
Institution Address	(0008,0081)	3	Not Written	
Station Name	(0008,1010)	3	Not Written	
Institutional Department Name	(0008,1040)	3	Not Written	
Manufacturer's Model Name	(0008,1090)	3	Written	Always RayPlan.
Device Serial Number	(0018,1000)	3	Not Written	
Software Versions	(0018,1020)	3	Written	Always written as the current software version of RayPlan.
Gantry ID	(0018,1008)	3	Not Written	
Spatial Resolution	(0018,1050)	3	Not Written	
Date of Last Calibration	(0018,1200)	3	Not Written	
Time of Last Calibration	(0018,1201)	3	Not Written	
Pixel Padding Value	(0028,0120)	1C	Not Written	

8.9.7 Spatial Registration Module

Attribute name	Tag	Type	Usage	Comment
Content Date	(0008,0023)	1	Written	
Content Time	(0008,0033)	1	Written	
Instance Number	(0020,0013)	1	Written	
Content Label	(0070,0080)	1	Written	
Content Description	(0070,0081)	2	Written	
Content Creator's Name	(0070,0084)	2	Written	
Content Creator's Identification Code Sequence	(0070,0086)	3	Not Written	
Registration Sequence	(0070,0308)	1	Written	
>Frame of Reference UID	(0020,0052)	1C	Written	
>Referenced Image Sequence	(0008,1140)	1C	Written	
>>Referenced SOP Class UID	(0008,1150)	1	Written	
>>Referenced SOP Instance UID	(0008,1155)	1	Written	
>>Referenced Frame Number	(0008,1160)	1C	Not Written	
>>Referenced Segment Number	(0062,000B)	1C	Not Written	
>Matrix Registration Sequence	(0070,0309)	1	Written	
>>Frame of Reference Transformation Comment	(3006,00C8)	3	Not Written	
>>Registration Type Code Sequence	(0070,030D)	2	Written	
>>Matrix Sequence	(0070,030A)	1	Written	

>>>Frame of Reference Transformation Matrix	(3006,00C6)	1	Written	
>>>Frame of Reference Transformation Matrix Type	(0070,030C)	1	Written	Always RIGID.
>Used Fiducials Sequence	(0070,0314)	3	Not Written	

8.9.8 SOP Common Module

Attribute name	Tag	Type	Usage	Comment
SOP Class UID	(0008,0016)	1	Written	
SOP Instance UID	(0008,0018)	1	Written	Generated from the RaySearch UID-series, see introduction for more details.
Specific Character Set	(0008,0005)	1C	Written	Possible values: ISO_IR 100, ISO_IR 192.
Instance Creation Date	(0008,0012)	3	Written	
Instance Creation Time	(0008,0013)	3	Written	
Instance Creator UID	(0008,0014)	3	Not Written	
Related General SOP Class UID	(0008,001A)	3	Not Written	
Original Specialized SOP Class UID	(0008,001B)	3	Not Written	
Coding Scheme Identification Sequence	(0008,0110)	3	Not Written	
Timezone Offset From UTC	(0008,0201)	3	Not Written	
Contributing Equipment Sequence	(0018,A001)	3	Not Written	
Instance Number	(0020,0013)	3	Not Written	
SOP Instance Status	(0100,0410)	3	Not Written	
SOP Authorization Date and Time	(0100,0420)	3	Not Written	
SOP Authorization Comment	(0100,0424)	3	Not Written	
Authorization Equipment Certification Number	(0100,0426)	3	Not Written	
MAC Parameters Sequence	(4FFE,0001)	3	Not Written	
Digital Signatures Sequence	(FFFA,FFFA)	3	Not Written	
Encrypted Attributes Sequence	(0400,0500)	1C	Not Written	
Original Attributes Sequence	(0400,0561)	3	Not Written	
HL7 Structured Document Reference Sequence	(0040,A390)	1C	Not Written	

8.9.9 Common Instance Reference Module

Attribute name	Tag	Type	Usage	Comment
Referenced Series Sequence	(0008,1115)	1	Written	
>Series Instance UID	(0020,000E)	1	Written	
>Referenced Instance Sequence	(0008,114A)	1	Written	
>>Referenced SOP Class UID	(0008,1150)	1	Written	
>>Referenced SOP Instance UID	(0008,1155)	1	Written	

Studies Containing Other Referenced Instances Sequence	(0008,1200)	1C	Written	If referenced images are located in a Study different from the REG object.
>Study Instance UID	(0020,000D)	1	Written	
>Referenced Series Sequence	(0008,1115)	1	Written	
>>Series Instance UID	(0020,000E)	1	Written	
>>Referenced Instance Sequence	(0008,114A)	1	Written	
>>>Referenced SOP Class UID	(0008,1150)	1	Written	
>>>Referenced SOP Instance UID	(0008,1155)	1	Written	

9 Data Dictionary of Private Attributes

All used Private Creators are listed in the table below. Usage of Private Attributes are listed in each module specification.

Attribute name	Tag	VR	VM	Value
GE Private Creator	(0009,0010)	LO	1	GEMS_PETD_01
RaySearch Private Creator	(3001,0011)	LO	1	RAYSEARCHLABS 1.0
IMPAC Private Creator	(300B,0010)	LO	1	IMPAC
Brainlab Private Creator	(300B,0012)	LO	1	Brainlab - ONC - Beam Parameters
IBA Private Creator	(300D,0010)	LO	1	IBA
medPhoton Private Creator	(30BB,0010)	LO	1	medPhoton 1.0
Brainlab Private Creator	(320B,0010)	LO	1	Brainlab - ONC - Multi-axial treatment machine
RaySearch Private Creator	(4001,0010)	LO	1	RAYSEARCHLABS 2.0
Philips Private Creator	(7053,0010)	LO	1	Philips PET Private Group

Contact information

Head office
RaySearch Laboratories AB
P.O. Box 3297
SE-103 65 Stockholm, Sweden
Phone: +46 8 510 530 00
Fax: +46 8 510 530 30
Visiting address:
Sveavägen 44
SE-111 34 Stockholm, Sweden
info@raysearchlabs.com
www.raysearchlabs.com

RaySearch Americas Inc.
Phone: +1 877 778 3849

RaySearch Belgium
Phone: +32 2 213 83 65

RaySearch France
Phone: +33 975 433 632

RaySearch UK Limited
Phone: +44 7508 426 563

RaySearch Germany GmbH
Phone: +49 30 89 36 06 90

RSL-D-RP-1.0-DCS-EN-1.0-2016-06-13
RayStation 5 DICOM Conformance Statement

RaySearch Laboratories