Integrating the Healthcare Enterprise

IHE Radiation Oncology
Technical Framework Supplement

Treatment Planning Plan Content-Brachy (TPPC-Brachy)

Revision 1.1 – Trial Implementation

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Please verify you have the most recent version of this document. See here for Trial Implementation and Final Text versions and here for Public Comment versions.

Foreword

This is a supplement to the IHE Radiation Oncology Technical Framework. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on September 5, 2024 for trial implementation and may be available for testing at subsequent IHE Connectathons. The supplement may be amended based on the results of testing. Following successful testing it will be incorporated into the Radiation Oncology Technical Framework. Comments are invited and can be submitted at Radiation Oncology Public Comments.

This supplement describes changes to the existing technical framework documents.

"Boxed" instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume.

Amend Section X.X by the following:

Where the amendment adds text, make the added text **bold underline**. Where the amendment removes text, make the removed text ~~**bold strikethrough**~~. When entire new sections are added, introduce with editor's instructions to "add new text" or similar, which for readability are not bolded or underlined.

General information about IHE can be found at IHE.net.

Information about the IHE Radiation Oncology domain can be found at IHE Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at Profiles and IHE Process.

The current version of the Radiation Oncology Technical Framework can be found at Radiation Oncology Technical Framework.

CONTENTS

Introduction to this Supplement

This content profile is motivated by medical physicists working with brachytherapy planning systems, who face an increasing demand from patient-care, data-quality and research perspectives to increase the usefulness, exchangeability and availability of clinical data across the various treatment planning systems and between treatment planning and delivery systems.

The main role of this profile is to address a solution for such interoperability using the DICOM objects provided in its 1st generation.

The aim is to streamline the implementation of the DICOM objects in order to identify a common understanding and key reading of the standard. This supplement provides the guidelines to handle techniques that exist in brachytherapy that benefit from digital data storage. The involved actors are either producers or consumers of a Structure Set, DICOM RT Plan or Ultrasound Images for brachytherapy.

History of Changes

Date	Rev.	Author	Change Summary
NOV 2023	1.0	RO Technical Committee	Initial Public Comment Publication
SEP 2024	1.1	RO Technical Committee	Initial Trial Implementation Publication (updates from public comment)

Open Issues

#	Comment/Issue
	None

Closed Issues

#	Comment/Issue
1	For temporary LDR treatment plans, can we restrict to just 2 control points (CP's) per channel like Permanent LDR?

IHE Technical Frameworks General Introduction

The IHE Technical Frameworks General Introduction is shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to this document where appropriate.

9 Copyright Licenses

IHE technical documents refer to, and make use of, a number of standards developed and published by several standards development organizations. Please refer to the IHE Technical Frameworks General Introduction, Section 9 - Copyright Licenses for copyright license information for frequently referenced base standards. Information pertaining to the use of IHE International copyrighted materials is also available there.

10 Trademark

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IHE Technical Frameworks General Introduction Appendices

The IHE Technical Framework General Introduction Appendices are components shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to these documents where appropriate.

Appendix A – Actors

New (or modified) Actor Name	Description
HDR/PDR Brachy Content Creator	A system capable of producing an HDR/PDR set of data
HDR/PDR Brachy Content Consumer	A system capable of consuming an HDR/PDR set of data
LDR Temporary Brachy Content Creator	A system capable of producing an LDR Temporary set of data
LDR Temporary Brachy Content Consumer	A system capable of consuming an LDR Temporary set of data
LDR Permanent Brachy Content Creator	A system capable of producing an LDR Permanent set of data
LDR Permanent Brachy Content Consumer	A system capable of consuming an LDR Permanent set of data

Appendix B – Transactions

New (or modified) Transaction Name and Number	Definition
None	

Appendix D – Glossary

*Add the following **new or modified** glossary terms to the IHE Technical Frameworks General Introduction Appendix D:*

New (or modified) Glossary Term	Definition	Synonyms	Acronym/ Abbreviation
Applicator	Device, consisting out of one or more catheters, holding the radioactive source(s) during brachytherapy		
High dose rate	As defined in ICRU 38, March 1 1985, "High Dose Rate refers to any dose rate higher than 0.2 gray per minute (12 grays per hour), although it usually refers to dose rates as high as 2 to 5 grays per minute, i.e., treatment sessions of a few minutes duration."		HDR
Low dose rate	Radiation delivered internally to the patient via a long half-life, low output radioisotope.		LDR
Pulsed dose rate	Radiation delivered internally to the patient with a dose rate higher than 0.2 gray per minute (12 grays per hour) and is moved in and out of the patient on a planned time schedule (pulsing)		PDR

Volume 1 – Profiles

X Brachy Treatment Planning – Plan Content Integration (TPPC-Brachy) Profile

This content profile defines the content of RT Structure Set, RT Plan and Ultrasound image information:

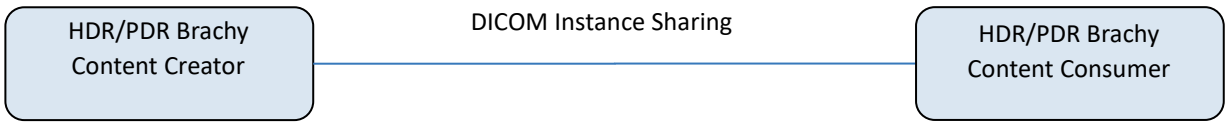
- Between treatment planning systems
- Between treatment planning systems and treatment management systems and / or treatment delivery systems.

The exchange of this information revolves around brachytherapy treatment specific workflows (e.g., specifying the process of transferring the treatment planning data to another treatment planning system or a treatment management system). Based on the planned technique for the treatment, the content of the DICOM information objects have different content specifications defined in chapter 7 in order to address the interoperability between different vendors. The actors are either creators or consumers of DICOM RT Structure Set, DICOM RT Plan and DICOM Ultrasound Image instances.

X.1 TPPC-BRACHY Actors, Transactions, and DICOM Content Definitions

Figure X.1-1 shows how the TPPC-BRACHY Content Profile is used in the exchange of DICOM instances between actors that are identified as creators and actors that are identified as consumers.

The DICOM objects that are exchanged between producers and consumers must implement the content requirements listed in this profile in order to be IHE compliant.



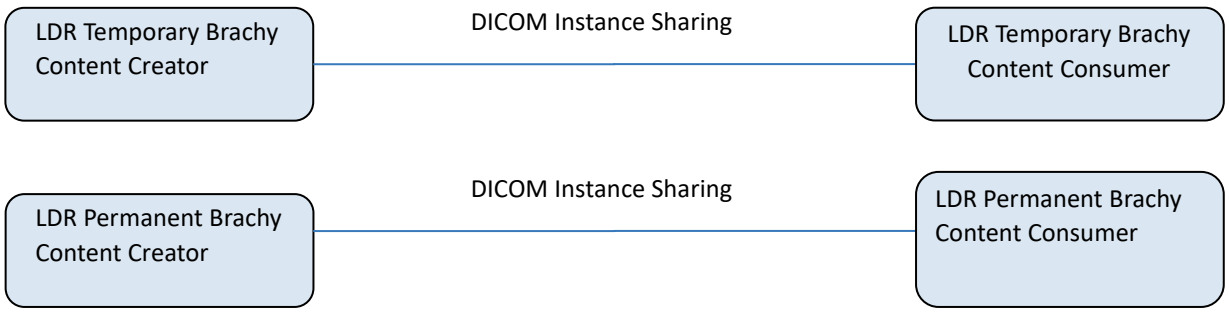


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Figure X.1-1: TPPC-Brachy Actor Diagram

Table X.1-1: TPPC-Brachy Profile - Actors and Content Modules

Actors	Content Definition	Optionality	Reference
HDR/PDR Brachy Content Creator	RT Structure Set for Brachytherapy	O	RO TF-3: 7.3.4.2
	RT Plan for HDR/PDR Brachytherapy	R	RO TF-3: 7.3.2.1.6
	RT Dose for Brachytherapy Planning	O	RO TF-3: 7.3.5.1.2
	Ultrasound image for Brachytherapy planning	O	RO TF-3: 7.3.3.3
HDR/PDR Brachy Content Consumer	RT Structure Set for Brachytherapy	O	RO TF-3: 7.3.4.2
	RT Plan for HDR/PDR Brachytherapy	R	RO TF-3: 7.3.2.1.6
	RT Dose for Brachytherapy Planning	O	RO TF-3: 7.3.5.1.2
	Ultrasound image for Brachytherapy planning	O	RO TF-3: 7.3.3.3
LDR Permanent Brachy Content Creator	RT Structure Set for Brachytherapy	O	RO TF-3: 7.3.4.2
	RT Plan for LDR Permanent Brachytherapy	R	RO TF-3: 7.3.2.1.8
	RT Dose for Brachytherapy Planning	O	RO TF-3: 7.3.5.1.2
	Ultrasound image for Brachytherapy planning	O	RO TF-3: 7.3.3.3
LDR Permanent Brachy Content Consumer	RT Structure Set for Brachytherapy	O	RO TF-3: 7.3.4.2
	RT Plan for LDR Permanent Brachytherapy	R	RO TF-3: 7.3.2.1.8
	RT Dose for Brachytherapy Planning	O	RO TF-3: 7.3.5.1.2

Actors	Content Definition	Optionality	Reference
	Ultrasound image for Brachytherapy planning	O	RO TF-3: 7.3.3.3
LDR Temporary Brachy Content Creator	RT Structure Set for Brachytherapy	O	RO TF-3: 7.3.4.2
	RT Plan for LDR Temporary Brachytherapy	R	RO TF-3: 7.3.2.1.7
	RT Dose for Brachytherapy Planning	O	RO TF-3: 7.3.5.1.2
	Ultrasound image for Brachytherapy planning	O	RO TF-3: 7.3.3.3
LDR Temporary Brachy Content Consumer	RT Structure Set for Brachytherapy	O	RO TF-3: 7.3.4.2
	RT Plan for LDR Temporary Brachytherapy	R	RO TF-3: 7.3.2.1.7
	RT Dose for Brachytherapy Planning	O	RO TF-3: 7.3.5.1.2
	Ultrasound image for Brachytherapy planning	O	RO TF-3: 7.3.3.3

Note: A system presenting for testing must support at least one of the Required Content Definitions for RT Plan.

The Integration Statement will indicate which transactions a system is capable of supporting. In general, these will be grouped according to the overall functionality of the actor.

X.1.1 Actor Descriptions and Actor Profile Requirements

For all Brachytherapy Content Creators and Consumers, the display requirements for dwell time and total dose contributions are not sufficiently met by just presenting the DICOM data. It must be converted as described in the notes in this section. A system does not adhere to the profile unless it provides the output in the prescribed format.

Actors shall be able to display total times and dwell times at the reference date and time of the plan (including time zone used) and not Cumulative Time Weights.

X.2 TPPC-Brachy Actor Options

None

X.3 TPPC-Brachy Required Actor Groupings

None

X.4 TPPC-Brachy Overview

X.4.1 Concepts

This profile enhances the content of the DICOM structure set and plan objects as regard the brachytherapy scope and adds the critical Image Plane module content to an Ultrasound image so that it can be used for contouring and planning.

The most important attributes that have to be properly included in the DICOM object in order to avoid ambiguities and safety implications on interpreting the object have been identified in the Module Content definitions in Volume 3, section 7.

X.4.2 Use Cases

X.4.2.1 Use Case #1 Brachytherapy Plan Exchange

A TPS sends images, structure set, treatment plan and dose to another TPS.

X.4.2.1.1 Use Case Description

A user wishes to view a plan from another TPS system or convert the plan into an equivalent plan for a different delivery device.

X.4.2.1.1.1 Pre Conditions

The first TPS has created a plan for a known delivery device.

X.4.2.1.1.2 Main Flow

The first TPS shares the images, structure set, plan and dose with another TPS.

X.4.2.1.1.3 Post Conditions

The second TPS imports and stores the content of the plan so that it can use it for plan review or as a basis for a new plan.

X.4.2.2 Use Case #2 Ultrasound for Brachytherapy

Share Ultrasound planning images between systems

X.4.2.2.1 Use Case Description

A TPS wishes to share US images that are useful for planning with another system.

X.4.2.2.1.1 Pre Conditions

A TPS is connected to an Ultrasound machine and captures axial US images suitable for planning.

X.4.2.2.1.2 Main Flow

The first TPS shares the planning-suitable US images with another TPS.

X.4.2.1.1.3 Post Conditions

The second TPS can display the US images and use them for contouring and planning.

X.5 TPPC-Brachy Security Considerations

None

X.6 TPPC-Brachy Cross Profile Considerations

BRTO-II – Basic RT Objects Integration

A Contourer in BRTO-II might be grouped with any Brachy Content Creator to share a RT Structure Set for Brachytherapy with any Brachy Content Consumer.

Appendices to Volume 1

None

Volume 2 – Transactions

None

Appendices to Volume 2

None

Volume 3 – Content Modules

7 Radiation Oncology DICOM Content Definitions

DICOM Content Definitions constrain the use of instances of specific DICOM IODs (also referred to as DICOM objects). This typically means placing requirements on the creators of those instances, although requirements may also be placed on the receivers and users.

The most common such requirements are to:

- Make a module that is optional (U) in a DICOM IOD be required or conditional,
- Make an attribute that is optional (Type 3) in a DICOM Module be required or conditional,
- Require that an attribute that is optional (Type 3) in a DICOM Module be absent.
- Constrain the content of an attribute to be empty.
- Constrain the content of an attribute to be populated in a certain way, such as:
  - Constraining the value to be taken from a specific table.
  - Constraining the value to be copied from a specific source.
  - Constraining the value to encode certain information.
- Require that an attribute be displayed/accessible to the operator.

Reiterating DICOM requirements is kept to a minimum sufficient to provide context for the IHE requirements. Implementers are still required to be familiar with, and conform to, the underlying DICOM specification.

Content Definitions may be referenced from a Profile independent of transactions to constrain content without specifying the transport. Content Definitions may also be referenced from within a transaction specification to constrain the content without duplicating the same constraint text across multiple related transactions.

For attributes that are optional, the creator is permitted but not required to include them, and the receiver is permitted but not required to ignore them.

7.1 Conventions

IOD Table

M / C / U	As defined in DICOM PS 3.3
R	The Module is defined as Conditional (C) or User Option (U) in DICOM. The Requirement is an IHE extension of the DICOM requirements, and the module shall be present.

RC	The Module is defined as Conditional (C) or User Option (U) in DICOM. The Requirement is an IHE extension of the DICOM requirements, and the module shall be present when the specified conditions apply.

Module Table

O		The attribute or its value is optional, i.e., in DICOM it is Type 2 or 3.
O+*		The attribute is optional, but additional constraints have been added. Note: The specification approach does not force a Type 2 or Type 3 value to become a Type 1 by stating O+.
R		The attribute is required and is not an IHE extension of the DICOM requirements, i.e., it is already Type 1 in DICOM, but additional constraints are placed by IHE, for example on the value set that may be used for the attribute.
R+		The Requirement is an IHE extension of the DICOM requirements, and the attribute shall be present, i.e., is Type 1, whereas the DICOM requirement may be Type 2 or 3.
RC+		The Requirement is an IHE extension of the DICOM requirements, and the attribute shall be present when the condition is satisfied, i.e., is Type 1C, whereas the DICOM requirement may be Type 2 or 3. If the condition is not fulfilled, the DICOM definitions apply. Note, that this means that the attribute may be present / have a value also in case the condition does not apply.
D		The requirements of DICOM apply unchanged, but the attribute needs to be displayed.
-		No IHE extension of the DICOM requirements is defined. The attribute is listed for better readability or similar purpose.
X+		The attribute information is required to be absent. DICOM Type 2 attributes shall be present with no value. DICOM Type 3 attributes shall be absent.

7.2 General Definitions

7.3 IOD Definitions

7.3.2 Plan IODs

7.3.2.1 Technique Specific RT Plan IODs

7.3.2.1.6 RT Plan IOD for HDR/PDR Brachytherapy

7.3.2.1.6.1 Referenced Standards

DICOM 2024b Edition. PS 3.3

7.3.2.1.6.2 IOD Definition

IE	Module	Reference	Usage	IHE-RO Usage
Patient	Patient	C.7.1.1	M	R See RO TF-3: 7.4.1.1.1 (Base Content)
	Clinical Trial Subject	C.7.1.3	U	U
Study	General Study	C.7.2.1	M	R See RO TF-3: 7.4.1.2.1 (Base Content)
	Patient Study	C.7.2.2	U	U
	Clinical Trial Study	C.7.2.3	U	U
Series	RT Series	C.8.8.1	M	R See RO TF-3: 7.4.1.4.1 (Base Content)
	Clinical Trial Series	C.7.3.2	U	U
Frame of Reference	Frame of Reference	C.7.4.1	U	R See RO TF-3: 7.4.1.7.1 (Base Content)
Equipment	General Equipment	C.7.5.1	M	R See RO TF-3: 7.4.1.5.1 (Base Content)
Plan	RT General Plan	C.8.8.9	M	R See RO TF-3: 7.4.3.1.1
	RT Prescription	C.8.8.10	U	R See RO TF-3: 7.4.3.2.1
	RT Tolerance Tables	C.8.8.11	U	-
	RT Patient Setup	C.8.8.12	U	-
	RT Fraction Scheme	C.8.8.13	U	R See RO TF-3: 7.4.3.3.3
	RT Beams	C.8.8.14	C - Required if RT Fraction Scheme Module exists and Number of Beams (300A,0080) is greater than zero for one or more fraction groups	Shall not be present
	RT Brachy Application Setups	C.8.8.15	C - Required if RT Fraction Scheme Module exists and Number of Brachy Application Setups (300A,00A0) is greater than zero for one or more fraction groups	R HDR and PDR see RO TF-3: 7.4.4.5.2
	Approval	C.8.8.16	U	R
	General Reference	C.12.4	U	-

IE	Module	Reference	Usage	IHE-RO Usage
	SOP Common	C.12.1	M	R See RO TF-3: 7.4.1.6.1
	Common Instance Reference	C.12.2	U	-

7.3.2.1.7 RT Plan IOD Definition for LDR Temporary Brachytherapy

7.3.2.1.7.1 Referenced Standards

DICOM 2024b Edition. PS 3.3

7.3.2.1.7.2 IOD Definition

IE	Module	Reference	Usage	IHE-RO Usage
Patient	Patient	C.7.1.1	M	R See RO TF-3: 7.4.1.1.1 (Base Content)
	Clinical Trial Subject	C.7.1.3	U	U
Study	General Study	C.7.2.1	M	R See RO TF-3: 7.4.1.2.1 (Base Content)
	Patient Study	C.7.2.2	U	U
	Clinical Trial Study	C.7.2.3	U	U
Series	RT Series	C.8.8.1	M	R See RO TF-3: 7.4.1.4.1 (Base Content)
	Clinical Trial Series	C.7.3.2	U	U
Frame of Reference	Frame of Reference	C.7.4.1	U	R See RO TF-3: 7.4.1.7.1 (Base Content)
Equipment	General Equipment	C.7.5.1	M	R See RO TF-3: 7.4.1.5.1 (Base Content)
Plan	RT General Plan	C.8.8.9	M	R See RO TF-3: 7.4.3.1.1
	RT Prescription	C.8.8.10	U	R See RO TF-3: 7.4.3.2.1
	RT Tolerance Tables	C.8.8.11	U	
	RT Patient Setup	C.8.8.12	U	-
	RT Fraction Scheme	C.8.8.13	U	R See RO TF-3: 7.4.3.3.3
	RT Beams	C.8.8.14	C - Required if RT Fraction Scheme Module exists and Number of Beams (300A,0080) is greater than zero for one or more fraction groups	Shall not be present
	RT Brachy Application Setups	C.8.8.15	C - Required if RT Fraction Scheme Module exists and Number of Brachy Application Setups (300A,00A0) is greater than zero for one or more fraction groups	R LDR Temporary see RO TF-3: 7.4.4.5.3
	Approval	C.8.8.16	U	R
	General Reference	C.12.4	U	-

IE	Module	Reference	Usage	IHE-RO Usage
	SOP Common	C.12.1	M	R See RO TF-3: 7.4.1.6.1
	Common Instance Reference	C.12.2	U	-

7.3.2.1.8 RT Plan IOD Definition for LDT Permanent Brachytherapy

7.3.2.1.8.1 Referenced Standards

DICOM 2024b Edition. PS 3.3

305 **7.3.2.1.8.2 IOD Definition**

IE	Module	Reference	Usage	IHE-RO Usage
Patient	Patient	C.7.1.1	M	R See RO TF-3: 7.4.1.1.1 (Base Content)
	Clinical Trial Subject	C.7.1.3	U	U
Study	General Study	C.7.2.1	M	R See RO TF-3: 7.4.1.2.1 (Base Content)
	Patient Study	C.7.2.2	U	U
	Clinical Trial Study	C.7.2.3	U	U
Series	RT Series	C.8.8.1	M	R See RO TF-3: 7.4.1.4.1 (Base Content)
	Clinical Trial Series	C.7.3.2	U	U
Frame of Reference	Frame of Reference	C.7.4.1	U	R See RO TF-3: 7.4.1.7.1 (Base Content)
Equipment	General Equipment	C.7.5.1	M	R See RO TF-3: 7.4.1.5.1 (Base Content)
Plan	RT General Plan	C.8.8.9	M	R See RO TF-3: 7.4.3.1.1
	RT Prescription	C.8.8.10	U	R See RO TF-3: 7.4.3.2.1
	RT Tolerance Tables	C.8.8.11	U	
	RT Patient Setup	C.8.8.12	U	-
	RT Fraction Scheme	C.8.8.13	U	R See RO TF-3: 7.4.3.3.3
	RT Beams	C.8.8.14	C - Required if RT Fraction Scheme Module exists and Number of Beams (300A,0080) is greater than zero for one or more fraction groups	Shall not be present
	RT Brachy Application Setups	C.8.8.15	C - Required if RT Fraction Scheme Module exists and Number of Brachy Application Setups (300A,00A0) is greater than zero for one or more fraction groups	R LDR Permanent see RO TF-3: 7.4.4.5.4
	Approval	C.8.8.16	U	R
	General Reference	C.12.4	U	-

IE	Module	Reference	Usage	IHE-RO Usage
	SOP Common	C.12.1	M	R See RO TF-3: 7.4.1.6.1
	Common Instance Reference	C.12.2	U	-

7.3.3 Image IODs

7.3.3.3 Ultrasound Image for Brachy Planning

310 **7.3.3.3.1 Referenced Standards**

DICOM 2024b Edition PS 3.3

7.3.3.3.2 IOD Definition

IE	Module	Reference	Usage	IHE-RO Usage
Patient	Patient	C.7.1.1	M	-
	Clinical Trial Subject	C.7.1.3	U	-
Study	General Study	C.7.2.1	M	-
	Patient Study	C.7.2.2	U	-
	Clinical Trial Study	C.7.2.3	U	-
Series	General Series	C.7.3.1	M	-
	Clinical Trial Series	C.7.3.2	U	-
Frame of Reference	Frame of Reference	C.7.4.1	U	R
	Synchronization	C.7.4.2	U	-
Equipment	General Equipment	C.7.5.1	M	-
Image	General Image	C.7.6.1	M	-
	…			
	US Image	C.8.5.6	M	R See RO TF-3:7.4.6.3.1
	Image Plane Module	C.7.6.2	Not used in regular US image. Added for IHE-RO Brachy planning use	R See RO TF-3: 7.4.6.2.3
	…			

IE	Module	Reference	Usage	IHE-RO Usage
	Image Pixel	C.7.6.3	M	-
	Contrast/Bolus	C.7.6.4	C - Required if contrast media was used in this image	-
	Palette Color Lookup Table	C.7.9	C - Required if Photometric Interpretation (0028,0004) has a value of PALETTE COLOR	R* Shall not be used
	Device	C.7.6.12	U	-
	Specimen	C.7.6.22	U	-
	US Region Calibration	C.8.5.5	U	R Shall not be present
	US Image	C.8.5.6	M	R+ See RO TF-3: 7.4.6.2.4
	Overlay Plane	C.9.2	U	-
	VOI LUT	C.11.2	U	-
	ICC Profile	C.11.15	U	-
	SOP Common	C.12.1	M	-
	Common Instance Reference	C.12.2	U	-

7.3.4 RT Structure Set IOD

7.3.4.2 RT Structure Set for Brachytherapy

7.3.4.2.1 Referenced Standards

DICOM 2024b Edition PS 3.3

7.3.4.2.2 IOD Definition

In the IHE-RO Usage column, the specific content required by Brachytherapy, is indicated; otherwise the Base Content is referenced. .

IE	Module	Reference	Usage	IHE-RO Usage
Patient	Patient	C.7.1.1	M	R See RO TF-3: 7.4.1.1.1 (Base Content)
	Clinical Trial Subject	C.7.1.3	U	U
Study	General Study	C.7.2.1	M	R See RO TF-3: 7.4.1.2.1 (Base Content)
	Patient Study	C.7.2.2	U	U
	Clinical Trial Study	C.7.2.3	U	U
Series	RT Series	C.8.8.1	M	R See RO TF-3: 7.4.1.4.1 (Base Content)
	Clinical Trial Series	C.7.3.2	U	U
Frame of Reference	Frame of Reference	C.7.4.1	U	R See RO TF-3: 7.4.1.7.1 (Base Content)
Equipment	General Equipment	C.7.5.1	M	R See RO TF-3: 7.4.1.5.1 (Base Content)
Structure Set	Structure Set	C.8.8.5	M	R See RO TF-3: 7.4.8.3.3
	ROI Contour	C.8.8.6	M	R See RO TF-3: 7.4.8.2.3
	RT ROI Observation	C.8.8.8	M	R See RO TF-3: 7.4.8.1.2
	Approval	C.8.8.16	U	U
	General Reference	C.12.4	U	-
	SOP Common	C.12.1	M	R
	Common Instance Reference	C.12.2	U	C – Required if reference information is available

7.3.5 RT Dose IOD

7.3.5.1 RT Dose IOD for General Use

7.3.5.1.1 RT Dose from Dosimetric Planning

7.3.5.1.2 RT Dose for Brachytherapy Planning

7.3.5.1.2.1 Referenced Standards

DICOM 2024b Edition PS 3.3

7.3.5.1.2.2 IOD Definition

IE	Module	Reference	Usage	IHE-RO Usage
Patient	Patient	C.7.1.1	M	M See Section 7.4.1.1.1
	Clinical Trial Subject	C.7.1.3	U	U
Study	General Study	C.7.2.1	M	M See Section 7.4.1.2.1
	Patient Study	C.7.2.2	U	U
	Clinical Trial Study	C.7.2.3	U	U
Series	RT Series	C.8.8.1	M	M See Section 7.4.1.4.1
	Clinical Trial Series	C.7.3.2	U	U
Frame of Reference	Frame of Reference	C.7.4.1	M	M See Section 7.4.1.7.1
Equipment	General Equipment	C.7.5.1	M	M See Section 7.4.1.5.1
Dose	General Image	C.7.6.1	C - Required if dose data contains grid-based doses.	M
	Image Plane	C.7.6.2	C - Required if dose data contains grid-based doses.	R See Section 7.4.13.1.1
	Image Pixel	C.7.6.3	C - Required if dose data contains grid-based doses.	M
	Multi-Frame	C.7.6.6	C - Required if dose data contains grid-based doses and pixel data is multi-frame data.	R See Section 7.4.13.2.1
	Overlay Plane	C.9.2	U	U
	Multi-Frame Overlay	C.9.3	U	U
	Modality LUT	C.11.1	U	U
	RT Dose	C.8.8.3	M	M See Section 7.4.13.32
	RT DVH	C.8.8.4	U	-

IE	Module	Reference	Usage	IHE-RO Usage
	Structure Set	C.8.8.5	C - Required if dose data contains dose points or isodose curves	Outside the scope of this profile.
	ROI Contour	C.8.8.6	C - Required if dose data contains dose points or isodose curves	Outside the scope of this profile.
	RT Dose ROI	C.8.8.7	C - Required if dose data contains dose points or isodose curves	Outside the scope of this profile.
	SOP Common	C.12.1	M	M
	Common Instance Reference	C.12.2	U	C – Required if reference information is available

7.4 Module Definitions

7.4.1 General Modules

7.4.1.3 General Series Module

7.4.1.3.4 General Series Module Brachy Content

Attribute Name	Tag	DICOM usage	IHE-RO usage	Attribute Description
Series Instance UID	(0020,000E)	1	-	
Series Date	(0008,0021)	3	R*	Shall be present
Series Time	(0008,0031)	3	R*	Shall be present
Operators' Name	(0008,1070)	3	R*	Shall be present

7.4.1.5 Equipment Module

7.4.1.5.1 General Equipment Module Base Content

340 **7.4.1.6 SOP Common Module**

7.4.1.6.2 SOP Common Module Brachy Content

7.4.1.6.2.1 Referenced Standards

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7.4.1.6.2.2 Module Definition

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Attribute Name	Tag	Type	IHE-RO usage	Attribute Description
Instance Creation Date	(0008,0012)		R+	Shall be present. If an image has been modified for planning purposes, the Date shall be when the modifying system created the instance.
Instance Creation Time	(0008,0013		R+	Shall be present. If an image has been modified for planning purposes, the Time shall be when the modifying system created the instance.
SOP Instance UID	(0008,0018)	1	R+*	If an image has been modified for planning purposes, the UID shall be updated and contain the root of the manufacturer of the updated image.

7.4.3 General Plan Related Modules

7.4.3.3 RT Fraction Scheme Module

7.4.3.3.3 RT Fraction Scheme Module for Brachy

350 **7.4.3.3.3.1 Referenced Standards**

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7.4.3.3.3.2 Module Definition

Attribute	Tag	Presence	Specific Rules
Fraction Group Sequence	(300A,0070)	R+*	Shall have only a single item in the sequence.
> Referenced Dose Reference Sequence	(300C,0050)		
>> Referenced Dose Reference Number	(300C,0051)		

Attribute	Tag	Presence	Specific Rules
>Number of Fractions Planned	(300A,0078)	R+	
> Number of Beams	(300A,0080)	R+*	Shall be 0.
> Number of Brachy Application Setups	(300A,000A)	R+*	Shall be equal to the number of items under "Application Setup Sequence" (300A,0230)
> Referenced Brachy Application Setup Sequence	(300C,000C)	-	
>> Brachy Application Setup Dose Specification Point	(300A,00A2)	-	
>> Brachy Application Setup Dose	(300A,00A4)	R+*	If the plan contains multiple Application Setups, the sum of the Brachy Application Setup Doses represents the dose per fraction for the plan.
>>Referenced Dose Reference UID	(300A,0083)	R+*	Identifies the Dose Reference specified by Dose Reference UID (300A,0013) in the Dose Reference Sequence (300A,0010) in the RT Prescription Module which specifies the primary target for the current Application Setup. If present shall have a value that is present in the Dose Reference Sequence.

7.4.4 Plan-Related Modules in Planning

7.4.4.5 RT Brachy Application Setups

7.4.4.5.1 Referenced Standards

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7.4.4.5.2 RT Application Setup Module for HDR Plan and PDR Plan

Attribute	Tag	HDR and PDR Technique		
			Presence	Specific Rules
Brachy Treatment Technique	(300A,0200)	1	R+*	Shall not be PERMANENT
Brachy Treatment Type	(300A,0202)	1	R+	Shall be HDR or PDR
Treatment Machine Sequence	(300A,0206)	1		
>Treatment Machine Name	(300A,00B2)	2	R+	Shall have a value.
>Manufacturer	(0008,0070)	3	R+*	Shall have a value.
>Institution Name	(0008,0080)	3	-	
>Institution Address	(0008,0081)	3	-	

Attribute	Tag	HDR and PDR Technique		
			Presence	Specific Rules
>Institutional Department Name	(0008,1040)	3	-	
>Manufacturer's Model Name	(0008,1090)	3	R+	Shall have a value.
>Device Serial Number	(0018,1000)	3	-	
Source Sequence	(300A,0210)	1		
>Source Number	(300A,0212)	1	-*	
>Source Serial Number	(3008,0105)	3	-	
>Source Model ID	(300A,021B)	3	-	
>Source Description	(300A,021C)	3	R+	Use this for the full model ID as it is not limited by the Source Model ID that is limited to 16 characters.
>Source Type	(300A,0214)	1	-*	
>Source Manufacturer	(300A,0216)	3	-	
>Active Source Diameter	(300A,0218)	3	-	
>Active Source Length	(300A,021A)	3	-	
>Material ID	(300A,00E1)	3	-	
>Source Encapsulation Nominal Thickness	(300A,0222)	3	-	
>Source Encapsulation Nominal Transmission	(300A,0224)	3	-	
>Source Isotope Name	(300A,0226)	1	R+	Representation of the Source shall be in the form used by SNOMED: <Element>-<number of nucleons> e.g., Iridium-192
>Source Isotope Half Life	(300A,0228)	1	-*	
>Source Strength Units	(300A,0229)	1C	R+	Shall have a value without constraint for gamma-emitting source. Measurement unit of Source Strength. Enumerated Values: AIR_KERMA_RATE Air Kerma Rate DOSE_RATE_WATER Dose Rate in Water
>Reference Air Kerma Rate	(300A,022A)	1	R+	Required if source is calibrated in Air-Kerma-Rate. If not, value shall be 0
>Source Strength	(300A,022B)	1C	R+	Source strength used to calculate the dwell times. Required if source is calibrated in Dose Rate in water. If not, attribute shall not be present.
>Source Strength Reference Date	(300A,022C)	1	-	
>Source Strength Reference Time	(300A,022E)	1	-	

Attribute	Tag	HDR and PDR Technique		
			Presence	Specific Rules
Application Setup Sequence	(300A,0230)	1	R+*	Number of items shall be 1.
>Application Setup Type	(300A,0232)	1	-*	
>Application Setup Number	(300A,0234)	1	-*	
>Application Setup Name	(300A,0236)	3	-	
>Application Setup Manufacturer	(300A,0238)	3	-	
>Template Number	(300A,0240)	3	-	
>Template Type	(300A,0242)	3	-	
>Template Name	(300A,0244)	3	-	
>Referenced Reference Image Sequence	(300C,0042)	3	-	
>Total Reference Air Kerma	(300A,0250)	1	-	
>Brachy Accessory Device Sequence	(300A,0260)	3	-	
>>Brachy Accessory Device Number	(300A,0262)	2	-	
>>Brachy Accessory Device ID	(300A,0263)	2	-	
>>Brachy Accessory Device Type	(300A,0264)	1		
>>Brachy Accessory Device Name	(300A,0266)	3	-	
>>Material ID	(300A,00E1)	3	-	
>>Brachy Accessory Device Nominal Thickness	(300A,026A)	3	-	
>>Brachy Accessory Device Nominal Transmission	(300A,026C)	3	-	
>>Referenced ROI Number	(3006,0084)	2	R+*	
>Channel Sequence	(300A,0280)	1	-*	
>>Channel Effective Length	(300A,0271)	3	R+	Shall be present to correctly specify the distance between connector on the afterloader and the center of the distal-most possible position of the source.
>>Channel Inner Length	(300A,0272)	2C	R+	Shall be present to correctly specify the distance between connector on afterloader and the end of the channel.
>>Afterloader Channel ID	(300A,0273)	2C	R+	Shall be present to correctly identify the channel connection on the afterloader.

Attribute	Tag	HDR and PDR Technique		
			Presence	Specific Rules
>>Channel Number	(300A,0282)	1	-*	
>>Channel Length	(300A,0284)	2	-	
>>Channel Total Time	(300A,0286)	1	-	
>>Source Movement Type	(300A,0288)	1	-*	
>>Number of Pulses	(300A,028A)	1C	-	
>>Pulse Repetition Interval	(300A,028C)	1C	-	
>>Source Applicator Number	(300A,0290)	3	R+	Shall be present for enabling (300A,0291) for channel mapping
>>Source Applicator ID	(300A,0291)	2C	R+	Shall be present in the plan for correct channel mapping
>>Source Applicator Type	(300A,0292)	1C	-*	Required if Source Applicator number is present FLEXIBLE or RIGID
>>Source Applicator Name	(300A,0294)	3	-	
>>Source Applicator Length	(300A,0296)	1C	-	
>>>Source Applicator Tip Length	(300A,0274)	2C	R+	Shall be present to specify the distance between the outer tip of the applicator and the center of the distal-most possible position of the source.
>>Source Applicator Manufacturer	(300A,0298)	3	-	
>>Material ID	(300A,00E1)	3	-	
>>Source Applicator Wall Nominal Thickness	(300A,029C)	3	-	
>>Source Applicator Wall Nominal Transmission	(300A,029E)	3	-	
>>Source Applicator Step Size	(300A,02A0)	1C	-	
>>Applicator Shape Referenced ROI Number	(300A,02A1)	3	O+*	If present, the RT ROI Interpreted Type (3006,00A4) for the referenced ROI shall be BRACHY_SRC_APP
>>Referenced ROI Number	(3006,0084)	2C	R+*	Shall be present in order to reproduce the channel of the applicator. RT ROI Interpreted Type (3006,00A4) for the referenced ROI shall be BRACHY_CHANNEL
>>Transfer Tube Number	(300A,02A2)	2	-*	
>>Transfer Tube Length	(300A,02A4)	2C	-*	
>>Channel Shield Sequence	(300A,02B0)	3	-	

Attribute	Tag	HDR and PDR Technique		
			Presence	Specific Rules
>>>Channel Shield Number	(300A,02B2)	1		
>>>Channel Shield ID	(300A,02B3)	2	-	
>>>Channel Shield Name	(300A,02B4)	3	-	
>>>Material ID	(300A,00E1)	3	-	
>>>Channel Shield Nominal Thickness	(300A,02B8)	3	-	
>>>Channel Shield Nominal Transmission	(300A,02BA)	3	-	
>>>Referenced ROI Number	(3006,0084)	2	-	
>>Referenced Source Number	(300C,000E)	1		
>>Number of Control Points	(300A,0110)	1		
>>Final Cumulative Time Weight	(300A,02C8)	1C	R+	As described in section X.1.1, display the final dwell time value
>>Brachy Control Point Sequence	(300A,02D0)	1	-	
>>>Control Point Index	(300A,0112)	1	-	
>>>Cumulative Time Weight	(300A,02D6)	2	R+	As described in section X.1.1, display the dwell time spent at each location
>>>Control Point Relative Position	(300A,02D2)	1	-	
>>>Control Point 3D Position	(300A,02D4)	3	R+*	If present it has to be consistent with the related information in the structure. The structure is defined by the Referenced ROI Number (3006,0084).
>>>Control Point Orientation	(300A,0412)	3	R+*	Shall be consistent with the related information in the structure. The structure is defined by the Referenced ROI Number (3006,0084)
>>>Brachy Referenced Dose Reference Sequence	(300C,0055)	3	R+	Mandatory for the last Control Point, see DICOM PS 3.3 C.8.8.15.11. See Note 1 for display requirement.
>>>>Referenced Dose Reference Number	(300C,0051)	1	-	
>>>>Cumulative Dose Reference Coefficient	(300A,010C)	1	-	

Note 1: As a minimum, the dose contribution from each Channel and all Channels to all Dose References shall be displayed.

7.4.4.5.3 RT Application Setup Module for LDR Temporary Plan

Attribute	Tag	LDR Temporary Technique		
			Presence	Specific Rules
Brachy Treatment Technique	(300A,0200)	1		Shall not be PERMANENT
Brachy Treatment Type	(300A,0202)	1		Shall be LDR
Treatment Machine Sequence	(300A,0206)	1	-	
>Treatment Machine Name	(300A,00B2)	2	-	
>Manufacturer	(0008,0070)	3	-	
>Institution Name	(0008,0080)	3	-	
>Institution Address	(0008,0081)	3	-	
>Institutional Department Name	(0008,1040)	3	-	
>Manufacturer's Model Name	(0008,1090)	3	-	
>Device Serial Number	(0018,1000)	3	-	
Source Sequence	(300A,0210)	1		
>Source Number	(300A,0212)	1		
>Source Serial Number	(3008,0105)	3	-	
>Source Model ID	(300A,021B)	3	-	
>Source Description	(300A,021C)	3	R+	Use this for the full Model ID
>Source Type	(300A,0214)	1	-*	
>Source Manufacturer	(300A,0216)	3	-	
>Active Source Diameter	(300A,0218)	3	-	
>Active Source Length	(300A,021A)	3	-	
>Material ID	(300A,00E1)	3	-	
>Source Encapsulation Nominal Thickness	(300A,0222)	3	-	
>Source Encapsulation Nominal Transmission	(300A,0224)	3	-	
>Source Isotope Name	(300A,0226)	1	R+	Representation of the Source shall be in the SNOMED form: <Element>-<number of nucleons> e.g., Iridium-192
>Source Isotope Half Life	(300A,0228)	1	-*	
>Source Strength Units	(300A,0229)	1C	R+	Shall have a value without constraint for gamma-emitting source. Measurement unit of Source Strength. Enumberated Values: AIR_KERMA_RATE Air Kerma Rate DOSE_RATE_WATER Dose Rate in Water
>Reference Air Kerma Rate	(300A,022A)	1	R+	Required if source is calibrated in Air-Kerma-Rate. If not, value shall be 0.

Attribute	Tag	LDR Temporary Technique		
			Presence	Specific Rules
>Source Strength	(300A,022B)	1C	R+	Source strength used to calculate the dwell times. Required if source is calibrated in Dose Rate in water. If not, attribute shall not be present.
>Source Strength Reference Date	(300A,022C)	1	-	
>Source Strength Reference Time	(300A,022E)	1	-	
Application Setup Sequence	(300A,0230)	1	R+*	Number of items shall be 1.
>Application Setup Type	(300A,0232)	1	-*	
>Application Setup Number	(300A,0234)	1	-*	
>Application Setup Name	(300A,0236)	3	-	
>Application Setup Manufacturer	(300A,0238)	3	-	
>Template Number	(300A,0240)	3	-	
>Template Type	(300A,0242)	3	-	
>Template Name	(300A,0244)	3	-	
>Referenced Reference Image Sequence	(300C,0042)	3	-	
>Total Reference Air Kerma	(300A,0250)	1	-	
>Brachy Accessory Device Sequence	(300A,0260)	3	-	
>>Referenced ROI Number	(3006,0084)	2	-	
>Channel Sequence	(300A,0280)	1	-*	
>>Channel Number	(300A,0282)	1	-*	
>>Channel Length	(300A,0284)	2	-	
>>Channel Total Time	(300A,0286)	1	-	Calculated Treatment Time
>>Source Movement Type	(300A,0288)	1	-*	
…				
>>Source Applicator Number	(300A,0290)	3	-	
>>Source Applicator ID	(300A,0291)	2C	-	
>>Source Applicator Type	(300A,0292)	1C	-	
>>Source Applicator Name	(300A,0294)	3	-	
>>Source Applicator Length	(300A,0274)	2C	-	
>>Source Applicator Tip Length	(300A,0274)	1C	-	
>>Source Applicator Manufacturer	(300A,0298)	3	-	
>>Material ID	(300A,00E1)	3	-	
>>Source Applicator Wall Nominal Thickness	(300A,0298)	3	-	
>> Source Applicator Wall Nominal Transmission	(300A,029E)	3	-	

Attribute	Tag	LDR Temporary Technique		
			Presence	Specific Rules
>>Source Applicator Step Size	(300A,02A0)	1C	-	
>>Applicator Shape Referenced ROI	(300A,02A1)	3	-	
>>Referenced ROI Number	(3006,0084)	2C	-	
>>Transfer Tube Number	(300A,02A2)	2	-	
>>Transfer Tube Length	(300A,02A4)	2C	-	
>>Channel Effective Length	(300A,0271)	3	-	
>>Channel Inner Length	(300A,0272)	2C	-	
>>Afterloader Channel ID	(300A,0273)	2C	-	
>>Channel Shield Sequence	(300A,02B0)	3	-	
…				No IHE-RO requirements for this sequence
>>Referenced Source Number	(300C,000E)	1	-	
>>Number of Control Points	(300A,0110)	1	R*	2
>>Final Cumulative Time Weight	(300A,02C8)	1C	R+	As described in section X.1.1, display the final dwell time value.
>>Brachy Control Point Sequence	(300A,02D0)	1	-	
>>>Control Point Index	(300A,0112)	1	-*	
>>>Cumulative Time Weight	(300A,02D6)	2	R+	As described in section X.1.1display the dwell time spent at each location.
>>>Control Point Relative Position	(300A,02D2)	1	R*	
>>>Control Point 3D Position	(300A,02D4)	3	R+*	
>>>Control Point Orientation	(300A,0412)	3	R+*	
>>>Brachy Referenced Dose Reference Sequence	(300C,0055)	3	R+	Mandatory for the last Control Point, see DICOM PS 3.3 C.8.8.15.11. See Note 1 for display requirement.
>>>>Referenced Dose Reference Number	(300C,0051)	1	-	
>>>>Cumulative Dose Reference Coefficient	(300A,010C)	1	-	

Note 1: As a minimum, the dose contribution from each Channel and all Channels to all Dose References shall be displayed.

7.4.4.5.4 RT Application Setup Module for LDR Permanent Plan

Attribute	Tag	LDR Permanent Technique		
			Presence	Specific Rules
Brachy Treatment Technique	(300A,0200)	1	R+*	Shall be PERMANENT
Brachy Treatment Type	(300A,0202)	1	R+*	Shall be LDR

Attribute	Tag	LDR Permanent Technique		
			Presence	Specific Rules
Treatment Machine Sequence	(300A,0206)	1	-	
Source Sequence	(300A,0210)	1		
>Source Number	(300A,0212)	1	-*	
>Source Serial Number	(3008,0105)	3	-	
>Source Model ID	(300A,021B)	3	-	
>Source Description	(300A,021C)	3	R+	Use this for the full Model ID
>Source Type	(300A,0214)	1	-*	
>Source Manufacturer	(300A,0216)	3	-	
>Active Source Diameter	(300A,0218)	3	-	
>Active Source Length	(300A,021A)	3	-	
>Material ID	(300A,00E1)	3	-	
>Source Encapsulation Nominal Thickness	(300A,0222)	3	-	
>Source Encapsulation Nominal Transmission	(300A,0224)	3	-	
>Source Isotope Name	(300A,0226)	1	R+	Representation of the Source shall be in the SNOMED format : <Element>-<number of nucleons> e.g., Iridium-192
>Source Isotope Half Life	(300A,0228)	1	-*	
>Source Strength Units	(300A,0229)	1C	R+	Shall have a value without constraint for gamma-emitting source. Measurement unit of Source Strength. Enumerated Values: AIR_KERMA_RATE Air Kerma Rate DOSE_RATE_WATER Dose Rate in Water
>Reference Air Kerma Rate	(300A,022A)	1	R+	Required if source is calibrated in Air-Kerma-Rate. If not, value shall be 0
>Source Strength	(300A,022B)	1C	R+	Source strength used to calculate the dwell times. Required if source is calibrated in Dose Rate in water. If not, attribute shall not be present.
>Source Strength Reference Date	(300A,022C)	1	-	
>Source Strength Reference Time	(300A,022E)	1	-	
Application Setup Sequence	(300A,0230)	1	R+*	Number of items shall be 1.
>Application Setup Type	(300A,0232)	1	-*	
>Application Setup Number	(300A,0234)	1	-*	
>Application Setup Name	(300A,0236)	3	-	
>Application Setup Manufacturer	(300A,0238)	3	-	

Attribute	Tag	LDR Permanent Technique		
			Presence	Specific Rules
>Template Number	(300A,0240)	3	-	
>Template Type	(300A,0242)	3	-	
>Template Name	(300A,0244)	3	-	
>Referenced Reference Image Sequence	(300C,0042)	3	-	
>Total Reference Air Kerma	(300A,0250)	1	-	
>Brachy Accessory Device Sequence	(300A,0260)	3	-	
…				No IHE-RO requirements for this sequence
>Channel Sequence	(300A,0280)	1	-*	
>>Channel Number	(300A,0282)	1	-*	
>>Channel Length	(300A,0284)	2	-	
>>Channel Total Time	(300A,0286)	1	-*	
>>Source Movement Type	(300A,0288)	1	R+*	Shall be FIXED
>>Number of Pulses	(300A,028A)	1C	-	
>>Pulse Repetition Interval	(300A,028C)	1C	-	
>>Source Applicator Number	(300A,0290)	3	-	
>>Source Applicator ID	(300A,0291)	2C	-	
>>Source Applicator Type	(300A,0292)	1C	-	
>>Source Applicator Name	(300A,0294)	3	-	
>>Source Applicator Length	(300A,0296)	1C	-	
>>Source Applicator Manufacturer	(300A,0298)	3	-	
>>Material ID	(300A,00E1)	3	-	
>>Source Applicator Wall Nominal Thickness	(300A,029C)	3	-	
>>Source Applicator Wall Nominal Transmission	(300A,029E)	3	-	
>>Source Applicator Step Size	(300A,02A0)	1C	-	
>>Applicator Shape Referenced ROI Number	(300A,02A1)	3	-	
>>Referenced ROI Number	(3006,0084)	2C	-	
>>Transfer Tube Number	(300A,02A2)	2	-*	
>>Transfer Tube Length	(300A,02A4)	2C	-*	
…				No IHE-RO requirements for this sequence
>>Channel Shield Sequence	(300A,02B0)	3	-	
…				No IHE-RO requirements for this sequence
>>Referenced Source Number	(300C,000E)	1	-*	
>>Number of Control Points	(300A,0110)	1	R+*	Value shall be 2

Attribute	Tag	LDR Permanent Technique		
			Presence	Specific Rules
>>Final Cumulative Time Weight	(300A,02C8)	1C	-	As described in section X.1.1, display the final time value.
>>Brachy Control Point Sequence	(300A,02D0)	1	-*	
>>>Control Point Index	(300A,0112)	1	-*	
>>>Cumulative Time Weight	(300A,02D6)	2	-	As described in section X.1.1display the total time spent at each location.
>>>Control Point Relative Position	(300A,02D2)	1	-	
>>>Control Point 3D Position	(300A,02D4)	3	R+*	Shall be present.
>>>Control Point Orientation	(300A,0412)	3	R+*	Shall be present.
>>>Brachy Referenced Dose Reference Sequence	(300C,0055)	3	R+	Mandatory for the last Control Point, see DICOM PS 3.3 C.8.8.15.11. See Note 1 for display requirement.
>>>>Referenced Dose Reference Number	(300C,0051)	1	-	
>>>>Cumulative Dose Reference Coefficient	(300A,010C)	1	-	

Note 1: As a minimum, the dose contribution from all Channels to all Dose References shall be displayed.

7.4.6 Image Related Modules in Planning

7.4.6.2 Image Plane Module

7.4.6.2.3 Image Plane Module for Brachy Planning

7.4.6.2.3.1 Reference Standardd

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7.4.6.2.3.2 Image Plane Module Brachy Content

Attribute Name	Tag	Type	IHE-RO Usage	Attribute Description
Pixel Spacing	(0020,0030)	1	-	
Image Orientation (Patient)	(0020,0037)	1	R+*	This element shall NOT be restricted to TRANSVERSE patient orientation only. The IOP (patient) shall create a cuboid dose pattern. That is, the frame shall be

Attribute Name	Tag	Type	IHE-RO Usage	Attribute Description
				square or rectangular, the normal to the IOP shall point in the same direction and be in alignment. All frames shall have the same X and Y pixel sizes and a uniform Grid Frame Offset Vector (3004,000C)
Image Position Patient	(0020.0032)	1	-	
Slice Thickness	(0018,0050)	2	-	

7.4.6.3 US Image Plane Module

7.4.6.3.1 US Image Module Content for Brachy Planning

7.4.6.3.1.1 Referenced Standards

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7.4.6.3.1.2 US Image Module Brachy Content

Attribute Name	Tag	Type	IHE-RO Usage	Attribute Description
…				
Content Date	(0008,0023)	2C	R	Shall be present if Image Module is present in US images.
Content Time	(0008,0033)	2C	R	Shall be present if Image Module is present in US images.
…				
…				
Photometric Interpretation	(0028,0004)	1	R*	Shall be MONOCHROME2
Bits Allocated	(0028,0100)	1	R*	Shall be 8
Bits Stored	(0028,0101)	1	R*	Shall be 8
High Bit	(0028,0102)	1	R+	Shall be 7
…				

7.4.8 Segment Related Modules

7.4.8.1 ROI Observations Module

7.4.8.1.2 ROI Observations for Brachy

7.4.8.1.2.1 Referenced Standards

DICOM 2024b Edition PS 3.3

7.4.8.1.2.2 Module Definition

Multiple RT Plans may reference the same RT Structure Set instance. For brachytherapy this means that the RT Structure Set can contain brachytherapy channel contours from multiple plans.

Base content applies except where noted below.

Attribute	Tag	Type	Presence	Attribute Note
RT ROI Observations Sequence	(3006,0080)			

>RT ROI Interpreted Type	(3006,00A4)		R+*	If referenced ROI has associated contours of type CLOSED_PLANAR, the content consumer must accept at minimum the following values: EXTERNAL PTV CTV GTV TREATED_VOLUME IRRAD_VOLUME BOLUS AVOIDANCE ORGAN CONTRAST_AGENT CAVITY BRACHY_SRC_APP BRACHY_CHNL_SHLD If referenced ROI has associated contours of type POINT, the content consumer must accept at minimum the following values: MARKER REGISTRATION ISOCENTER If referenced ROI has associated contours of type OPEN_NONPLANAR, the content consumer must accept at minimum the following values: BRACHY_CHANNEL See Note 1.
>>ROI Physical Property	(3006,00B2)		R+*	Only the following shall be supported: REL_MASS_DENSITY REL_ELEC_DENSITY

Note 1. The ROI with value 'BRACHY_CHANNEL' as the RT ROI Interpreted Type (3006,00A4) shall contain a single item in the Contour Sequence (3006,0040) and the Number of Contour Points (3006,0046) shall be two or greater. The points in the Contour Data (3006,0050) shall start from the distal end of the channel (the point furthest from the after-loader). See also Figure C.8.8.15-1 in DICOM standard part 3.

400 **7.4.8.2 ROI Contour Module**

7.4.8.2.3 ROI Contour for Brachy

7.4.8.2.3.1 Referenced Standards

DICOM 2024b Edition PS 3.3

7.4.8.2.3.2 Module Definition

The Base content of tags apply unless superseded by the definitions below.

Attribute	Tag	Type	Attribute Note
ROI Contour Sequence	(3006,0039)		
>> Contour Geometric Type	(3006,0042)	R+*	OPEN_PLANAR shall not be used.

7.4.8.3.3 RT Structure Set Module Brachy

7.4.8.3.3.1 Referenced Standards

DICOM 2024b Edition PS 3.3

7.4.8.3.3.2 Module Definition

The Base content of attributes apply unless superseded by the definitions below.

Attribute	Tag	Type	Attribute Note
>>>>Referenced SOP Class UID	(0008,1155)	R+*	Must be present with a value of '1.2.840.10008.5.1.4.1.1.2', (CT) or '1.2.840.10008.5.1.4.1.1.4' (MR) or '1.2.840.10008.5.1.4.1.1.6.1' (Ultrasound)

7.4.13.3 RT Dose Module

7.4.13.3.1 RT Dose Module Base Content

7.4.13.3.2 RT Dose Module Brachytherapy Content

7.4.13.3.2.1 Referenced Standards

DICOM 2024b Edition PS 3.3

7.4.13.3.2.2 Module Definition

RT Dose Module Base Content applies unless otherwise noted below.

Attribute Name	Tag	Type	IHE-RO Usage	Attribute Description
Bits Allocated	(0028,0100)	1C	R+*	Shall be present and equal to 32
Dose Type	(3004,0004)	1	R+	Shall be **PHYSICAL**

Appendices to Volume 3

None

Volume 4 – National Extensions

National Extensions

Not applicable.

