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Radiotherapy simulators—Functional performance characteristics

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Foreword

This translation has been made based on the original Japanese Industrial Standard established by the Minister of Health, Labour and Welfare and the Minister of Economy, Trade and Industry through deliberations at the Japanese Industrial Standards Committee according to the proposal of establishing a Japanese Industrial Standard from Japan Industries Association of Radiological Systems (JIRA)/Japanese Standards Association (JSA), with a draft of Industrial Standard based on the provision of Article 12 Clause 1 of the Industrial Standardization Law.

This Standard has been made based on IEC 61168 : 1993 *Radiotherapy simulators—Functional performance characteristics* for the purposes of making it easier to compare this Standard with International Standard; to prepare Japanese Industrial Standard conforming with International Standard; and to propose a draft of an International Standard which is based on Japanese Industrial Standard.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Ministers and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

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Contents

	Page
Introduction	1
Preface	1
1 Scope and object.....	1
1.1 Scope.....	1
1.2 Object.....	2
1.3 Environmental conditions	3
2 Normative references.....	3
3 Terminology and definitions	4
3.1 Terminology	4
3.2 Definitions	4
4 Standardized test conditions	4
4.1 Angle and linear settings.....	4
4.2 Positioning of the measuring place and radiation detectors	4
4.3 Focal spot and loading factors	5
5 Indication of delineated radiation fields.....	5
5.1 Numerical field-indicator	5
5.2 Light field-indicator.....	6
5.3 Reproducibility	7
5.4 Geometry of the delineator	7
5.5 Illuminance of the delineated light field	8
6 Indication of delineated radiation beam axis	8
6.1 Indication of the delineated radiation beam axis on entrance surface.....	8
6.2 Indication of the delineated radiation beam axis on exit surface.....	10
6.3 Variation of the delineated radiation beam axis with source axis distance (SAD).....	10
7 Isocentre	11
7.1 Displacement of the delineated radiation beam axis from the isocentre.....	11
7.2 Indication of the isocentre	13
7.3 Displacement of the delineated radiation beam axis with change in focal spot.....	13
8 Indication of the distance along the delineated radiation beam axis	14
8.1 Device for indicating distance from isocentre.....	14
8.2 Device for indicating distance from radiation source	14
8.3 Indication of image receptor plane to isocentre distance	14
8.4 Numerical indication of the radiation source to isocentre distance	15

9	Zero position of rotational scales.....	15
9.1	Information to the user.....	15
9.2	Tests.....	15
10	Congruence of opposed delineated radiation fields.....	16
10.1	Information to the user.....	16
10.2	Test	17
11	Movements of the patient support	17
11.1	Vertical movement of the table top	17
11.2	Isocentric rotation of the patient support	18
11.3	Parallelism of patient support rotational axes	18
11.4	Rigidity of the patient support.....	19
Annex A (informative)	Format for presentation of functional performance values	25
Annex 1 (informative)	Radiotherapy simulators—Guidelines for functional performance characteristics	30
Annex 2 (informative)	Term—Index of defined terms	43
Annex 3 (informative)	Comparison table between JIS and corresponding International Standard.....	47

Radiotherapy simulators — Functional performance characteristics

Introduction This Japanese Industrial Standard has been prepared based on the first edition of IEC 61168 *Radiotherapy simulators — Functional performance characteristics* published in 1993 with some modifications of the technical contents.

The portions given sidelines or dotted underlines are the matters in which the contents of the original International Standard have been modified. A list of modifications with the explanations is given in Annex 3 (informative). Annex 1 has been prepared based on the first edition of IEC/TR 61170 *Radiotherapy simulators — Guidelines for functional performance characteristics* published in 1993 without modifying of the technical contents.

Preface This Standard specifies methods of disclosure of and describes methods of test for functional performance of **simulators** intended for **radiotherapy**. It permits a direct comparison between the performance data of **equipment** of different **manufacturer**.

Since this Standard does not contain safety requirements it has not been numbered in JIS T 0601 series. It describes aspects of functional performance of **radiotherapy simulators** and the way in which they should be presented. It also includes suggested test methods and conditions suitable for **type tests**. Alternative methods may be equally appropriate, but the specified functional performance characteristics of the **radiotherapy simulators** shall be related to these test methods and conditions.

Tests specified in this Standard are not necessarily appropriate for ensuring that any individual **radiotherapy simulator** conforms with the declared functional performance during the course of its working lifetime.

Guidance on the values which may be expected are given in the technical report Annex 1 (informative).

1 Scope and object

1.1 Scope This Standard applies to **radiotherapy simulators** which use diagnostic X-ray equipment to geometrically simulate a **radiotherapy radiation beam** so that the **treatment volume** to be **irradiated** during **radiotherapy** can be localized and the position and size of the therapeutic radiation field can be confirmed.

This Standard applies to **radiotherapy simulators** using **high voltage generators** operating at a voltage not exceeding 400 kV complying with JIS Z 4702 : 1999.

This Standard applies to **radiotherapy simulators** intended exclusively for **radiotherapy simulation** as a prelude to intended **radiotherapy** and not for any other purposes such as general diagnostic purposes.

The requirements in this Standard are based on the assumption that the **radiotherapy simulator** consists of:

- a) a system for producing a beam of **X-radiation** not exceeding 400 kV which simulates the geometry of the **radiotherapy radiation beam**;
- b) a system for producing images of the transmitted **X-ray beam**, either by **radiography** or by **radioscopy**;
- c) an assembly which controls the size of the **radiation beam** and which delineates the intended treatment area;
- d) a mechanical structure that physically simulates the geometry and motions of **radiotherapy equipment**, and which supports an imaging system;
- e) a **patient support system**

This Standard applies to **equipment** intended for use under the supervision of a **qualified person**.

Except where otherwise stated this Standard assumes that the **radiotherapy simulator** has an **isocentric gantry** with no pitch or roll movement of the **radiation head**.

This Standard specifies **type tests** to be performed by the **manufacturer** at the design and construction stages of a **radiotherapy simulator** but does not specify **site tests** to be performed after installation at the **user's site**. The accompanying technical report Annex 1, however, does suggest that many of the test procedures are appropriate for **site tests**.

During the course of any test procedure only those adjustments of the **radiotherapy simulator** are permissible that can be carried out using controls normally accessible to the **operator** and which are regarded as forming part of the normal operation of the **radiotherapy simulator**.

Remarks : The International Standard corresponding to this Standard is as follows.

In addition, symbols which denote the degree of correspondence in the contents between the relevant International Standard and JIS are IDT (identical), MOD (modified), and NEQ (not equivalent) according to ISO/IEC Guide 21.

IEC 61168 : 1993 *Radiotherapy simulators — Functional performance characteristics* (MOD)

1.2 Object The object of this Standard is to:

- a) identify geometric parameters which are critical for the accurate simulation of a **radiotherapy treatment**;
- b) recommend methods of measuring these parameters.

It is recognized that inaccuracies in the test methods must be allowed for when assessing performance. However, it is not felt advisable to combine the errors into

an overall performance tolerance but keep them separate in the expectation that more accurate test methods will be evolved.

It is not intended that this Standard should in any way inhibit the future development of new designs of **equipment** which may have operating modes and parameters different from those described herein.

1.3 Environmental conditions

1.3.1 General Except where other allowable environmental conditions are stated in the accompanying documents this Standard applies to **equipment** installed, used or kept in locations where the following environmental conditions prevail:

- a) the ambient temperature falls within the range 10 °C to 40 °C;
- b) the relative humidity falls within the range 30 % to 75 %;
- c) the atmospheric pressure falls within the range 70 kPa to 110 kPa (700 mbar to 1 100 mbar).

1.3.2 Transport and storage The allowable environmental conditions for transport and storage shall be stated in the accompanying documents.

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. If the indication of the year of coming into effect or the year of publication is given to these referred standards, only the edition of the indicated year constitutes the provision of this Standard but the revision and amendment made thereafter do not apply.

JIS T 0601-1 : 1999 *Medical electrical equipment—Part 1: General requirements for safety*

Remarks : IEC 60601-1 : 1988 *Medical electrical equipment—Part 1 : General requirements for safety*, Amendment 1 : 1993 and Amendment 2 : 1995 are identical with the said standard.

JIS Z 4005 : 1991 *Medical radiology—Terminology*

Remarks : IEC 60788 : 1984 *Medical radiology—Terminology* is identical with the said standard.

JIS Z 4702 : 1999 *General requirements for high-voltage generators of medical X-ray apparatus*

Remarks : IEC 60601-2-7 : 1998 *Medical electrical equipment—Part 2-7: Particular requirements for the safety of high-voltage generators of diagnostic X-ray generators* is identical with the said standard.

JIS Z 4751-2-29 : 2005 *Medical electrical equipment—Part 2-29: Particular requirements for the safety of radiotherapy simulators*

Remarks : IEC 60601-2-29 : 1999 *Medical electrical equipment—Part 2-29: Particular requirements for the safety of radiotherapy simulators* is identical with the said standard.

IEC 61217 : 1996 Radiotherapy equipment—Coordinates, movements and scales

3 Terminology and definitions

3.1 Terminology In this Standard terms printed in **boldface type** are used as defined in JIS Z 4005.

Other additional terms are listed in Annex AA of JIS Z 4751-2-29 and in 3.2 of this Standard.

Information : Annex AA of JIS Z 4751-2-29 is attached as Annex 2 (informative) of this Standard.

3.2 Definitions For the purpose of this Standard, the following additional definition applies:

delineated light field : for radiotherapy simulators, the area of the light field bounded by the delineator shadow and in a plane perpendicular to the X-ray beam axis

4 Standardized test conditions In determining performance characteristics in accordance with this Standard, standardized test conditions according to 4.1 to 4.3 shall prevail, unless otherwise stated. The specified axes are given in figure 1 to figure 3. Unless otherwise stated all measurements shall be taken at either 80 cm or 100 cm source axis distance (SAD).

4.1 Angle and linear settings The following angles and linear settings are at zero unless otherwise specified (see figures 1 to 3):

- gantry rotation, Axis ①
- roll of radiation head, Axis ②
- pitch of radiation head, Axis ③
- rotation of the delineator, Axis ④
- isocentric rotation of the patient support, Axis ⑤
- rotation of the table top, Axis ⑥
- pitch of the table top, Axis ⑦
- roll of the table top, Axis ⑧
- height of the table top, Direction ⑨
- lateral displacement of the table top, Direction ⑩
- longitudinal displacement of the table top, Direction ⑪.

If in this Standard the test conditions call for measurements to be made at angles of rotation of the gantry, Axis ①, or of the delineator, Axis ④, of 90° only, it is equally acceptable to use the angle of 270°.

4.2 Positioning of the measuring plane and radiation detectors Measurements are made, unless otherwise specified, in the plane normal to the delineated radiation beam axis

and containing the isocentre. Measurements are generally made with radiographic film. For geometric alignment tests other radiation detectors with adequate spatial resolution may be used.

4.3 Focal spot and loading factors Unless otherwise specified the tests shall be made with the small focal spot and the manufacturer's recommended loading factors of the X-ray tube.

5 Indication of delineated radiation fields

5.1 Numerical field-indicator The numerical field-indicator shall display the dimensions of the delineated radiation field at one or several specified source axis distance(s).

5.1.1 Information to the user The accompanying documents shall state the maximum differences between the numerical field indication and the distances along the major axes of the opposing delineated radiation field edges at source axis distances specified in table 1.

The maximum differences shall be given in millimetres or shall be expressed as a percentage of the size of the delineated radiation field. The maximum difference shall be given in mm for delineated radiation fields up to 20 cm × 20 cm and in % for delineated radiation fields greater than 20 cm × 20 cm.

The maximum difference(s) shall apply to all delineated radiation fields for which the smaller dimension is equal to or greater than 3 cm and for all angular positions of the gantry and of the delineator.

5.1.2 Test

NOTE : The numerical indicators of the delineated radiation field refer to the plane normal to the radiation beam axis at a specified source axis distance.

Radiographic films for these tests are placed so that they are centred in the delineated radiation field at the axis of rotation of the gantry in a plane normal to the delineated radiation beam axis.

For the set of conditions given in table 1 the delineated radiation field dimensions shall be determined under the following conditions:

The delineated radiation field shall be set using the numerical field-indicators.

The edges of the delineated light field shall be marked on the radiographic film cover.

**Table 1 Conditions for testing the numerical field-indicator
and the light field- indicator**

Angular position of		Delineated radiation field	SAD	Distance source to film	Remarks
Gantry	Delineator				
Axis ①	Axis ④	cm × cm	cm	cm	
90°	0°	3 × 3 10 × 10 * 20 × 20 30 × 30 *	100 and 80	SAD	
270°	90°	10 × 10 * 30 × 30 *	100 and 80		
0°	135°	10 × 10 * maximum	minimum	SAD	Only for numerical test (5.1.2)
180°	180°	10 × 10 * maximum	maximum	SAD	
0°	45°	10 × 10 * maximum	100 and 80	SAD	Only for light field indicator test (5.2.2)
180°	180°	10 × 10			
0°	0°	maximum			

Note * These symmetrical fields shall be tested also in the asymmetrical mode as follows:

One edge of the delineated radiation field is set to half the field size of the symmetrical field and the other edge to zero.

The light field-indicator may also be included in this test (see 5.2.2).

Before moving the films from the exposure position, pierce the edges close to the corner points of the delineated light field and its central axis as shown by the central cross with a sharp pin. Other devices (e.g., a radiopaque jig) may be used to define the delineated light field on the exposed film.

The centre of the delineator shadow shall be taken as the reference. The maximum difference between the delineated radiation field and the delineated light field should be measured and the delineated radiation field dimensions compared with their numerical indication.

5.2 Light field-indicator The light field-indicator shall indicate the delineated radiation field on the entrance surface by means of light.

5.2.1 Information to the user The accompanying documents shall state:

- the maximum distance measured along each major axis between any edge of the delineated light field and the corresponding edge of the delineated radiation field at a source axis distance of 100 cm (or nearest, if not available) and at a radiation source to measuring plane distance 1.5 times the value of the source axis distance;
- the maximum distance between the centre of the delineated light field and the delineated radiation beam axis at a source axis distance of 100 cm (or nearest, if

not available) and at the radiation source to measuring plane distance 1.5 times the value of the source axis distance.

All tests shall be carried out using both small and large focal spots if available.

The maximum distance for a) shall be given in millimetres for delineated radiation field up to 20 cm × 20 cm and shall be expressed as a percentage of its size for delineated radiation fields greater than 20 cm × 20 cm.

The maximum distance for b) shall be given in millimetres.

The maximum difference shall apply for:

- all delineated radiation fields for which the smaller dimension is equal to or greater than 3 cm;
- all angles of rotation of the gantry and of the delineator;
- both large and small focal spots, if available.

5.2.2 Test See 5.1.2, which includes the test of the light field indicator.

5.3 Reproducibility

NOTE : This may be alternatively checked by the use of either the numerical indicator or the delineated light field.

5.3.1 Information to the user The accompanying documents shall state the maximum variation in millimetres of the size of the delineated radiation field for repeated settings of the same numerical field-indications at 100 cm source axis distance.

5.3.2 Test For the set of test conditions given in table 2, the test according to 5.1.2 shall be carried out six times approaching the same setting of the numerical field-indicators alternately from larger and smaller indicated values.

Table 2 Conditions for testing reproducibility of delineated radiation fields

Angular position of		Delineated radiation field	SAD
Gantry	Delineator		
Axis ①	Axis ④	cm × cm	cm
0°	0°	20 × 20	100
90°	0°	20 × 20	100

5.4 Geometry of the delineator

5.4.1 Information to the user For the delineator, the accompanying documents shall state

- the maximum angular deviation in degrees of the opposing edges from being parallel; and
- the maximum angular deviation in degrees of adjacent edges from being at a right angle (90°).

5.4.2 Test For the set of test conditions given in table 3, measurements shall be made directly on the **delineator** or on the **delineated light field**.

Table 3 Conditions for testing the geometry of the delineator

Angular position of		Delineated radiation field
Gantry	Delineator	
Axis ①	Axis ④	cm × cm
90°	0°	20 × 20
	90°	
	180°	
	270°	
90°	0°	Maximum
	90°	
	180°	
	270°	

5.5 Illuminance of the delineated light field

5.5.1 Information to the user The accompanying documents shall state

- the value of average illuminance in lux of the **delineated light field-indicator** on a surface normal to the **delineated radiation beam axis** at 100 cm SAD;
- the contrast ratio of illuminance along the edges of the **delineated light field** when corrected for ambient lighting.

The contrast ratio is the ratio of the illuminances measured along the major field axes at the centre of the **delineator** shadow and at a distance of 3 mm from the centre point on the inner side of the **delineator** shadow.

The average illuminance shall be given in lux and the contrast ratio shall be expressed in percent figures.

5.5.2 Test For this test the room light shall be dimmed.

The illuminance and contrast ratio at the edges of the **delineated light field** shall be measured, at 100 cm SAD, with an instrument having an aperture of 1 mm or less and calibrated for the light spectrum used.

The average illuminance shall be determined from measurements made at the approximate centre of each of the quadrants of the **delineated light field**.

6 Indication of delineated radiation beam axis

6.1 Indication of the delineated radiation beam axis on entrance surface

NOTE : Delineated radiation field axis concerns only symmetrical delineated radiation fields.

- a) The radiographic image of the device for indicating the geometric centre of the delineated radiation field shall coincide with the geometric centre of the symmetric delineated radiation field.
- b) The light image of the device for indicating the geometric centre of the delineated radiation field shall coincide with the radiographic image of the device for indicating the geometric centre of the symmetric delineated radiation field.

6.1.1 Information to the user The accompanying documents shall state the maximum deviation in millimetres of the indicated delineated radiation beam axis from the measured delineated radiation beam axis.

The maximum deviation shall apply to all angles of rotation of the gantry and of the delineator and:

- within 25 cm from the source axis distance (SAD) of 100 cm; or
- within its working ranges, whichever is smaller.

6.1.2 Test The maximum deviation is determined by using radiographic film. The radiographic film is contained in an envelope and placed normal to the delineated radiation beam axis.

The indicated delineated radiation beam axis is marked on the radiographic film cover by an opaque marker and pierced with a sharp pin immediately before the film is removed from the position of exposure. One radiographic exposure is made for each set of test conditions given in table 4.

After the films are developed the delineated radiation beam axis position is found by measuring the radiograms to find the point at the centre of the two major axes. Compare the position of this point with both the visible and/or radiopaque markers on the radiographic film.

Conditions for testing the delineated radiation beam axis on the entrance surface are shown in table 4.

Table 4 Conditions for testing the indication of the delineated radiation beam axis on the entrance surface

Angular position of		Delineated radiation field	Distance source to film *
Gantry	Delineator		
Axis ①	Axis ④	cm × cm	cm
90°	0°	3 × 3	100 and 80
		10 × 10	
		20 × 20	
270°	90°	10 × 10	
0°	45°	10 × 10	75 ** and 125
180°	180°	10 × 10	
90°	90°	20 × 20	

Notes * Radiographic film set at isocentre

** Or maximum and minimum, if range is smaller

The optical density of the **radiograms** is measured along a series of four lines, each approximately parallel to a different edge of the **delineated radiation field** and displaced toward that edge by about $F/4$ from the approximate centre of the **delineated radiation field**, where F is the **delineated radiation field** dimension.

For each line, points of equal density (at approximately 50 % of the optical density in the centre of the field) are determined and the bisector point is marked. The bisector points of one pair of parallel lines are joined to form a bisector line. This is repeated for the orthogonal pair of parallel lines. The intersection of these two bisector lines indicates the position of the **delineated radiation beam axis** at the test film plane.

6.2 Indication of the delineated radiation beam axis on exit surface

6.2.1 Information to the user For all devices indicating the **delineated radiation beam axis** on exit surface (for example, **back pointer**), the **accompanying documents** shall state the maximum deviation in millimetres of the indication from the **delineated radiation beam axis** for the range of 0 to 30 cm beyond a source axis distance of 100 cm (or nearest, if not available).

6.2.2 Test Using **radiographic film** in the same manner as described in 6.1.2, one **radiographic exposure** is made for each set of test conditions given in table 5.

Table 5 Conditions for testing the indication of the delineated radiation beam axis on the exit surface

Angular position of		Delineated radiation field	Distance source to film
Gantry	Delineator		
Axis ①	Axis ④	cm × cm	cm
90°	90°	10 × 10	SAD *
			SAD * + 30
270°	90°	10 × 10	SAD *
			SAD * + 30

Note * : 100 cm and 80 cm or nearest if not available.

The **delineated radiation beam axis** is found as in 6.1.2.

6.3 Variation of the delineated radiation beam axis with source axis distances (SAD)

6.3.1 Information to the user For **radiotherapy simulators** with a variable source axis distance the **accompanying documents** shall state the maximum variation in millimetres of the position of the centre of the **delineated radiation field** at the **isocentre** level when the source axis distance varies from its minimum to its maximum value.

6.3.2 Tests The maximum displacement is measured with a **radiographic film** placed in the **isocentre** plane perpendicular to the **delineated radiation beam axis** with **gantry** and **delineator** angles of zero degrees.

The film is irradiated twice:

- with minimum SAD and a delineated radiation field of 10 cm × 10 cm;
- with maximum SAD and a delineated radiation field of 15 cm × 15 cm with the central 10 cm × 10 cm area covered by lead.

The displacement of the centre of the delineated radiation field is measured on the superimposed radiograms.

7 Isocentre

7.1 Displacement of the delineated radiation beam axis from the isocentre

7.1.1 Information to the user The accompanying documents shall state the maximum displacement in millimetres of the delineated radiation beam axis from the isocentre.

The maximum displacement shall be stated for 100 cm SAD, maximum SAD and minimum SAD, and shall include the maximum displacement occurring for all angles of rotation of the gantry and of the delineator. It shall also be stated with maximum specified mass of shadow blocks in place, if the capability of supporting shadow blocks is provided.

7.1.2 Test Firstly the position of the isocentre is determined by successive approximations using either a front pointer or delineator radiopaque cross hairs using a combination of the delineated light field and the delineated radiation field. The distance from the isocentre to the delineated radiation beam axis is then measured.

This test to determine the approximate position of the isocentre can be carried out using either a test device and the X-ray image receptor, or front pointer. Radiographic film measurements are then carried out to confirm the position of the isocentre.

7.1.2.1 Test device and X-ray image receptor

- a) A suitable test device is a small cube with a cross accurately inscribed at the centre of each side of the cube. At the central point, in the middle of the cube, should be placed a small, X-ray opaque object 2 mm in diameter.
- b) The test device is then placed on the table top and, with the gantry at an angle of 0° adjusted using patient support movements and the light field-indicator to bring the top centre cross to the centre of the delineated light field.
- c) The delineator is rotated through its full travel and the position of the test device adjusted to give minimum movement between the test device cross and the centre of the light field-indicator.
- d) Following this adjustment a check is carried out with the gantry at angles of 90°, 180° and 270° that the movement of the centre of the light field-indicator (e.g., cross hairs) and the test device cross remains within the stated specification.

For record purposes a radiographic film may be used once the test device has been set up.

- e) Following this test, without moving the test device, rotate the gantry around the four angles (0° , 90° , 180° and 270°) from outside of the room, while viewing with the X-ray image receptor system, the coincidence of the delineated radiation beam axis with the central small radiopaque portion of the test device, as specified in table 6.

This test checks both the isocentre accuracy and the coincidence of the axes of the delineated light field and the delineated radiation field.

NOTE : Finally without moving the test device the wall and ceiling lasers can be checked against the test device crosses for isocentric accuracy.

7.1.2.2 Front pointer

- a) The position of the isocentre is determined by successive approximations.

If the equipment does not have a front pointer which rotates with the delineator, a suitable pointer is fixed instead to the delineator for the purpose of this determination.

- b) With the gantry at an angle of 0° and with the tip of the front pointer at the nominal position of the gantry rotation axis, a sheet of graph paper is arranged horizontally so that it touches the tip of the front pointer.
- c) The delineator is rotated through its full travel and the front pointer adjusted to give minimum movement of its tip during this rotation.
- d) Following this adjustment, a check is carried out with the gantry at angles of 90° , 180° and 270° that the movement of the tip on rotation of the delineator remains small.
- e) A reference pointer is adjusted to the mean position of the tip of the front pointer at the angles of rotation of the gantry of 0° , 90° , 180° and 270° . (The length of the tip of the front pointer will also have to be adjusted against the reference pointer.)
- f) Steps c) to e) are repeated in an iterative process to approximate the isocentre. The process is conducted at 100 cm SAD, 80 cm SAD, the minimum SAD and the maximum SAD as indicated in table 6. The process is repeated at 100 cm SAD with the maximum weight shadow blocks in place if the capability for supporting blocks is provided.

7.1.2.3 Radiographic film measurements to confirm the isocentre determination

- a) Radiographic film contained in an envelope is placed perpendicular to the radiation beam axis and slightly further from the radiation source than the reference pointer or test device.
- b) Radiographic films are exposed using a delineated radiation field of $10\text{ cm} \times 10\text{ cm}$. One film is exposed with the gantry angle at 90° and one at 270° . Two films are exposed with gantry at angles of 0° , one film after approaching the position clockwise and one counter-clockwise in order to include any contribution from play in the components of the delineator. Similarly, two films are exposed at a gantry

angle of 180°, one film after approaching the position clockwise and one counter-clockwise.

This step therefore involves the exposure of a total of six films for each SAD and shadow block placement.

- c) After evaluation of the radiographic films with a densitometer, the reference pointer or test device is readjusted to the mid-position of the intersections defining the delineated radiation beam axis. This point is an approximation of the isocentre.
- d) The maximum displacement of the isocentre from the delineated radiation beam axis is measured for each set of conditions in table 6.

- NOTES 1 The tip of the reference pointer or test device centre marker defines a reference point for further measurement.
- 2 The maximum displacement of the radiation beam axis from the reference point may be obtained from the films already analysed as described above or by repeating steps a) to c).

Table 6 Conditions for testing the displacement of the delineated radiation beam axis from the test device or reference pointer indicating the isocentre

Angular position of gantry Axis (1)	SAD cm	Remarks
90° 270° 0° 180°	100 * and minimum	Test conditions for adjustment of reference pointer and subsequent final tests (if needed)
0° 90°	100 * and maximum	With accessory holder unloaded and maximum specified load

Note * : Nearest if not available.

7.2 Indication of the isocentre

7.2.1 Information to the user For all devices integral to the radiotherapy simulator, or mounted on the gantry, which indicate the position of the isocentre, the accompanying documents shall state the maximum deviation in millimetres of this indication from the isocentre as determined according to 7.2.2.

7.2.2 Test The position indicated by the device is compared with the reference point according to 7.1.2.3 for each set of test conditions given in table 6.

7.3 Displacement of the delineated radiation beam axis with change in focal spot

7.3.1 Information to the user For equipment with changeable focal spots, the accompanying documents shall state the corresponding maximum shift of the centre of the delineated radiation field at the isocentre for a source axis distance of 100 cm. The maximum shift shall be given in millimetres.