

ICS 13.100
CCS C 57

WS

**INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

WS 531-2017

**Specification for testing of quality control in helical
tomotherapy unit
(English Translation)**

Issued on: April 10, 2017

Implemented on: October 1, 2017

**Issued by: National Health and Family Planning Commission of the
People's Republic of China**

Table of Contents

Foreword
1 Scope
2 Normative references
3 Terms and definitions
4 General requirements for quality control testing
5 Quality control test items and technical requirements
6 Testing methods and evaluation requirements for quality control testing items
Attachment A (informative appendix) The main structure and technical parameters of the spiral tomotherapy device
Attachment B (informative appendix) Basic elements of quality control testing technical report for spiral tomotherapy device
Attachment C (Normative appendix) Test items and technical requirements for spiral tomotherapy devices
Attachment D (informative appendix) Reference phantom selected for output dose testing
References

Foreword

This standard was drafted in accordance with the rules given in GB/T 1.1-2009.

4.1~4.5, 5.1 and Appendix C of this standard are mandatory, and the rest are recommended.

Drafting organizations of this standard. Beijing Center for Disease Control and Prevention, Peking Union Medical College Hospital of Chinese Academy of Medical Sciences, China Center for Disease Control and Prevention Cardiac Radiation Protection and Nuclear Safety Medicine Institute, Hunan Provincial Occupational Disease Prevention and Treatment Hospital, Chinese People's Liberation Army General Hospital.

1 Scope

This standard specifies the quality control and testing requirements for helical tomotherapy unit (TOMO) method.

This standard applies to the quality control testing of spiral tomotherapy devices.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this document.

For undated references, the latest version (including all amendments) applies to this document.

GB 18871 Basic standard for ionizing radiation protection and radiation source safety GBZ 126 Radiation Protection Requirements for Electron Accelerator Radiotherapy GBZ 179 Basic requirements for radiation protection from medical exposure

3 Terms and definitions

The following terms and definitions apply to this document.

Helical tomotherapy unit Install the linear accelerator on the slip ring frame, apply the principle of reverse CT imaging, and use an intensified fan beam to rotate in a spiral Means of radiotherapy.

Note: See Appendix A for the structure, coordinate system and main technical parameters of the treatment device.

Gantry isocenter

Treatment plane isocenter the center point of the gantry aperture in the fan beam irradiation path of the spiral tomography device.

Virtual isocenter

The Y-axis direction above the treatment bed is located at a point -700mm from the isocenter of the gantry, and the height is consistent with the isocenter of the gantry.

4 General requirements for quality control testing

4.1

Medical institutions that carry out spiral tomographic radiotherapy should follow the requirements of GB 18871, GBZ 126 and GBZ 179, Quality assurance program and quality control testing plan or program that are compatible with treatment technology.

4.2

Medical institutions should be equipped with basic dosimetry equipment and quality control testing instruments and tools compatible with the operation of the spiral tomotherapy device.

Effective maintenance and maintenance of treatment devices and testing equipment.

4.3

The quality control test of the spiral tomotherapy device includes acceptance test, status test and stability test. Acceptance inspection and status inspection A qualified radiological health technical service agency should be entrusted; the stability test shall be conducted by the medical agency itself or by commission.

4.4

Spiral tomotherapy device after new installation, major maintenance or replacement of important components should be accepted and tested every time after operation.

State inspection shall be carried out once a year, and stability inspection shall be carried out during operation.

4.5

In the quality control test, the test result of the performance index shall be compared with the index evaluation value specified in Chapter 6: If it deviates from the evaluation value, it shall be Identify the cause and correct it in time to ensure that all indicators are within the range of the evaluation value. Spiral tomography devices with unqualified indicators should not be used Clinical use.

4.6

The status of each quality control test shall be recorded and archived in time. The recorded content shall include the information of the testing equipment used, the environmental conditions, irradiation conditions and test results etc. The technical report for quality control testing shall include but not be limited to the basic requirements listed in Appendix B Vegetarian.

5 Quality control test items and technical requirements

5.1

The technical indicators and technical requirements of the test items shall be implemented in accordance with Table C.1 in Appendix C of this standard.

5.2

The specific testing methods of testing items shall be implemented in accordance with the requirements of Chapter 6, and the equipment selected in the testing shall meet the corresponding index testing Performance requirements.

5.3

The selected phantom parameters for static output dose and rotary output dose stability testing are shown in D.1 and D.2 in Appendix D, respectively. Acceptance inspection Test and status detection can use this type of phantom or use other equivalent phantoms.

6.1 Static output dose

6.1.1

Set the beam out conditions with a fixed angle of the treatment gantry at 0° and an irradiation field of 40cmx5cm or 10cmx5cm.

6.1.2

The dose detection phantom is set on the treatment bed, the source skin distance (SSD) is 85cm, and the center of the dose measurement point in the phantom is the virtual isocenter alignment.

6.1.3

Insert the dosimeter measuring probe into the phantom, the dose measurement reference point is located 1.5cm below the surface of the phantom, the probe is connected with the electrometer, Warm up and calibrate the temperature and air pressure to ensure that the instrument functions normally.

6.1.4

The treatment device emits beams at a predetermined time, records the measurement readings of the electrometer, and calculates with the parameters such as instrument verification or calibration factors the absorbed dose from the reference point of the phantom.

6.1.5

The deviation between the measured value of the absorbed dose at the reference point in the phantom and the nominal value should be within $\pm 2.0\%$.

6.2 Rotating output dose

6.2.1

Design a spiral tomographic conformal intensity-modulated radiation treatment plan on the intensity-modulated verification phantom.

6.2.2

Position the intensity modulation verification phantom on the treatment bed according to the conditions of the treatment plan, and insert the dosimeter probe into the intended measurement position in the phantom.

6.2.3

Recall the treatment plan set in 6.2.1, and control the rotation of the gantry to simulate treatment irradiation.