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

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Replacing GBZ 126-2011 (Partly)

**Medical electronic linear accelerator quality control inspection
specification
(English Translation)**

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Foreword

Chapter 4, Chapter 5, Appendix A, Appendix B, Appendix C, Appendix D and Appendix E of this standard are mandatory clauses, and the rest are recommended Terms.

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

This standard replaces the equipment protection performance and equipment quality control of GBZ 126-2011 "Radiation Protection Requirements for Electron Accelerator Radiotherapy" section. Compared with the equipment protection performance and equipment quality control part of GBZ 126-2011, except for editorial changes, the main technical changes as follows.

- Modified the scope of standard application (see Chapter 1, Chapter 1 of the 2011 edition);
- Modified some terms and definitions (see 3.1, 3.3 and 3.6, 3.1, 3.6 and 3.12 of the 2011

version);

--- Added quality control testing requirements and testing methods (see Chapter 5 and Chapter 6);

- Deleted the dose monitoring system calibration control test items, the maximum absorbed dose rate test items, and the X-ray field of the wedge filter Detection items, the light field of the irradiation field indicates the detection items, the position of the radiation beam axis on the patient's exit surface indicates the detection items, Indicating test items for the distance to the radiation source, and test items for the coincidence of the front and back irradiation fields (see Appendix E of the 2011 edition);

--Modified the items and testing cycle of acceptance testing, status testing and stability testing (see Appendix C, Appendix E of the 2011 edition);

--Increase the inspection index and recommended index of acceptance inspection and stability inspection, and the zero-scale position detection items of the rotating movement scale and its requirements, the testing items and requirements of the treatment bed movement accuracy, and the testing items and requirements of the treatment bed stiffness (see Appendix C);

-Added the best layout of the phantom position and measurement center in quality control testing (see Appendix D);

--Increase the testing conditions for quality control (see Appendix E);

--- Added a schematic diagram of the uniformity and symmetry of the radiation field (see Appendix F);

- Added a schematic diagram of the rotating frame (see Appendix G).

Drafting organizations of this standard. Institute of Radiation Medicine, Chinese Academy of Medical Sciences, Peking University Cancer Hospital, Chinese Center for Disease Control and Prevention Institute of Radiological Protection and Nuclear Safety Medicine, Sichuan Provincial Center for Disease Control and Prevention.

1 Scope

This standard specifies the requirements and methods for the protective performance and quality control testing of medical electronic linear accelerators.

This standard applies to the quality control testing of medical electronic linear accelerators.

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 9706.5-2008 Medical electrical equipment Part 2: Special requirements for the safety of electron accelerators with energy from 1 MeV to 50 MeV GB 15213-2016 Medical electron accelerator performance and test methods

3 Terms and definitions

The following terms and definitions defined in GB 9706.5-2008 and GB 15213-2016 apply to this document.

Normal treatment distance; NTD in the case of an electronic wire, it is the distance measured along the useful wire beam axis from the electron wire window along the radiation beam axis to the end of the beam limiter or the specified plane; X for ray, it is the distance measured from the front surface of the target along the radiation beam axis to the isocenter; for non-isocentric equipment, it is the distance to the specified plane from.

Isocentre

In radiology equipment, the reference axis of various motions moves around a common center point, and the radiation beam is centered on the smallest sphere inside the However, this point is the isocenter.

Nominal energy

It is given by the manufacturer to characterize the energy of the radiation beam.

Note: referred to as energy in this document.

Flatteness

A performance index that measures whether the absorbed dose rate at each point in the irradiation field at a specified irradiation distance is uniform.

In the plane of the patient, the area is centered on the useful beam axis and the maximum irradiation field is the boundary.

Patient plane

When using an accelerator to treat patients, the normal treatment distance is parallel to the treatment table and the vertical distance to the treatment table is 7.5 cm Plane.

Test area in patient plane on the patient's plane, the area with a radius of 2 m from the center of the useful harness, excluding the M area.

Maximum absorbed dose the maximum absorbed dose measured along the axis of the radiation beam in a water model under the condition of a normal treatment distance and an irradiation field of 10 cmx10 cm.

Stray radiation

Except for useful radiation beams, all radiations mainly include stray X-rays during electron therapy, and X-ray therapy causes patients' relative appearance.

Stray radiation and stray neutrons with increased surface dose.

4.1 General requirements

4.1.1

When applying for acceptance testing, a medical institution shall provide the testing institution with random documents from the manufacturer of radiotherapy equipment.

4.1.2

The leakage radiation and stray radiation of the equipment (including the induced radioactivity of accelerator treatment) should be accepted and tested. Under normal circumstances the status and stability test may not be performed; however, when the beam limiting equipment is replaced, modified or repaired, the leakage radiation and stray radiation shall be tested.

4.2.1 Monitoring and control of absorbed dose

4.2.1.1

The equipment used should have an independent dual-channel dose monitoring system, the output of which is displayed as the dose monitoring value, and should be able to be used to calculate the illuminate the dose at a reference point in the target volume.

4.2.1.2

The dual-channel dose monitoring system shall meet the following requirements.

- a) The dual-channel dose monitoring system can be either a redundant dose monitoring combination or a primary-secondary dose monitoring combination. In redundant dose monitoring when testing the combination, both dose monitoring should reach the performance specified in the manufacturer's technical specification; when the primary-secondary dose monitoring is combined, the the low-main-dose monitoring system should reach the performance specified in the manufacturer's technical specification;
- b) When a certain dose monitoring system fails, the other one should be guaranteed to work normally; each dose monitoring system should be able to independently Termination of irradiation; in the case of redundant dose monitoring combination, each channel should be set to terminate the irradiation when the preset parameters are reached; primary-secondary dose monitoring when measuring the combination, the main channel should be set to terminate the irradiation when the preset parameters are reached, and the secondary channel should be set to terminate when the preset parameters are exceeded.