

HJ

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Technical standard of radiation safety for electron linear accelerator industrial computed tomography

电子直线加速器工业CT辐射安全技术规范

(English Translation)

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Foreword

In order to implement the Environmental Protection Law of the People's Republic of China and the Law of the People's Republic of China on the Prevention and Control of Radioactive Pollution, Protect the protection of workers and the public radiation and safety, the development of this standard.

This standard specifies the sales (including construction) of the electronic linear accelerator industrial CT and the radiation safety and management requirements in use.

Annex A to this standard, Appendix D is a normative appendix, Appendix B, Appendix D is an informative appendix.

This standard is proposed by the Department of Environmental Protection Radiation Safety Administration.

This standard is organized by the Ministry of Environmental Protection Nuclear Safety Management Division, Science and Technology Standards Division.

The main drafting unit of this standard. Chongqing University, Chongqing City, radiation

environmental supervision and management station, China Atomic Energy Research Institute.

This standard is approved by the Ministry of Environmental Protection on March 29, 2016.

This standard has been implemented since April 1, 2016.

This standard is explained by the Ministry of Environmental Protection.

Electronic linear accelerator - Industrial CT radiation safety technical specification

1 Scope of application

This standard specifies the sales (including construction) of the electronic linear accelerator industrial CT and the radiation safety and management requirements in use.

This standard is applicable to industrial CT devices with energy not higher than 15MeV electron linear accelerator.

2 Normative reference documents

The contents of this standard refer to the terms of the following documents. For undated references, the valid version applies to this standard.

GB 3095 Ambient Air Quality Standard Basic standards for the safety of ionizing radiation protection and radiation sources GB 18871-2002 GB/T 9445 Non - destructive testing personnel qualification and certification Electronic linear accelerators for non - destructive testing GB/T 29070 Non - destructive testing - General requirements for industrial computer tomography (CT) testing

3 Terms and definitions

The following terms and definitions apply to this standard

3.1 Electronic linear accelerator

A device for accelerating the use of a pulsed radio frequency generator for electrons generated by an electron gun in a linear accelerating tube to obtain a high-energy electron beam.

Called accelerator. Accelerator produces high-energy electrons can be directly derived for industrial irradiation or medical treatment, but also bombardment to heavy metals Target, resulting in X-ray as an industrial non-destructive testing or medical treatment of X-ray source. The electronic linear accelerator in this standard is only used X-ray source.

3.2 Industrial CT industrial computed tomography

Industrial CT is an industrial computer tomography (CT) detection technology, is a digital radiation imaging nondestructive testing technology. Rays After passing through a specific area of the object to be detected along the plurality of viewing angles, the radiation transmittance is recorded by the radiation detector, the algorithm reconstructs the distribution of physical features in the region. Industrial CT generally by the radiation source system, detection systems, data acquisition and transmission systems, Mechanical systems, control systems, image processing systems and radiation protection security systems and other components.

3.3 Linear accelerator industry

The use of electronic linear accelerator as a radiation source of the industrial CT device, referred to as accelerator industry CT.

3.4 accelerator industry CT radiation source system radiation source system of accelerator industrial CT an apparatus for providing an X-ray beam required for accelerator industrial CT scanning. Mainly by the accelerator head, modulator cabinet, control cabinet (Taiwan), Cooling unit, beam limiting device, radiation protection and related support mechanism and other components, referred to as accelerator system.

3.5 Accelerator industrial CT control system control system of accelerator industrial CT

To achieve accurate control of industrial CT scanning motion, to coordinate the acceleration of the accelerator beam and the data acquisition system sampling signal accurate synchronization of the timing logic control, and is responsible for the system of radiation safety protection. Generally by the servo control system, computer, console (cabinet) and other hardware equipment and related control software components, referred to as industrial CT control system.

3.6 Accelerator industrial CT test room test room of accelerator industrial CT

For the installation of accelerator industrial CT scanning device and has a radiation safety protection function of the special scan detection workshop, referred to as the detection room.

3.7 Maximum air-kerma rate of accelerator

When the accelerator is in normal operating state at maximum power, the air detonation energy at the center of the ray cone is about 1 m away from the target the maximum value.

3.8 Accelerator leakage dose ratio

In the accelerator useful beam, at any distance of 100 cm from the accelerator target, the leak of the accelerator head the ratio of the gas kerma rate to the air kerma at the target axis of 1m on the center axis of the useful beam.

4.1.1 Basic requirements

Accelerator Industrial CT sales (including construction) and the use of units should be based on national laws and regulations to establish a sound radiation Safety management system and the annual assessment of radiation safety and protection status management system.

4.1.2 Radiation protection depth defense principle

According to the principle of defense in depth, set the accelerator industrial CT multiple radiation protection and safety measures, and its radiation protection and safety the system, components and equipment have the appropriate redundancy, diversity and independence.

4.2.1 Radiation of workplaces

In accordance with the provisions of GB 18871-2002, accelerator industrial CT radiation workplace is divided into.

- A) Control area. detection area within the protective door area;
- B) supervision area. control room, equipment room, inspection parts loading and unloading area and other auxiliary room and other areas.

4.2.2 Warning signs and equipment working status identification

In the detection room workpiece and personnel entrance, should set the ionizing radiation warning signs, and accelerator working status indicator device. ionization Radiation warning signs and Chinese warning instructions, etc., shall comply with GB 18871-2002 Appendix F in Figure F.1 and Figure F.2 requirements.

4.3.1 Personal Dose Control

4.3.1.1

Accelerator Industrial CT sales (including construction), in use, occupational exposure and public exposure dose limits should be met GB 18871-2002 requirements.