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

GB 17589-2011

**Specifications for quality assurance test for computed
tomography X-ray scanners**

X射线计算机断层摄影装置质量保证检测规范

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Foreword

This standard was drafted in accordance with GB/T 1.1-2009 given rules. This standard replaces GB/T 17589-1998 "X-ray computed tomography apparatus of image quality assurance testing standards." This standard compared with GB/T 17589-1998, the major technical changes as follows:

- The GB/T 17589-1998 in Table 1 is amended as normative appendix;
- Increasing the value of CT to detect a linear content;
- Modify the definition and calculation of noise;
- Modify the project name and the calculation method CTDI;
- Modify the detection of high contrast resolution;
- Modify the project name and test methods can detect low-contrast capability and

reconstruction thickness deviation. This standard is proposed and administered by the People's Republic of China Ministry of Health. This standard by the People's Republic of China Ministry of Health is responsible for interpretation. This standard was drafted. Chinese Center for Disease Control Radiation Protection and Nuclear Safety of the medicine. The main drafters of this standard. Yuebao Rong, Wei Dao, Liu Lan Tao. This standard replaces the standards previously issued as follows:

--- GB/T 17589-1998. X-ray computer tomography apparatus Quality assurance testing standards

1 Scope

GB 17589-2011 is the Chinese national standard on specifications for quality assurance test for computed tomography x-ray scanners, in the field of environment and health protection, safety. It carries no /T suffix, which in the Chinese system means compliance is mandatory: a product or a practice within its scope has to meet it to be lawfully made, sold or carried out in China. It was issued on 30 December 2011 by the Ministry of Health of the People's Republic of China; Standardization Administration of China, and has been in force since 1 May 2012. Classification: ICS 13.280, CCS C57. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This standard provides for medical X-ray computed tomography apparatus (computedtomographyX-rayscanner, Acronym CT) for the purpose of quality assurance testing methods and projects and requirements. This standard applies to acceptance testing CT machines, CT machines use state testing and stability testing. This standard does not apply to CT machine Production quality control, and supporting the use of CT imaging and display system and hard copy system.

2 Normative references

The following documents for the application of this standard is essential. For dated references, only the dated version suitable for use herein Member. For undated references, the latest edition (including any amendments) applies to this document. Evaluation and routine testing - Part 3-5

GB/T 19042.5 medical imaging departments. X-ray computed tomography imaging apparatus Performance Acceptance Test

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1 CT dose index CTdoseindex, CTDI₁₀₀ Standard cross section along the central axis from -50mm to 50mm to integral dose profile curve, divided by the nominal thickness with a single sweep Product description generating N number of faults, according to equation (1) calculations. $CTDI_{100} = \frac{1}{N} \int_{-50}^{50} D(z) dz$ (1) Where. T

--- nominal thickness; N

--- Number of faults arising from a single scan; D (z)

--- standard dose cross section along the central axis of the profile curve.

Note. A scan consists of many levels.

3.2 Weighted CT dose index weightedCTdoseindex, CTDI_w The average value of the phantom center CTDI₁₀₀ collected CTDI₁₀₀ and peripheral points collected weighted sum. $CTDI_w = \frac{1}{3} CTDI_{100,c} + \frac{2}{3} CTDI_{100,p}$ (2) Where. CTDI₁₀₀, c

--- phantom center collected CTDI₁₀₀; CTDI₁₀₀, p

--- motif peripheral points collected CTDI₁₀₀ average.

3.3 CT value CTnumber CT image voxel corresponding to each pixel of the X-ray attenuation average.

Note. CT Hounsfield value is usually used as a unit, referred to as HU. Using (3), the attenuation values measured in accordance with internationally harmonized turn Hounsfield scale CT values replaced. $CT \text{ value substance} = \frac{\mu_{\text{substance}} - \mu_{\text{water}}}{\mu_{\text{water}} - \mu_{\text{air}}} \times 1000$ (3) Where. Linear attenuation coefficient μ substance

--- ROIs substance. Linear attenuation coefficient μ water

--- water. According to the above definition of CT value scale, then there must be. water CT value 0HU, air CT value -1000HU.

3.4 Voxel voxel Is an imaging layer in artificial division, several small basic unit in a rectangular array.

4 Detection

Positioning accuracy of

4.1 Diagnosis bed

4.1.1 minimum scale of 1mm, an effective length of 500mm near the straightedge diagnosis fixed bed of moving bed, and to ensure that the ruler Parallel to the direction of movement of the bed and the bed surface can indicate as a ruler tick mark pointer.

4.1.2 ensure that the bed load of about 70kg.

4.1.3 were given the diagnosis of bed "into 300mm" and "back 300mm" instruction.

4.1.4 record forward, back the start and end point values shown on the ruler, measure the positioning error and homing error.

4.2.1 Motif detection

4.2.1.1 detector module having a body with a surface clear alignment marks, embedded within the specific shape of the object, the shape of the object, the position of Should mold surface alignment mark with strict spatial relations.

4.2.1.2 The detection module body is placed in the center line of the radiation field is fixed, the mold body axis perpendicular to the scanning cross section, so that all surfaces of the phantom trimming Marking and locating light coincide.

4.2.1.3 the head of clinical common exposure conditions, the total thickness of less than 3mm imaging collimator axial scanning mode to obtain positioning light Markable layer image, comparing the image with a standard shape and positional relationship between the level of a particular object are the same, if the same, then the alignment light, accurate.

4.2.1.4

4.2.1.3 If the two do not match, the scan back and forth perpendicular to the axis of the level of fine-tuning die body in accordance with

4.2.1.3 Scanning conditions, ultimately consistent with the nominal level of the image, according to the mold body to adjust the distance along the axis, positioning light to determine the degree of deviation.

4.2.2 Film detection

4.2.2.1 Select an unexposed film in a dark room with black paper wrapped tightly and keep it neat.

4.2.2.2 In the paper side of the direction perpendicular to the longitudinal direction draw two straight lines, a straight line distance of 10cm or more, respectively, with a needle through the two straight lines 2 and 3 holes, hole diameter should be as small as possible and should not exceed the maximum diameter of 1mm, hole spacing at least greater than 5cm.

4.2.2.3 The perforated with small holes on the film flat on the examining table, the film coincides with the central axis of rotation and CT center will first have to wear two Linear positioned within the aperture of light projected on the film coincides with the CT machine positioning within the set mode, choose a lower exposure conditions, minimum Nominal thickness, the use of single-axial scan mode to scan.

4.2.2.4 and then pan the film, will wear a straight line with three holes positioned outside the projection of light on the film coincides with the CT machine outside the given set Bit mode, using the same exposure conditions

4.2.2.5 final rinse scanned film were measured inside, positioned between the outer light