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

GB/T 17589-1998

Replacing GB/T 17589-1998

**Specifications for quality assurance test for computed
tomography X-ray scanners
(English Translation)**

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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.

1 Scope

This standard provides for medical X-ray computed tomography apparatus (computed tomography X-ray scanner, 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.

CT dose index CT dose index, 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.

$CTDI_{100} = \text{integral}$

$N \times T_{dz}$

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.

Weighted CT dose index weighted CT dose index, CTDI_w the average value of the phantom center CTDI₁₀₀ collected CTDI₁₀₀ and peripheral points collected weighted sum.

$CTDI_w = 1/3 CTDI_{100} + 2/3 CTDI_{100}$, p (2) where.

CTDI₁₀₀, c --- phantom center collected CTDI₁₀₀;

CTDI₁₀₀, p --- motif peripheral points collected CTDI₁₀₀ average.

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 value substance = $\mu - \mu_{\text{water}}$ $\mu_{\text{water}} \times 1000$ (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.

Voxel voxel

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

Dose profile curve doseprofile on a standard cross-sectional central axis dose distribution with the correlation function of its position.

The full width at half maximum fulwidthathalf-maximum Half the maximum distance between two points on the dose profile curve.

High contrast resolution Spatial resolution in the object with the background on the difference in the degree of attenuation of noise sufficiently large as compared with the case where, CT imaging distinguish objects of different sizes ability.

Note: In general, the attenuation coefficient difference between the object and the background of the result for the corresponding CT value difference 100HU above is considered to be large enough.

The average CT value meanCTnumber the average of all the pixel values of CT in a special area of interest.

Noise noise

In homogeneous mass image, given its regional variation in the average value CT. Available in the size of the region of interest of a uniform substance CT Divided by the standard deviation value of the contrast scale representation.

3.10

Nominal thickness nominaltomographyslicethickness CT machine is selected on the control panel and indicating the layer thickness.

3.11

ROIs region of interest, ROI Within a given time images of particular interest to the local area.

3.12

Sensitivity profile curve sensitivity profile as a function of position in the vertical correlation response volume CT system on a straight line fault plane.

3.13

Reconstruction thickness reconstructed slice thickness the half-scan field at the center of a cross-sectional imaging sensitivity curve full width.

3.14

Pitch pitch

360 ° from the tube and the diagnostic bed with ratio of the total width of the imaging detector for each rotation.

$P = dMS$

Where.

d --- tube each 360 ° rotation diagnostic bed moving distance;

M --- tube each 360 ° rotation of the tomographic image of a number;

S --- each piece of tomographic images of the nominal thickness.

3.15

Uniformity the entire scan field, the consistency of a homogeneous mass imaging CT values.

3.16

Baseline baseline value Reference X-ray diagnostic equipment function parameters. After the acceptance or status is qualified, from the initial stability testing obtained Value, or by the respective standard values given.

3.17

Low-contrast detectability ability low contrast detectability CT machine can identify the minimum size of the image low-contrast detail.

3.18

Acceptance Testing acceptance test X-ray diagnostic equipment after installation or major repairs, as identified compromising image quality performance indicators into compliance with the agreed value Line testing.