**Section 360.75 Computed Tomography (CT) Systems**

a) Requirements for Equipment

1) Termination of Exposure

A) In the event of equipment failure affecting data collection, means shall be provided to terminate the x-ray exposure automatically, either by de-energizing the x-ray source or by shuttering the x-ray beam, through the use of either a back-up timer or devices that monitor equipment function.

B) A visible signal shall indicate when the x-ray exposure has been terminated through the means required by subsection (a)(1)(A).

C) The operator shall be able to terminate the x-ray exposure at any time during a scan, or series of scans, of greater than 0.5 second duration.

2) Tomographic Plane Indication and Alignment

A) Means shall be provided to permit visual determination of the location of a reference plane. This reference plane can be offset from the location of the tomographic planes.

B) If a device using a light source is used to satisfy subsection (a)(2)(A), the light source shall provide illumination levels sufficient to permit visual determination of the location of the tomographic plane or reference plane under ambient light conditions of up to 500 lux (45 footcandles).

C) The total error in the indicated location of the tomographic plane or reference plane shall not exceed 5 millimeters.

D) The deviation of indicated scan increment versus actual increment shall not exceed plus or minus 1 millimeter with a typical patient mass resting on the patient support device. The patient support device shall be moved incrementally from a typical starting position to the maximum incremental distance or 30 centimeters, whichever is less, and then returned to the starting position. If the CT system has the capability of variable gantry angles, the compliance measurements shall be performed with the CT gantry positioned at zero degrees.

3) Beam-On and Shutter Status Indicators. The CT x-ray control panel and gantry shall provide visual indication whenever x-rays are produced and, if applicable, whether the shutter is open or closed.

4) Technique Indicators. The CT x-ray control panel shall provide visual indication of the technique factors, tomographic section thickness and scan increment prior to the initiation of a scan or a series of scans.

b) Facility Design Requirements

1) The control panel shall be located behind a protective barrier.

2) Communication. Provision shall be made for two-way aural communication between the patient and the operator at the control panel.

3) Viewing Systems. Windows, mirrors, closed-circuit television or an equivalent system shall be provided to permit continuous observation of the patient during irradiation and shall be located so that the operator can observe the patient from the control panel.

c) Radiation dose measurements shall be performed by a diagnostic imaging specialist on each CT x-ray system. The measurements shall be specified in terms of the computed tomography dose index (CTDI), for the head and abdomen, using a head or abdomen phantom, respectively, and the facility's technique factors most frequently used for a CT examination of the head or abdomen, respectively, and shall be performed:

1) At least annually by a diagnostic imaging specialist and after any change or replacement of components that could cause a change in the radiation output;

2) With a dosimetry system that has been calibrated within the preceding 12 months. The calibration of such system shall have no more than a three-step (tertiary) calibration, traceable to the National Institute of Standards and Technology; and

3) Using the computed tomography dose measurement protocol found in Report 111 of the American Association of Physicists in Medicine (AAPM), entitled "Comprehensive Methodology for the Evaluation of Radiation Dose in X-Ray Computed Tomography" published by AAPM, February 2010, exclusive of subsequent amendments or editions. A copy of this report is available for public inspection at the Illinois Emergency Management Agency, 1035 Outer Park Drive, Springfield, Illinois or may also be obtained directly from the AAPM, One Physics Ellipse, College Park MD 20740-3846.

AGENCY NOTE: The Agency recognizes that other phantoms and protocols are available to provide accurate dose measurements as specified in this Section. The Agency will consider use of such phantoms and protocols as satisfying this Section if the intent of the regulation is met.

d) Diagnostic Imaging Specialists who perform radiation dose measurements and develop quality assurance procedures for CT systems shall have CT training as follows:

1) Individuals certified in diagnostic radiological physics or radiological physics by either the American Board of Radiology or the American Board of Medical Physics shall have 20 contact hours of documented specialized training in conducting surveys of CT equipment;

2) Individuals not certified as specified in subsection (d)(1) shall have 40 contact hours of documented specialized training in conducting surveys of CT equipment.

e) Documentation of the training required by subsection (d) shall be available for review at the facility by January 1, 2015. Documentation shall include the name of the individual performing the CT training.

f) Quality assurance procedures shall be conducted on each CT system and shall meet the following requirements:

1) The quality assurance procedures shall be in writing and shall have been developed by a diagnostic imaging specialist. The procedures shall include, but need not be limited to, the following:

A) Specifications of the tests that are to be performed, including instructions to be employed in the performance of those tests; and

B) Specifications of the frequency at which tests are to be performed, the acceptable tolerance for each parameter measured and actions to be taken if tolerances are exceeded.

2) Quality assurance procedures shall include acquisition of images using a CT phantom that has the capability of providing an indication of the resolution capability of the system. Quality assurance procedures shall include, at a minimum:

A) Image quality evaluation, including CT number uniformity, noise, and low and high contrast resolution;

B) Quantitative accuracy including CT number calibration and constancy;

C) Image display evaluation, including visual and hard copy output.

g) Operating Procedures. Information shall be available at the control panel regarding the operation of the system. The information shall include written quality assurance procedures, as required in subsection (f)(1).

(Source: Amended at 38 Ill. Reg. 12031, effective May 29, 2014)