Government of India
Atomic Energy Regulatory Board
Radiological Safety Division
Niyamak Bhavan, Anushaktinagar,
Mumbai-400094

PERIODIC QUALITY ASSURANCE TEST REPORT FOR COMPUTED TOMOGRAPHY EQUIPMENT

(Periodic Quality Assurance shall be carried out at least once in two years and also after any repairs having radiation safety implications)

A. DETAILS OF THE DIAGNOSTIC X-RAY EQUIPMENT

1	Name of the Institution and City	
2	Type of Equipment	
3	Model Name	
4	Name of the Manufacturer	
5	Name(s) of Person(s) testing the equipment and Name of Supplier/Service Agency	
6	Dates and Duration of the Tests	

B. SUMMARY OF RADIATION SAFETY PERFORMANCE TEST REPORT

Sr. No.	Parameters tested	Specific values	Measured values	Tolerance		Remarks
1.	Slice thickness (mm)			For slice thickness a. Less than 1 mm b. 1 mm to 2 mm c. Above 2 mm	 0.5 mm ± 50% ±1 mm	
2.	Accuracy of Operating Potential (kV)	(last value maximum kV)		±2 kV		
3.	Accuracy of Timer			% Error< 10 %		
4.	mA/mAs Linearity (CoL)			CoL $\leq \pm$ 0.1		
5.	Reproducibility of output (CoV)			CoV $\leq$ 0.05		

6.	Radiation dose test CTDI –(mGy/100 mAs) at 120 kV	As per technical specifications		± 20 % of Stated value	
7.	Low contrast resolution	As per technical specifications		5.0 mm at 1% contrast	
8.	High contrast resolution	As per technical specifications		3.12 lp/cm	
9.	Total Filtration	Measured at Maximum kVp		2.5 mm Al for kV > 100	
10.	Radiation Leakage level from X-Ray tube housing	Measurement at Maximum kVp and corresponding mA		< 1mGy in one hour	

I hereby undertake that all the information provided above is correct and in accordance with the detailed Quality Assurance Report enclosed herewith.

Place:
Date:

Signature:
Name of the Service Engineer:
Name of Supplier/Service Agency:
Seal of Supplier/Service Agency:

#Signature of Institution's Representative:
Name of Institution:
Seal of the Institution:

 # Quality Assurance Tests Report shall be signed by Institution's Representative and duly stamped by the User's Institution.

1. **Radiation Profile Width/ Slice thickness:**
   Exposure parameters: kVp : mAs :

Applied Slice thickness (mm)	Measured density profile width (FWHM)	Tolerence	
		For slice thickness	
		a. Less than 1 mm	0.5 mm
		b. 1 mm to 2 mm	± 50%
		c. Above 2 mm	±1 mm

2. **Measurement of operating potential:**

Set kV	mA station **I**	mA station **II**	mA station **III**	**Ave kVp**

Tolerance : ± 2 kVp

3. Timer Accuracy:

Set Time	Observed Time	% Error

Tolerance: Tolerance: ± 10 %

4. **Measurement of mAs linearity**

Operating parameters: kVp : Slice thickness :

Output in μGy				μGy/mAs (X)
mAs	I	II	III	

Coefficient of linearity (COL) = $\frac{X_{max} - X_{min}}{X_{max} + X_{min}}$

Tolerance in COL : ± 0.1

5. **Output Consistency**

Operating parameters : mAs: Slice thickness:

kVp	Output					Mean (X)	COV
	1	2	3	4	5		
80							
100							

120							

Coefficient of Variation (COV) = $X^{-1} [\sum (Xi - X)^2 / n-1]^{½}$

Tolerance in COV : ± 0.05

6. **Measurement of Computed Tomography Dose Index (CTDI)**

Use pencil ionization chamber connected to a suitable electrometer, in conjunction with a head/body phantom. Measure the dose in the axial and peripheral cavities of the phantom for typical techniques.

Operating parameters: kVp : 80 / 100 / 140 **mAs : 100** Slice thickness :

Result: **Head** **Body**

Axial dose : --------- mGy/mAs ----------mGy/mAs

Peripheral dose : --------- mGy/mAs ----------mGy/mAs

: --------- mGy/mAs ----------mGy/mAs

: ---------mGy/mAs ----------mGy/mAs

: ---------m Gy/mAs ----------mGy/mAs

Peripheral dose(Mean): ---------mGy/mAs ----------mGy/mAs

$CTDI_c$: --------- mGy/mAs ----------mGy/mAs

$CTDI_{p\ (mean)}$: --------- mGy/mAs ----------mGy/mAs

Weighted CTDI ($CTDI_w$) = 1/3 $CTDI_c$ + 2/3 $CTDI_p$
$CTDI_w$: ---------- mGy/mAs

Tolerance : ± 20% of the quoted value (Expected)
± 40% of the quoted value (maximum)

7. **Low contrast resolution**

Use low contrast resolution test phantom.

Operating parameters : kVp : mAs : Slice thickness
Window width:

Result:

Low contrast resolution: ---------- mm at -------- % contrast difference

Tolerance : 5.0 mm at 1% contrast difference (minimum)
2.5 mm at 0.5 % contrast difference (expected)

8. **High contrast resolution**

Use high contrast resolution test phantom.

Operating parameters : kVp : mAs : Slice thickness :

Window width : Use high resolution algorithm.

Result :

Size of the smallest resolvable bar/hole pattern: ----------mm (-------- lp/cm)
Tolerance: At 10% contrast difference the size of the bar/hole pattern that could be resolvable should be 1.6 mm (≈ 3.12 lp/cm).
Expected high contrast resolution: 0.8 mm (≈ 6.25 lp/cm)

9. **Radiation leakage levels from X-ray tube housing at 1 M from the focus**

Operating Potential: kV: mAs: Sec:
(Use maximum kV available in the machine for leakage measurement)

Radiation Leakage Level (mR/hr)			
Front(Cathode)	Back (Anode)	Left	Right

Max leakage = 500 mAmin in one hour X ----Max leakage mR/hr
60 X -----mA used for measurement

Maximum radiation leakage from tube = ---------- mR in one hour

Result: Maximum radiation leakage at 1 meter from the focus for workload of 180 mA min in one hour is mR.

Recommended upper limit: Leakage radiation level at 1 meter from the focus should be ≤ 115 mR in one hour.

10. Details of Radiation Protection Survey of the installation

Date of radiation protection survey:

Whether radiation survey meter used for the survey has valid calibration certificate: Yes/No

Equipment Setting:-
Applied Current (mA):
Applied Voltage (kV):
Exposure time(s):
Workload:
Provide the measured maximum radiation levels (mR/hr) at different locations

Location	Max. Radiation level (mR/hr)
Control console(Operator Position)	
Outside patient entrance door	
Behind Windows (if applicable)	
Patient Waiting Area	

Maximum Radiation level/week (mR/wk) = $\frac{\text{mAmin/week}}{60} \times \frac{\text{Max. radiation level (mR/hr)}}{\text{mA used for measurement}}$

Permissible limit

For location of Radiation Worker: 20 mSv in a year (40 mR/week)
For Location of Member of Public: 1 mSv in a year (2mR/week)