

LAB INSTRUCTION

Tips for using the dosimeter:

Avoid hitting and mechanical shocks to the dosimeter.

From placing the dosimeter in hard environments, organic solutions and irritants Avoid.

When using a dosimeter, avoid placing it near sources of radio radiation such as telephones

In case of radioactive contamination of the device, it is better to remove the contamination first and then use the dosimeter.

How to use the dosimeter:

- Do Unpack the dosimeter first
- Install the battery in the dosimeter.
- As soon as the battery is inserted, the device will turn on automatically.
- To check if the dosimeter works, first the dosimeter filter must be closed, and then to DER will be placed as soon as the device is turned on in measurement mode. Then the device is displayed information on LCD.
- For measuring the DER, the background dose and reading should be between 0.05 and 0.2 microsievert per hour.
- On/off can be selected by selecting the Menu button to turn off the device and turned off the device.



Test 1: Measurement of scatter radiation at 1 m from the phantom in different direction:

Required materials: phantom, meter, dosimeter

Method:

Positioned the ambient dosimeter at a distance of one meter from the phantom in different directions.

Measure and register the dosimeter reading.

Draw the isodes curve using the obtained numbers.

Isodose curve requires more exposures.

From the total scatter, the leakage ($0.04 \mu\text{Sv/hr}$ is leakage) is subtracted and net value is obtained.

With a 20 cm phantom:

Position	Measurment($\mu\text{Sv/hr}$)
Under of II	
above Tube	
Left side	
Right side	
Front of II	

Test 2: Measurement of scatter radiation at 1 m from the phantom with different thickness:

Thickness of Phantom(cm)	Measurment($\mu\text{Sv/hr}$)
0	
4	
10	
20	
24	

Test 3: Measurement of standard entrance dose rate

Purpose :

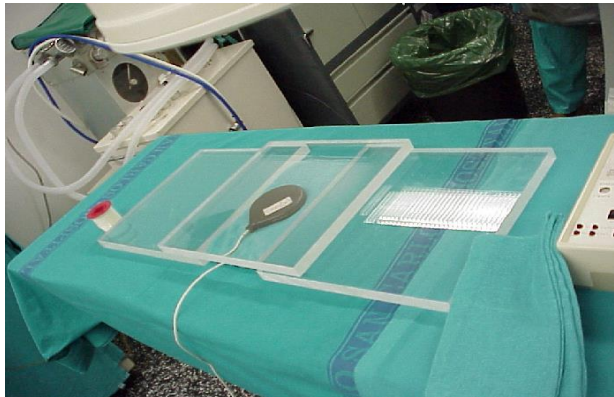
- Measurement of dose rate at the entrance of patient for different thickness
- Effect on scattered radiation

Method :

- Use different water equivalent absorber (acrylic, 20 cm for a standard patient) or copper sheets (2 mm for a standard patient)
- Place dosimeter on input (x-ray tube side) of absorber
- Set-up for measurement of standard dose rate.



The ionization chamber should be protected pressure and possible malfunctioning. It should be in contact with the acrylic to include backscatter in the measurement.



Use 10 cm thickness of acrylic to simulate a thin patient. The table to intensifier distance is 35 cm (this distance will be kept constant for the different patient thicknesses)



The dose rate due to scatter radiation also increases with the patient thickness. mSv/h is measured close to the phantom.

Thickness of Phantom(cm)	Intrance dose rate Measurment($\mu\text{Sv/hr}$)	Scater close to phantom($\mu\text{Sv/hr}$)
10		
16		
20		

Test 4: Low contrast resolution and noise measurement

Purpose :

- to measure the low contrast resolution and the influence of noise on low contrast detectability

Equipment :

- image quality phantom (Leeds phantom)

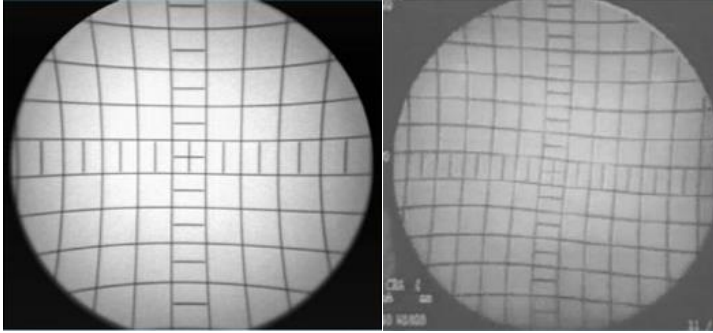
Thickness of Phantom(cm)	Number of objects detected
0	
20	

Test 5: High contrast resolution

Thickness of Phantom(cm)	Number of line/mm detected
0	
20	

Test 6: Image Distortion

- Pincushion distortion results because the input phosphor is curved but the output phosphor is flat
- This results in a warped image, which bends straight lines inwards
- Pincushion distortion is reduced when magnification modes are used



Pin-cushion

S-distortion

Incorporates:

- a wire matrix of 20 mm square spacing with 10 mm minor indicators
- Integral distortion = $\frac{\text{mean diagonal of large square} - 1}{n \times \text{mean diagonal of central square}}$

n x mean diagonal of central square

less than 10 %.