TECHNICAL SPECIFICATION

MESIN X-RAY UNTUK KLINIK KESIHATAN

1. APPLICATION : For General Radiography Procedure.

2. GENERATOR :

2.1 Type:

Multipulse microprocessor controlled high frequency inverter/converter of at least 25 kHz, 12 pulse generator with ripple factor of less than 5%.

2.2 Radiographic kV range

2.2.1 Lower limit should not exceed 45 kV
2.2.2 Upper limit should not be less than 150 kV with not less than 25 pre-set steps or continuous kV adjustments
2.2.3 kV accuracy +/ -5%

2.3 Radiographic mA range

2.3.1 Lower limit should not exceed 30 mA
2.3.2 Upper limit should not be less than 500 mA, in not less than 15 pre-set steps, or continuous mA adjustments.

2.4 Timer range :

The timer should provide accurately timed exposures over the range of 0.002 sec. to 5 secs in not less than 20 pre-set steps or continuous time adjustments.

2.5 kW output :

At least 50 kW at 100 kV and 0.1 sec.

2.6 Rectification:

Full wave, solid state rectifiers

2.7 Exposure Control :

Automatic exposure control in kV and kV-mA operation
Note : For the above, exposure factor selection could be in :

i. kV, mAs, OR
ii. kV, mA, s, OR
iii. kV.

2.8 Anatomically programmed radiography :

Provision of specially pre-set controls, programmed anatomically accordingly to all radiographic parameters, setting the generator and auxiliary components for the required examination techniques. The user should be able to alter pre-set parameter when necessary.

2.9 Facilities for automatic Density Correction control as to provide optimum image quality in normal exposure.

2.10 Control Desk :

2.10.1 Must be able to control and select all the above settings with the following features :

a) Overload protective device for all x-ray tubes
b) Safety interlock to prevent x-ray exposures if :
   i. Anode does not rotate
   ii. Filament does not heat

2.10.2 Hand switch controls for preparation & exposure to be provided.

2.11 Power supply :

To be compatible with existing power supply :

a) 3 - phase 415 V, 50 Hz supply system with fluctuation of +/- 10%.

b) Line/main impedance should be able to achieve the maximum power specified for the x-ray generator.

3. TUBE :

3.1 Type :

Rotating anode

3.2 Rotation Speed :

Approximately **9000 rpm**

3.3 Focus : Dual Focus

Dual focus ;
Fine focus should not be more than **0.6 mm** and large focus should not be more than **1.3 mm**.

3.4 Power :

The large focus to match generator output

3.5 Voltage :

To match maximum peak voltage of generator output.

3.6 Anode Heat Storage Capacity :

Not less than **300 kHu**

3.7 Anode heat dissipation :

Not less than **100 kHu/min**.

3.8 Light Beam Collimator :

3.8.1 Multi-leaf type with 'LIGHT ON' indicator

3.8.2 Built in light time switch

4. TUBE MOUNT :

4.1 Type :

Floor mounted

4.2 Rotation of tube arm about vertical axis of column :

4 x 90 degrees.

4.3 Rotation of tube about horizontal axis of support pin :

+/ - 120 degrees.

4.4 Indicators and Control :

4.4.1 Electromagnetic brakes with push - button controls

4.4.2 Angle indicator

4.4.3 Indicating scales of source-image distance & provision for automatic locking facilities for tube centering

5. TABLE :

5.1 Type :

Fixed based, height adjustable radiolucent table top

5.2 Length X Width :

At least 2000 mm X 680 mm

5.3 Table-top to film distance :

Not more than 75 mm

5.4 Bucky :

Oscillating bucky with tray for self-centering for cassette sizes of up to 35 X 43 cm.

5.5 Grid :

Minimum ratio of 14 : 1 with minimum of 40 lines / cm

5.6 Able to hold patient weight up to 200 kg.

6. UNIVERSAL BUCKY STAND :

6.1 Type :

Height adjustable and counter balanced floor - wall mounted

6.2 Bucky :

Oscillating bucky with tray for self-centering for cassette sizes of up to 35 X 43 cm.

6.3 Grid :

Minimum ratio of 14 : 1 with minimum of 40 lines / cm.

6.4 Cassette holder to accommodate cassette sizes of 18 X 24 cm up to 35 X 43 cm is to be provided.

7. TRAINING :

7-days on-site training is to be provided by an application specialist on operation and basic maintenance of the equipment.

8. ACCESSORIES :

8.1 Rachet compression band - **1 unit**

8.2 Lateral cassette holder - **1 unit**

8.3 Lead Protective Apron with wall mounted hangers - **1 pieces**

Light-weight, half-back / single sided protective apron with at least 0.25 mm lead equivalent.

8.4 Half / Mini Apron with hanger - **1 set**

Light weight for the protection of lower parts with at least 0.25 mm lead equivalent. Complete set of at least 3 sizes (small, medium and large).

8.5 Alphanumeric lead lettering marker - **1 set**

8.6 Lead Anatomical Markers (L & R) - **1 pair**

8.7 Cassettes:

Window type. Come complete with Universal speed green emission rare-earth intensifying screen. Must be compatible with the type of patient ID printer provided as in 8.8. The following sizes need to be provided :

1. 35 X 43 cm - **6 pieces**
2. 24 X 30 cm - **6 pieces**
3. 30 X 40 cm - **2 pieces**
4. 24 X 18 cm - **2 pieces**

8.8 Daylight Patient ID Printer - **1 piece**

The printer must be compatible for use with the type of cassette provided as in 8.7.

8.9 Stationary Secondary Radiation Grid with grid holder

Grid Ratio of 12 : 1 with minimum of 36 lines / cm

1. 35 X 43 cm - **1 piece**
2. 24 X 30 cm - **1 piece**

8.10 Positioning aids : - **1 set**

1 set of radiolucent foam in various shapes suitable for general radiography. The set to come complete with storage box.

8.11 Automatic Film Processor come with automatic Chemical mixer - **1 unit**

8.11.1 Type :

a) Fully automatic, floor standing unit for developing, fixing, washing and drying of films.

b) Capable of processing Radiographic Films from 18 x 24 cm to 35 x 43 cm.

c) Film processing time of 90 sec.

8.11.2 Water supply :

a) Direct connection tap water supply without the need for external heating or cooling with automatic shut-off facilities when not in use.

b) Water filter for incoming water supply to the processor must be provided.

8.12 Table top Film Processor **- 1 unit**

a) As back-up unit.

b) Able to cater medium and low volume processing application.

c) Film processing time of 90 sec.

8.13 Quality Control Test Tools (complete set) - **1 set**

8.13.1 Sensitometer : **1 unit**

a) A hand-held transmission sensitometer, compact and alkaline battery operated.

b) Dual colour (blue/green) light source.

c) 21 steps exposure area

8.13.2 Densitometer : 1 unit

a) Hand-held digital densitometer, to measure the optical density of the sensitometric strips

b) Alkaline battery and electrical A/C adaptor compatible with the unit and local usage must be included.

Controls :
a. Zero push button
b. Power ON/OFF switch
c. READ push button
d. Calibration control – to calibrate against known step tablet. (Calibrated photographic step tablet of at least 4 calibrated steps must be supplied).

8.13.3 Digital Thermometer : 1 unit

a) Battery operated to be used for measuring processing temperature in degrees Celcius and degrees Fahrenheit.

b) Lower limit should not be more than 25 deg. Celcius and Upper limit should not be less than 40 deg. Celcius.

c) At least with 3 digit display and ON/OFF switch.

8.14 Cassette hatch/cassette transfer cabinet - **1 unit**

a) Made from steel.
b) Dimension: 58 x 50 x 55 cm
c) Light proof interlocking door

8.15 Film Hopper - **1 unit**

a) The light tight storage of x-ray films.
b) The system shall prevent a premature expose of the films

8.16 Cassette Holder for bucky stand (floor stand or hang on) - **1 unit**

a) Adjustable height.
b)

8.17 Ovarian Shield (set of difference sizes) - **1 set**

a) optimal protection of the entire female ovaries
b) made from lead sheets and protected in a PVC cover for easy cleaning
c) Lead equivalent of 1.0 mm Pb
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8.18 Gonad Shield (set of difference sizes) - **1 set**

a) optimal protection of the entire male genitals by entirely containing penis scrotum
b) made from lead sheets and protected in a PVC cover for easy cleaning
c) Lead equivalent of 1.0 mm Pb

8.19 Thyroid Shield (set of difference sizes) - **1 set**

a) optimal protection of thyroid and sternum area
b) made from multiple lead sheets
c) Lead equivalent of 0.5 mm Pb

8.20 Cassette Storage Box - **1 unit**

a) 2/3 compartment leaded with 2.0 mm Pb

8.21 Silver Recovery Unit - **1 unit**

a) body made from acid proof PVC

8.22 to supply chemical starter/consumable for three (3) months of clinics usage

NOTE: ALL X-RAY EQUIPMENT TENDERED MUST BE LICENCED FOR USE IN MALAYSIA AND MEET MALAYSIAN STANDARDS (MS 838 : 1985).