



# **SPECIFICATION FOR MESIN X-RAY KLINIK KESIHATAN**

**CAWANGAN KEJURUTERAAN  
ELEKTRIK**

**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.

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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**.

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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 :**

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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 :**

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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   | - | <b>1 unit</b>   |
| 8.2        | Lateral cassette holder   | - | <b>1 unit</b>   |
| 8.3        | Lead Protective Apron with wall mounted hangers   | - | <b>1 pieces</b> |
|            | Light-weight, half-back / single sided protective apron with at least 0.25 mm lead equivalent.  |   |                 |
| 8.4        | Half / Mini Apron with hanger   | - | <b>1 set</b>    |
|            | 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).   |   |                 |
| <b>8.5</b> | Alphanumeric lead lettering marker  | - | <b>1 set</b>    |
| 8.6        | Lead Anatomical Markers (L & R)   | - | <b>1 pair</b>   |
| 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   | - | <b>6 pieces</b> |
|            | 2. 24 X 30 cm   | - | <b>6 pieces</b> |
|            | 3. 30 X 40 cm   | - | <b>2 pieces</b> |
|            | 4. 24 X 18 cm   | - | <b>2 pieces</b> |
| 8.8        | Daylight Patient ID Printer   | - | <b>1 piece</b>  |
|            | The printer must be compatible for use with the type of cassette provided as in 8.7.  |   |                 |
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**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**

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**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**

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- 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
- 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).

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