MINISTRY OF INDUSTRY, INVESTMENT AND COMMERCE
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CRITERIA FOR THE ACCEPTABILITY OF X-RAY EQUIPMENT IN DENTISTRY

<table>
<tr><th>Test</th><th>Acceptance Criteria</th></tr>
<tr><td>kV accuracy</td><td>a) Kilovoltage shall be ≥ 50

b) Accuracy: ±10% for single phase unit
± 5% for high frequency units

Greater accuracy would be expected in the case of new units.</td></tr>
<tr><td>Filtration</td><td>Total permanent filtration shall be ≥ 1.5 mm Al for kVp ≤ 70 and ≥ 2.5 mm Al for kVp > 70. For intra-oral units this may be checked by verifying that the first half value layer (HVL) is greater than or equal to the values shown in the table below.

<table>
<tr><th>Measured X-ray tube voltage
(kVp)</th><th>HVL (mmAl)</th></tr>
<tr><td>≥ 50 and ≤ 56</td><td>1.4</td></tr>
<tr><td>> 56 and ≤ 62</td><td>1.6</td></tr>
<tr><td>> 62 and ≤ 68</td><td>1.9</td></tr>
<tr><td>> 68</td><td>2.1</td></tr>
</table>

The value of the total permanent filtration should be marked on the tube housing.</td></tr>
<tr><td>Focal spot size</td><td>Focal spot size should be measured throughout the working life of the tube to determine the extent of any deterioration.

The focal spot size should be < 1.5 times the nominal stated value, which should</td></tr>
</table>

Test	Acceptance Criteria
	be marked on the tube housing.
Size of X-ray field:	The maximum dimension of the radiation field shall be ≤ 6cm at the patient end of the cone. The use of adjustable rectangular collimation that reduces the field size to that of the film is preferred.
Timer accuracy	The actual exposure time shall be within ± 25% and should be within ±10% of that selected or indicated. Where an anatomical timer is fitted, the preset exposure times for each view shall be documented by the manufacturer.
Radiation output	a) Where a selection of kV settings is available, the output in μGy/mAs should be proportional to the $(kVp)^2$. b) For repeat exposures, the output shall be constant to within ± 10% for single phase units and ± 5% for high frequency units.
Radiation leakage from tube housing	Leakage radiation from the housing should not exceed 0.25mGy (air-kerma) in one hour at 1 metre from the focus for any rating specified by the manufacturer. This measurement shall be averaged over an area of 100 cm^2
Skin-focus distance	Minimum of 20 cm for kVp ≥ 60. Minimum of 18 cm for kVp < 60. Open ended cones should be used.
Exposure mechanism	X-ray exposure shall be initiated only by applying pressure to the exposure switch. Maintaining this pressure on the exposure switch must not result in a second exposure of X-rays. Release of pressure on the exposure switch shall terminate the production of X-rays immediately.
Cable length	The cable length shall be sufficient to allow the operator stand at least two (2) meters from the X-ray tube and patient.
Warning signals	Mains 'on' and 'exposure' warning lights shall be fitted to the control panel. In addition, an audible alarm shall be fitted to the unit.

ADDITIONAL FOR PANORAMIC UNITS
1. The focus to skin distance is at least 15 cm. 2. The size of the useful beam at the image receptor does not exceed either dimension of the scanning slit by more than 2% of the focus to image receptor distance.
ADDITIONAL FOR CEPHALOMETRY
1. The focus to skin distance shall be at least 30 cm and should be approximately 100 cm. 2. If a collimator and light beam diaphragm are fitted then the sum of the misalignment of any two opposite edges of the visually defined field with the respective edges of the X-ray field shall not exceed 3% of the distance from the source to the centre of the visually defined field, and the sum of the deviations in two perpendicular directions shall not exceed 4%. Where no light beam diaphragm is fitted, the X-ray field size on the film cassette at the maximum focus to cassette distance should not exceed the field size stated on the collimator. Where a distance is quoted for the field size given on the collimator, the field size shall be measured at that distance. 3. The variation in radiation output with current variation at a fixed kVp shall be linear within 15% for a single phase unit and within 10% for a three phase unit. 4. Leakage radiation from the housing shall not exceed 1 mGy (air kerma) in one hour at 1 metre from the focus at every rating specified by the manufacturer. The measurement shall be averaged over an area of 100 cm^2.