D H E C

PROMOTE PROTECT PROSPER

# Dental Systems Inspection
# Division of Electronic Products

Facility Name: Survey Date:

Registration #: Registration Sticker: Variance RHB:

X-Ray Control Manufacturer: Model #: Serial # : Mfr. Date:

Tube Housing Manufacturer: Model #: Serial # : Mfr. Date:

| **X-RAY UNIT TYPE:** | Intraoral | Panoramic | Cephalometric |
|---|---|---|---|
| Room #: | Tube #: | Maximum kVp: | Maximum mA: |

Minimum SSD: _____ cm

Measured Beam Size: _____ cm

Indicated SID (Ceph Only): _____ in/cm

Measured SID (Ceph Only): _____ in/cm

Indicated Beam Size (Ceph Only):
Across: _____ in/cm Along: _____ in/cm

Measured Beam Size (Ceph Only):
Across: _____ in/cm Along: _____ in/cm

Focal Spot to Paper: _____ cm

| Technique Chart Adequate | Focal Spot indicated | Pass Through Interlocked | Visual &/or Audible Exposure Indication |
|---|---|---|---|
| Tube Head Stable | Operator Protection Adequate | Shielding Plan/As-Built Accepted | mA Station<br>Single Multiple |

**EXPOSURE AT SKIN ENTRANCE**

| Projection | Film Type | kVp | mA/ mAs | Time | ESE (mR) | ESE Limit (mR) | mR (Ceph Only) | Focal Spot To Probe |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | | |
| | | | | | | | | |

**BEAM QUALITY (HVL)**

| kVp | mA/mAs | Sec/Pul. |
|---|---|---|
| mm Al | Exposure mR | |
| 2.5 (> 70 kVp) | | |
| 1.5 (≤ 70 kVp) | | |
| 0.0 | | |
| **HVL =** | mm Al equiv. | |

**REPRODUCIBILITY AND LINEARITY**

| **Pre-Set** | | **Measured mR** | | | | |
|---|---|---|---|---|---|---|
| Time | mA/mAs | mR1 | mR2 | mR3 | mR4 | mR/mAs |
| | | | | | | |
| | | | | | | |

**Measured Time/Pulses**

| mSec | Pulses | 1 | 2 | 3 | 4 | |
|---|---|---|---|---|---|---|
| | | | | | | |
| | | | | | | |

**kVp Accuracy**

| **Selected** | **Measured** | |
|---|---|---|
| | | |
| | | |
| | | |

**Inspector(s):** **Date:**

| DENTAL SYSTEMS INSPECTION | REGISTRATION #: | ROOM #: |
|---|---|---|

**CIRCLE ITEMS NOT IN COMPLIANCE:**

**A. TIMER AND EXPOSURE SWITCH**
1. Preset timer terminates exposure - RHB 4.5.3
2. Timer accurate - RHB 4.5.7
3. Timer reproducible - RHB 4.5.3.3

**B. EQUIPMENT**
1. Filtration adequate - RHB 4.3.5
2. Tube head stable - RHB 4.3.8 / RHB 4.5.10
3. Minimum Source to Skin Distance - RHB 4.5.1
4. X-ray beam size - RHB 4.5.2.2
5. Open ended cone - RHB 4.5.2.2
6. Focal Spot Indication – RHB 4.3.10

**C. SHIELDING**
1. Adequate barriers provided - RHB 4.5.11
2. Pass throughs interlocked - RHB 4.5.11.3
3. Shielding – RHB 4.4 (Ceph Only)
4. As-Built Drawings – RHB 4.4.7 (Ceph Only)
5. Area Survey – RHB 4.4.6 (Ceph Only)

**D. TECHNIQUE FACTORS/MACHINE PERFORMANCE**
1. Technique factors indicated - RHB 4.3.9.1
2. Kilovolt indicator accurate - RHB 4.5.7
3. mA stations linear - RHB 4.5.6
4. Exposures reproducible - RHB 4.5.5

**E. SAFETY FACTORS**
1. Visual/Audible indication of exposure - RHB 4.5.4.2.4
2. Technique chart present - RHB 4.2.6
3. Technique chart adequate - RHB 4.2.6
4. Control located in protected area - RHB 4.5.4.2
5. Entrance exposure within specified limits - RHB 4.2.13.2

**F. LABELS AND INDICATORS**
1. Warning label present - RHB 4.3.1
2. Technique factors visible to operator - RHB 4.3.9
3. Multiple tubes labeled at control and tube - RHB 4.5.9
4. Radiation Area Sign (Ceph. Only) – RHB 3.15

**DENTAL ESE LIMITS**

| | D Speed Film/Digital | | E Speed Film | |
|---|---|---|---|---|
| kVp | Recommended ESE | ESE Limit | Recommended ESE | ESE Limit |
| 50 | 425-575 | 340-690 | 220-320 | 176-384 |
| 55 | 350-500 | 280-600 | 190-270 | 152-324 |
| 60 | 310-440 | 248-528 | 165-230 | 132-276 |
| 65 | 270-400 | 216-480 | 140-200 | 112-240 |
| 70 | 240-350 | 192-420 | 120-170 | 96-204 |
| 75 | 170-260 | 136-312 | 100-140 | 80-168 |
| 80 | 150-230 | 120-276 | 90-120 | 72-144 |
| 85 | 130-200 | 104-240 | 80-105 | 64-126 |
| 90 | 120-180 | 96-216 | 70-90 | 56-108 |
| 95 | 110-160 | 88-192 | 60-80 | 48-64 |
| 100 | 100-140 | 80-168 | 50-70 | 40-56 |

**Linearity:**

$$\frac{\text{mR/mAs for first mA - mR/mAs for second mA)}}{\text{(mR/mAs for first mA + mR/mAs for second mA)}} < .10$$

**Timer reproducibility**:
Average time $\geq$ 5 X (Highest time - Lowest time)

**Exposure reproducibility**:
Average exposure $\geq$ 5 X (Highest exposure - Lowest exposure)
Minimum SSD $\geq$ 18 cm
Beam size $\leq$ 7 cm

**Cephalometric ESE Calculation**:

$$\text{ESE} = \frac{(\text{Focal Spot To Probe})^2 \times (\text{mR})}{(\text{Measured SID} - 15)^2}$$

$$\text{ESE} = \frac{(_____\text{cm})^2(_____\text{mR})}{(_____\text{cm} - 15)^2}$$

ESE Limit For Cephalometric: 15-45 mR

**X-Ray systems installed after July 1, 1993, shall have the x-ray control permanently mounted in a protected area, so the operator is required to remain in that protected area during the entire exposure.**

**COMMENTS:**

**Inspector(s):** **Date:** **Violation page attached: Yes ☐ No ☐**

## DENTAL EQUIPMENT INSPECTION FINDINGS

| FACILITY REGISTRATION #: | ROOM #: |
|---|---|

| Violation | Rec. | DESCRIPTION OF VIOLATION/RECOMMENDATION |
|---|---|---|
| **Timer and Exposure Switch:** | | |
| | | **RHB 4.5.3 - Termination of Exposure.** There is no means to terminate the exposure at a preset time. |
| | | **RHB 4.5.7 - Timer Accuracy.** The actual time of exposure varies from the indicated exposure time by more than ten (10) percent. |
| | | **RHB 4.5.3.3 - Timer Reproducibility.** The timer is not reproducing accurately. |
| **Equipment:** | | |
| | | **RHB 4.3.5 - Filtration.** This unit does not have the required aluminum equivalent filtration. |
| | | **RHB 4.5.1 - Minimum Source to Skin Distance.** The minimum source to skin distance is less than eighteen (18) centimeters. |
| | | **RHB 4.5.2.1 - X-ray Beam Size.** The x-ray beam size is greater than seven (7) centimeters. |
| | | **RHB 4.5.2.2 - Cones.** Pointed cones shall not be used. |
| | | **RHB 4.5.9 - Multiple Tubes.** The tube selected for an exposure is not indicated on the control and/or tube housing. |
| | | **RHB 4.3.10 Focal Spot Indication.** The focal spot shall be clearly marked on the tube housing. |
| | | **RHB 4.5.10 - Tube Head Stability.** The tube housing is not stable during exposures. |
| **Shielding:** | | |
| | | **RHB 4.5.11.1 - Primary Barriers.** Primary barriers are not provided. |
| | | **RHB 4.5.11.2 - Adjacent Installations.** Protective barriers are not provided between adjacent rooms or areas. |
| | | **RHB 4.4 Shielding.** There was not a shielding plan submitted, for review and acceptance, prior to installation of this unit. |
| | | **RHB 4.4.7 As-built Drawings.** As-built drawings, indicating the composition of all walls, and placement of the equipment and control, were not submitted for this unit, Log # _____. |
| | | **RHB 4.4.6 – Area Survey.** An area survey; including an as-built drawing and an evalution of the adequacy of each protective barrier, the operator's location, and the film storage area; was not submitted for this unit, Log # _____ . |
| **Technique Factors/Machine Performance:** | | |
| | | **RHB 4.3.9.1 - Technique Factor Indication.** Technique factors are not indicated before an exposure begins. |
| | | **RHB 4.5.11.3 - Pass Throughs.** Pass throughs between adjacent areas are not securely interlocked. |
| | | **RHB 4.5.7 - kV Accuracy.** The actual kVp differs from the indicated kVp by more than ten (10)%. |
| | | **RHB 4.5.6 - mA/mAs Linearity.** This unit is not linear between mA/mAs stations. |
| | | **RHB 4.5.5 - Exposure Reproducibility.** With all technique factors held constant, this unit does not reproduce accurately. |
| **Safety Factors:** | | |
| | | **RHB 4.5.4.2.4 - Indication of Exposure.** Visual and/or audible indication, observable at or from the operator's protected position, shall be provided whenever x-rays are initiated and terminated. |
| | | **RHB 4.2.6 - Technique Chart.** The technique chart does not include the following:<br>☐ Patients anatomical size vs. technique factors.<br>☐ The technique chart does not accurately reflect techniques currently in use. |
| | | **RHB 4.2.13.2 - Exposure at Skin Entrance.** The Exposure at Skin Entrance (ESE) for a _____ exam at your facility was found to be _____ milliRoentgens(mR). This exceeds the ESE limit of _____ mR for this exam. Some means must be found to reduce the radiation exposure to your patients. |
| | | **RHB 4.5.4.2 - Control Location.** The control or remote exposure switch is not permanently mounted in a protected area. |

**Inspector(s):** **Date:**