

Soft X-Ray in ANSI-ESD SP3.5-2020 ESDA Standards

WHAT SOFT-X-RAY IONIZER MEANS

Soft X-ray ionizers are static-elimination devices that use low-energy (typically <10 keV) X-rays to ionize the air, generating a perfectly balanced mix of positive and negative ions. They are widely used in cleanrooms and semiconductor manufacturing because they don't produce ozone or require airflow.

The following is extracted content with approval from EOS/ESD Association, Inc., from ANSI/ESD SP3.5-2020. "For the Protection of Electrostatic Discharge Susceptible Items - Test Methods for Air Assist Bar Ionizers, Soft X-Ray (Photon) Ionizers, Room Ionization Alternatives, and Non-Airflow Alpha Ionizers".

www.esda.org

PERSONNEL SAFETY

4.2 X-Ray and Alpha Radiation Safety

Safe use of X-ray and alpha ionizers is beyond the scope of this document. Users should consult manufacturer's information and regulatory agency documents before using these types of ionizers. The following information is for guidance only.

Consult Osha document 29 CFR 1910.1096 for additional information concerning the safe handling of devices emitting ionizing radiation.

4.2.1 X-Ray

The manufacturer and user shall meet all requirements of 21 CFR PART 1020 and any other applicable government regulations. Typically, government regulations will require the device to be registered at its use location.

The test should be performed inside a safety enclosure, which prevents accidental X-ray exposure to personnel. Typically, this will include some type of enclosure for the X-ray device and electrical interlocking to turn the X-ray device off when the enclosure is opened. See Figure 3 for an example of this safety enclosure. Figure 3 illustrates only the dimensions of the X-ray test enclosure. Information on construction techniques, materials to be used, and operating procedures should be obtained from manufacturers of X-ray ionizers or appropriate standards.

The person performing the tests shall check leakage of the safety enclosure with a radiation survey meter to assure that the leakage level is under safety requirements before performing tests.

Please also refer to Simco-Ion, Technology Group Technical Note (TN-025) - [Photon Safety Considerations](#)

PRODUCT QUALIFICATION PROCEDURES

8.2 Soft X-Ray (Photon) Ionizers

8.2.1 The test should be performed inside the safety enclosure, which prevents accidental exposure to personnel per Section 4.2. See Figure 3 for an example of this safety enclosure.

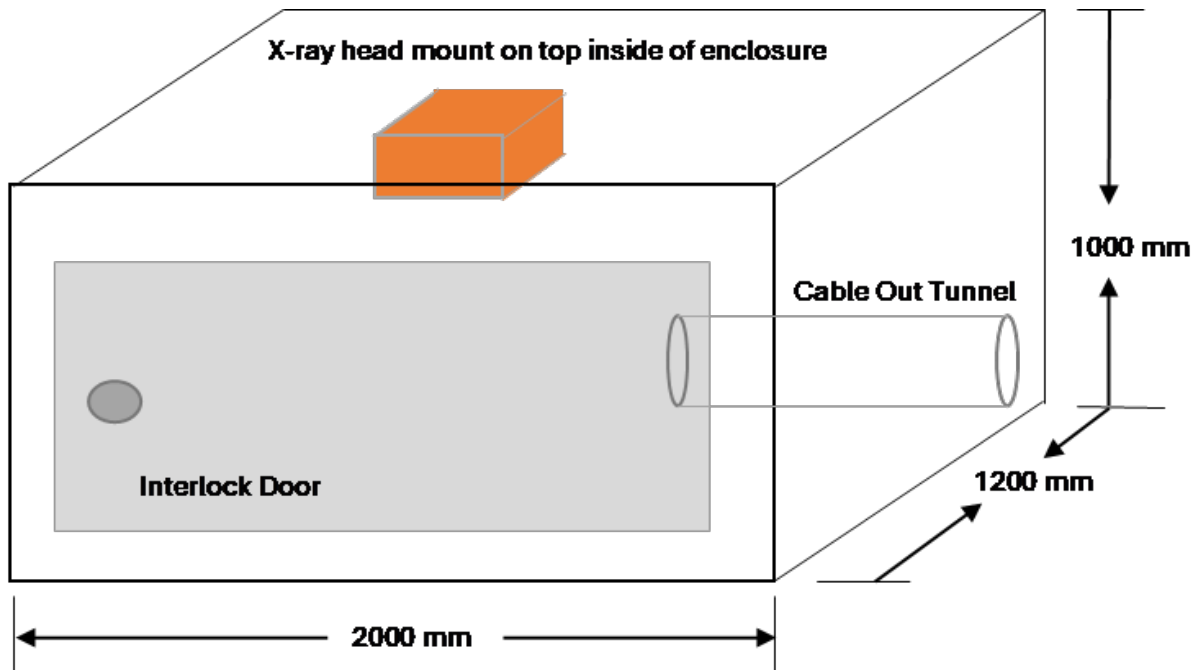


Figure 3: Soft X-Ray (Photon) Ionizer Safety Enclosure

8.2.2 Install the X-ray emitting head at the top center of the safety enclosure according to the manufacturer's instructions.

8.2.3 Turn on the x-ray ionizer. Before performing any tests, authorized personnel shall properly check X-ray leakage of the safety enclosure with a radiation survey meter. Authorized personnel shall determine that the leakage level is within safety requirements.

8.2.4 Discharge time from an initial 1,000 volts to 100 volts final voltage should be measured for both positive (+) and negative (-) polarities.

8.2.5 The tests should be performed using the test setup shown in Figures 4 and 5. Measurements with the CPM should be made at test positions TP1 through TP9, as shown in Figure 4.

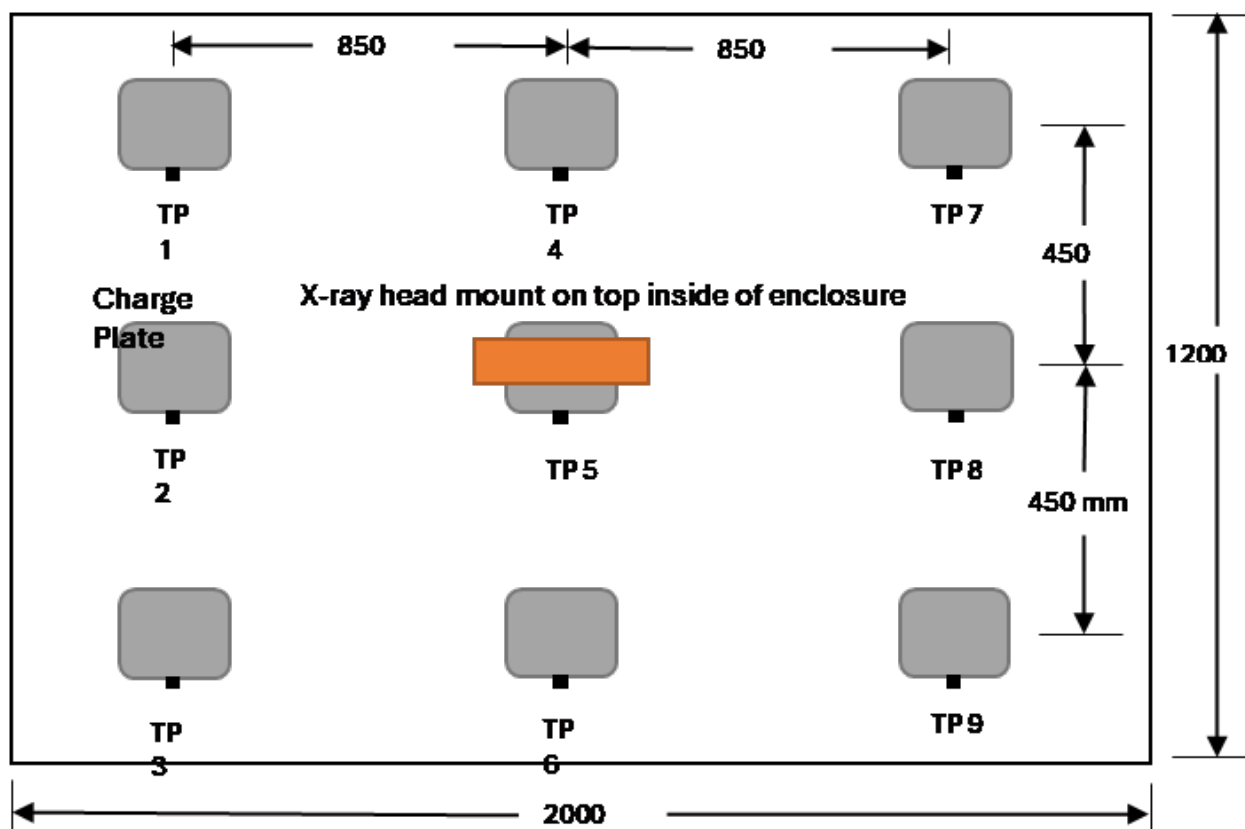


Figure 4: Soft X-Ray (Photon) Ionizer - Top View

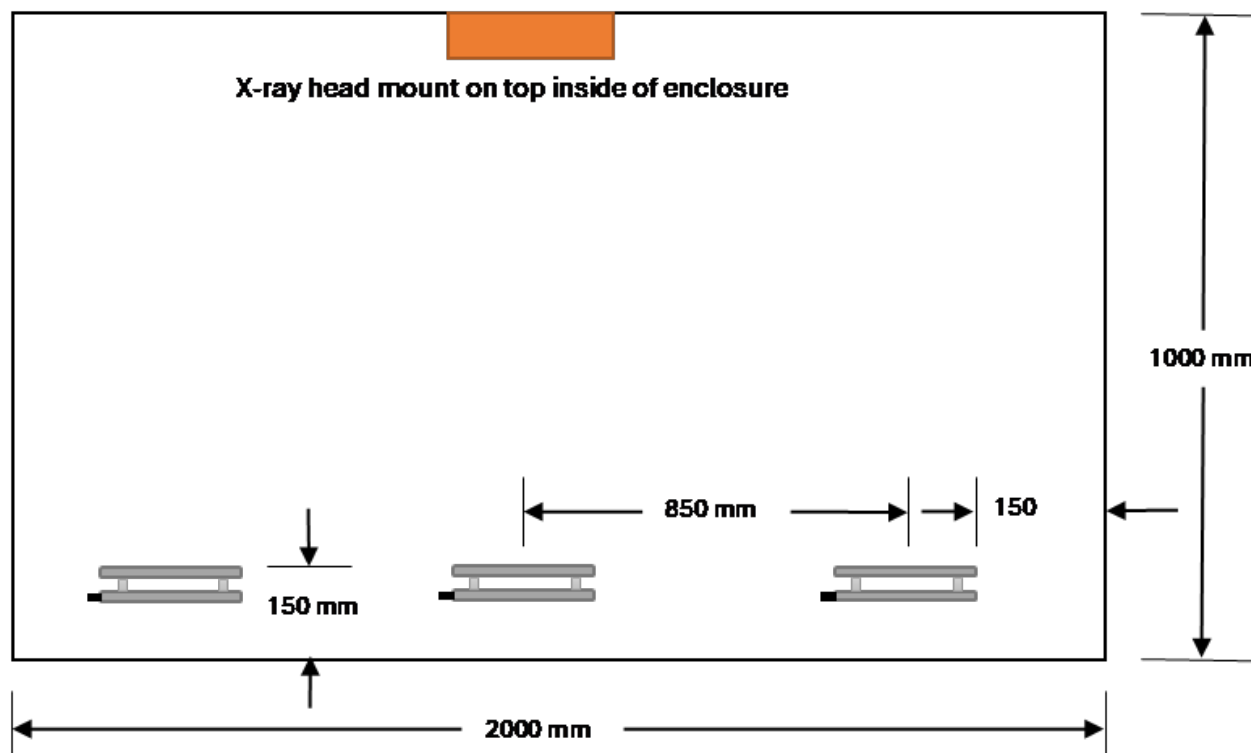


Figure 5: Soft X-Ray (Photon) Ionizer - Side View

8.2.6 Discharge time, as described in Section 7.2, should be measured at the test positions.

8.2.7 Offset voltage, as described in Section 7.3, should be determined at the test positions. Offset voltage should be measured after at least 10 seconds or as necessary to allow the reading to stabilize (maximum of 1 minute).

COMPLIANCE VERIFICATION PROCEDURE

9.2 Soft X-Ray (Photon) Ionizers

9.2.1 The test should be performed inside the application safety enclosure, which prevents accidental exposure to personnel. Typically, this will include some type of enclosure for the X-ray device and electrical interlocking to turn the X-ray device off when the enclosure is opened. See Figure 3 for an example of this safety enclosure.

9.2.2 An example of a test setup for performing periodic verification of soft X-ray (photon) ionizers is shown in Figure 12.

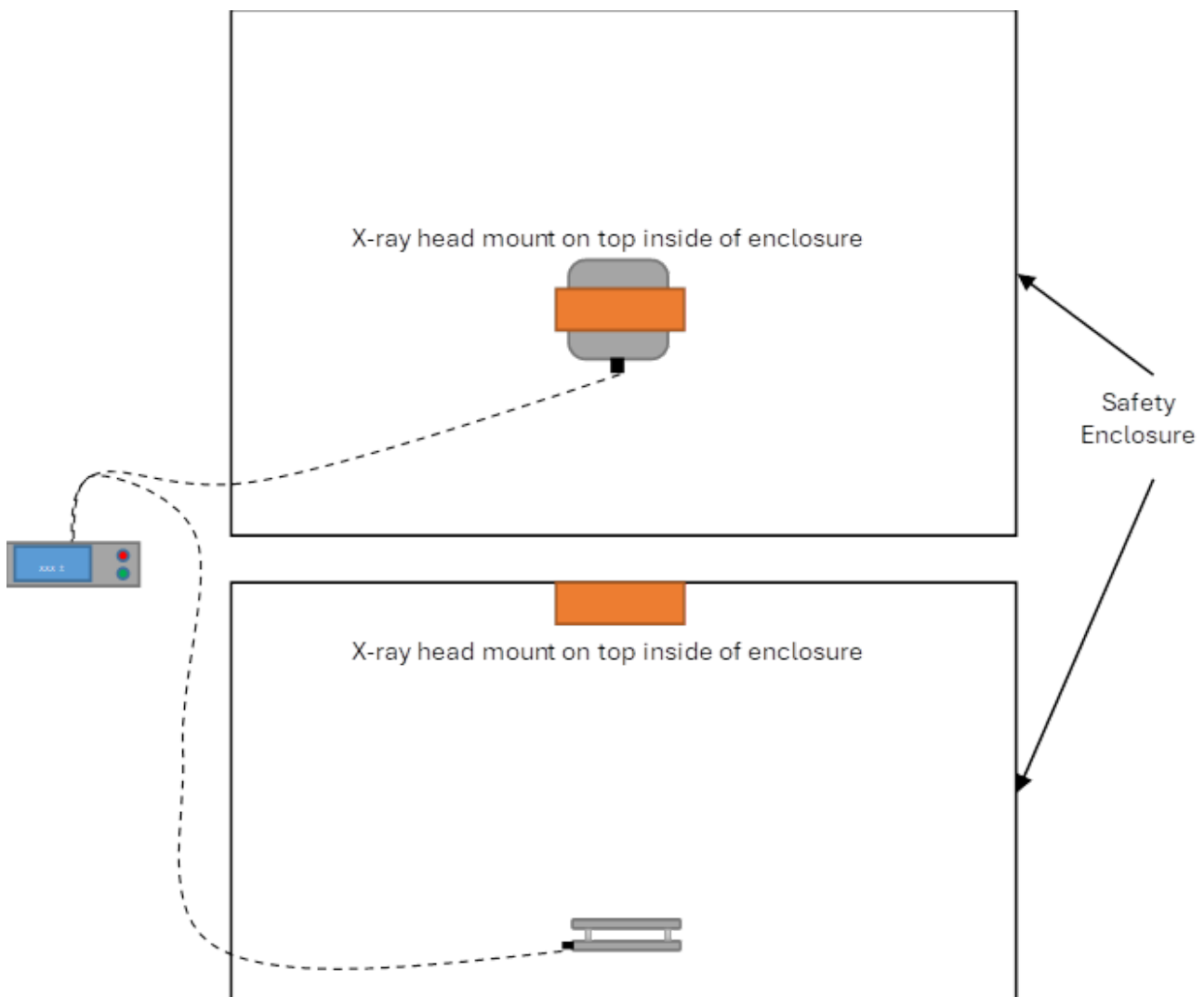


Figure 12: Soft X-Ray (Photon) Ionizer

9.2.3 Measurement of soft X-ray (photon) ionizers should be made in the middle of the application enclosure. The distance between the ionizer and the isolated conductive plate should be any repeatable distance (for example, 610 mm), but a distance that ensures that the ionizer placement is effective. The isolated conductive plate should face the ionizer. Consideration should also be given to the location of critical processes and product placement in relationship to the ionizer source when establishing the measurement location. This location should be recorded during the initial installation of the ionizer.

9.2.4 Discharge time, refer to the EDSA Standard Practice Handbook ANSI-ESD SP3.5-2020 Section 7.2 and should be measured at the test position.

9.2.5 Offset voltage, refer to the EDSA Standard Practice Handbook ANSI-ESD SP3.5-2020 Section 7.3 and should be measured at the test position after reading stabilizes (maximum of 1 minute).

9.2.6 Measurement should be made with the same operating condition as recorded in the initial acceptance process (see Section 8.2).

For more information, please contact Simco-Ion, Technology Group at +1 (800) 367-2452 or Sales Services at +1 (510) 217-0460 or email them at saleservices@simco-ion.com

The full requirements and procedures are detailed in the official [ESDA standard ANSI/ESD SP3.5-2020](#), which can be purchased directly from the EOS/ESD Association.