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1. Safety Precautions:

Safety factors to be considered by users of Exposure Systems:

1. Effects of UV Radiation

Since these sources produce high levels of UV IR radiation, precautions must be taken to prevent looking into output beams or reflections of it, even for short periods. Damage to the eyes and possible blindness can result.

Prolonged exposure to diffused reflection from the output beam (even from illuminated surfaces near the beam) or exposure of even a few seconds to the direct output beam or to the lamp itself, can cause short-wave ultraviolet burns on the skin or outer layers of the eyes (these are similar to severe sunburns- initial symptoms feel like “sand” under the eyelids.)

CAUTION: WHEN OPERATING THE LIGHTSOURCE WITH A BRIGHT OR RELECTIVE SURFACE, WEAR GOGGLES OR SUNGLASSES. NEVER LOOK DIRECTLY AT LAMP OR INTO BEAM. NEVER OPERATE THE LAMP WITHOUT ALL ACCESS PANELS IN PLACE AND SECURE.

1. Lamp Explosion

1.

1. When at operating temperature, the mercury arc lamps have an internal pressure at 35 to 50 atmospheres. Lamps are subject to possible explosion due to (1) aging of the quartz, (2) physical abuse, or (3) lamp temperature (over cooled/high exhaust), (over heated/low exhaust, bad cooling fan or missing lamp heat sink).

* MINIMIZE TORQUE TO THE QUARTZ ENVELOPE DURING LAMP INSTALLATION & REMOVAL.

1. A lamp exploding inside the housing can effect reflector performance, break main 45 degree mirror and occasionally damage some of the elements in the optical integrator assembly.

1. Fingerprints and other contaminants left on the lamp during replacement will cause deterioration of the quartz envelope and can lead to catastrophic lamp failure.

* DO NOT TOUCH LAMP WITH BARE HANDS. CLEAN LAMP WITH EITHER (#1 METHANOL), (#2 ALCOHOL), (#3 ACETONE), UPON INSTALLATION.

1. Ozone Hazards

Do not operate the system without proper room ventilation because lamps produce small levels of ozone, especially during warm up. If ozone generation is a problem, the use of ozone free lamps is recommended.

Call ABM for ozone free lamp information.

1. Electrical Shock

1. Before lamp replacement or working on the exposure system, disconnect input power and check the power supply voltmeter for zero voltage to be sure that the system is fully discharged. Or remove the lamp leads (anode/cathode) from the power supply.

1. Do not turn on power supply or ignite lamp with any exposure system access panels removed.

1. Cooling

DO NOT ATTEMPT TO ALTER THE SYSTEM'S COOLING WITHOUT FIRST CONSULTING ABM. Lightsource cooling fans have been designed to maintain lamps in a comfortable, thermally stable environment (approximately 200 degrees C @ lamp heat sink operating at rated wattage of lamp).

Modification of the cooling could lead to overcooled, unstable operation (low/wavering intensity) or overheating, which produces short lamp life and possible catastrophic failure.

1. Description of Standard UV Lightsource System (350nm-450nm)

This UV lightsource produces an intense, uniform, collimated beam of ultraviolet energy. Radiation from high-pressure mercury arc lamps is collected by a reflector and directed to a 45 degree mirror, optic integrator (fly's eye lens), then reflected toward the 2nd 45 degree mirror and to the exposure area after passing through the collimating lens.

3. Description of Deep UV (200nm-280nm) & Mid UV (280nm-310nm) Lightsources

Deep UV (220-280nm) and Mid-UV (280-310nm) Lightsource Systems differ from the standard system in three (3) ways.

1. The optics are designed for high reflection and transmission at shorter wavelengths. The mirrors are tuned to the wavelength spectral regions desired. All transmitting optics (optical integrator and collimating lens) are made of high transmission (low absorption) quartz materials.
2. The lamp used can be either mercury (Hg), Xenon (Xe), Mercury-Xenon (Hg-He), or Mercury Xenon Plus (Hg-Xe). The selection depends on the wavelength and level of radiation desired. The (Hg) type lamps are anode (+) down while the Xe types are anode (+) up. In all cases, the gold band on the envelope should be down.
3. The electrical system is different for Hg and Xe type lamps. The anode (+) and cathode (-) sides are reversed with Hg and Hg-Xe lamps.

Different power supplies must be used as Hg lamps are higher voltage, lower current, while the Xe lamps operate at a significantly higher current. (Example: the 500W Hg lamp has 65-70 Volts @ 7.7-7.1 Amps while the 500W Xg lamp has 31-36 Volts @ 14-16 Amps).

1. Setup and Alignment

1. Lamp Installation

NOTE: Be sure lightsource power supply is turned off prior to lamp removal and installation.

Xenon-Mercury (Xe-Hg) arc lamps must be operated with cathode (-) down and anode (+) up (a gold band is down). Use the heat sink provided and install by rotating lamp into the heat sink. **Note: Some higher wattage (short arc mercury) UV lamps, 2,000 watts & higher require anode (+) up, cathode (-) down.**

Mercury (Hg) arc lamps must be operated with cathode (-) up and anode (+) down (gold band is down). Always mount proper heat sink on lamp before starting lamp.

1. Thoroughly clean lamp envelope with either (#1 Methanol), (#2 alcohol), (#3 acetone) with lint-free or lab wipes prior to installation.

CAUTION: FINGERPRINTS OR GREASE STAINS LEFT ON THE LAMP DURING OPERATION WILL CONTAMINATE THE QUARTZ ENVELOPE AND CAN CAUSE PREMATURE LAMP FAILURE OR LAMP EXPLOSION.

2. Mount lamp in housing. Remove lamp access panel by removing thumbscrews. Install lamp in brass mount through opening in reflector. Install ignition wire to lamp base and secure with nut.
CAUTION: IF LAMP INSTALLATION IS REVERSED (anode/cathode), LAMP WILL NOT BE STABLE (voltage/current ratings will be out of specification) AND LAMP COULD EXPLODE.

1. Secure lamp access panel with thumb screws.

1. Electrical Installation (verification / initial system installation)

1. With the cables supplied, connect the positive (+) housing lead to the positive (+) terminal of the power supply output. Connect the negative (-) lamp housing lead to the negative (-) terminal on the power supply.
2. Connect other cables accordingly. 7-pin, male (to shutter timer or mask aligner timer) 3-pin, male (to lamp power supply, cooling fan power), 3-pin, female (feedback sensor, C/I operation).
3. Connect power supply line cord to proper voltage AC inlet.
4. Recheck all connections and connectors to be certain they are secure. Also check that both sides of power supply are in a position where the cooling air flow will not be restricted.

1. Alignment (lamp focusing), Required For All Installed Lamps

1. After the lamp has been operating long enough to stabilize (5 to 10 minutes), place a suitable ultraviolet sensitive sensor (such as the ABM Model 150 Digital Power Meter) in the center of light beam. **(Make sure power supply is operating in C/P mode only).**
1. Remove access panel to lamp focus assembly. Using the vertical adjustment (Z motion) wheel, raise (or lower) the lamp until the light sensor indicates maximum intensity.
1. Turn the other horizontal (X,Y) lamp adjustments (one at a time) in either direction until maximum intensity is achieved.
4. Move sensor from side-to-side, front-to-rear (within specified uniform beam size), to check uniformity. Adjust horizontal (X,Y) knobs until uniformity is achieved (+ / - 3 to 5%). Uniformity formula: difference between high & low intensity, divided by low intensity, divided by 2 x 100.
5. Repeat step 2 with vertical lamp adjustment for final output verification.
6. If a lower intensity is desired, the lamp can be lowered (turning Z wheel counter clockwise) without significantly affecting uniformity of light beam.

1. Lamp Replacement

1. Lamps used are typically rated by the manufacturer for 400-600 hours of operation.

CAUTION: CATASTROPHIC FAILURES INCREASE WITH NUMBER OF LAMP STARTS AND EXCESSIVE INPUT POWER TO THE LAMP.

1. To replace a lamp, refer to Section 4 (Setup and Alignment) and follow all steps.