



Hazard Alert for Ultraviolet Germicidal Lamps Used in Air Handling Units

FACT SHEET 24-013-0316

Introduction: In areas where high humidity is common, buildings tend to have problems with mold and bacteria growth in their heating, ventilation and air conditioning systems. The mold and bacteria tend to grow on cooling coils and drain pans, contaminating the air and reducing air flow. These problems are often solved using ultraviolet (UV) germicidal lamps in the buildings' air handling units (AHUs). The UV radiation from these lamps can cause eye and skin injuries, but can be used safely when they are installed properly and workers take appropriate precautions.

What is UV radiation? UV radiation, like visible light, is a type of electromagnetic radiation. UV radiation is present in sunlight, in mercury vapor lamps, in welding and cutting arcs, in tanning lamps, and other types of lamps.

How is the UV radiation in germicidal lamps different from the UV radiation in sunlight?

The solar UV radiation that reaches the Earth is mainly in the UV-A and UV-B range (UV-A: 315 nm – 400 nm, UV-B: 280 nm – 315 nm). UV germicidal lamps emit mainly at 254 nm in the UV-C range (UV-C: 100 nm – 280 nm), which is not visible, and also some visible blue and violet light. The most widely-used UV germicidal lamps are "ozone free" low-pressure mercury vapor lamps.

What is the hazard from the UV radiation in germicidal lamps? Safety limits can be exceeded with even a brief exposure. The UV-C radiation from germicidal lamps can cause a corneal swelling (i.e., photokeratitis, also known as "welder's flash"). The feeling can range from a minor "foreign body" sensation to significant pain. It may also cause skin erythema, more commonly known as "sunburn." Though painful, these symptoms are usually gone within 24-48 hours with no lasting effects afterward.

The fact that many UV germicidal lamps look like common fluorescent lamps, and are usually not visibly bright, tends to lull workers into complacency and increase the risk for injury. Again, the hazardous UV radiation is not visible.

Can UV-C radiation increase my long-term risk for skin cancer or cataract? In theory? Yes. But is it a realistic risk compared to the UV radiation from sunlight? No.

UV-C radiation is considered a cancer risk for the same reasons that it is an effective germicidal agent. But, UV-C radiation doesn't penetrate the skin and eye tissues nearly as deeply as the UV-A and UV-B radiation in sunlight. Solar UV radiation is a source of much greater risk, and people are exposed to sunlight on a daily basis.

The International Agency for Research on Cancer and the International Commission on Illumination both maintain that the main source of UV-related risk for skin cancer and cataract is exposure to outdoor sunlight.

What control measures are recommended?

Engineering controls are preferred. Workers shall:

- (1) Ensure that only "ozone free" UV lamps are used in the AHUs.
- (2) Install on/off switches with clear labels.
- (3) Install interlocks for access panels, to cut power to the UV lamp when the access panels are removed.
- (4) Install plastic spy holes in order to warn workers if the lamp is operating. These will not transmit UV-C radiation, but will allow workers to spot the lamp's bluish/purple glow.
- (5) Add warning labels and signs to identify the hazard and inform workers.
- (6) Dispose of the UV lamps in the same manner as workplace fluorescent lamps.



Figure 1. Air handler unit with UV germicidal lamp inside, showing appropriate warning signs.



Figures 2-3. Close detail of the warning labels used on the air handler unit in Figure 1.

Administrative controls are also recommended:

- (1) Standing operating procedures (SOPs) should be developed that explain the hazards, outline the control measures, and provide methods to report accidents or defective equipment.
- (2) Education and training. All workers who might gain access to the lamps should be informed regarding the hazard and trained in the SOPs.
- (3) Authorized operators only. Only workers who have received the proper training should be allowed to work with air handler units that have UV germicidal lamps.

Personal protective equipment is recommended when exposures cannot be avoided:

- (1) To protect the eyes, use UV-protective face shields. Face shields using common plastics and glass will provide adequate protection.
- (2) To protect the skin, use face shields, gloves (e.g., work gloves, nitrile gloves), and clothing with tightly-woven fabrics.

Where can I get additional information, or report a suspected overexposure? In the event of a known or suspected overexposure, contact the following as soon as possible after getting the accident victim immediate medical attention:

- (1) Your installation radiation safety officer.
- (2) The Army's Nonionizing Radiation Program at DSN 584-3932; commercial (410) 436-3932.
- (3) The Army's Tri-Service Vision Conservation and Readiness Program at DSN 584-2714; commercial (410) 436-2714.