

An intolerable rise in body temperature, as well as localized damage, can result from an exposure of sufficient intensity and time. In addition, flammable gases and vapors may ignite when they are inside metallic objects located in a microwave beam.

Power intensities for microwaves are given in units of watts per sq cm. Areas having a power intensity of over 0.01 watt per sq cm should be avoided. In such areas, dummy loads should be used to absorb the energy output while equipment is being operated or tested. If a dummy load cannot be used, adjacent populated areas should be protected by adequate shielding.

Infrared radiation does not penetrate below the superficial layer of the skin so that its only effect is to heat the skin and the tissues immediately below it. Except for thermal burns, the health hazard is negligible.

Excessive exposure of the eyes to radiation, mainly visible and infrared radiation, from furnaces and similar hot bodies has been said for many years to produce "glass blower's cataract" or "heat cataract." This condition is an opacity of the rear surface of the lens of the eye. It was first reported among the hand blowers of glass in England in 1903 and became compensable in England in 1908.

An investigation (see Karl L. Dunn in "References") conducted in an old plant producing borosilicate glass, where the heat exposure is much higher than it is in the production of the soft glasses on which heat cataract was first observed, failed to show any cases, although many of the employees have been exposed to the work for more than thirty years.

Although this investigation concerned only one company and too small a number of employees to be conclusive, the exposure was at least double that in the soft glass works from which the original reports were made, and the exposures of many of the workers had been long enough to throw a good deal of doubt on the production of the condition in the modern glass industry.

This doubt should not, however, be permitted to obscure the necessity for the provision of proper eye protection for men exposed to high visible glare, which is usually so intense as to require the employee to wear protective goggles.

Routine, low-temperature operations emit-

ting little visible light may be encountered, attention to eye protection must also be given.

Visible radiation and ultraviolet radiation also do not penetrate appreciably below the skin, their effects are essentially heating on the surface. The effects of the ultraviolet waves are much more violent than are those of the visible or infrared—a severe burn can be produced with no warning whatever and significant damage to the lens of the eye can occur from excessive exposure.

Since ultraviolet radiation in industry may be found around electric arcs, they should be shielded by materials opaque to the ultraviolet. Opacity in the ultraviolet has no relation to opacity in the visible part of the spectrum. Ordinary window glass, for instance, is almost completely opaque to the ultraviolet although transparent to the visible. A piece of plastic dyed a deep red-violet may be almost entirely opaque in the visible part of the spectrum and transparent in the near ultraviolet.

Electric welding arcs and germicidal lamps are the most common strong producers of ultraviolet in industry. The ordinary fluorescent lamp generates a good deal of ultraviolet inside the bulb, but it is essentially absorbed in the glass bulb and its fluorescent coating, although mild skin irritation from fluorescent lamps that burned within a few inches of the skin during a full day for several days has been reported.

The most common exposure to ultraviolet radiation is from direct sunshine. Men who continually work outdoors in the full light of the sun may develop tumors on exposed areas of the skin, and these tumors occasionally turn malignant.

Ultraviolet radiation from the sun also increases the skin effects of some industrial poisons. After exposure to compounds such as cresols, the skin is exceptionally sensitive to the sun. Even a short exposure in the late afternoon when the sun is low is likely to produce a severe sunburn. There are other compounds which minimize the effect of UV-rays. Some of these are used in certain protective creams.

Lasers

Lasers emit beams of coherent light of a single color or wavelength and frequency,