

General and Comfort Ventilation

is very severe heat strain, which only a small percentage of the population may be expected to sustain. An HSI of 100 is the maximum strain that can be tolerated daily by fit, acclimatized young men. These evaluations of the HSI are for 8-hour exposures. The physiological strain and discomfort may be much less for shorter exposures.

J. S. McKarnes and R. S. Brief (see "References") have published nomographs for estimating the heat stress index.

Control of radiant heat. Ventilation does not control radiant heat. No number of fans circulating air in a work space will reduce the radiant heat load on a person. Control comes only from

- 1 Reducing the temperature or thermal emissivity of the infrared source
- 2 Installing shields which will set up infrared "shadows" for men to work in
- 3 Providing personal protective clothing which is infrared-reflecting

Wherever possible, conductive heat insulation should be applied to sources whose temperature cannot otherwise be lowered. This reduces the surface temperature, and so diminishes the radiant heat emitted.

However, heat is sometimes an inherent part of the operation or product, and its temperature cannot be lowered. For example, a red-hot ingot of steel, or molten glass, or a heat-treat bath must be at a certain high temperature. Then shields or clothing are the answer.

Shields have been commonly used for years, as illustrated by the variety of sheet iron, boiler plate, asbestos mat, and wooden shields which can be found in most hot plants. However, these materials are good absorbers of radiant heat. They get hot and reradiate to the men working on the "cool" side. Such shield materials are unwisely chosen. The following will yield better results.

- Reflective screens or shields made of corrugated or flat aluminum sheets (commercial siding and roofing). Polished copper, nickel, and chromium are also good, but of course are impractical because of cost. Tinplate and new galvanized iron are satisfac-

tory, but tend to tarnish fairly rapidly and then become ineffective. Excellent screens are made of aluminum foil, and foil backed by a supporting board such as gypsum board. If the foil becomes blackened or torn, it is easy to paste a new piece over the board. It is important to realize that the reflection is a surface phenomenon. It does not matter how thick the aluminum is. To have reflecting surface is vital, and so the aluminum should never be covered or embedded in anything.

- Heat exchanging screens can be made of iron or steel and can be water cooled. The heat absorbed by the screen is removed from the area by a film of water flowing over the metal.

- Absorbing screens are a possibility only if they are covered with thermal insulation to keep their "cool" side from getting hot and reradiating to the men.

- Transparent screens can be made of glass. They may be (a) heat-absorbing glass, or (b) heat-reflecting glass. Ordinary flat glass absorbs long wavelength infrared fairly well, there also are special glasses that accent this property. They all, however, get hot and reradiate copiously. Heat-reflecting glass has a thin permanent coating that does an admirable job of reflecting heat, while still being thoroughly transparent to light. Glass windows should be heat-treated. Wire mesh can also be used as a semitransparent screen. Screens must be tailor-made for each operation. Sometimes they can be attached permanently to a hot surface, with a gap between it and the shield. The width must be sufficient to allow air movement for removing heat by convection.

Such an arrangement is generally much cheaper than conductive insulation and does not upset the heat balance of the equipment—which is important for furnaces, annealing ovens, and the like. Sometimes the screens have to be movable to provide access to the equipment. Then they can be hung from above with hooks, and hinged. One plant uses overhead aluminum garage doors to open large control areas quickly. At some operations vertical standing screens on legs or wheels, or folding screens, fill a need.