moist industries. The extent to which such direct measures can be applied varies with the nature of the hot process but, obviously, elimination of all heat escaping to the environment is the most desirable action. As concern with the heat problem increases, interest in direct control at the source goes up; greater efforts are being made to isolate hot processes, and a growing tendency is seen to locate such equipment out of doors with only a roof shelter.

2. *Radiation Shielding*

Shielding against radiant heat is a primary measure for control of exposure but until recently it was not generally employed. It has the flexibility that insulation lacks and can be designed to protect the exposed person *rather than* to minimize escape of heat from the hot body. *Reflecting* shields made of aluminum foil backed by insulating board or aluminum sheets may be employed. The substantial benefits from radiation shielding are demonstrated by the data[9] in Table 3. Such experimental results have led to extensive application of shielding in

TABLE 3

Reduction in Radiation by Screening
(Single sheet of aluminum foil)

Test location	Heat exchange by radiation (B.t.u./hr.) Without screening	With screening	% reduction in radiation
D4	2600	900	65
D6	2240	775	65
D7	1440	500	65
D10	2450	1010	59
D12	1460	560	62
D15	1850	775	58
D16	3150	825	74
A11	3525	1275	64
A12	2000	980	51
A14	2670	820	69
A15	1850	800	57

glass plants and other hot-dry industries. *Absorbing* shields of ordinary sheet steel also may be used. The radiant heat is absorbed and largely converted to convective heat with some re-radiated at a lower temperature. Absorbing shields may be constructed of two or three sheets separated by air spaces. Insulating materials are even better since the radiation temperature on the shielded side will be lower than on the hot side. *Water-cooled* shields absorb the heat, which is carried away with the water. *Transparent* shields are required where the view of the operation cannot be interrupted. For this purpose, chains may be employed to reduce the radiation in proportion to the area intercepted, and wire mesh screens are also

effective in the same way. Special heat-reflecting glass is available for windows in observation rooms and the like.

The radiant energy impinging on employees at most work locations is not uniformly distributed. It comes to them in concentrated amounts from certain directions with relatively little contribution from other quarters. The principal sources may be obvious so that shields can be interposed at the most effective points about the exposed persons. In other instances, it will be desirable to study the horizontal distribution of radiation intensity about the work station to determine the direction of major concern. For this purpose a directional radiometer is used,[18] which yields results as illustrated in Figure 4.

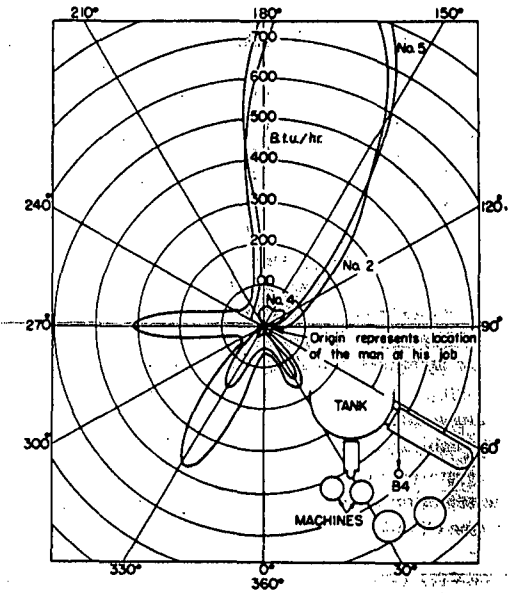

Figure 4. Variation in distribution of radiant heat intensity around work station in forming department of glass factory. (After Haines.[18])

3. *Local Exhaust Ventilation*

Canopy hoods with natural-draft or mechanical-exhaust ventilation are in common use over furnaces and similar hot equipment. The benefits are obvious, although it must be remembered that heat control by ventilation serves only to

[18] G. F. Haines, *Analysis and Control of Hot Environments*. Industrial Hygiene Foundation of America, Pittsburgh, Pa., April, 1950.