Heat Output Diagram

Heat output diagram for Type BN-4 ventilating heater (1 kcal = 3.96 BTU)

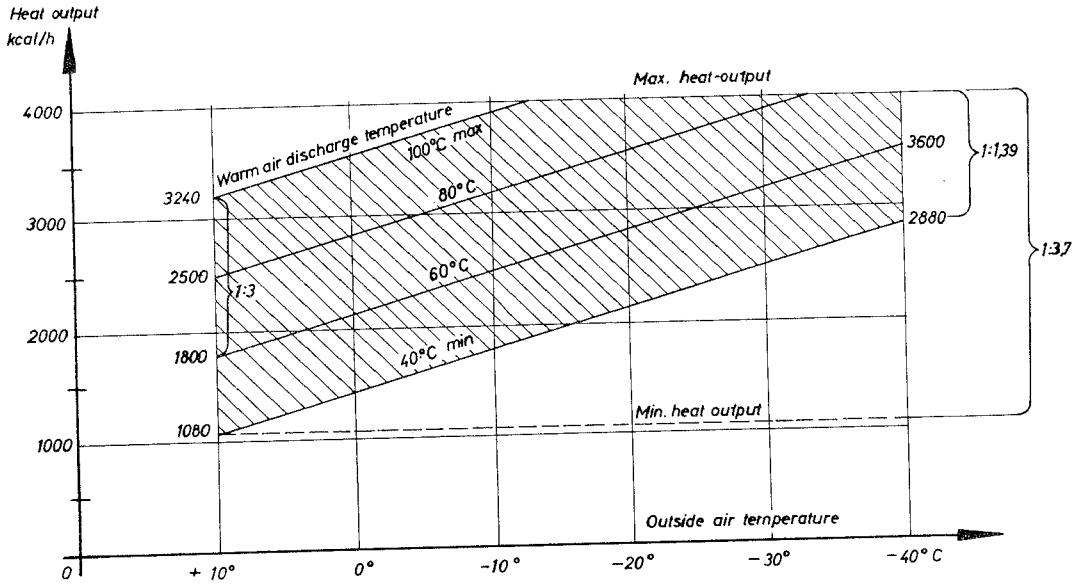

Fig. 1

Explanatory notes to the heat output diagram

The above heat output diagram shows the temperatures of outside air prior to heating, from $+10^{\circ}$ C to -40° C (X-coordinate), and the rate of heat output up to 4000 kcal/h (Y-coordinate). The diagonal lines in the diagram represent values of constant discharge air temperature from 40° C to 100° C. As may be seen, the diagram shows a limit of maximum heat output of 4000 kcal at the top of the diagram. The minimum heat output is 1080 kcal with a discharge air temperature of 40° C at an outside air temperature of $+10^{\circ}$ C. Accordingly, this represents a maximum variability ranging from 1080 to 4000 kcal, or a ratio of 1:3.7. Variability range at -40° C is 1:1.39, i.e., 2800 to 4000 kcal. The indicated discharge air temperatures apply only to readings obtained at the heater since a temperature drop occurs during the transfer of the heated air to the car's interior.

Fresh air flowing at the rate of 150 kg/h, at an outside temperature of $+10^{\circ}$ C, will receive a maximum of only 3240 kcal because a top limit of 100° C is set for the heated air discharge temperature. The maximum transfer of heat to ventilating air occurs at an outside temperature of -11° C. The heat output of 4000 kcal remains constant at lower outside air temperatures, and decreases to 3240 kcal at higher outside air temperatures of between -11° C and $+10^{\circ}$ C. At 0° C outside air temperature the heat output is 3600 kcal with a heated air temperature of 100° C. The decrease in generation of heat at rising outside air temperatures is of an advantage inasmuch that less energy is required to heat warmer outside air.

The diagram is based on an air flow of approximately 150 kg/h, a maximum temperature differential of 110° C, and a maximum heat output of 4000 kcal/h, with warm air discharge temperature variability ranging from 40° C to 100° C.