

combinations. A relationship between pulse rate and time was established for this purpose, viz.,

$$P(t) = P_1(1 - e^{-Kt}) + P_0; \text{ where } P_0 \text{ is resting pulse rate; } P(t) \text{ is pulse rate at any time } t \text{ and } P_1 \text{ and } K \text{ are constants relating to acclimatization and work duration respectively.}$$

The parameter K , which reflected the degree of cumulative fatigue during successive cycles of activity, was related to the percentage rest pause (with respect to the work period); both linear and non-linear relationships were examined for varied thermal and workrate conditions. The conjugate gradient method was used to minimize the functions, thereby establishing optimum rest pauses for specific grades of activity.

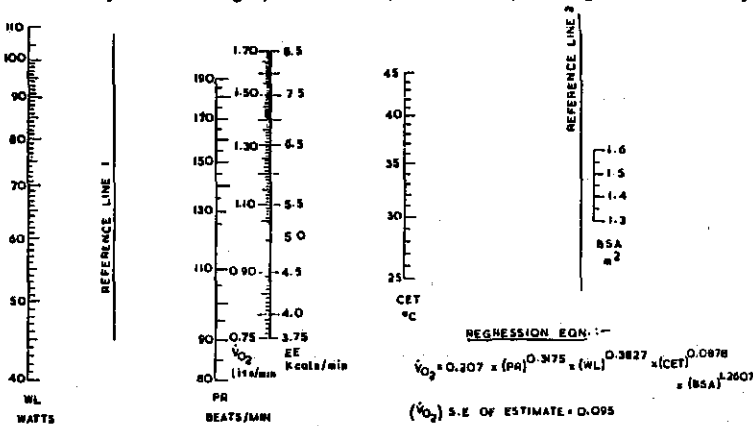


FIG. 5.2.17 ESTIMATION OF METABOLIC RATE FROM WORK LOAD, PULSE RATE, CET & BSA.

64 Laboratory evaluation of ISO 7243. A method for assessing heat stress based on the WBGT index

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The Wet Bulb Globe Temperature (WBGT) index is now widely used as a simple method for assessing the effects of heat stress on workers and military personnel. The index forms the basis of the method for estimating the heat stress on working man which is presented in ISO 7243 (1982). This international standard presents limiting values of the WBGT index for a range of activities and for acclimatized and unacclimatized workers. The laboratory experiments which are reported in this study investigated whether the limits which are presented in ISO 7243 (1982) will protect workers from unacceptable heat stress.

Eight unacclimatized male subjects each attended four experimental sessions. The conditions for each experimental session were different, however they were selected so that they would produce equivalent heat stress and also be acceptable to subjects according to the ISO 7243 (1982). The conditions during the four experimental sessions included both steady state and changing thermal conditions and work rates. Subjects' aural temperature, sweat loss and subjective reports were used to assess the thermal strain on the subjects. Metabolic rates were also measured.

The results showed that, based on aural temperatures, for almost all conditions the subjects were protected. However, environments which should produce equivalent heat stress according to the ISO 7243 (1982) did not produce equivalent heat stress on subjects. A problem with use of the standard is in the estimation of metabolic heat production. For a particular task there are large individual differences and this may lead to an incorrect selection of a WBGT limit for a particular application.