Diode sensitivity variations with temperature (SVWT) have been reported to vary from small negative values up to 0.6 % per ^{o}C [1]. Thus, it is possible for diode calibration factors established at room temperature (~20^{o}C) to yield errors in the range of –1% to +7% when diodes are placed on a patient's skin (~32^{o}C) for *in vivo* entrance dose measurements. There are currently no accepted protocols that account for or predict diode temperature change when placed on a patient for radiotherapy. In this study, we examined the heat transfer process and the establishment of thermal equilibrium for both hemispherical and cylindrical diodes. We simulated several skin temperatures using a temperature-controlled aluminum surface in contact with a section of superflab. The *internal* temperatures of several diodes with different buildup thickness were monitored as a function of time. Our results indicate that for different combinations of room temperature (18^{o}C-24^{o}C) and patient skin temperature (30^{o}C-35^{o}C) diodes reached 90% of their equilibrium temperature within 3-8 minutes. In addition, the range of typical skin temperatures was determined by measurements performed on a population of volunteers under clinical conditions. Based on the results of our experiments a protocol was developed to minimize the temperature based errors for *in vivo* dosimetry.

[1] Grusell E, Rikner G, Physics in Medicine and Biology, **31**(5): 527-534 1986