Problem 2 (Taken from Incropera and Dewitt - *Introduction to Heat Transfer*)

Two long copper rods of diameter $D = 10$ mm are soldered together end to end, with solder having a melting point of $650 \, ^\circ C$. The rods are in air at $25 \, ^\circ C$ with a convection coefficient of $10 \, \text{W/m}^2\cdot^\circ\text{C}$. What is the minimum power input needed to effect the soldering?