The effect of viscous heat dissipation (VHD) in raising the temperature field of incompressible oscillatory air flow is studied numerically. A threshold is established for when the viscous heat dissipation term in the thermal energy equation changes or does not change the temperature field for the case of oscillatory air flow in a tube connecting two reservoirs. This new criterion has not been specified clearly in earlier oscillatory flow research. According to the defined threshold and when VHD is important, the effect of dissipative bulk heating can be described by a proposed correlation in terms of Womersley number (Wo) and axial tidal displacement (ΔZ) of the oscillatory fluid. These results are determined using two-dimensional (2D) numerical simulations of laminar oscillatory air flow (Pr=0.7) for different adiabatic unconductive tube-reservoirs' systems configurations over a wide range of oscillatory frequencies and tidal displacements. It is found that the low amount of fluid kinetic energy, which is converted into internal energy, is not sufficient to significantly heat up the fluid at a low rate of the viscous work. Therefore, the effect of viscous heat dissipation in oscillatory air flow can be ignored only below a specific limit of unsteadiness depending on Womersley number and axial tidal displacement. Also, the results showed that the VHD becomes more significant with increasing (Wo) and (ΔZ)..