The air in a strong column thermal, heated initially by contact with the ground, is rising at a constant speed of $V = 10\,\text{m/s}$. The conditions inside the column at point 1 near the ground are $T_1 = 300\,\text{K}$ and $p_1 = 10^5\,\text{Pa}$. Use $R = 287\,\text{J/kg K}$, $c_p = 1004\,\text{J/kg K}$. Assume the column flow has negligible friction with the surrounding air.

a) Using the convective total enthalpy equation $Dh_0/Dt = \ldots$ along the column thermal, determine the change in the h_0 from a point 1 at ground level to a point 2 at $1000\,\text{m}$ altitude. Determine the corresponding change in static temperature $T_2 - T_1$.

b) Explain why the flow along the column is isentropic.

c) Determine the density change $\rho_2 = \rho_1$ inside the column, and the ratio of column's cross-sectional areas A_2/A_1.