Thermodynamics list 1

1. The manometric pressure of a gas in a tank is $p_m = 0{,}5MPa$. The ambient pressure is $p_0 = 750mmHg$. Calculate the absolute pressure of a gas in the tank. The specific gravity of mercury $\gamma_{Hg} = 132\ {}^{N}/_{dm^3}$. Present all mentioned pressures on a graph.
2. Calculate the dynamic pressure (p_d) of a gas with density of $\varrho = 0{,}8\ {}^{kg}/_{m^3}$, flowing through a pipeline with diameter of d=200mm. The volumetric gas flow rate is $\dot{V} = 0{,}5\ {}^{m^3}/_{S}$.
3. Calculate air velocity in a pipeline of diameter d = 200 mm, if the static pressure $p_s = 1000Pa$, and total pressure $p_t = 1100Pa$. The air density is $\varrho = 1{,}195\ {}^{kg}/_{m^3}$.
4. Calculate the air velocity knowing that $\dot{V}_0 = 2000\ {}^{um^3}/_{h}$. Calculate the dynamic pressure (p_d) if t=500°C, p=2 bar, air density in standard condition is $\varrho = 1{,}29\ {}^{kg}/_{m^3}$, pipeline diameter is d=250mm.
5. The air with temperature of t=100°C , static pressure of $p_s = 500mmH_2O$ and dynamic pressure of $p_d = 20mmH_2O$ flows through a pipeline with diameter of d=0,5m. Calculate volumetric, and mass flow rate if the ambient pressure is $p_0 = 750mmHg$, air density in the standard condition is $\varrho = 1{,}195\ {}^{kg}/_{m^3}$.
6. Calculate the volumetric flow rate and the static pressure of gas with a density of $\varrho = 1{,}4\ {}^{kg}/_{m^3}$ flowing through a pipeline with diameter of d=0,2m at speed of $v = 20\ {}^{m}/_{S}$ knowing that the total pressure is $p_t = 0{,}01\ bar$.
7. Calculate the height of manometric liquid with density of $\varrho = 850\ {}^{kg}/_{m^3}$ if the barometric pressure is $p_0 = 1000hPa$ and the absolute pressure is p=1,5 bar.
8. The manometric pressure of a gas in a tank is $p_m = 0{,}5Mpa$. The ambient pressure is $p_0 = 745mmHg$. Calculate the absolute pressure of a gas in the tank. The specific gravity of mercury $\gamma_{Hg} = 132\ {}^{N}/_{dm^3}$.
9. Calculate the absolute pressure of a gas in a tank if the liquid column manometer height is h = 500 mm, density $\varrho = 1240\ {}^{kg}/_{m^3}$, and the ambient pressure $p_0 = 1\ bar$.
10. The total pressure of a gasoline, measured by means of Pitot tube is $p_t = 60mmHg$, the static pressure is $p_s = 0$. The ambient pressure is $p_0 = 1045hPa$. Calculate the velocity of gasoline.