Name _____ **TDP-504**

Date _____ **Duct Design, Level 1 Fundamentals**

1. The total pressure of the air moving within a duct is made up of two separate components. Name them.

   _____

2. The total pressure within the duct always decreases in the direction of airflow. Which of the following statements best describes the relationship between the static and velocity pressures?
   a) Static pressure always decreases, while the velocity pressure changes with the velocity of the air in the duct.
   b) Static and velocity pressure both decrease along with the total pressure.
   c) Velocity pressure changes with the velocity of the air in the duct, and the static pressure changes in the opposite direction to the velocity pressure change.
   d) They both decrease because of the friction in the duct.

3. True or false? Fan selection is commonly based on the total static pressure across the fan, even though the total pressure difference is what the fan must work against, because the inlet velocity pressure is so small that we don't bother to include it in the calculation.

   _____

   _____

4. The potential energy component of the air within a duct is also called _____ pressure.

5. The early steps in the duct design process are directed at gathering data and calculating requirements so the ducts can be sized. List the following steps or tasks in the order they normally occur. _____

   a) Determine the number of zones to be fed by the duct system being designed.
   b) Select the duct material, shape and amount of insulation to be used in the design.
   c) Perform cooling and heating load estimates.
   d) Determine the various space, zone and block airflows.

6. Similarly, place the following duct design criteria in their relative order of importance.

   _____

   a) Air friction loss
   b) Codes and standards requirements
   c) Installation cost
   d) Space availability
   e) Noise level
   f) Duct heat transfer and airflow leakage

7. True or false? Since ductwork is usually the biggest service in the ceiling plenum, other services need to use whatever space is left over after the ducts, terminals and fittings are laid out.

8. Noise can best be designed out of a duct system by which of the following methods?

   a) Place balancing dampers upstream from filters
   b) Put diffusers in the trunk ducts so balancing dampers are needed
   c) Keep velocities within recommended ranges
   d) Place silencers in the ducts upstream of the diffusers
   e) Line short runouts
   f) Don't use turning vanes because they cause air turbulence

9. A variable air volume system, with fan total static pressure of 3.25-in. wg, requires seal class _____, which requires sealing all _____ joints and _____ seams.

10. A lined 24 x 12 sheet metal branch duct (1/2-in. acoustic lining) in a school is carrying 1800 cfm. The designer is worried about excessive static pressure loss. Should he change the size? Explain your answer.

11. A round trunk (main) duct needs to carry 2500 cfm. Without exceeding the 1600 fpm maximum recommended velocity, what is the smallest size that can be used? What is the shallowest rectangular size that can be used without violating the recommended maximum aspect ratio?

12. To complete the quiz, determine the required fan total static pressure (TSP) for the duct system partially shown in Figure 4 of the book. The following system description should be adequate for you to fill in the missing pieces and follow Design Steps 5 thru 9. Make assumptions when in doubt. Show your work for both the system schematic and the duct sizing worksheet. You can use either the Duct Friction Chart or the Duct Calculator.

    A small factory addition is to be air conditioned using a DX fan coil located within the space, which will also serve as a return air plenum. A straight trunk duct is run out 55-ft from the fan coil to a tee, with both branches running out 30-ft to end of the run duct-mounted diffusers. Five feet back from the tee, a short 5-ft branch also feeds an end of run diffuser. Forty feet out from the fan coil, a branch duct runs out 45-ft to a diffuser supplying the small receiving office at the loading dock. Right after the branch duct takeoff a final duct-mounted diffuser directs air down to the shop floor 20-ft below. All outlets are balanced to 250 cfm each, with a pressure loss of 0.25-in. for the end-of-run diffusers, and 0.45-in. for the office unit because it is a self-powered VAV type with a 6-in. neck and runout from the main duct. Size ductwork at 0.10-in. wg / 100-ft EL.