When exhaust fumes and pollutants can impair health as well as safety, specifying the right equipment for source capture ventilation is made easier when you are working with an industry leader. Plymovent offers Construction Specifications Institute (CSI) format, Division 23 exhaust system specifications. Architects and Engineers can enjoy additional support that is tailored to specific building segments such as automotive and fire/EMS building construction.

**TYPE OF VEHICLE**

- **Engine Size & Fuel Type**
  Displacement of the engine effects the CFM required at the nozzle.

- **Location of Tailpipes**
  Vertical or horizontal stacks effect the type of nozzle used and how it’s placed.

- **Number of Tailpipes**
  Single, dual or other arrangements create the need for Y-tailpipe adaptors or more than one drop.

**VEHICLE OPERATING CONDITIONS**

- **Running Condition (low, med, high RPM)**
  As RPM and load increase, so does the CFM and temperature requirements.

- **Load**
  Are engines idling or under partial loading?

- **Duration at Running Condition**
  When tests are short (approx. 10-15 minutes or less), ductwork and fan components may be able to be rated for lower temperatures.

**WORK AREA REACH REQUIREMENTS**

- **System Flexibility Requirements**
  - Always in the same location (<5° rad)
    A simple drop or hose reel can effectively serve an area if vehicle exhaust is typically in the same general location.
  - Exhaust system needs to be available in varied locations (bay to bay)
  - Source capture needs to move with the vehicle while running
    Rail and track systems allow source capture extraction for a moving vehicle.

- **Location of Exhaust System**
  Source capture systems can be moveable or stationary.
  Monitoring and control of exhaust systems is critical.

**INTELLIGENT SYSTEM CONTROLS**

- **Consider all the drops. What are the maximum and minimum to be used at any one time?**
  Larger installations never use all drops at the same time. Energy-saving automated controls can be installed to operate only the drops in use. This significantly lowers total exhaust CFM and lowers required make-up air which lowers operating costs.

- **How should the system be controlled?**
  - Basic on/off
  - Proper controls provide required ventilation where and when it is needed. This is done with a combination of high-quality motorized dampers, pressure transmitters and a variable frequency drive control box.
  - Manually variable
  - Automated with energy saving capabilities

**SCOPE OF TOTAL COVERAGE**

- **Area**
  What are the total number of areas to require source capture ventilation? And will expansion be required in the future?
#1 TYPE OF VEHICLE

1. What type and size vehicles will be serviced?
2. Are there multiple size vehicles being serviced within the same facility?
3. Tailpipe adaptors. What kind of tailpipes do you have? And what are their diameters?
   a. Undercarriage?
   b. Rear of vehicle?
   c. Underneath chassis, behind the cab?
   d. Vertical stack exhaust?
   e. Combination of all?
4. Dyno testing. This requires a much larger volume exhaust system and in some cases allowances for extremely high temperatures within the hoses and the fan.

#2 VEHICLE OPERATING CONDITIONS

1. How long and under what conditions will the engines be running? Short and long runs at idle generally do not present any temperature problems. Higher RPMs and increased engine loading will dramatically increase temperatures and exhaust volume (not only from the increased RPMs but from the expansion of the exhaust due to the higher temperatures).
2. Dyno testing. This requires a much larger volume exhaust system and in some cases allowances for extremely high temperatures within the hoses and the fan.

#3 WORK AREA

1. Are there dedicated service bays for cars and light trucks and other areas for larger vehicles? A situation like this may call for various solutions based on the work areas.
2. How big are the work areas? Defined service bays for cars do not generally require long hoses, however open plan service areas may require a boom arm or motorized hose reels with long exhaust hoses.
3. Ceiling height, light fixtures, HVAC ductwork, overhead cranes and the type of building structure all need to be considered when laying out and selecting equipment.
4. Are there lifts in the work bays? These will typically determine what size vehicles can be worked on within that service area, thus determining the hose size.

#4 SCOPE OF TOTAL COVERAGE

1. How many mechanics are there vs. the number of service bays? Do you need exhaust flow for every service bay?
   a. Can one hose/hose reel serve two work areas that are side by side?
   b. Would a rail system offer better coverage than individual hose reels/fixed extractors?
   c. Would a hose reel on a rail offer better coverage?
2. Fans. Should each hose or hose reel have a fan, or is a centrally located fan a better choice?

#5 INTELLIGENT SYSTEM CONTROLS AND AIRFLOW NEEDED

1. Will a simple, centrally located fan starter be suitable or having the fan start/stop activation occur when a hose is pulled down for use?
2. Fan start/stop options and automated fan speed controls. Simple systems with 2-5 hoses can be set up with a single fan and 100% usage, larger systems will typically only have a 35-40% usage factor and lend themselves to automated airflow controls (DCV fan controllers). This type control system can usually handle a large number of hoses/hose reels with a much smaller fan. For example, a 20 hose drop system, operating at 500 CFM per hose would require a fan that could exhaust 10,000 CFM. The same system with a DCV controller and designed at a 40% usage factor would need a fan suitable for 4,000 CFM. This benefits the owner with less exhausted conditioned air, less make-up air needed, less fan horse power, lower electrical energy requirements and smaller diameter ductwork.
3. Airflow needed to capture and remove the exhaust fumes
   a. For cars and light trucks a 4” hose with 275-300 CFM is usually suitable (cars and up to class 4 vehicles).
   b. Dump trucks, stake bodies, school buses and small construction equipment (typically class 4-6) use a five-inch hose flowing 500-550 CFM.
   c. Bigger trucks and construction equipment typically use a 6” hose flowing 700-800 CFM (class 7 and larger).
   d. For military equipment, CNG engines and very large machines you can typically use an 8” hose with an airflow of 1200-1400 CFM.

*These values are all general guides, results may differ.