

POSITIVE PRESSURE VENTILATION

Purpose:

This guideline identifies the tactical application of positive pressure ventilation during structural fire operations and other techniques for use.

Benefits:

Positive pressure ventilation (PPV) has many benefits to fire operations. They include:

- A. PPV rapidly removes heat and smoke from the building, thus reducing the fires' ability to propagate and advance.
- B. PPV causes an improving atmosphere – thus improving patient survivability profiles.
- C. Rapid removal of smoke improves firefighters ability to conduct search and rescue operations as well as effective loss control operations.
- D. The improved atmosphere and visibility increases the firefighters ability to conduct the attack/extinguishment operations.
- E. The improved atmosphere reduces firefighter heat stress.
- F. PPV reduces loss caused by smoke and fire damage to the structure.
- G. PPV can reduce the need and risk of roof ventilation at many fires.

Application:

Engine 703, 704 and Ladder 710 are equipped with high volume positive pressure fans. All offensive fire operations qualify for early application of PPV. The Incident Commander should order PPV where appropriate and early in the operation. Companies should expect to apply PPV and crews should dismount apparatus planning to take fans to the fire scene.

Placement of Fans:

- A. Positive pressure fans should be placed at the point of entry(s) from the unburned side of the fire.
- B. Fans should be positioned 12-15 feet back from the entry point. The objective is to create a pressure “cone” effect around the door. This position will also allow access for crews to enter the building.
- C. Where additional fans are required, placing two or more fans in “tandem” – one behind the other is more effective than side by side.

Require Tactical Considerations:

The company officer performing ventilation will ensure that certain requirements are completed prior to injecting positive pressure into the structure. PPV is effective only when applied properly. Two major items are required:

- A. An “exit” for the pressurized air must be provided and must be located in the fire area. This is generally a window, door or other opening.
- B. Positive pressure ventilation must be injected from the unburned side of the fire.

Controlling Air Flow:

Air flow from PPV must be controlled throughout the operation. Too many openings or exit points reduce the effectiveness of PPV. In some cases, windows and doors that are already open may need to be closed to direct the air flow into the fire area, or the most densely affected smoke area. As one area is cleared of smoke, that area may need to be sealed off and another exit created in another area of the structure to direct the air flow into the next area to clear.

Attic Fires:

- A. Isolated attic fires can benefit from PPV. During initial attack, fire crews should use small openings in the ceiling for water application. This will prevent the clear environment below the ceiling from rapidly filling with smoke. Moving from one room to another and “punching” the nozzle through the ceiling and using a fog application is very effective. Use of penetrating nozzles is also recommended. Loss control measures should be initiated simultaneously with fire attack.
- B. An “exit” for PPV in the attic must be in place. Most roofs/attics have pre-existing vents typically at the end of the attic space in a vertical wall. These are often adequate for an “exit”.
- C. Some structures may have a “sealed” attic space with no in place vent openings. In this case, opening a vertical wall on one end of the attic or cutting a vent hole in the roof may be required. If pre-existing vents are too small, they may need to be enlarged.
- D. Once PPV is in place, large sections of the ceiling can be pulled. PPV will keep the environment below the ceiling clear. Salvage covers or black plastic should be applied first before the ceiling is pulled, if possible.

Multi-Story/Large Structure:

- A. Multi-story or large area structure fires require greater coordination and additional fans.
- B. Stairwells in multi-story structures should be used to direct air flow from PPV. A stairway should be selected. An exit in the fire area (i.e., window) is a first choice. In some situations, a stairwell on the opposite

- side of the fire area can be used. An exit for the exhaust must be obtained. A roof door is appropriate.
- C. Multiple fans may be required. Two or more fans may be needed at the base of the building. Additional fans may be needed on landings at various levels in the stairwell. A fan will be needed at the entry to the fire floor.
 - D. Multi-story and/or large structure positive pressure ventilation is complex. A Ventilation Sector should be established to coordinate all aspects of PPV on all floors.
 - E. Point Pleasant Fire Protection District Ventilation 1367 is available to respond for ventilation of such structures.

Positive Pressure for Exposure Control:

- A. In some cases, PPV can be used for exposure control. This is most effective with common attics (i.e., strip shopping centers and apartment complexes) or where separating walls may have been breached (i.e. plumbing, cracks, etc.)
- B. The objective is to introduce PPV ahead of a moving fire and force it back into the fire area. An exit point in the fire area is needed in most cases.
- C. For exposure control, the fan(s) would be placed at an entry point at the most severe exposure first. If a heavy smoke condition exists, it may be beneficial to create a temporary opening (i.e. door) to allow an exit for the pressure and smoke. Once smoke has cleared, the exit should be closed, the building sealed, so that it will “over pressurize” the exposure. An opening in the ceiling will be required to pressurize the attic area. Over pressurized air will force hot gases back across the breaches, or back down common attic spaces towards the fire area. This can prevent fire spread extension.
- D. The second most critical exposure would then receive PPV in a similar manner.
- E. The next priority would be the fire occupancy.

Precautions:

Positive pressure ventilation can create problems if not effectively managed, monitored, and coordinated. Be aware of the problems listed below and take appropriate corrective action.

- A. An exit must be in the burned area or the fire may be pushed into the unburned portion.
- B. Because of positive pressure, a “blow torch” effect of fire blowing far out of the exit may occur.
- C. This is normal and predictable; adjacent exposures may need to be protected.
- D. Do not direct a fire stream into an operating PPV exit point.
- E. All concealed spaces need to be checked for extension.

- F. The Ventilation Sector will be responsible for monitoring and coordinating the application of PPV.
- G. The gas powered fans do produce carbon monoxide and breathing apparatus may be required when PPV is used during overhaul operations.
- H. Lines should be in place to control/extinguish the fire, as it will intensify with added air from the fans.