

### 3.2.3.7 Ventilation



YOUR ORGANIZATION  
STANDARD OPERATING PROCEDURES/GUIDELINES

**TITLE:** Ventilation

**SECTION/TOPIC:** Tactical-Strategic Guidelines

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**PREPARED BY:**

**APPROVED BY:**

X

Preparer

X

Approver

These SOPs/SOGs are based on FEMA guidelines FA-197

#### 1.0 POLICY REFERENCE

CFR

NFPA

NIMS

#### 2.0 PURPOSE

This standard operating procedure/guideline addresses conducting safe and effective ventilation operations.

This procedure identifies the tactical application of positive pressure ventilation and roof or vertical ventilation during structural fire operations. Early ventilation of a building is critical to the success of fire control operations and the safety of firefighters and victims. We ventilate to alter conditions. The interior team has the best operating position to determine if a building requires ventilation, as well as the location and timing of that ventilation. Interior and ventilation forces must communicate in order to coordinate the effort effectively.

#### 3.0 SCOPE

This SOP/SOG pertains to all personnel in this organization.

#### 4.0 DEFINITIONS

These definitions are pertinent to this SOP/SOG.

## **5.0 PROCEDURES/GUIDELINES & INFORMATION**

### **5.1 Conducting safe and effective ventilation operations:**

Proper ventilation procedures have many benefits to fire operations. Ventilation rapidly removes heat and smoke from the building, thus reducing the fire's ability to propagate and advance. It causes an improving atmosphere, thus improving victim(s) survivability profiles. The improved atmosphere also increases visibility and reduces heat stress, which increases the firefighter's ability to conduct the interior fire attack, search and rescue operations, and loss control operations.

### **POSITIVE PRESSURE VENTILATION**

All offensive fire operations qualify for early application of positive pressure ventilation (PPV). Command should order positive pressure ventilation where appropriate and early in the operation. Basic procedures for positive pressure ventilation are outlined below.

1. Identify or create an exit for the pressurized air before initiating positive pressure ventilation.
2. Place positive pressure fan at the point of entry into the unburned side of structure.
3. Position the fan 12-15 feet from the entry point to create a pressurized seal around the door.
4. If additional fans are required, place two or more fans in a tandem position.
5. Control the air flow by opening or closing windows and doors to clear specific areas.

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

- An exit for the pressurized air should be in the burned area. Otherwise, the fire may be pushed into unburned portion.
- Because of the pressurized air, a "blow torch" effect of fire blowing far out of the exit may occur. Adjacent exposures may need to be protected.
- Do not direct a fire stream into an operating positive pressure ventilation exit point.
- All concealed spaces need to be checked for fire extension.
- The gas powered fans produce carbon monoxide and breathing apparatus may be required when PPV is used during overhaul operations.

### **High-Rise Application**

Positive pressure ventilation can be an effective way to pressurize stairwells, thus maintaining a smoke-free environment for evacuation. Basic positive pressure ventilation procedures apply. Place the PPV fan(s) at the base of the stairwell and open the roof hatch. Keep in mind that pressurizing the stairwell will make it more difficult to open doors from the building to the stairwell.

### **Exposure Control Application**

In some cases, positive pressure ventilation can be used for exposure control. The objective is to introduce positive pressure ventilation ahead of a moving fire and force it back into the fire area.

Exposure control may be used with common attics found in strip shopping centers and apartment complexes or where separating walls may have been breached by plumbing, cracks, etc.

For exposure control, the fans should be placed at an entry point at the most severe exposure first. The building should be 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 opening, or back down common attic spaces towards the fire area. This can prevent fire-spread extension. The second most critical exposure would then receive positive pressure ventilation in a similar manner.

### **NEGATIVE PRESSURE VENTILATION**

Negative pressure fans pull smoke, heat, and gases from inside the building and eject them to the exterior. Basic procedures for negative pressure ventilation are outlined below.

1. Place the negative pressure ventilation fan in an exterior opening to exhaust in the same direction as the natural wind.
2. Remove all obstacles to the air flow (window screens, curtains).
3. To prevent air recirculation around the sides of the fan, cover the area around the unit with salvage covers or other material.

### **NATURAL VENTILATION**

Vertical ventilation and horizontal ventilation can be used to ventilate a structure naturally. Vertical ventilation, as close to directly over the fire as possible, is the most effective form of ventilation in working interior fire situations.

#### **Vertical Ventilation**

Vertical ventilation generally means opening the roof or existing roof openings to allow heated gases and smoke to escape from the structure. Roof ventilation should be considered only when positive

pressure ventilation cannot accomplish effective ventilation and only when safe to do so. Lightweight construction has a history of very early collapse. If there is any evidence of fire in the attic space of a suspected lightweight constructed roof, no personnel will be permitted on the roof. All roof ventilation personnel shall wear full protective clothing and equipment when operating above a fire. SCBA with face pieces connected will be worn at all times while operating above a fire. Basic procedures for roof ventilation are outlined below.

1. Ladders should be strategically placed to allow safe access to the roof, emergency exit from the roof, and in tactical positions that would permit effective defensive operations if needed.
2. The first person reaching the roof must evaluate conditions to assure the roof is structurally sound before attempting to work on it.
3. Once on the roof, fire personnel must evaluate their route and progress as they proceed out on the roof.
4. Roof ladders shall be used for operations on any roof where the pitch presents a problem or crews cannot effectively operate aerial ladders.
5. Determine a safe working area for ventilation.
6. If possible, provide a hose line for the protection of roof ventilation personnel.
7. Coordinate roof ventilation with interior crews.
8. Complete adequate size ventilation hole(s) and achieve effective ventilation.
9. Maintain roof top monitoring of roof structure and fire conditions. 1
10. Roof personnel should provide progress reports to command.

### **Horizontal Ventilation**

Horizontal ventilation is the venting of heat, smoke, and gases through wall openings such as windows and doors. Because horizontal ventilation is not accomplished at the highest point of a building, there is the constant danger that when the rising heated gases are released, they will ignite higher portions of the fire building. Basic procedures for horizontal ventilation are outlined below.

1. When possible, horizontally ventilate on the leeward side of the structure.

2. Monitor exposures both horizontally and vertically where smoke, heat, and gasses are escaping.
3. Unless for the specific purpose of rescue, a building should not be opened until charged lines are in place.