

**DELAWARE STATE FIRE SCHOOL**  
**For Your Instruction: In-Service Drill**

**POSITIVE PRESSURE VENTILATION**

**PURPOSE**

To conduct refresher training for positive pressure ventilation. A brief review of ventilation techniques will be given to all on each participant to perform adequately during the evolutions.

**OBJECTIVE**

At the conclusion of the drill, each participant will have reviewed ventilation, pressurized ventilation, structural considerations, proper use of blowers and will have participated in ventilation evolutions.

**EQUIPMENT**

Blower(s), & smoke ejectors with wire reels

**SAFETY PRECAUTIONS**

1. Participants should wear personal protective equipment when using ventilation equipment.
2. The drill area should be adequately lighted.
3. Each search team should be monitored by the Drill Leader during the evolution.
4. The Drill Leader will be responsible for being familiar with and following the drill guidelines.

**REFERENCES**

**NOTE:** Reference materials contain illustrations or pictures of the steps listed for the evolutions.

IFSTA "Essentials of Firefighting", Seventh Edition

**SKILLS**

- I. VENTILATION – DEFINITION AND PRINCIPLES
  - A. DEFINITION – Ventilation is the systematic removal of heat, smoke, and gases.

## B. Principles of Ventilation

1. Prevents further ignition of contents by removing the heat and gases of combustion.
2. Ventilation tends to carry the fire in a direction where the fire spread can be controlled.
3. Ventilation is often a necessity in locating the seat of the fire.
4. Saves lives – Primary reason for ventilating an occupied dwelling
5. Easier to search and remove persons
6. Permits smoke, heat, and gases to exit so that the building can be evaluated for fire location(s).
7. Removes backdraft conditions
8. Decreases chances of lateral fire spread.
9. Decreases possibility of exposure on firefighters

## II. WHEN TO VENTILATE

- A. When the officer gives the order
- B. When the hose lines are charged and ready to be advanced
  1. Exception – Life is in danger
  2. Exception – Venting over shafts
- C. When all points of spread are protected
- D. Higher and adjacent exposures are protected

## III. PRESSURIZED VENTILATION AFTER KNOCKDOWN

- A. Forcing the movement of contaminants to:
  1. Exit through pre-selected and/or controlled openings

2. Overcome the effects of humidity
3. Use openings that wouldn't normally be utilized by natural ventilation
4. Reduce the time needed to ventilate a building – twice as effective as smoke ejectors
5. Prevent personnel from being exposed to hazardous interior conditions
6. Make sure contaminants are not drawn through blowers – may cause gasoline engine failure
7. Keeps doorways, windows, and halls from being blocked by fan cords
8. Exterior blowers do not add to noise

#### B. Operational Considerations

1. Single blower placement
  - a. Cone of pressurized air
  - b. "Tilting" blower back 20-30°
  - c. May stack electric blowers/units
2. Multiple blower placement
  - a. In-Line
    - 1) Larger blower approximately 2 ft. from opening (door)
    - 2) Smaller blower behind larger one, to seal door with a cone of pressurized air
  - b. Parallel – units side by side to seal opening (door) with a cone of pressurized air
3. Exhaust Openings

- a.  $\frac{3}{4}$  to  $1\frac{3}{4}$  the size of entrance opening
- b. Opening for exhaust depends on the size of the blower(s)
- c. Remove screens

#### IV. STRUCTURAL CONSIDERATIONS

##### A. Single family, single story

1. All doors and windows are closed proper placement of blower
2. Open window in kitchen (1), when smoke has cleared close it
3. Open door to bedroom (1), open window in bedroom (1) to clear smoke
4. Repeat for each room

##### B. Multiple Story

1. Always start at the lowest level
2. Ventilate towards the top of dwelling

##### C. Multiple family, multiple story

1. Must control air flow between entrance and exhaust openings
2. Use blowers of at least 3-5 HP
3. Using multiple blowers will enhance operations
4. First – pressurize appropriate hallways
5. Second – ventilate contaminated hallways
6. Third – ventilate all contaminated rooms common to pressurized hallways

##### D. Commercial Buildings

1. Often require combination of blowers

2. Attempt to divide into smaller areas
3. Then use SEQUENTIAL VENTILATION
4. Openings made by the fire or fire attack, use as exhaust openings

E. Multiple Floors

1. Ventilate by sequentially ventilating each floor – you must control all the stairways
2. Start at the bottom floor and work up

V. DURING OVERHAUL OPERATIONS

- A. Heat within area will be reduced
- B. Smoke will be reduced or removed
- C. Concentrations of carbon monoxide will be significantly –helps you to locate smoldering spot fires
- D. If any fire begins to accelerate or spread:
  1. Shut blower off
  2. Reduce RPM of blower
  3. Increase the distance between the overhaul area and the blower
  4. Extinguish the fire

VI. TECHNICAL AND OPERATIONAL KNOWLEDGE OF POSITIVE PRESSURE IS ESSENTIAL!

1. Most effective when utilized on confined structure fires
2. Must be careful on attic fires
3. Backdraft conditions must not be present
4. Using two in-line blowers is best

5. Blower(s) must seal the entrance opening
6. Exhaust must be close to seat of the fire – horizontal or vertical opening may be used
7. Attack lines should advance approximately 5-15 seconds after pressure

A. Operational Considerations

1. Blower brought to doorway, facing away from door, and started
2. Hand lines are placed for fire attack
3. Crew locates fire room and creates exhaust opening
4. Blower turned toward opening (door) create seal with cone of air
5. Attack line waits 5-15 seconds then advances on fire room

B. Fire attack using positive pressure must be well planned operation

VII. STARTING OF BLOWER(S)

A. Location of fuel – type

B. Location of any fuel shutoffs

C. Location of choke

1. Position for start
2. Position for run
3. Position for stop

D. Starting of blower

E. Stopping of blower

F. Have students explain the parts

G. Have students start and stop a blower

VIII. PLACEMENT OF SINGLE BLOWER

- A. Place blower approximately 5 feet from doorway/opening

IX. CONE OF AIR

- A. Seal around the opening

- 1. Feel with your hand
- 2. Move blower if needed

- B. Have students start the blower and perform the proper seal around the opening with a cone of air.

X. PLACEMENT WITH TWO (2) BLOWERS

- A. Larger blower – place approx. two (2) feet from doorway, in front

- B. Smaller blower

- 1. In back of larger blower
- 2. Smaller blower forms the cone of air around opening

- C. Have students place blowers in the correct position(s) and start blowers correctly.

XI. EXHAUST OPENING

- A.  $\frac{3}{4}$  to  $1\frac{3}{4}$  the size of the entrance or openingthe opening for exhaust depends on the size of the blower

- B. Doorway

- C. Windows – remove screens

- D. Have students select exhaust openings

## **SKILLS EVOLUTION**

DURING CLASS, UNDER THE DIRECTION OF THE DRILL INSTRUCTOR, THE STUDENTS WILL PERFORM:

1. The proper manner of starting a blower
2. The proper manner of stopping a blower
3. The proper placement of blower(s)
4. A cone of air
5. Selecting an exhaust opening

## **CONCLUSION**

At the conclusion of the skills, the Drill Leader will do the following:

1. Secure the drill area to return it to normal condition.
2. Return all equipment to normal operational condition.

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