

# PEOSH

## Indoor Air Quality Training for Asthma-Friendly Schools

### Part I

### PEOSH Indoor Air Quality Standard Overview



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Public Employees Occupational  
Safety and Health Unit

# IAQ Asthma-Friendly Schools Training Goals

- Understand PEOSH IAQ standard
- Appreciate Roles and Responsibilities
  - Designated Person
  - School Nurse
  - IAQ Team
- Recognize basic IAQ problems
  - Asthma triggers
  - Infectious disease transmission
  - Other IAQ health complications

# IAQ Asthma-Friendly Schools Training Goals (cont.)

- Use of Green Cleaning Products
- Perform a Walkthrough Survey
- Investigate employee complaints
- Use IAQ/TFS checklists & worksheets
- Be familiar with HVAC System basics
- Understand IAQ Terminology
- Know where to get Assistance

# PEOSH IAQ Standard N.J.A.C. 12:100-13

Adopted in 1998; first IAQ Standard in U.S.

Revised May 21, 2007 by PEOSH Advisory Board, IAQ Subcommittee

1. Designated Person
2. Written IAQ Program
3. 48 hrs to remove damp materials



# PEOSH IAQ Standard N.J.A.C. 12:100-13

13.1 Scope

13.2 Definitions

13.3 Compliance Program

13.4 Control of Specific Contaminant Sources

13.5 Air Quality During Renovation & Remodeling

13.6 Recordkeeping

13.7 Employer's Response to Complaints

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# PEOSH IAQ Standard N.J.A.C. 12:100-13.1

**Scope:** “apply to matters relating to indoor air quality in **buildings** occupied by **public employees** during **regular work hours.**”

# PEOSH IAQ Standard N.J.A.C. 12:100-13.3

## Compliance Program

**Employer shall identify and train a Designated Person:** “person given responsibility [and authority] by the employer to take measures to assure compliance”

- ✓ Prepare written plan
- ✓ Review and update written plan annually

# PEOSH IAQ Standard N.J.A.C. 12:100-13.3

- ✓ Establish a preventative maintenance schedule
- ✓ Ensure inoperable components are replaced or repaired promptly
- ✓ Ensure no microbial growth
- ✓ Implement general or local exhaust ventilation

# PEOSH IAQ Standard N.J.A.C. 12:100-13.3

- Check the HVAC system when:
  - ✓ Carbon Dioxide (CO<sub>2</sub>) levels >1,000 ppm
  - ✓ Temperature is <68°F->79°F
- Prevent contamination of fresh air supply
- Check natural ventilation portals are maintained
- Promptly investigate all employee IAQ complaints

# "HVAC system"

“collective components of the heating, ventilation and air-conditioning system including, but not limited to, filters and frames, cooling coil condensate drip pans and drainage piping, outside air dampers and actuators, humidifiers, air distribution ductwork, automatic temperature controls, and cooling towers.”

# Skills and Authority of Designated Person

- Knowledgeable about NJ IAQ Standard
- Familiar with basic IAQ issues
- Working knowledge of air handling system
- Have a position of authority
- Effectively communicate with management, staff, maintenance, contractors
- Good problem solver
- Available

# PEOSH IAQ Standard N.J.A.C. 12:100-13.4

## Controls of Specific Contaminant Sources

- If General Ventilation inadequate implement other control measures
- Microbial Contaminants
  - Promptly repair water intrusion
  - Remediate damp/wet material by drying or removal within 48hrs of discovery
  - Remove visible microbial contamination

# PEOSH IAQ Standard N.J.A.C. 12:100-13.5

## Renovation and Remodeling

- ✓ Evaluate chemical hazards prior to selection or use.
- ✓ Isolate construction areas (scheduling, physical barriers, pressure differentials)
- ✓ Utilize local exhaust ventilation
- ✓ Notify employees 24 hours prior to any construction
- ✓ Construction areas must be cleaned and aired out prior to re-occupancy

# "Renovation and remodeling"

building modification involving activities

that include but are not limited to:

removal or replacement of walls, roofing, ceilings, floors, carpet, and components such as moldings, cabinets, doors, and windows; painting; decorating; demolition; surface refinishing; and removal or cleaning of ventilation ducts.

# PEOSH IAQ Standard N.J.A.C. 12:100-13.6

## Recordkeeping

- ✓ Written IAQ Program
- ✓ Documentation of Designated Person Training
- ✓ Written Preventive Maintenance Program
- ✓ Maintenance Log (Date, What, Who)

# PEOSH IAQ Standard N.J.A.C. 12:100-13.6

## Recordkeeping

- Maintained for 3 years
- Available to employees and representatives ASAP or within 10 working days
- Available immediately during PEOSH inspection



# PEOSH IAQ Standard N.J.A.C. 12:100-13.7

## Employer's Response to Complaint

PEOSH will send a letter for response:

➤ Statement that the complaint is NOT founded

and/or

➤ Study of issue initiated and completion date

➤ Remediation measures already completed

➤ Remediation planned and completion time

**Must comply with Uniform Construction Code, N.J.A.C. 5:23**

# PEOSH IAQ Standard N.J.A.C. 12:100-13.8

## IAQ Compliance Documents

- ✓ As-built construction documents
- ✓ HVAC System Commissioning Report
- ✓ HVAC Testing, Adjusting, and Balancing Reports
- ✓ Operations and Maintenance Manuals
- ✓ Water Treatment Logs
- ✓ Operator Training Materials

\*Must provide to PEOSH upon request (if available)

# Other Standards Related to IAQ

## Air Contaminants Standards

(29 CFR 1910.1000, Tables Z-1, Z-2)

## Access to Employee Exposure and Medical Records Standard

(29 CFR 1910.1020)

# Other Standards Related to IAQ

## PEOSH Asbestos Standards

(General Industry 29 CFR 1910.1001 and Construction 29 CFR 1926.1101)

- Identification of asbestos-containing materials in all buildings (pre-1980)
- Labeling and signage requirements
- Annual awareness training of maintenance staff
- Classification of asbestos work and requirements
- Notification of outside contractors

# Other Standards Related to IAQ

## Federal and State Asbestos Standards

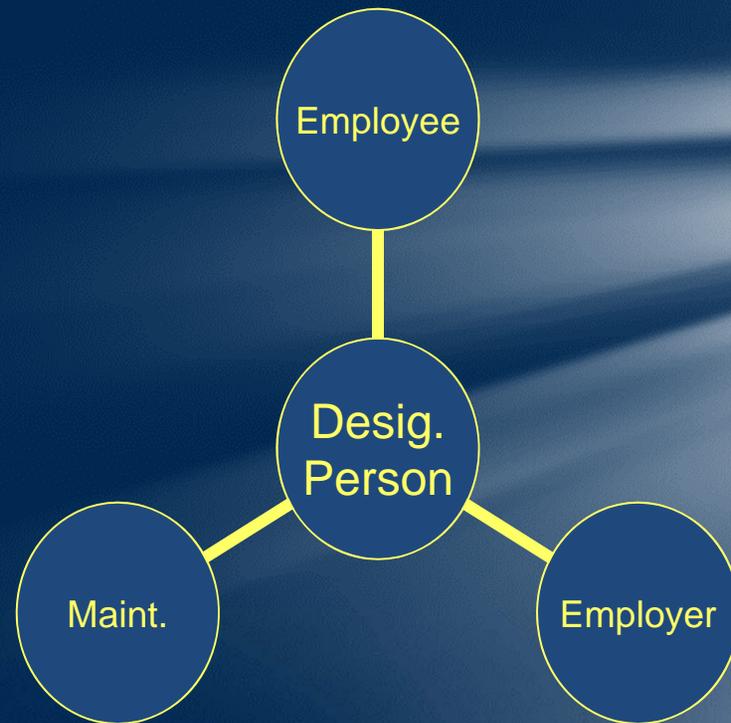
- AHERA - U.S. EPA/NJDOH (Schools K-12)
- NJ Uniform Construction Code-Subchapter 8,  
NJ Dept. of Community Affairs (NJDCA)

# Designated Person

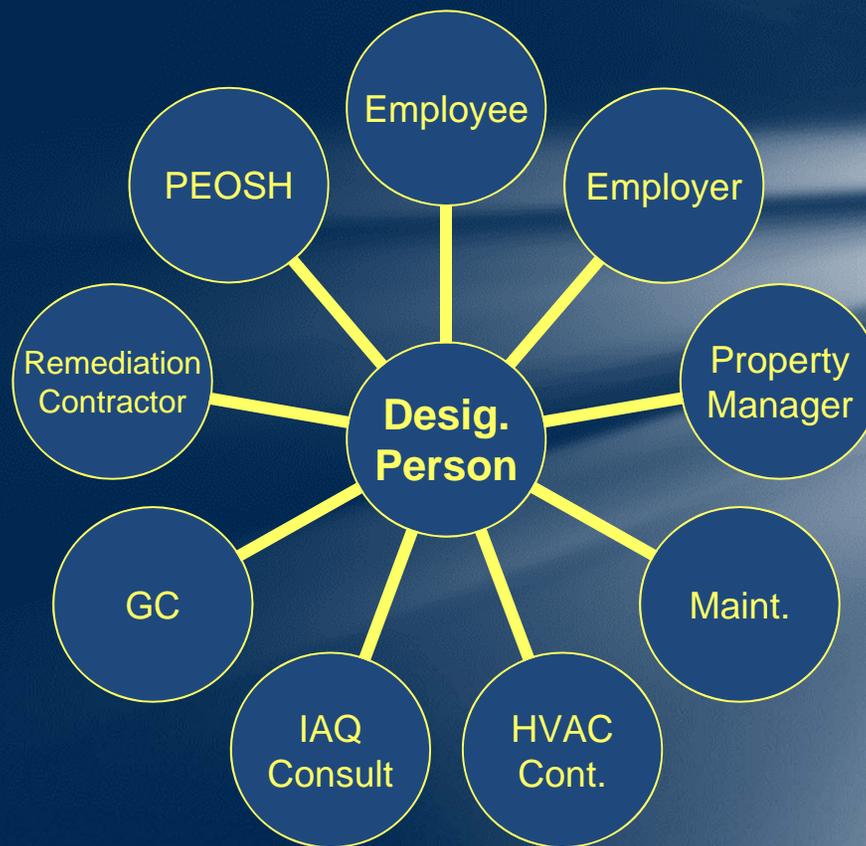
## Coordinate IAQ Activities

- Prepare and review Written IAQ Program
- Establish preventive maintenance procedures
- Track and document maintenance & repair
- Establish control measures for pollutants
- Manage renovation and construction
- Coordinate specific facility operations
- Manage maintenance activities
- Maintain IAQ Records

# Management of IAQ A Coordinated Effort



# Management of IAQ A Coordinated Effort



# “Acceptable IAQ”

From ASHRAE: “no known contaminants at harmful concentrations as determined by Authorities and at which a substantial majority (80% or more) of the people exposed do not express dissatisfaction”

\* American Society of Heating, Refrigeration, and Air-Conditioning Engineers

# “Sick Building Syndrome”

substantial number of occupants experience health and comfort problems related to working indoors.”

Symptoms do not fit the pattern of any particular illness, are difficult to trace to any specific source and relief from these symptoms upon leaving the building.”

# "Building-related Illness"

specific medical conditions of known etiology  
documented by physical signs and laboratory findings

sensory irritation when caused by known agents,  
respiratory allergies, asthma, nosocomial infections,  
humidifier fever, Legionnaires Disease

signs and symptoms characteristic of exposure to  
chemical or biological substances

# IAQ Employee Complaints

- Go to the location(s) of the complaint
- Conduct interviews
- Review building operations and maintenance procedures
- Complete PEOSH IAQ Inspection Checklist
- Involve employees through L/MH&SC\*
- Communicate outcome and corrective action
- Report all complaints to School Nurse

\*Labor-Management Health & Safety Committee

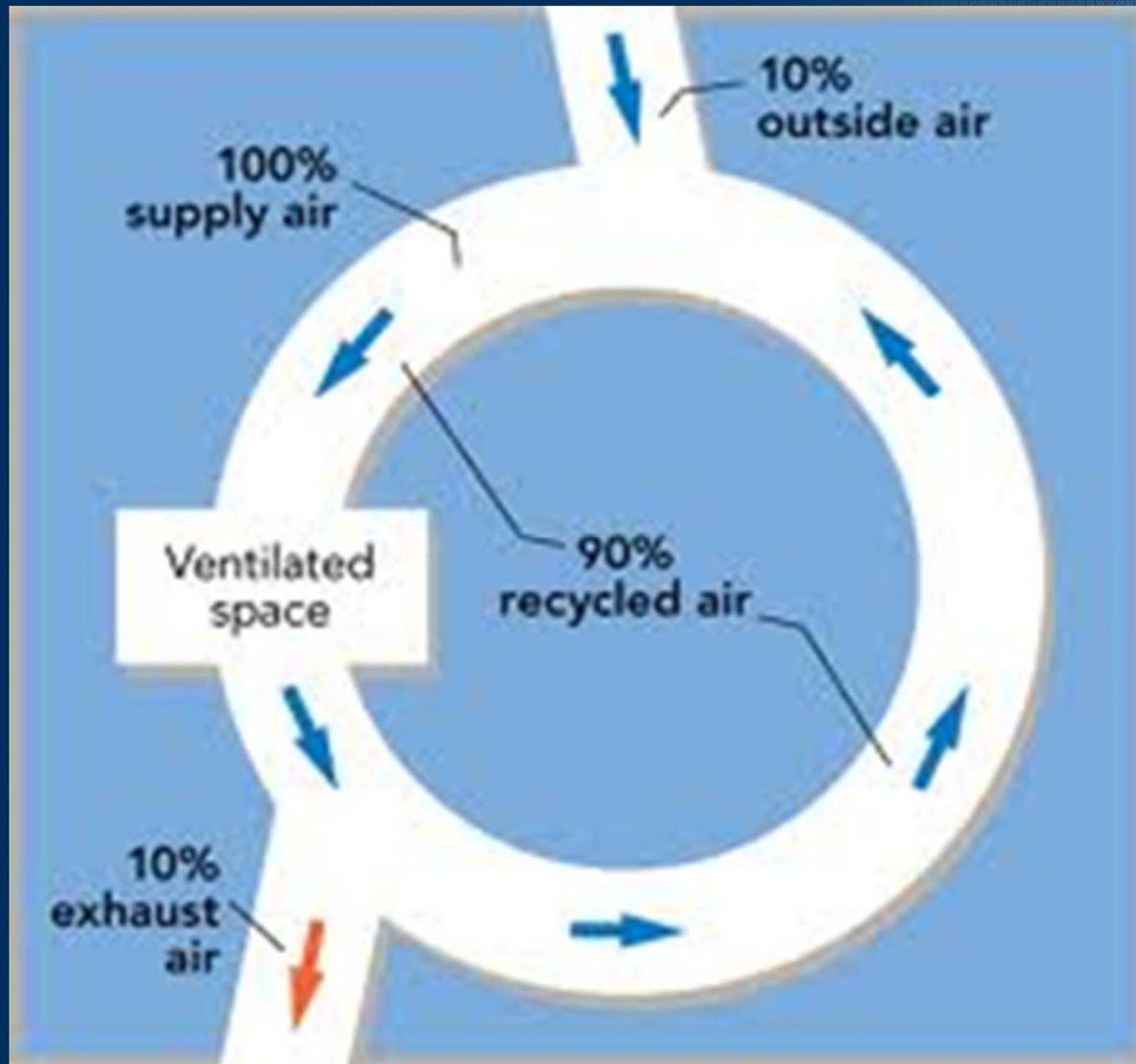
# IAQ Ventilation System



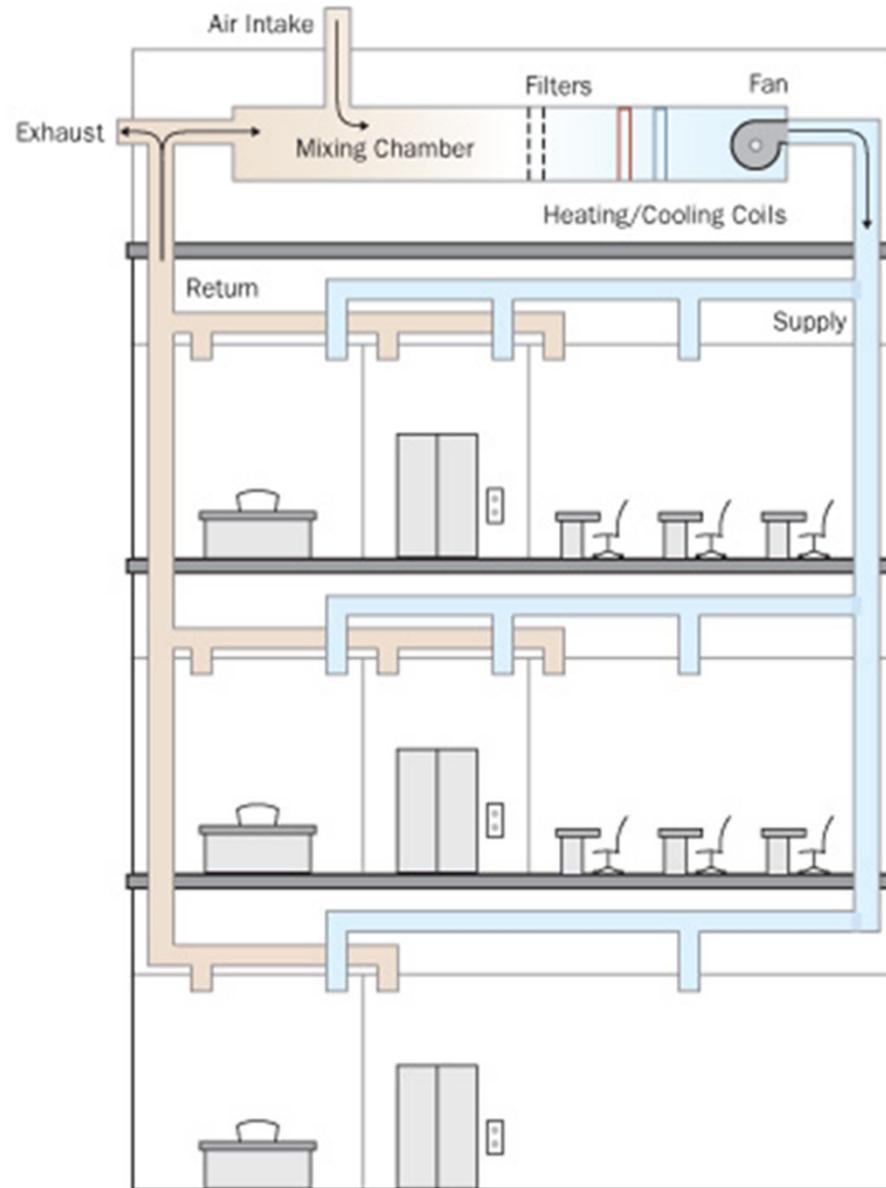
## Heating Ventilation and Air Conditioning (HVAC)

- Regulates the temperature and humidity for comfort
- Supplies general dilution ventilation to decrease indoor pollutants

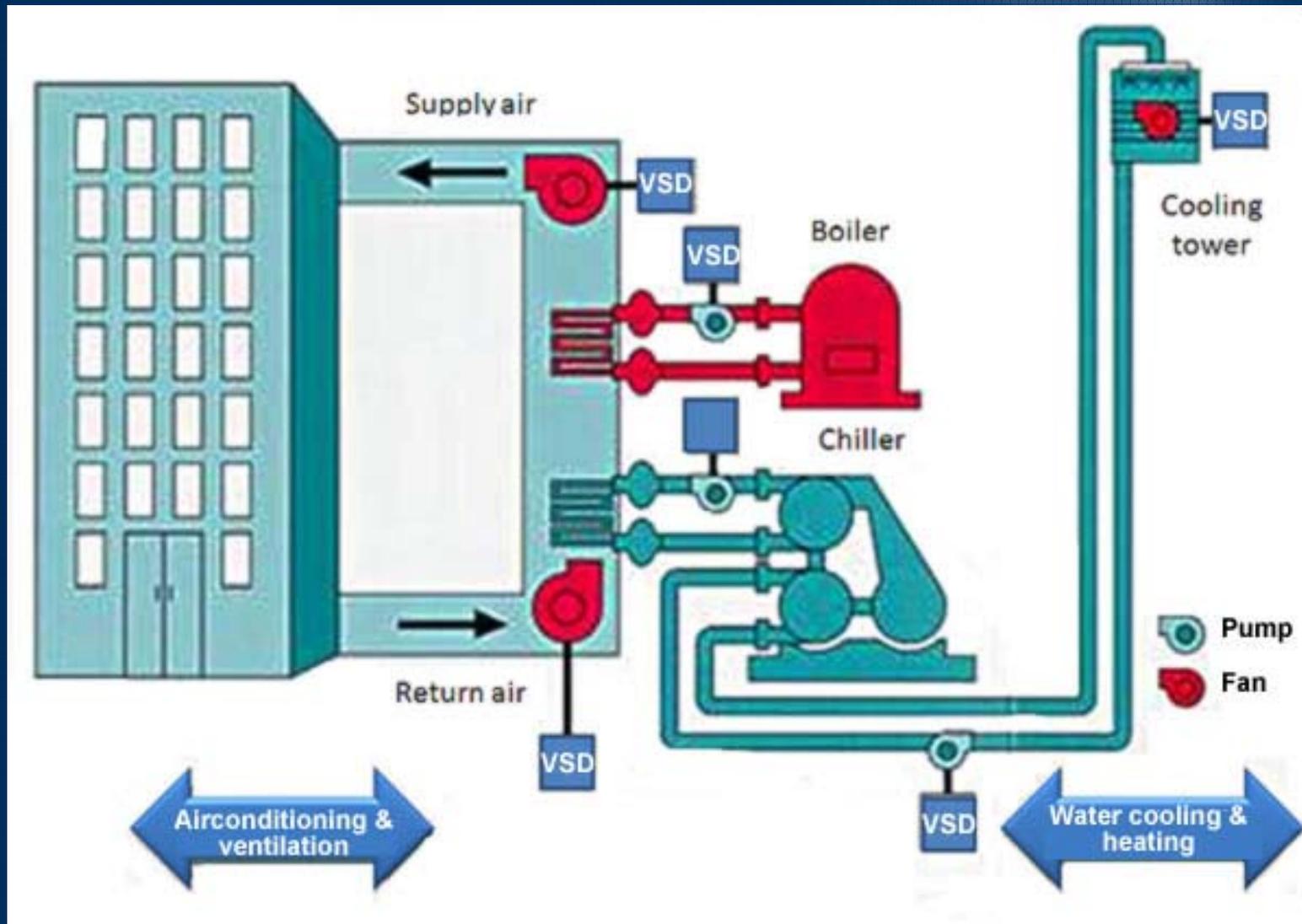
# IAQ Basic Ventilation System



# IAQ Basic Ventilation System



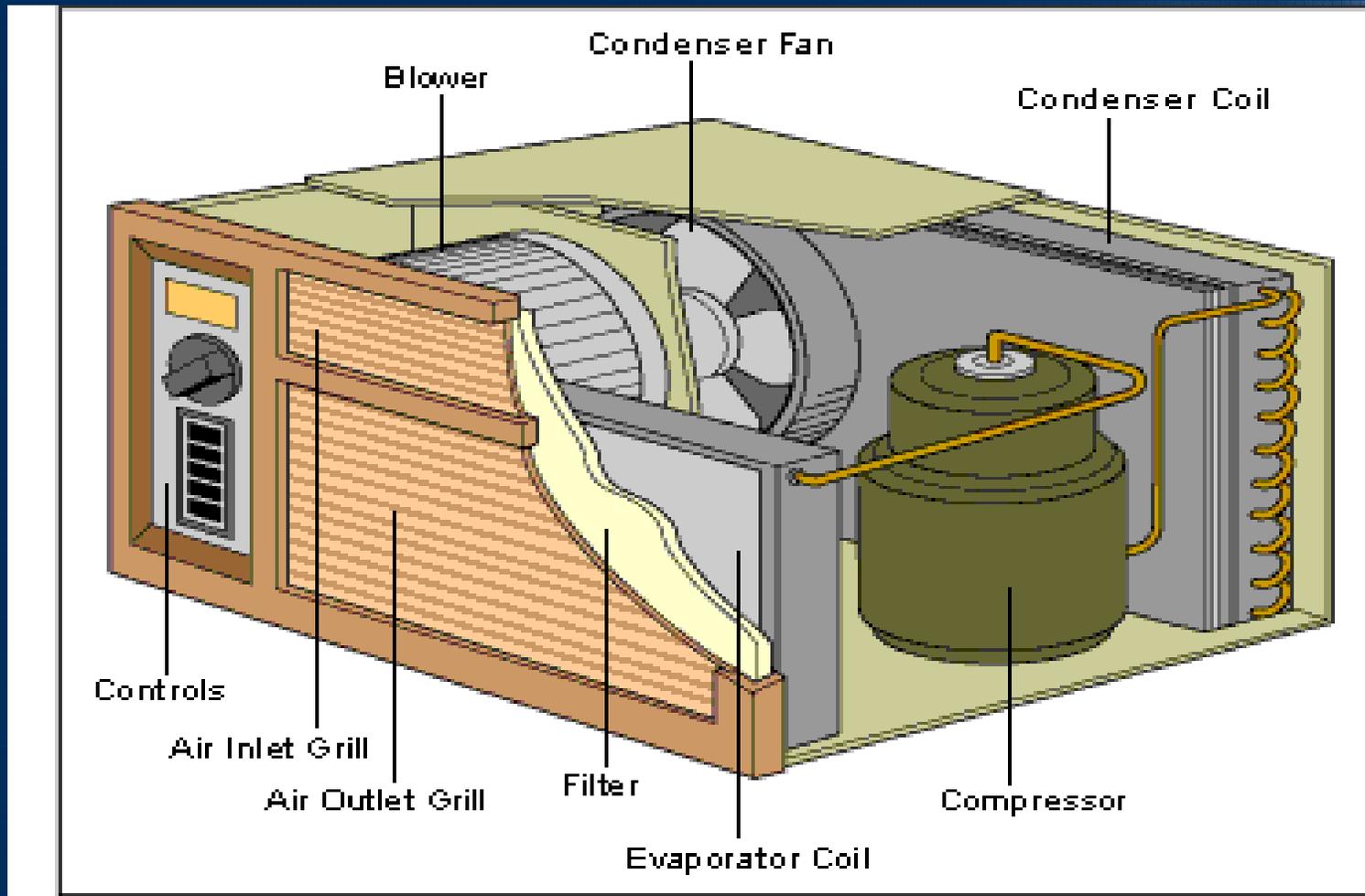
# IAQ Ventilation System



# IAQ Complex Ventilation System

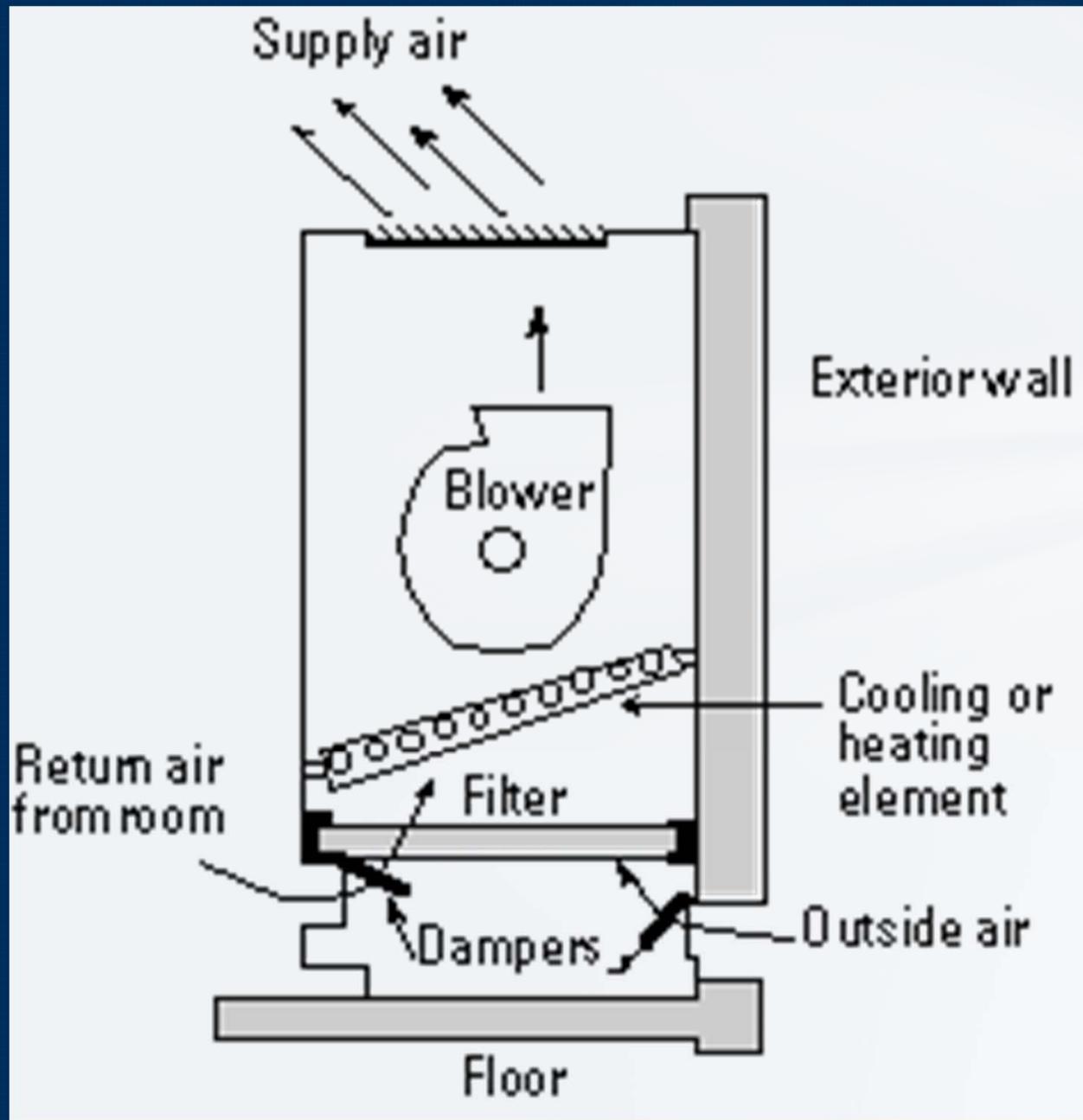


# IAQ Ventilation System



# IAQ Ventilation System





# Basics: Factors Affecting IAQ

- Building occupant activities
- General Indoor sources
- Construction and renovation activities
- Design and condition of HVAC
- Outdoor sources
- Unidentified Sources

# IAQ Basics: Indoor Sources

- CO2 (primarily from occupants)
- Perfume, cologne, air fresheners
- Cleaning / disinfecting products
- Plants & Flowers
- Off gassing from new materials
- Mold (result of water intrusion)
- Stale air from unventilated storage closets
- Lab chemicals & animals

# IAQ Basics: Outdoor Sources

- Exhaust vents located near make up air intakes
- Vehicles idling near open doors or windows
- Pollen from outdoor plants
- Pollution from nearby facilities & construction
- Infiltration of general outdoor contaminants

# IAQ Basics

## Types of Air Contaminants

-  **Gases** – Formless fluid occupying an enclosure which confines it (i.e., carbon dioxide, oxygen)
-  **Vapors** – Solid or liquid converted by heat to a gaseous state (i.e., methylene chloride, mercury)
-  **Fumes** – Condensation of gas into particle <1 micrometers ( $\mu\text{m}$ ) (welding)
-  **Dust** – Particulate ranging in size from 0.1 to 25 $\mu\text{m}$
-  **Fibers** – An elongated particle with aspect ratio of greater than 3:1
-  **Bioaerosols** – Airborne particles that originate from living organisms (i.e., pollen, spores, fragments, waste)

# IAQ - Ventilation System

## General (Dilution) Ventilation System

- Balanced system of supply & return air
- Control exchange of inside air with fresh air
- Filter, temper & humidify supply air
- Maintain rooms at slight positive pressure
- Maintain building at slight positive pressure

**Primary Goal: Comfort**

# IAQ - Ventilation System

## Air Handling Unit (AHU)

### Air Filters

- Use filters that meet HVAC manufacturer's and operating specifications
- Minimum Efficiency Rating Value (MERV) of between 8 and 13
- Below 13 may remove small bacterial or fungal spores
- Check that are proper size, in good condition, clean and not clogged

# MERV Table

<b>MERV</b>	<b>Particle size</b>	<b>Typical controlled contaminant</b> <sup>[2]</sup>	<b>Typical Application</b> <sup>[2]</sup>
17– 20 <sup>[3]</sup>	< 0.3 μm	Virus, carbon dust, sea salt, smoke	Electronics & pharmaceutical manufacturing cleanroom
13–16	0.3–1.0 μm	Bacteria, droplet nuclei (sneeze), cooking oil, most smoke and insecticide dust, most face powder, most paint pigments	hospital & general surgery
9–12	1.0–3.0 μm	Legionella, Humidifier dust, Lead dust, Milled flour, Auto emission particulates, Nebulizer droplets	Superior residential, better commercial, hospital laboratories
5–8 <sup>[4]</sup>	3.0–10.0 μm	Mold, spores, dust mite debris, cat and dog dander, hair spray, fabric protector, dusting aids, pudding mix	Better residential, general commercial, industrial workspaces
1–4	> 10.0 μm	Pollen, dust mites, cockroach debris, sanding dust, spray paint dust, textile fibers, carpet fibers	Residential window AC units

# IAQ - Ventilation System

## **Air Handling Unit (AHU)**

### Humidification and Dehumidification

- Humidification - add moisture
- Dehumidification - reduce moisture
- Maintain RH below 60% in all occupied spaces and plenums

# IAQ Ventilation System

## **Air Handling Unit (AHU)**

### Cooling Coils and Drain Pans

- Coils condense water vapor into drain pans
- Drain pipes must remove water from the AHU

# IAQ Ventilation System

## Air Handling Unit

### Return Air Plenum \*

- Maintain all exhaust systems that pass through plenum
- Prevent contamination of the plenum
- Ensure air flow is not blocked

\* Space above ceiling tiles is often used as return air plenum

# IAQ Ventilation System

## Ducts

- Move the supply air (filtered and conditioned) air to occupied areas
- Repair leakage especially at joints
- Do not make paths for utilities through ducts

# IAQ Ventilation System

## Fans

- Force the supply air to ventilated areas
- Ensure fan belts are operating properly
- Ensure the rotation is in correct direction
- Ensure there are no obstructions in the Fan

\* Safety hazard – maintain guards & use lockout procedure

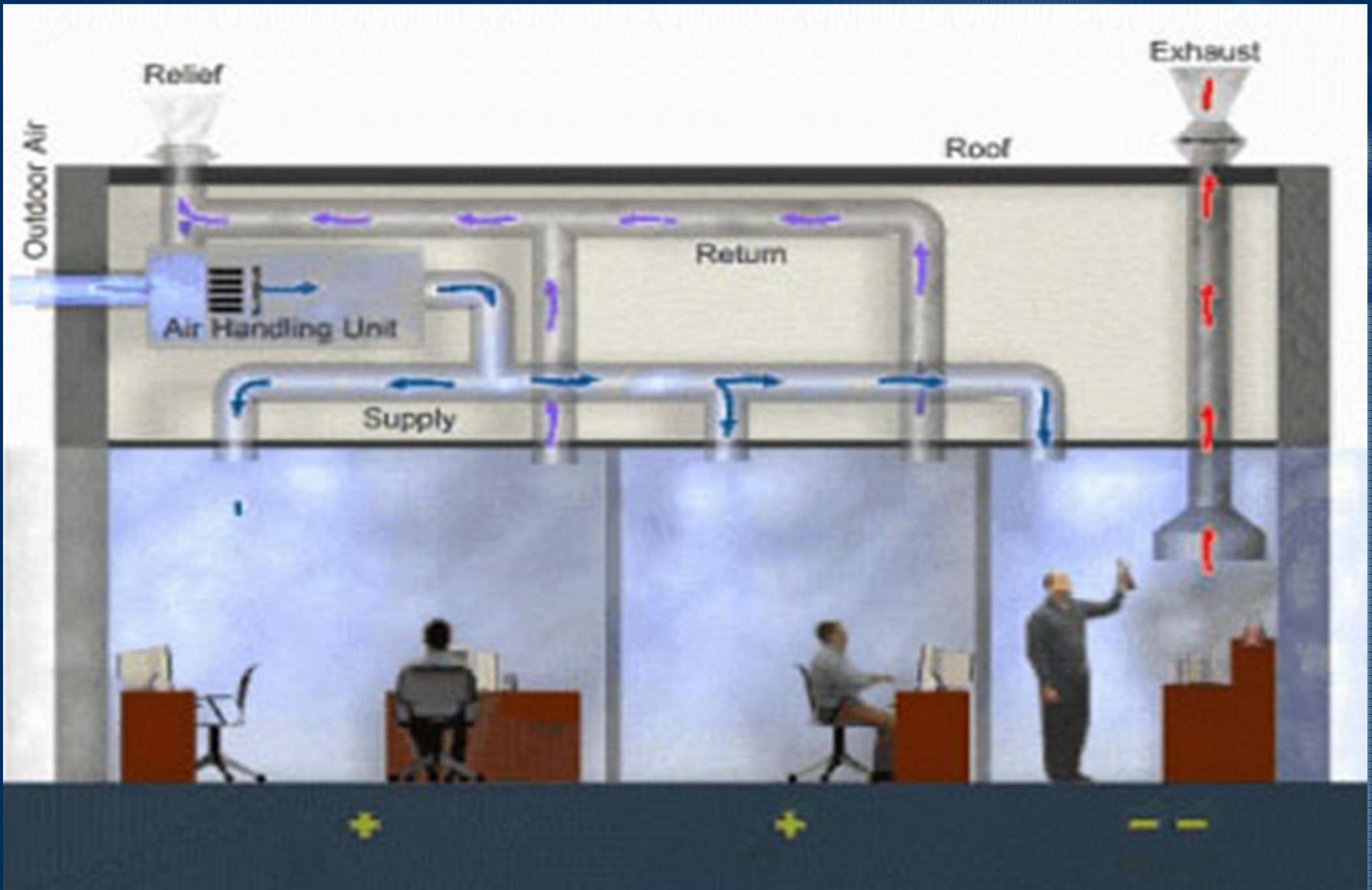
# IAQ Ventilation System

## Local Exhaust Systems

Lab / Vo-tech

- Hazardous contaminant removal
- Point of exhaust (hood) close to source
- Make up air requirements may be greater than for general ventilation
- Room should have negative pressure

# IAQ Ventilation System



# IAQ Ventilation System

## Dampers

Control airflow

- Check condition of dampers and controls
- Ensure all dampers are operable and meet design specifications
- Clean screens and grilles

# IAQ Preventive Maintenance

- Equipment List & Operation Manuals, Blueprints
- Master Schedule & Manufacturer Recommendations
- Maintenance Contracts
- Documentation Inspection/Maintenance: checklists, Work Order & Maintenance Log, Repair Documentation

# IAQ Typical Inspection Protocol

- Fan belts operate properly and in good condition
- Filters are installed properly and replaced as scheduled
- Dampers are open as designed and not blocked
- Motor functions properly
- Diffusers are opened
- Condensate pan drains remove condensate properly
- Supply and exhaust system are properly balanced

# IAQ - PM Documentation

- Name of person(s) and date
- Reason for Inspection/Repair(s)
- Activity(s) performed
- Item(s) repaired/replaced
- Time spent on activity
- Observations

Questions

&

Answers