

**DRI**<sup>TM</sup>**APS**

Protect yourself indoors  
against outdoor pollution



# Air Alert

City Breathes Uneasy

PM<sub>2.5</sub>

PM<sub>2.5</sub>

SO<sub>x</sub>

NO<sub>x</sub>

PM<sub>10</sub>

NO<sub>x</sub>

Odour

## Outdoor Air Pollutants

### Particulate - PM<sub>2.5</sub> PM<sub>10</sub>

**Source** - Soot, particulate contaminants, energy production (especially coal power plants), 'chullahs', open fire cooking, stubble burning, burning of waste, industrial process emissions, etc.

#### Effect on Health

Increasing respiratory symptoms, e.g. irritation of the airways, coughing, or difficulty in breathing; decreasing lung function; aggravation of asthma; development of chronic bronchitis; adverse effects on the cardiovascular system; and premature death of people with heart or lung diseases.

#### Acceptable levels

Particulate matter (PM <sub>2.5</sub> )	24 h mean < 25 µg/m <sup>3</sup>
Particulate matter (PM <sub>10</sub> )	24 h mean < 50 µg/m <sup>3</sup>

### Harmful Gases - SO<sub>x</sub>, NO<sub>x</sub>

**Source** - Vehicular traffic, industrial processes, open sewage systems

#### Effect on Health

**SO<sub>x</sub>** : Irritates the throat and lungs; if there are fine dust particles in the air, it can damage a person's respiratory system; and if combined with other substances in the air, it produces a haze that reduces visibility.

**NO<sub>x</sub>** : Increased incidence of respiratory illness, increased airway resistance (due to inflammation), damage to lung tissue, chronic obstructive pulmonary disease or COPD (narrowing of the airways), emphysema (as part of COPD), pulmonary edema (accumulation of excessive fluid in the lungs), infant and cardiovascular death.

#### Acceptable levels

Sulphur dioxide (SO <sub>2</sub> )	24 h mean < 20 µg/m <sup>3</sup>
Nitrogen dioxide (NO <sub>2</sub> )	1 h mean < 200 µg/m <sup>3</sup>





Odour

CO

CO<sub>2</sub>

O<sub>3</sub>

CO

Odour

CO

CO<sub>2</sub>

CO

Odour

CO

## Indoor Air Pollutants

**VOCs; Formaldehyde; Radon asbestos; Virus & Bacteria; Mould, Mildew & Fungus.**

**Source:** Printers, photocopiers, fax machines; carpets, cleaning products; paints, polish, solvents; moisture and people themselves.

### Effect on Health

Headaches, Dizziness

Short Term Exposure (few hours or days)

- Irritation of eyes, nose and throat
- Asthma attacks
- Acute bronchitis
- Increased susceptibility to respiratory infections
- Lung disease

Long-term Exposure (Years)

- Reduced lung function
- Development of chronic bronchitis
- Even premature death.

### Acceptable levels

Carbon dioxide (CO <sub>2</sub> )	< 1000 ppm
Ozone (O <sub>3</sub> )	8 h mean < 100 µg/m <sup>3</sup>
Carbon monoxide (CO)	8 h mean < 75 ppm
Formaldehyde	< 0.1 mg/m <sup>3</sup>

## Poor IAQ: Health Consequences

### SBS - SICK BUILDING SYNDROME

- No specific illness or identifiable cause of discomfort
- Cluster of complex irritating symptoms including headache; nausea; fatigue, dizziness, lethargy; respiratory problems; coughing; wheezing; eye, nose & throat irritation; dry skin, skin rashes; and sensory discomforts

### BRI - BUILDING RELATED ILLNESS

- A more serious condition
- Symptoms of diagnosable illness are identifiable
- Cause of illness directly attributable to environmental agents in air
- Diseases include:
  - Legionnaire's disease
  - Sensitivity pneumonitis





## Enhance IAQ with Healthy Life



SCHOOLS



OFFICES



RESIDENCES



## Objective: Maintain Good Indoor Air Quality

### Acceptable levels

Particulate matter (PM <sub>2.5</sub> )	24 h mean < 25 µg/m <sup>3</sup>	WHO Air Quality Guideline
Particulate matter (PM <sub>10</sub> )	24 h mean < 50 µg/m <sup>3</sup>	WHO Air Quality Guideline
Carbon dioxide (CO <sub>2</sub> )	< 1000 ppm	ASHRAE 62.1-2013
Sulphur dioxide (SO <sub>2</sub> )	24 h mean < 20 µg/m <sup>3</sup>	WHO Air Quality Guideline
Nitrogen dioxide (NO <sub>2</sub> )	1 h mean < 200 µg/m <sup>3</sup>	WHO Air Quality Guideline
Ozone (O <sub>3</sub> ) 8 h mean	< 100 µg/m <sup>3</sup>	WHO Air Quality Guideline
Carbon monoxide (CO)	8 h mean < 75 ppm	ASHRAE 62.1-2013
Formaldehyde	< 0.1 mg/m <sup>3</sup>	ASHRAE 62.1-2013

### Solution

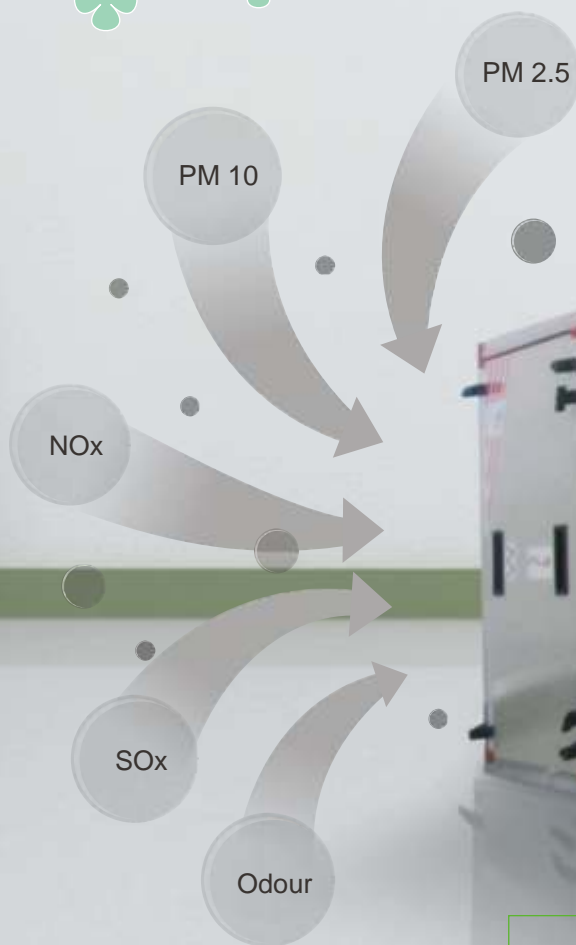
- Dilute / flush out indoor pollutants using clean outside air and further prevent infiltration by positively pressurizing the area.
- To clean out side air, proper particulate and chemical filtration is required before the air is introduced into the space.



# **Air Purification System (APS)**



Outdoor Polluted Air



**The best solution for Indoor Air Pollution** is dilution using Outside Clean Air.

**Customization possible based on:**

- City / Area / Application
- Outdoor Air Pollution Level
- Vertical or Horizontal Units (Space Limitations)
- Retrofit Cases



**Particulate Filters**  
(Standard)



**Gas Phase Filters**  
(Standard)



**Odour Filters**  
(Add-on option)

# Air Purification System (APS)



Vertical unit

Fresh,  
Clean Healthy Air...  
Indoor

## Additional Options



Controls



Wet Scrubber  
+Evaporative Cooling  
Module

OR



Cooling Coil

AND/OR



Energy  
Recovery  
Wheel

# Innovative Air Solutions from DRI

## Fresh Air Solutions for Green HVAC and Evaporative Cooling



IAQ & Energy Recovery Solutions



EcoBeam Chilled Beams



Comprehensive Evaporative Cooling Solutions

## Labs for Certified and Tested Solutions

### GAS Phase Filtration



### Energy Recovery



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