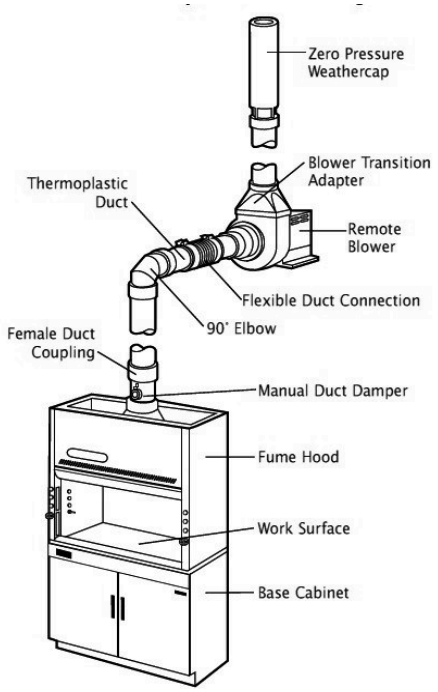
Laboratories in a Changing World

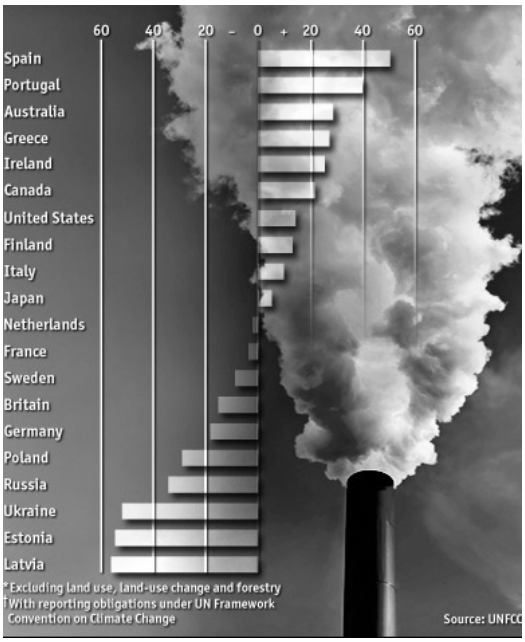
SLCan 2014

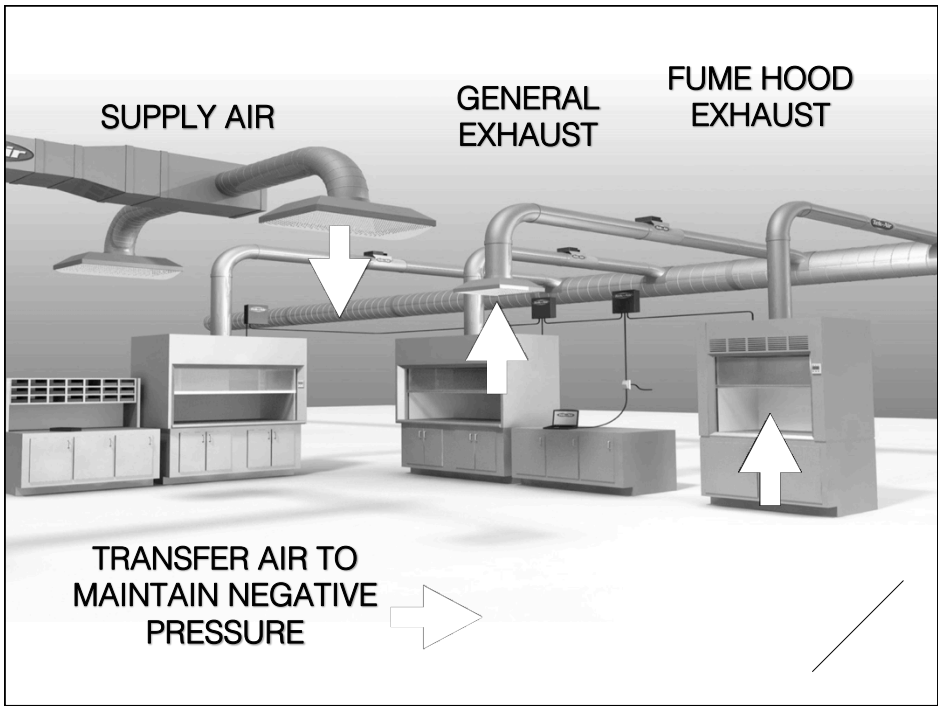
How have "WE" controlled Lab Air Quality ?

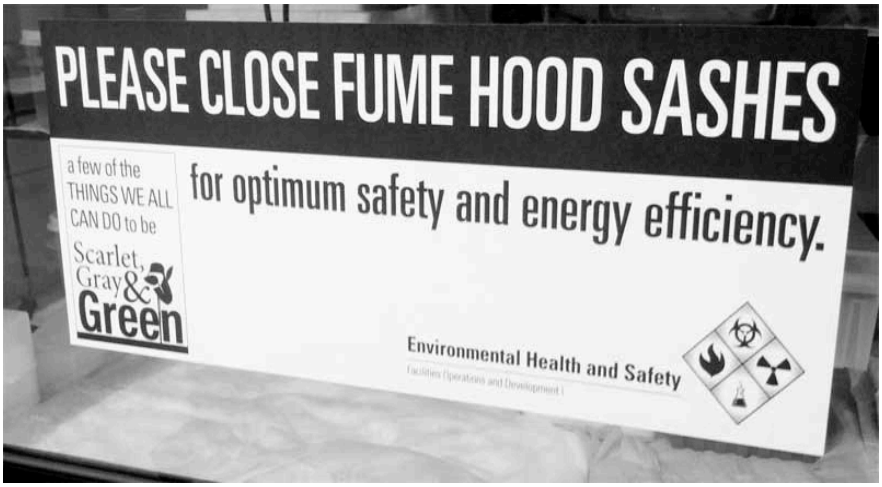


Change on Greenhouse Gas Emissions*

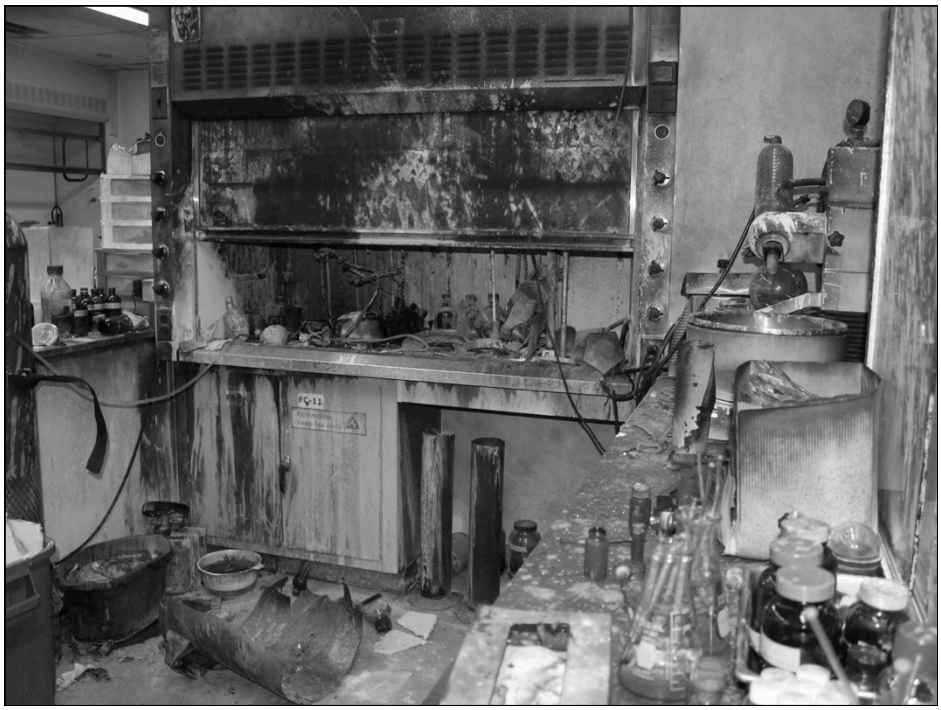
1990-2006 %




SUPPLY AIR
GENERAL EXHAUST
FUME HOOD EXHAUST
TRANSFER AIR TO MAINTAIN NEGATIVE PRESSURE


PLEASE CLOSE FUME HOOD SASHES
for optimum safety and energy efficiency.
a few of the THINGS WE ALL CAN DO to be
Scarlet, Gray & Green
Environmental Health and Safety

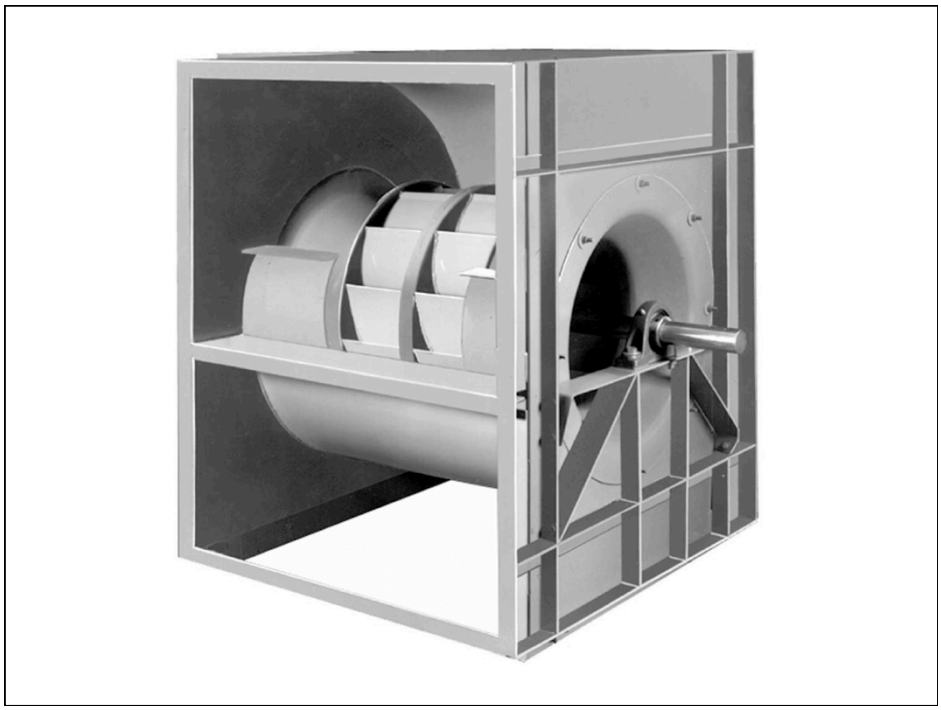
mott
MANUFACTURING
ISO 9001:2000 REGISTERED
For Safety
MAX
WORKING
HEIGHT

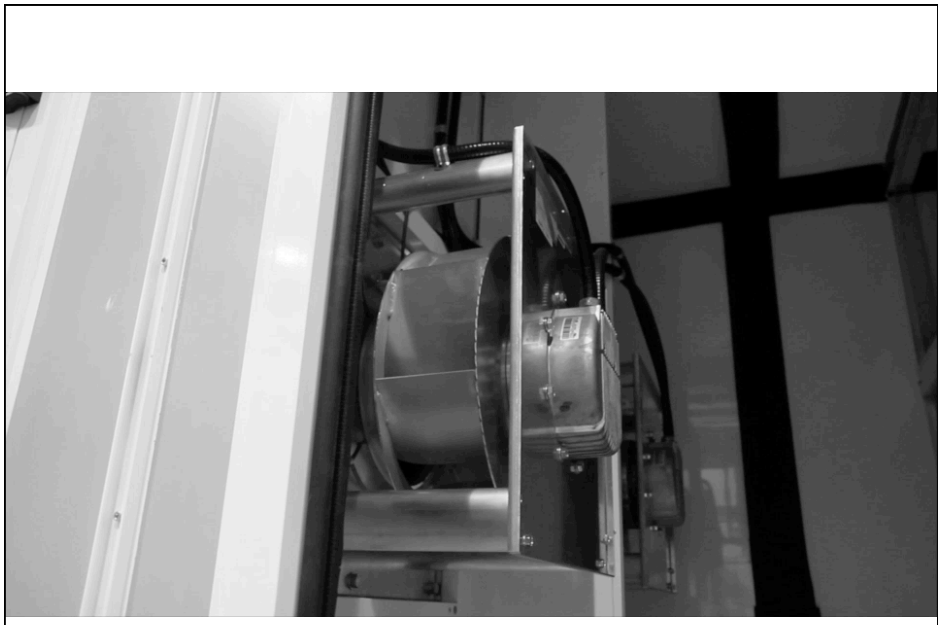


Energy Efficient Design Concepts
REDUCE – System Air Pressure Drop

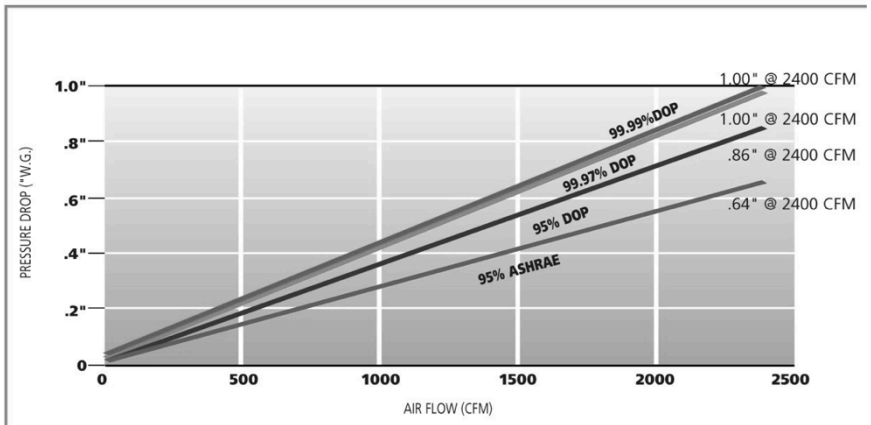
Component	Standard	Better	Best
Face Velocity	500	400	300
AHU Pressure Drop	2.7” WG	1.7” WG	1.0” WG
Energy Recovery	1.0” WG	0.6” WG	0.35” WG
VAV Control Devices	NA	0.6 - 0.3” WG	0.1” WG
SA / EA Pressure Drop	4.5” WG	2.25” WG	1.1” WG
Noise Control Silencers	1.0” WG	0.25” WG	0.0” WG
Total	9.2” WG	5.3” WG	2.55” WG
Fan Power (W/CFM)	2	1.2	0.6

LABS FOR THE 21ST CENTURY®





AIR FLOW VS. PRESSURE DROP

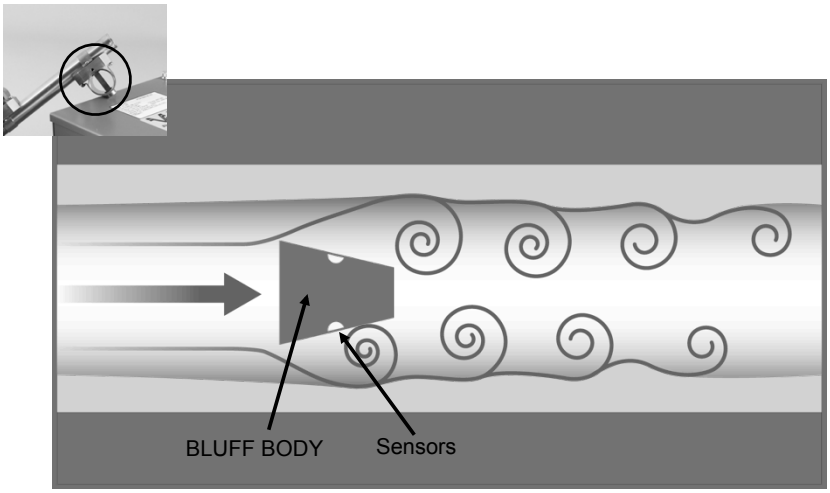


To determine the approximate pressure drop for half size (24" x 12" x 11.5") filters, divide flow rate in half.

2,000 CFM @ 1.0”WC = $329.52
2,000 CFM @ 0.42” WC = $136.80

DANGER

Vortex Airflow Sensor



8

1960's

1960's

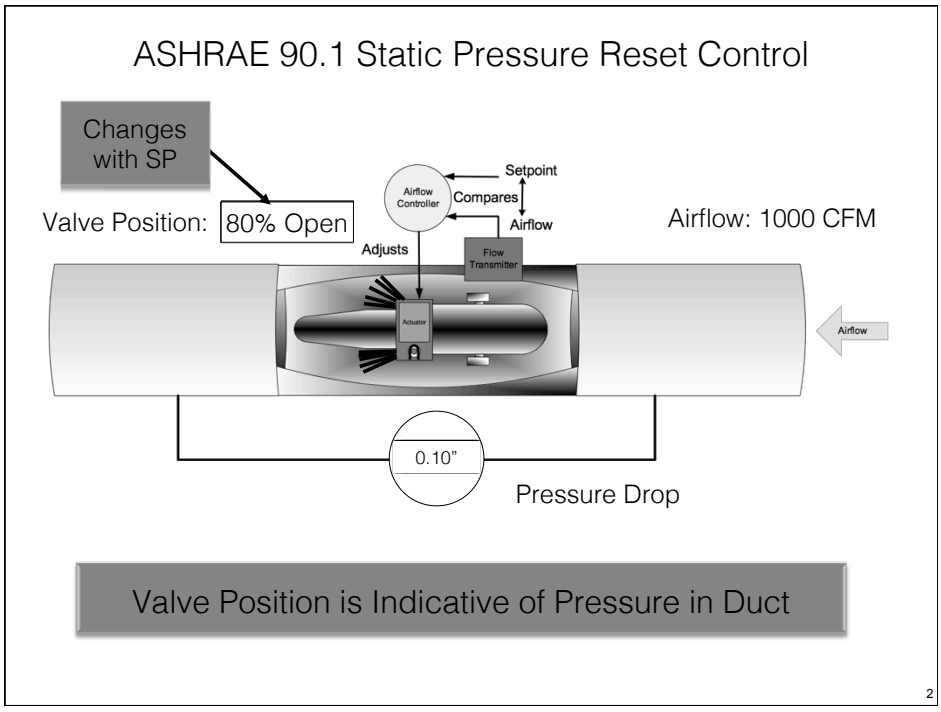
1980's

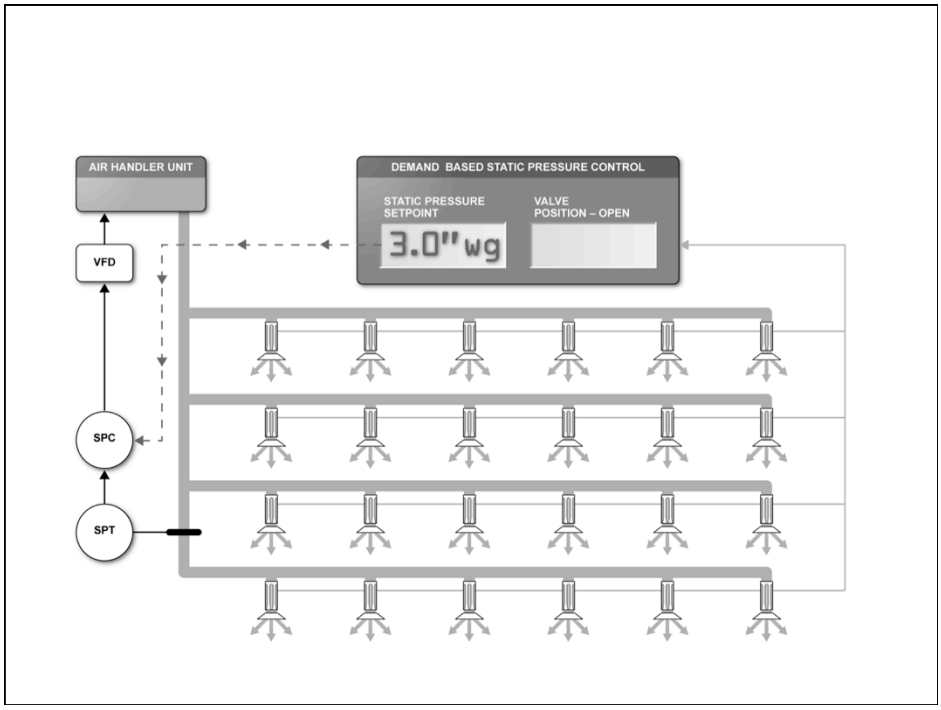
1980's

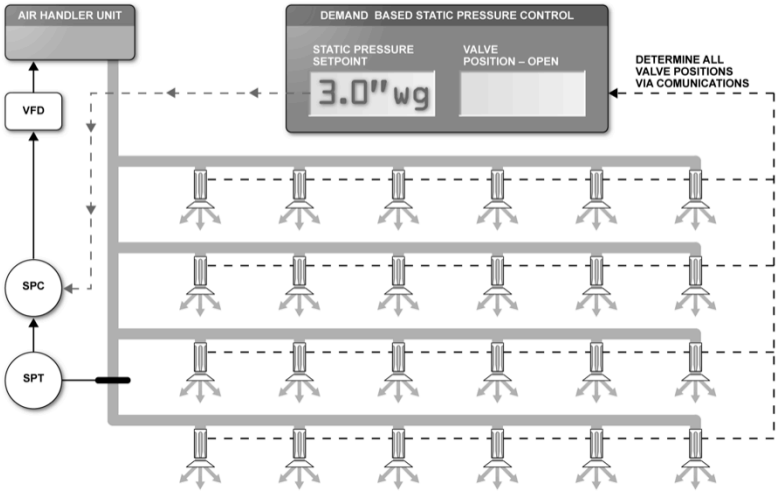
2006

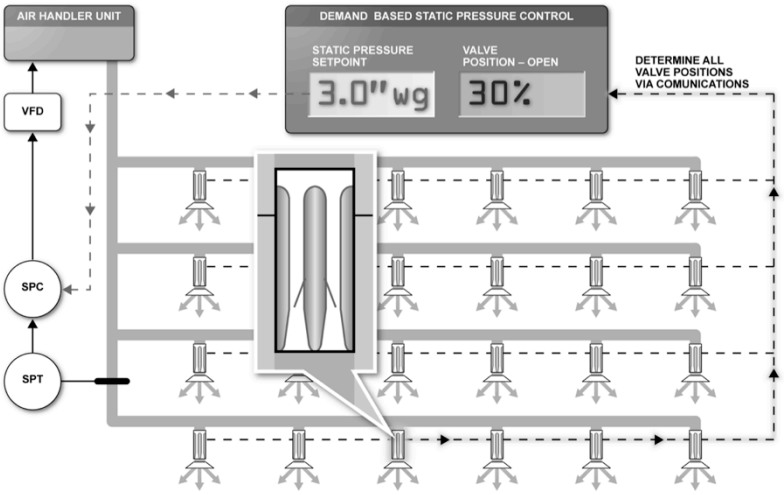
ACCUVALVE™

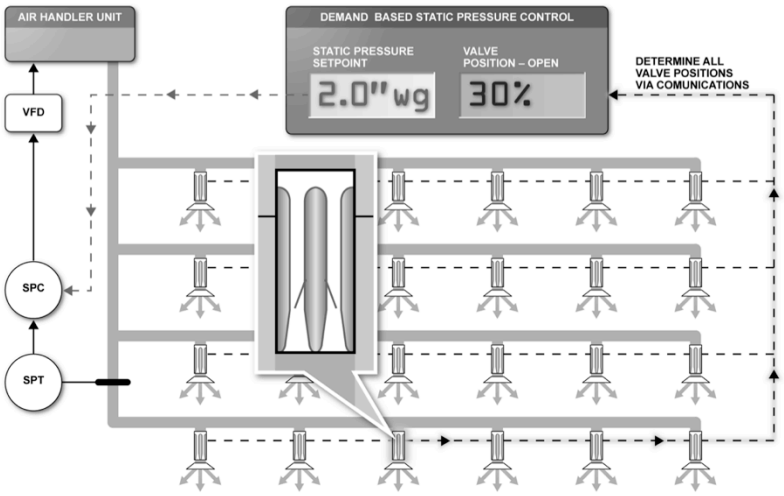
2008 AHR Expo®
INNOVATION AWARDS
Value
Impact
Application
WINNER

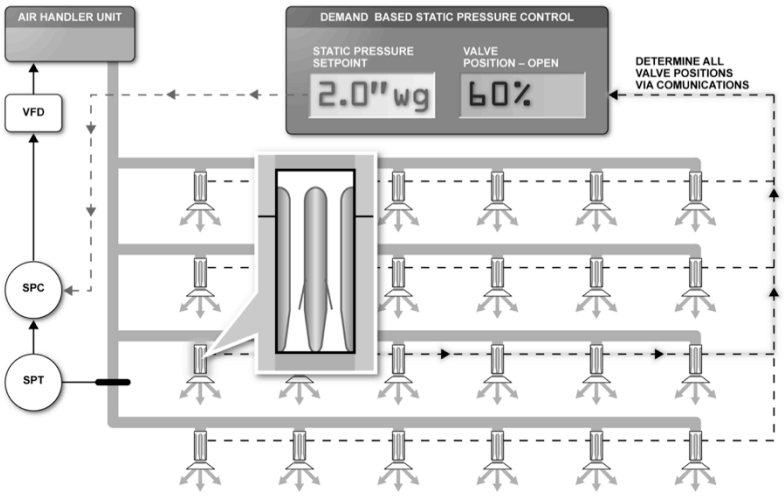

ASHRAE 90.1 Static Pressure Reset Control
Changes with SP
Valve Position:
80% Open
Airflow Controller
Setpoint
Compares
Airflow
Adjusts
Flow Transmitter
Actuator
Airflow: 1000 CFM
Airflow
0.10"
Pressure Drop
Valve Position is Indicative of Pressure in Duct
2

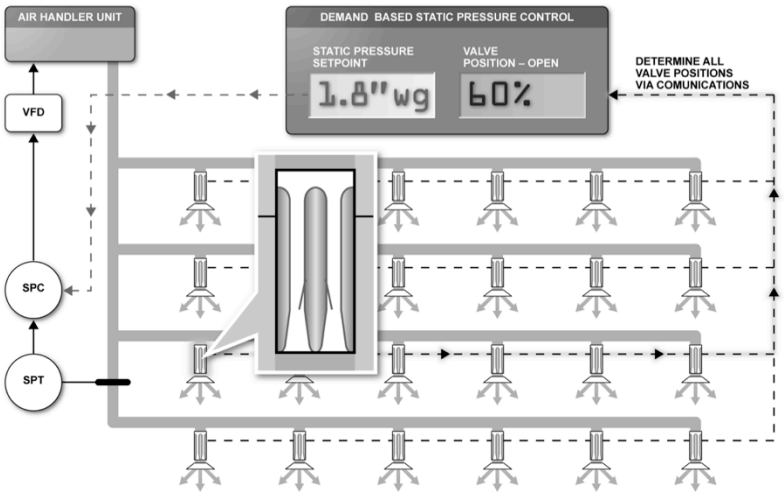

AIR HANDLER UNIT
DEMAND BASED STATIC PRESSURE CONTROL
STATIC PRESSURE SETPOINT
3.0"wg
VALVE POSITION – OPEN
VFD
SPC
SPT

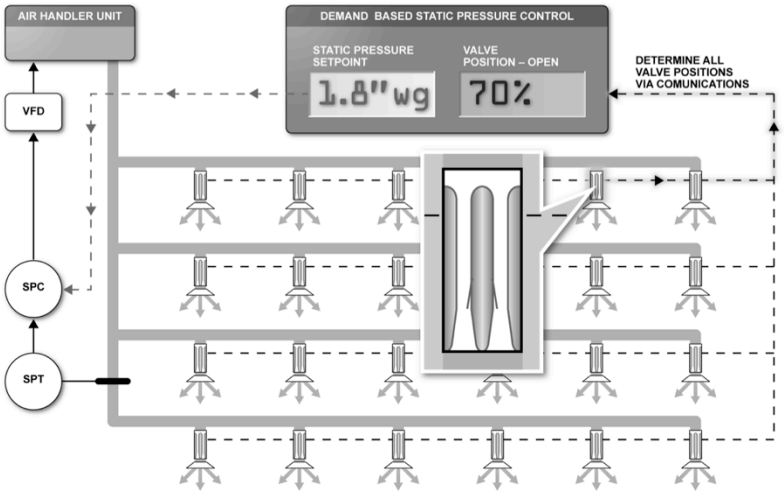

AIR HANDLER UNIT
DEMAND BASED STATIC PRESSURE CONTROL
STATIC PRESSURE SETPOINT
3.0"wg
VALVE POSITION – OPEN
DETERMINE ALL VALVE POSITIONS VIA COMUNICATIONS
VFD
SPC
SPT

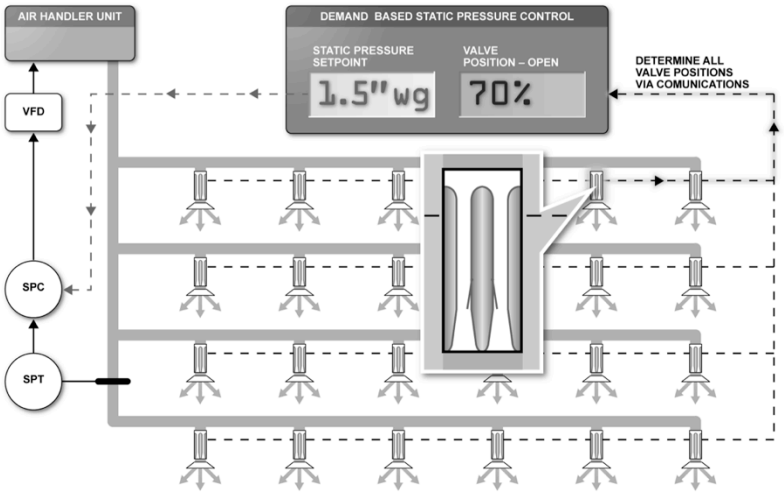

AIR HANDLER UNIT
DEMAND BASED STATIC PRESSURE CONTROL
STATIC PRESSURE SETPOINT
3.0"wg
VALVE POSITION – OPEN
30%
DETERMINE ALL VALVE POSITIONS VIA COMUNICATIONS
VFD
SPC
SPT

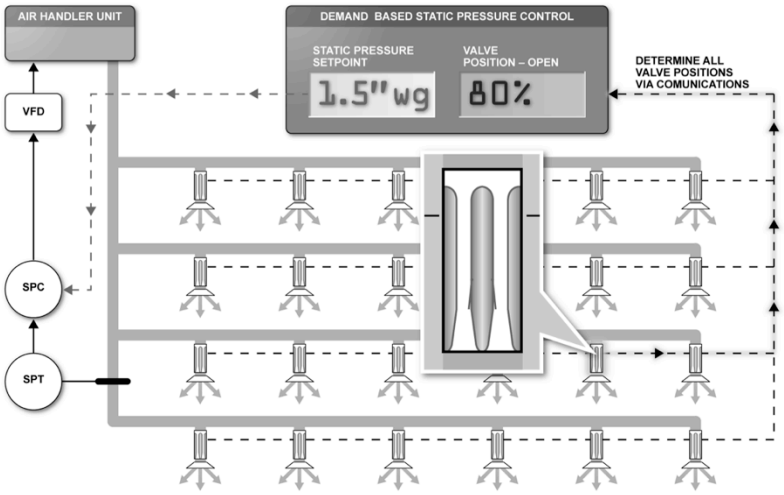

AIR HANDLER UNIT
DEMAND BASED STATIC PRESSURE CONTROL
STATIC PRESSURE SETPOINT
2.0"wg
VALVE POSITION – OPEN
30%
DETERMINE ALL VALVE POSITIONS VIA COMUNICATIONS
VFD
SPC
SPT

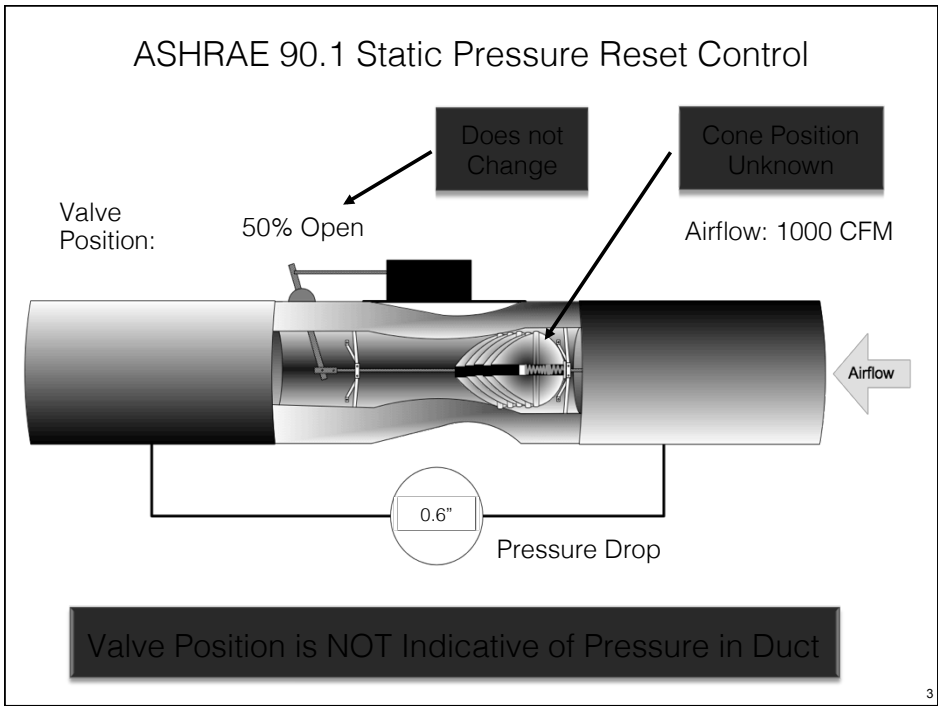

AIR HANDLER UNIT
DEMAND BASED STATIC PRESSURE CONTROL
STATIC PRESSURE SETPOINT
2.0"wg
VALVE POSITION – OPEN
60%
DETERMINE ALL VALVE POSITIONS VIA COMUNICATIONS
VFD
SPC
SPT

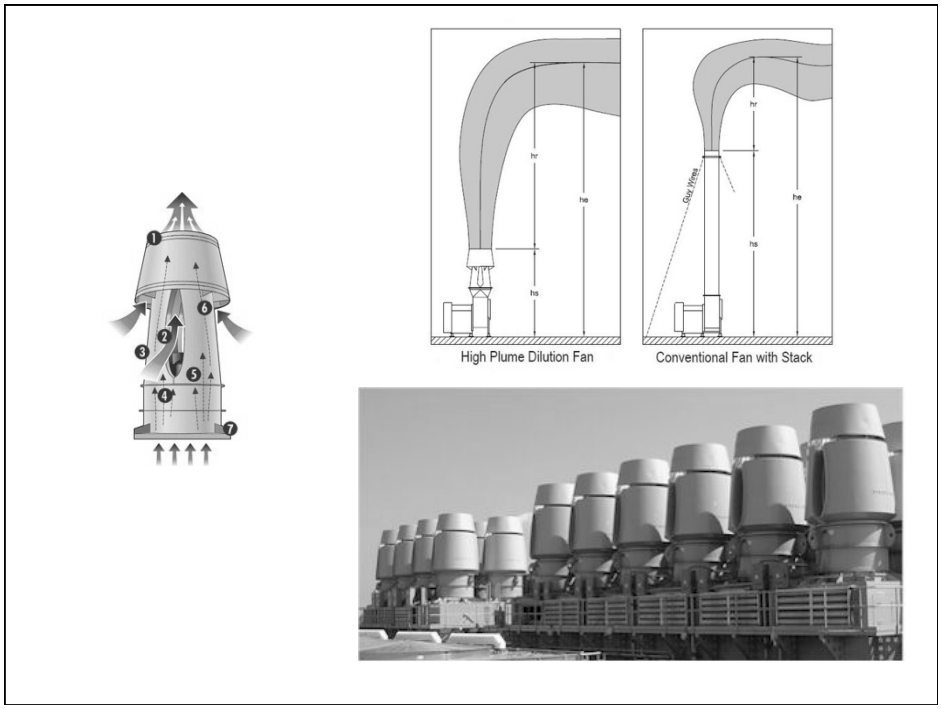

AIR HANDLER UNIT
DEMAND BASED STATIC PRESSURE CONTROL
STATIC PRESSURE SETPOINT
1.8"wg
VALVE POSITION – OPEN
60%
DETERMINE ALL VALVE POSITIONS VIA COMUNICATIONS
VFD
SPC
SPT

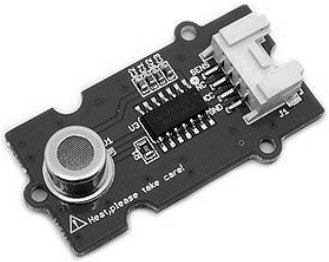

AIR HANDLER UNIT
DEMAND BASED STATIC PRESSURE CONTROL
STATIC PRESSURE SETPOINT
1.8"wg
VALVE POSITION – OPEN
70%
DETERMINE ALL VALVE POSITIONS VIA COMUNICATIONS
VFD
SPC
SPT

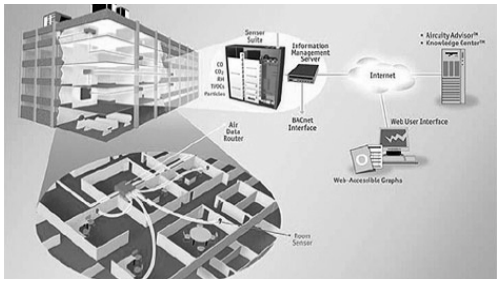

AIR HANDLER UNIT
DEMAND BASED STATIC PRESSURE CONTROL
STATIC PRESSURE SETPOINT
1.5"wg
VALVE POSITION – OPEN
70%
DETERMINE ALL VALVE POSITIONS VIA COMUNICATIONS
VFD
SPC
SPT


AIR HANDLER UNIT
DEMAND BASED STATIC PRESSURE CONTROL
STATIC PRESSURE SETPOINT
1.5"wg
VALVE POSITION – OPEN
80%
DETERMINE ALL VALVE POSITIONS VIA COMUNICATIONS
VFD
SPC
SPT


ASHRAE 90.1 Static Pressure Reset Control
Does not Change
Cone Position Unknown
Valve Position:
50% Open
Airflow: 1000 CFM
Airflow
0.6"
Pressure Drop
Valve Position is NOT Indicative of Pressure in Duct
3

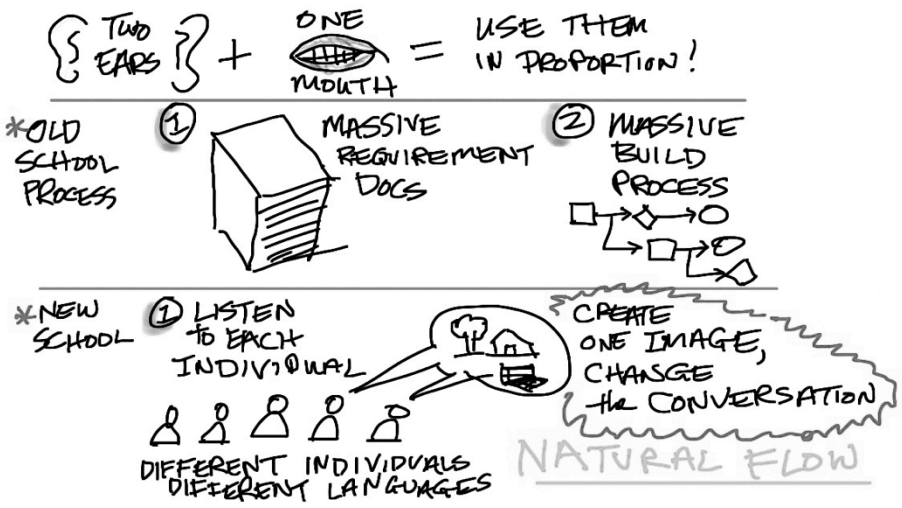

High Plume Dilution Fan
Conventional Fan with Stack


Hey,please take care!


Sensor Suite
Information Management Server
Internet
• AircuityAdvisor™
• Knowledge Center™
Air Data Router
BACnet Interface
Web User Interface
Web-Accessible Graphs
Room Sensor

AHU
Room
AHU Total Average Flow Reduction
Estimated Savings this period
$66.66
Target Savings this period
$101.69
Annual Estimate Dollars/cfm ($)
4.5
Supply Flow Reduction (cfm)
CFM
Current
Previous
Target
Sash Management - AHU
Fume Hood Excess Flow
Fume Hood Sash Management
Average ACH (Occupied Hours) per Room
Design Min w OptiNet
Design Min w/o OptiNet
Navigation

Being a Member of a Collaborative Team



Resources

ISPE - Baseline Guides
Communities of Practice & So much More www.ispe.org
IEST - Recommended Practices & ISO Documents
www.iest.org
ASHRAE – Handbooks - www.ashrae.org
Labs for the 21st Century - www.labs21century.gov
International Institute for Sustainable Laboratories
www.i2sl.org

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