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Building Science

HVAC

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Build Tight - Ventilate Right

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Build Tight - Ventilate Right

How Tight?

What's Right?

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Air Barrier Metrics

Material	0.02 l/(s-m2) @ 75 Pa
Assembly	0.20 l/(s-m2) @ 75 Pa
Enclosure	2.00 l/(s-m2) @ 75 Pa
	0.35 cfm/ft2 @ 50 Pa
	0.25 cfm/ft2 @ 50 Pa
	0.15 cfm/ft2 @ 50 Pa

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Getting rid of big holes	3 ach@50
Getting rid of smaller holes	1.5 ach@50
Getting German	0.6 ach@50

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Best

As Tight as Possible - with -
Balanced Ventilation
Energy Recovery
Distribution and Mixing
Source Control - Spot exhaust ventilation
Filtration
Material selection

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Worst

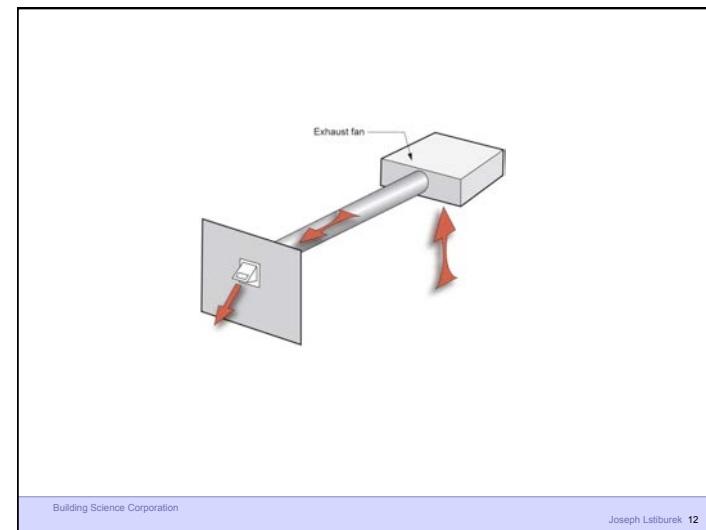
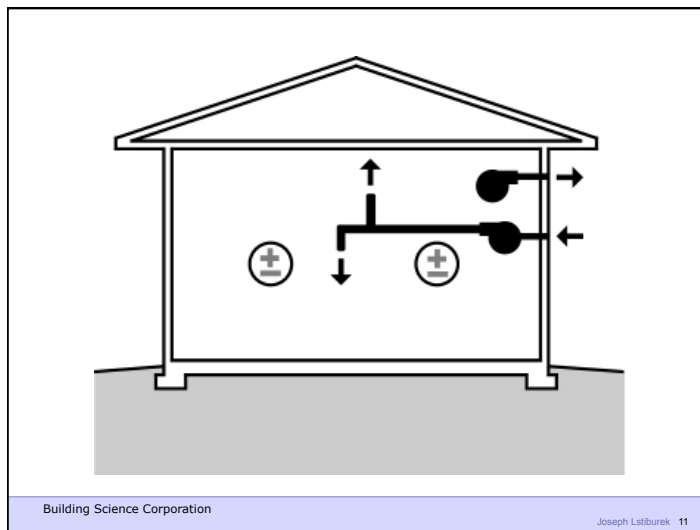
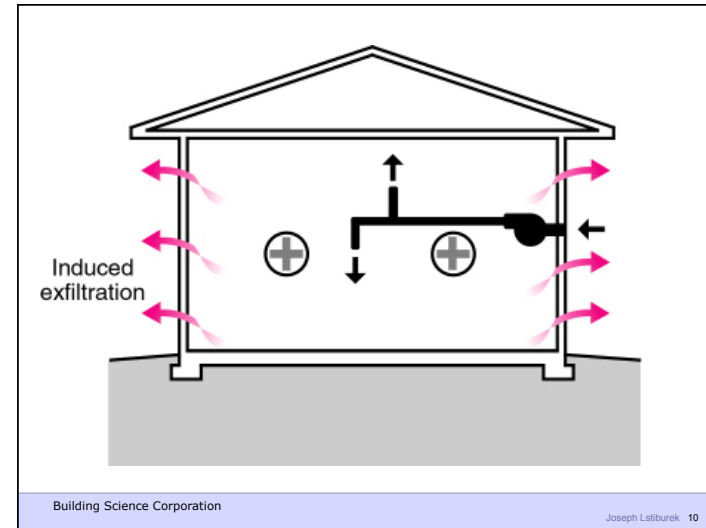
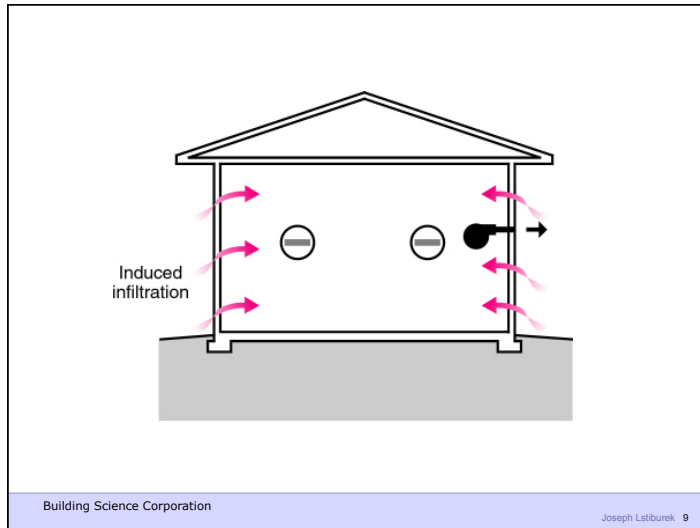
Leaky - with – Nothing
Spot Ventilation in Bathroom/Kitchen
Exhaust Ventilation – with – No Distribution
and No Mixing

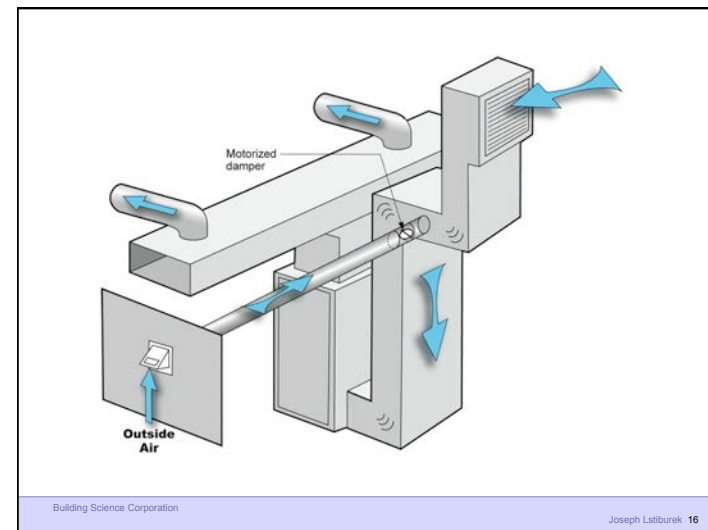
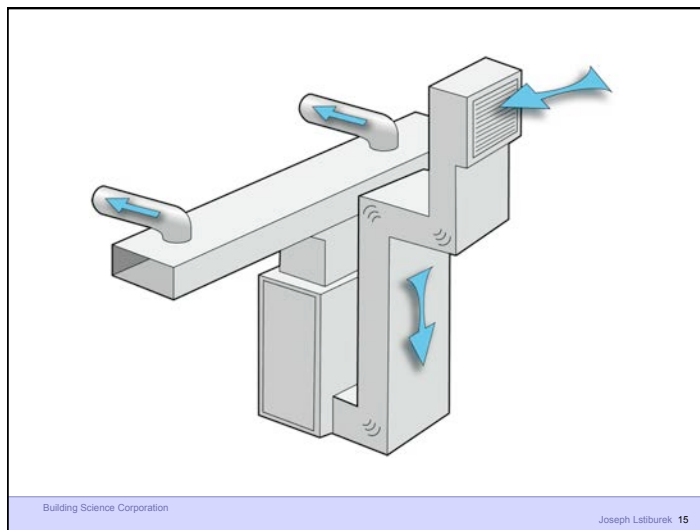
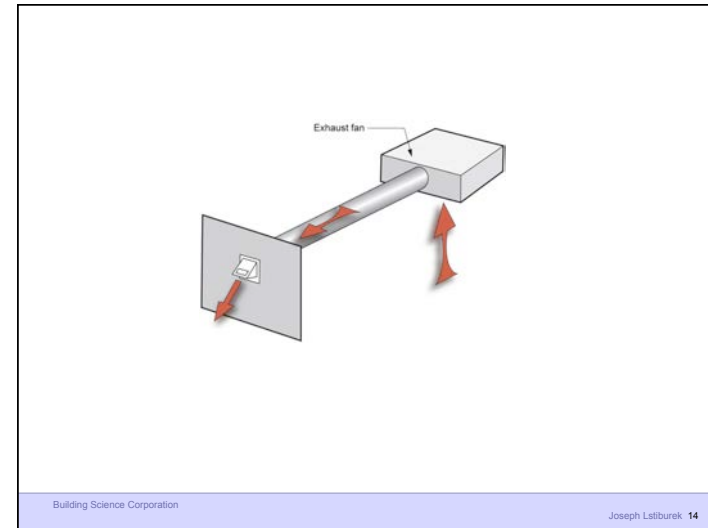
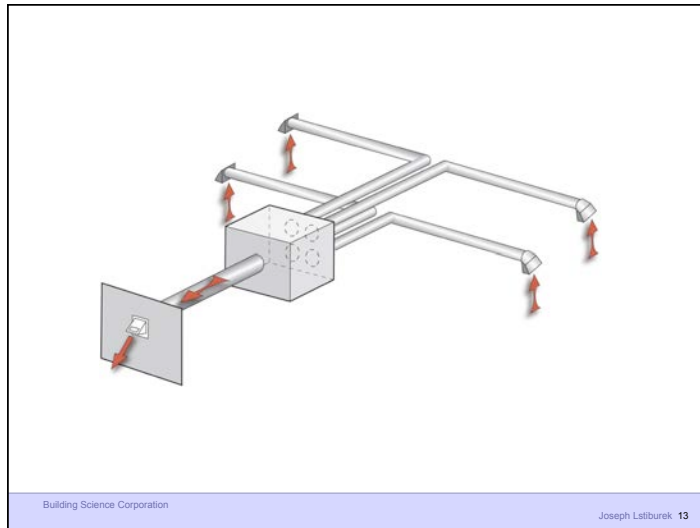
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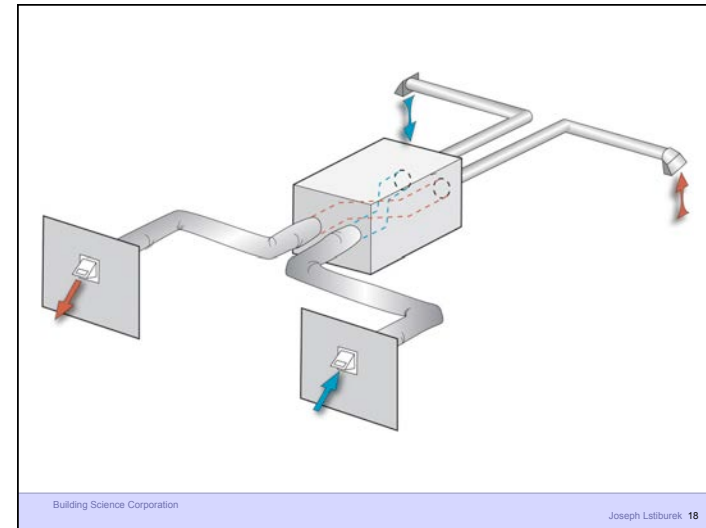
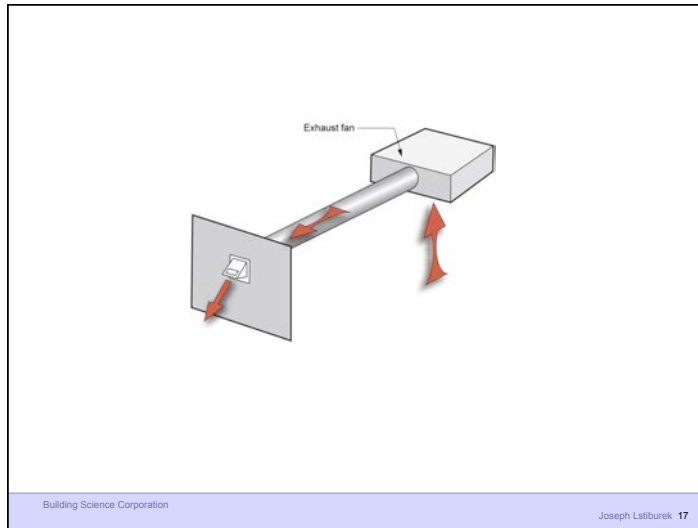
Three Types of Controlled Ventilation
Systems

Exhaust Ventilation
Supply Ventilation
Balanced Ventilation

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Ventilation Rates Are Based on Odor Control

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Ventilation Rates Are Based on Odor Control
Health Science Basis for Ventilation Rates is
Extremely Limited

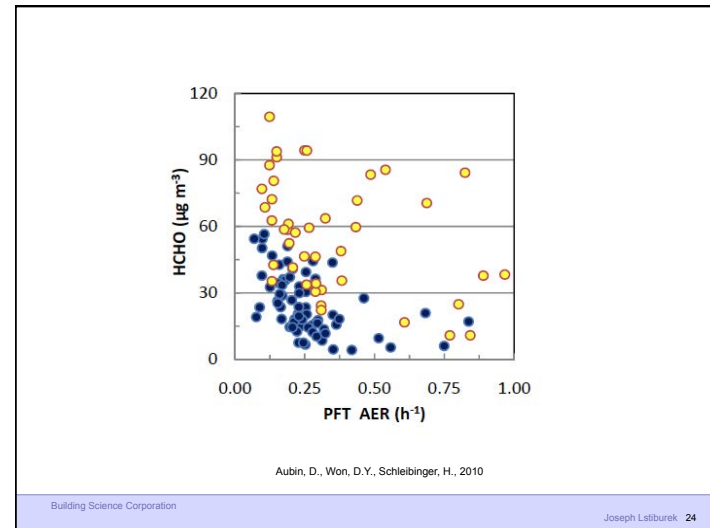
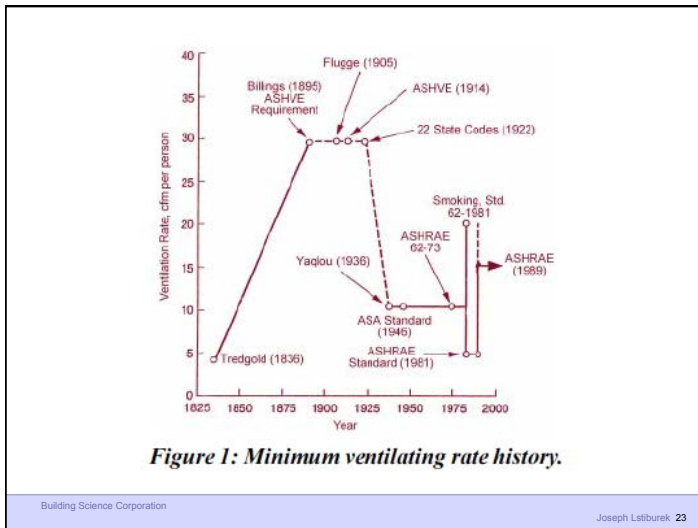
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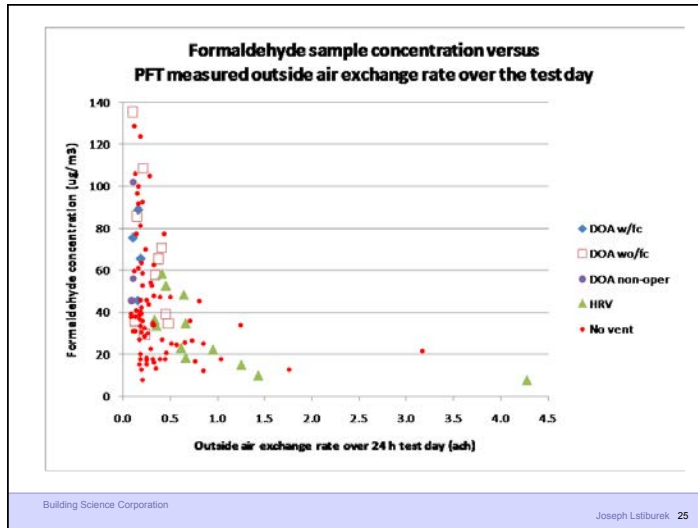
Ventilation Rates Are Based on Odor Control
 Health Science Basis for Ventilation Rates is
 Extremely Limited
 Almost Nothing Cited Applies to Housing

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Ventilation Rates Are Based on Odor Control
 Health Science Basis for Ventilation Rates is
 Extremely Limited
 Almost Nothing Cited Applies to Housing
 The Applicable Studies Focus on Dampness

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Dilution Is Not The Solution To Indoor Pollution Source Control

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Dilution For People Source Control For The Building

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ASHRAE Standard 62.2 calls for 7.5 cfm per person plus 0.03 cfm per square foot of conditioned area
Occupancy is deemed to be the number of bedrooms plus one

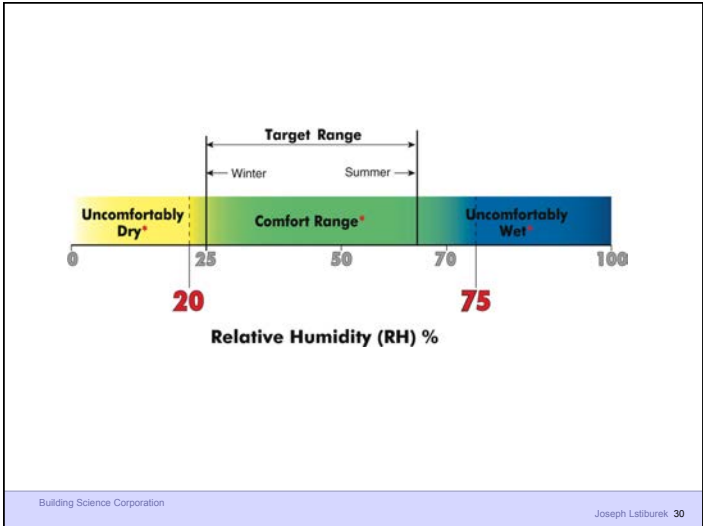
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ASHRAE Standard 62.2 calls for 7.5 cfm per person plus 0.03 cfm per square foot of conditioned area

Occupancy is deemed to be the number of bedrooms plus one

Outcome is often bad – part load humidity problems, dryness problems, energy problems

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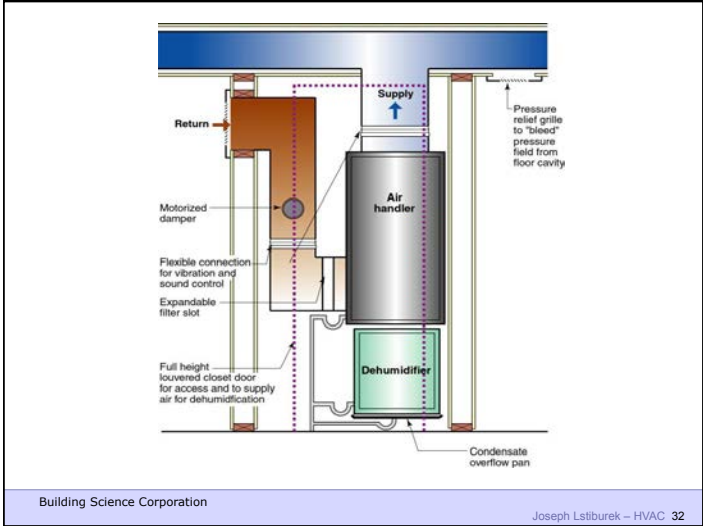


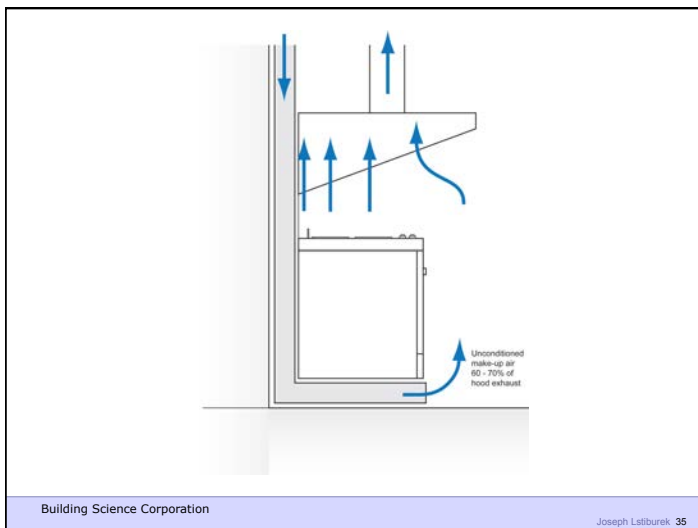
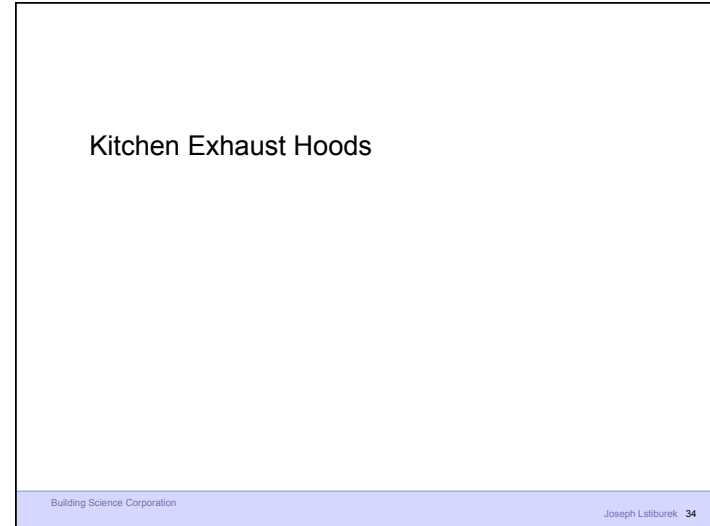
Recommended Range of Relative Humidity

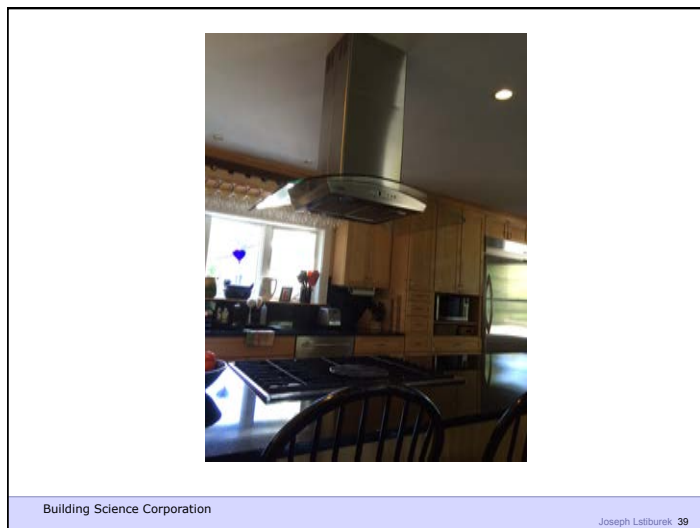
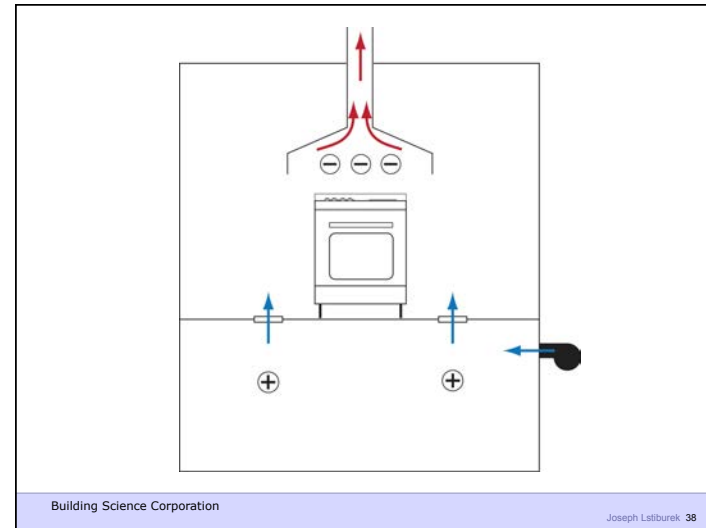
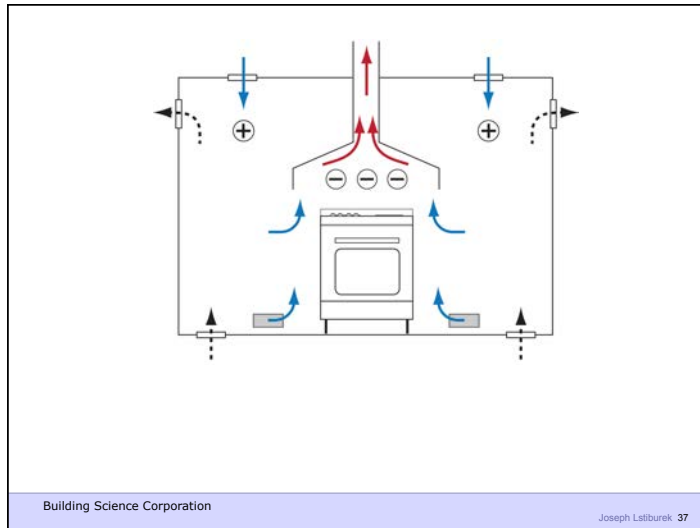
Above 25 percent during winter

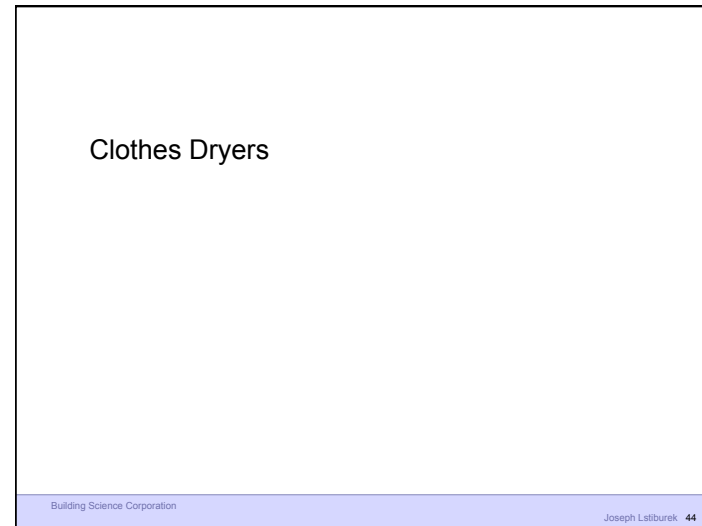
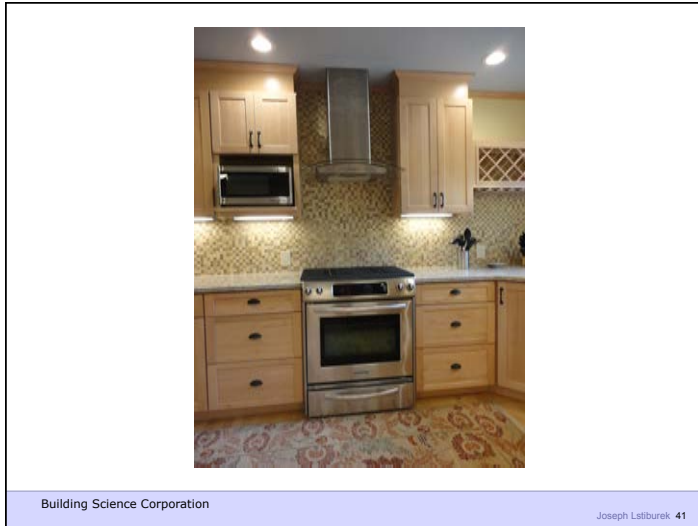
Below 70 percent during summer

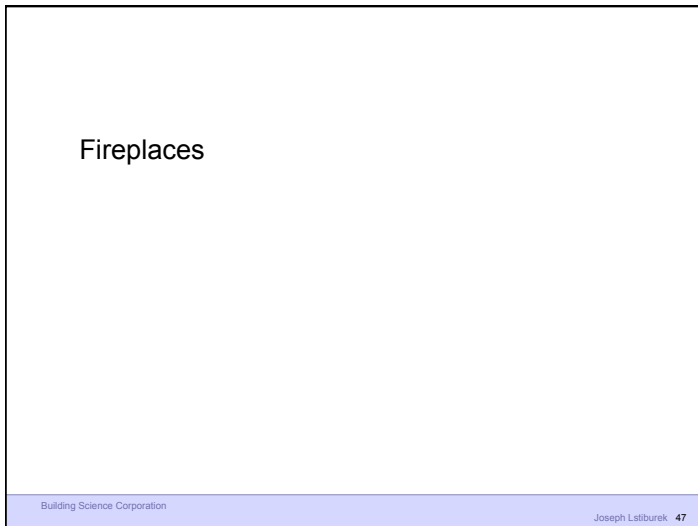
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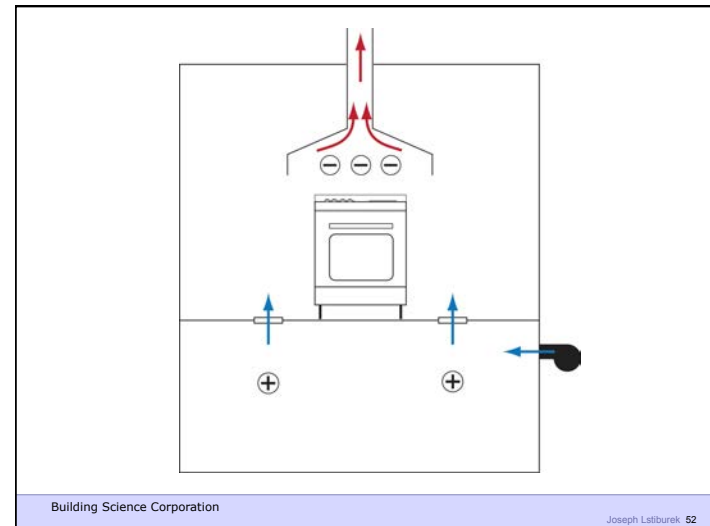
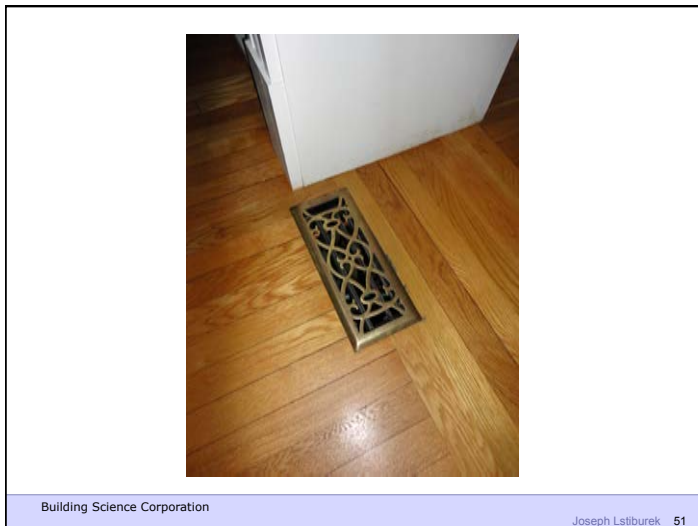
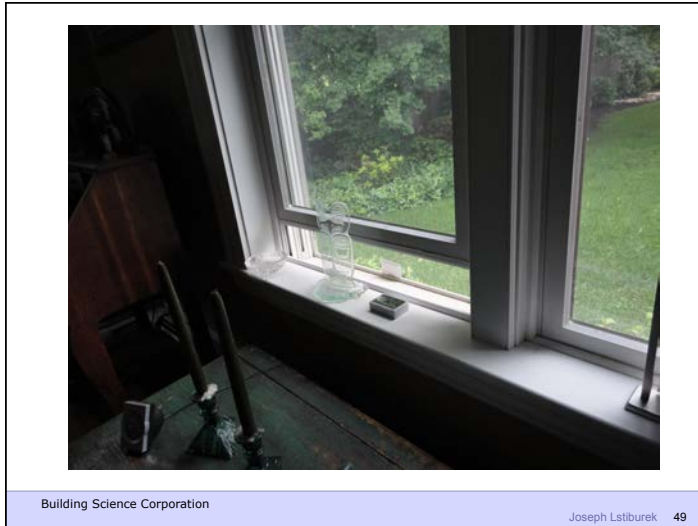






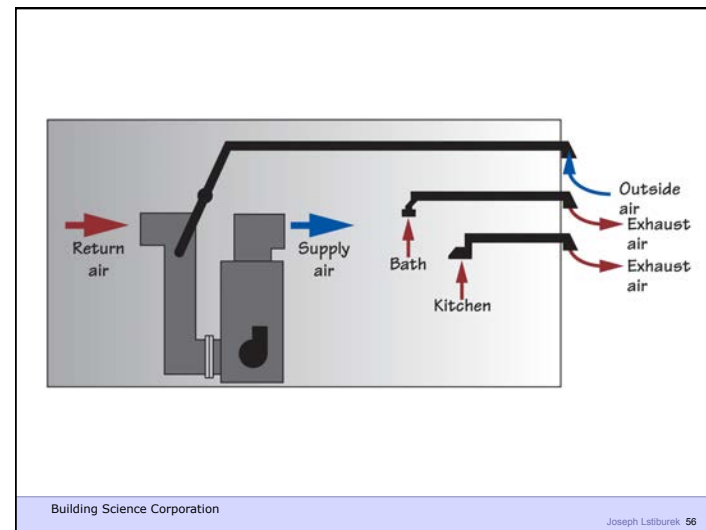
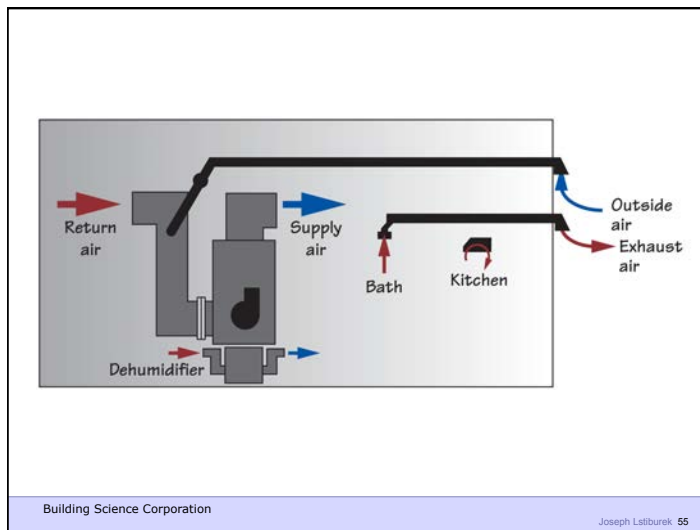
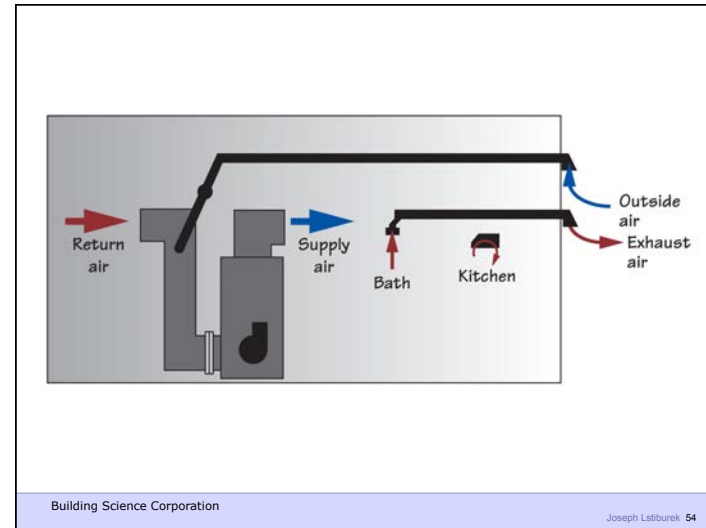


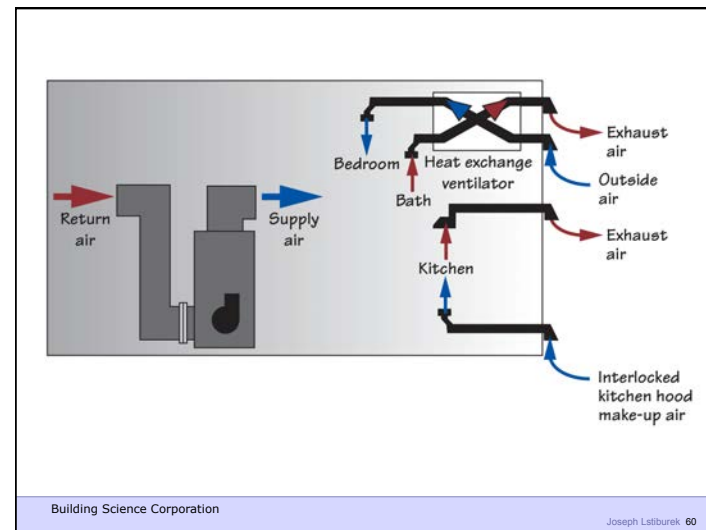
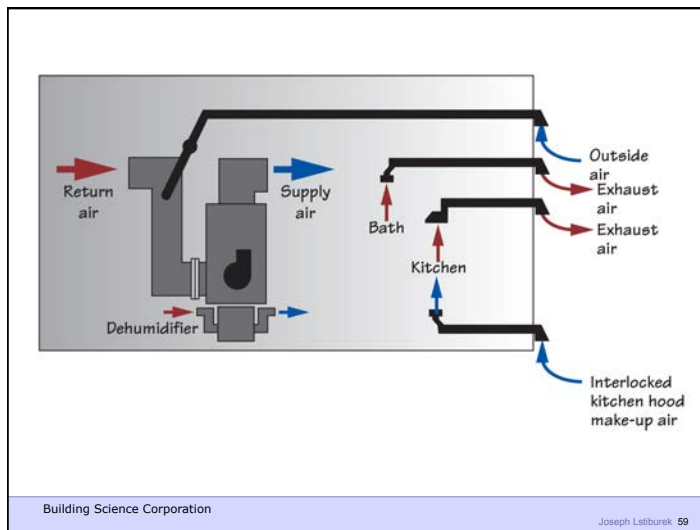
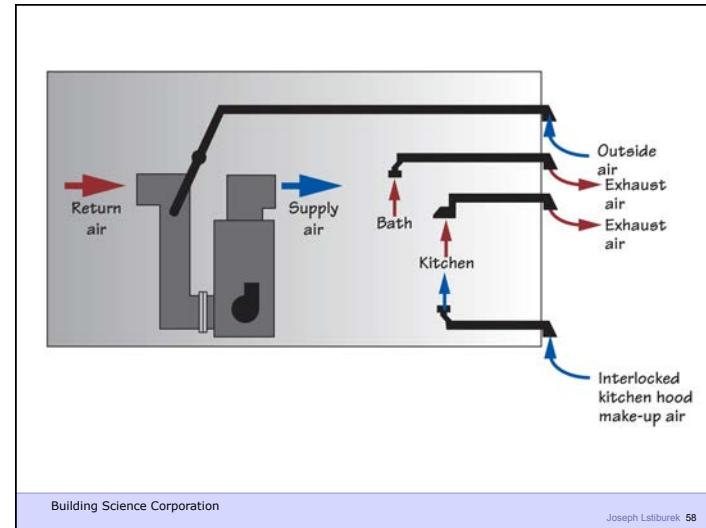
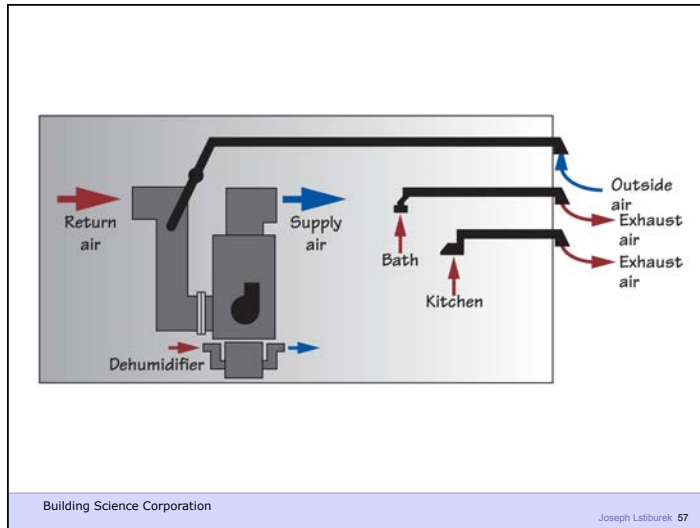


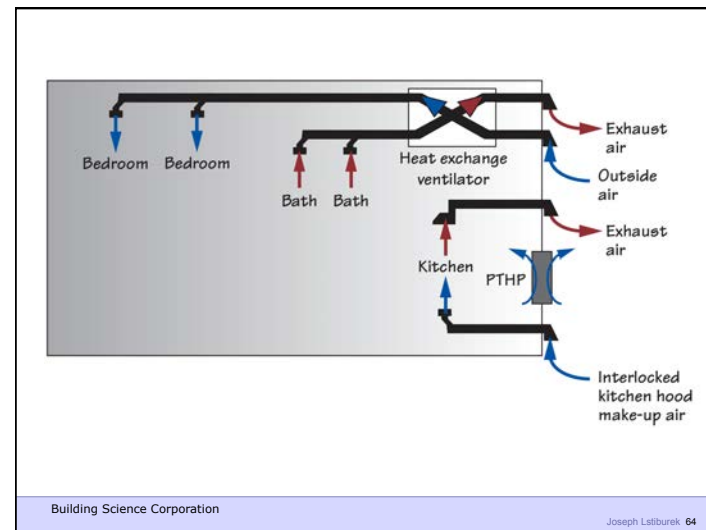
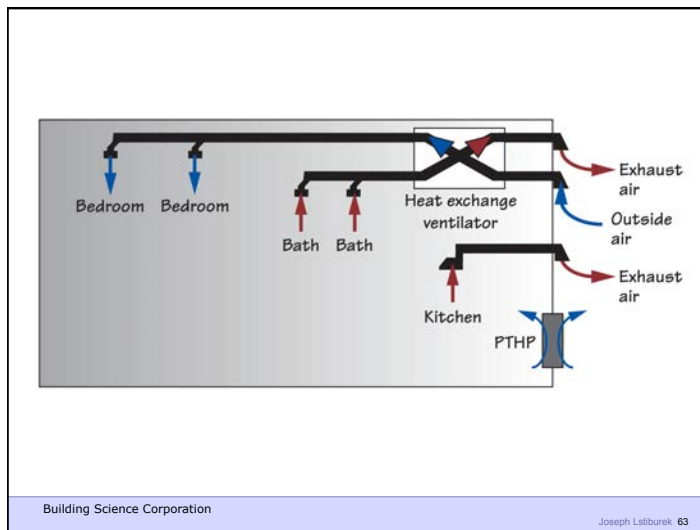
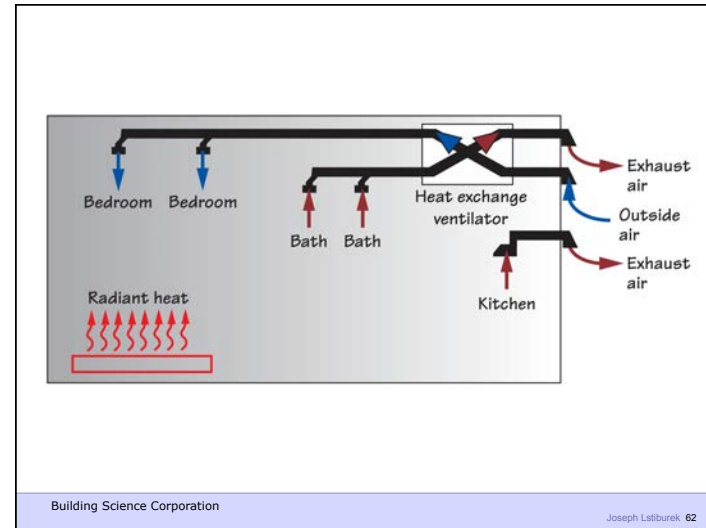
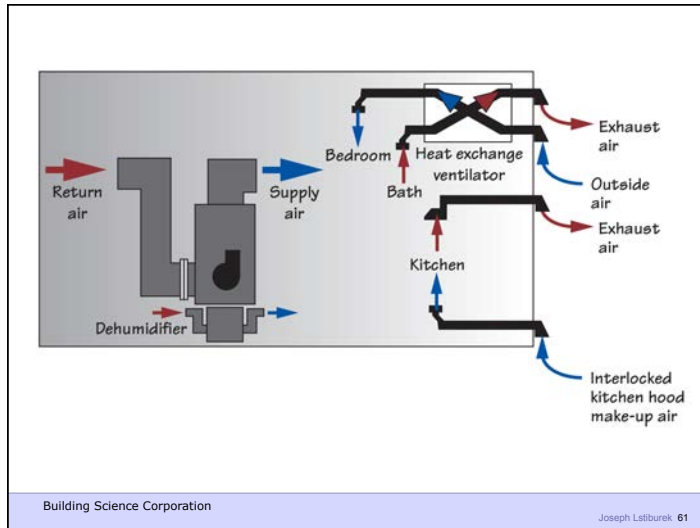


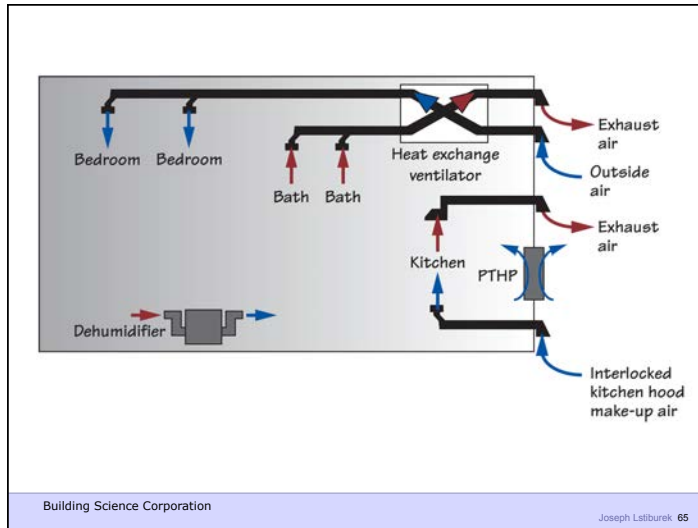
Approaches

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Duct Leakage Should Be Less Than 5% of Rated Flow As Tested by Pressurization To 25 Pascals

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