Building Science

Compartmentalization

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Lapse Rate
Figure 11.1: Building with no internal separations with opening at the bottom (Adapted from G.O. Handegord, 1998)
Figure 11.2: Building with no internal separations with opening at the top
(Adapted from G.O. Handegord, 1998)
Figure 11.3: Building with no internal separations with openings at top and bottom (Adapted from G.O. Handegord, 1998)
Figure 11.4: Basic two storey house with vented attic
(Adapted from G.O. Handegord, 1998)
Stack Effect Flow Out (Exfiltration)

$P_{\text{inside}}$ drops with height slower than $P_{\text{outside}}$

Stack Effect Flow In (Infiltration)

$P_{\text{outside}}$ drops with height faster than $P_{\text{inside}}$

Neutral Pressure Plane
Figure 11.8: Stack effect pressures in high rise office building
(Adapted from G.O. Handegord, 1998)
Figure 11.9: Multi-storey building with floor spaces isolated from vertical shafts (Adapted from G.O. Handegord, 1998)
Figure 11.12: Apartment building with tighter apartment entry doors (Adapted from G.O. Handegord, 1998)
Build Tight - Ventilate Right
Build Tight - Ventilate Right
How Tight?
What’s Right?
# Air Barrier Metrics

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
<th>Pressure</th>
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<tbody>
<tr>
<td>Material</td>
<td>0.02 l/(s-m²) @ 75 Pa</td>
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<tr>
<td>Assembly</td>
<td>0.20 l/(s-m²) @ 75 Pa</td>
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<tr>
<td>Enclosure</td>
<td>2.00 l/(s-m²) @ 75 Pa</td>
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- 0.35 cfm/ft² @ 50 Pa
- 0.25 cfm/ft² @ 50 Pa
- 0.15 cfm/ft² @ 50 Pa
<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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<tbody>
<tr>
<td>Getting rid of big holes</td>
<td>3 ach@50</td>
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<tr>
<td>Getting rid of smaller holes</td>
<td>1.5 ach@50</td>
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<tr>
<td>Getting German</td>
<td>0.6 ach@50</td>
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As Tight as Possible - with -
Balanced Ventilation Distribution
Source Control - Spot exhaust ventilation Filtration Material selection
Energy Recovery
Grille located high in wall on bedroom side to avoid blockage by furniture

Cavity is sealed tight, drywall glued to studs and plates on both sides

Grille located low in wall on hallway side
Unconditioned make-up air 60 - 70% of hood exhaust
Move cabinets farther apart.

Hood wider than cook top and extended outboard past head space.

Move hood up to provide headroom.

Interlocked make-up air.
Bedroom

Bedroom

Bath

Bath

Heat exchange
ventilator

Exhaust air

Outside air

Exhaust air

Radiant heat

Kitchen
Bedroom  Bedroom  Bath  Bath  Heat exchange  ventilator  Kitchen

Radiant heat

Exhaust air  Outside air  Exhaust air

Interlocked kitchen hood make-up air
Building Science Corporation

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Motorized damper — typically closed (connected to fire control system)

Smoke and hot gas vent
($3\frac{1}{2}\%$ of shaft or 3 ft² per elevator car)

Constant airflow regulator

Exhaust from elevator shaft