

Ducts

Improving Efficiency, Comfort, and Health in Existing Homes

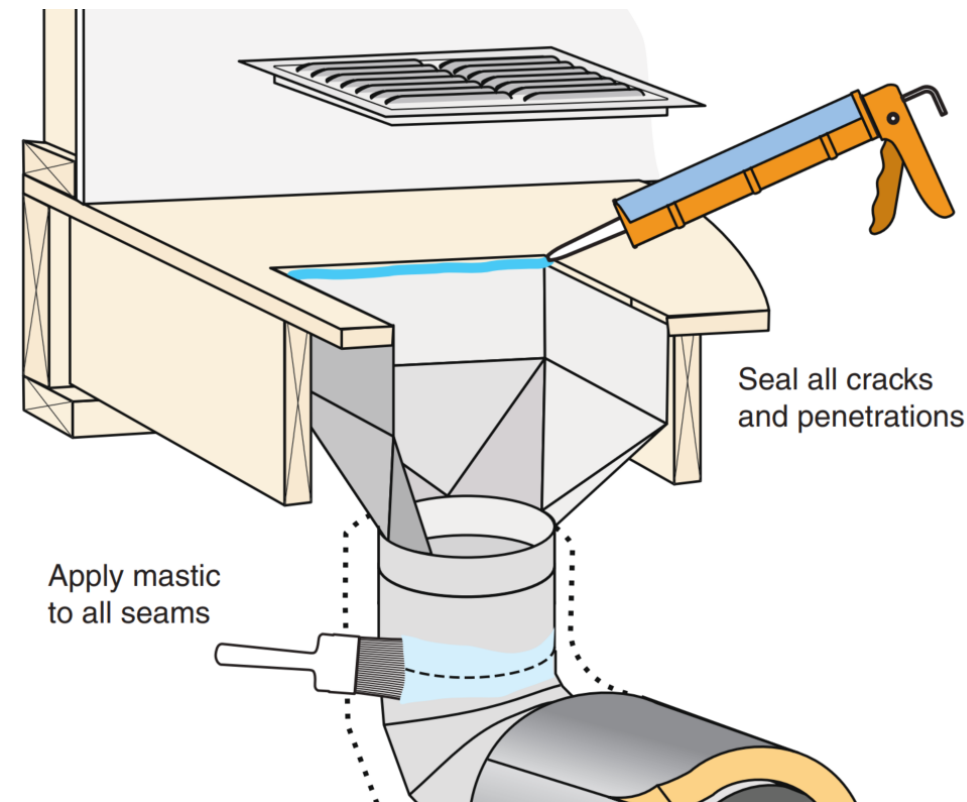
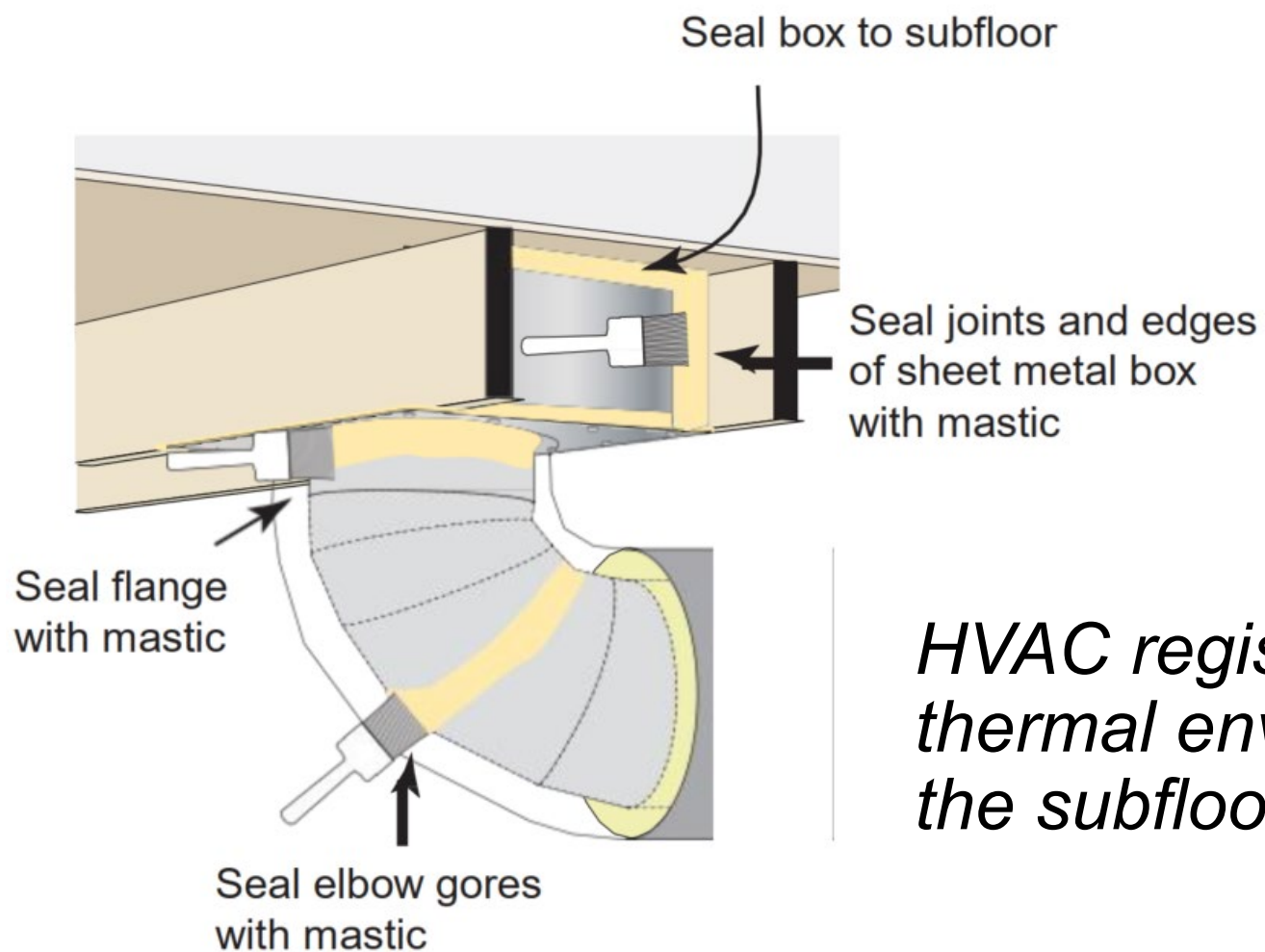


Duct Sealing

- All duct connections must be mechanically fastened
- **Regardless of duct location**, the joints and seams of all ducts, air handlers, and filter boxes should be sealed with mastic or mastic tape that is at least 2 mm in thickness (0.08 inch), approximately the thickness of a nickel
- Mastic shall be installed at the inner liner of rigid metal and flexible duct (not the outer insulation jacket).



HVAC Register Boots



HVAC register boots that penetrate the thermal envelope must be sealed to the subfloor or drywall.



- Remove registers
- Vacuum duct
- Seal with mastic – start as far in as you can reach and work your way out
- Finish by sealing boot to floor/ceiling

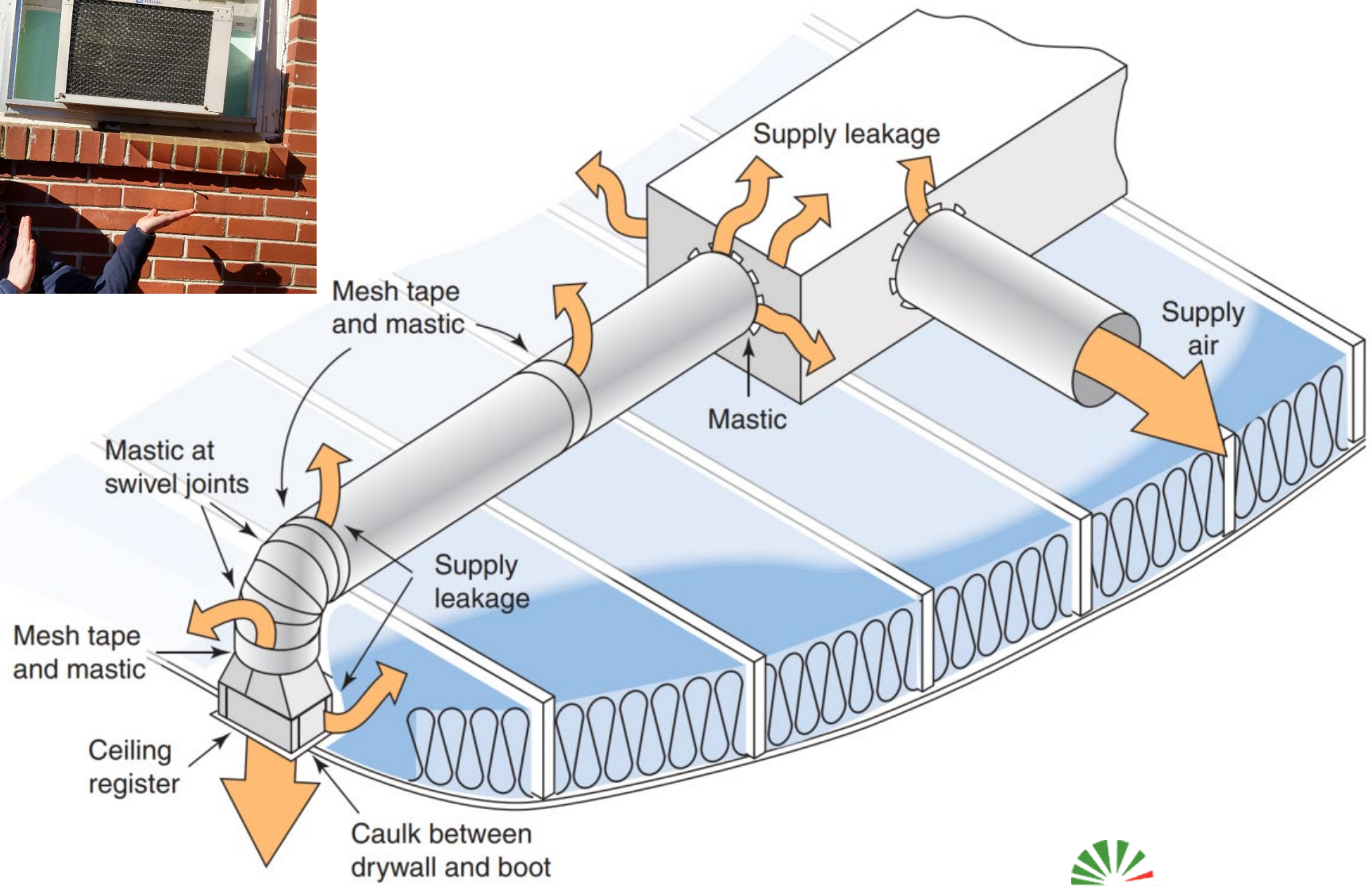




- Remove registers
- Vacuum duct
- Seal with mastic – start as far in as you can reach and work your way out
- Finish by sealing boot to floor/ceiling



Pipe insulation



Pan Returns

- Unlined building cavities should not be used as ducts, returns, or plenums!



Lighting

Improving Efficiency, Comfort, and Health in Existing Homes



R503.1.4 Lighting

New lighting systems that are part of the alteration shall comply with Section R404.1

Exception: Alterations that replace less than 50 percent of the luminaires in a space, provided that such alterations do not increase the installed interior lighting power.



R404.1 Lighting Equipment

- This requirement is **mandatory**
- Not less than 90 percent of the permanently installed lighting fixtures shall contain only high-efficacy lamps
- High efficacy lamps include
 - Compact fluorescents
 - T8 or T5 fluorescent bulb
 - **LEDs**
- Exception – low voltage lighting



Benefits of LED Lighting

- LEDs boast a 25,000-hour average life, which means less maintenance for your clients
- LEDs use 6 times less energy than comparable incandescent bulbs
- Ideally, upgrade all bulbs to LED
- Look for the ENERGY STAR® label



Economics of Incandescent Lighting

9 bulbs x 60 watts each = 540 w

540 w x 4 hours a day = 2160 wh

2160 wh x 365 days = 788,400 wh a year

788,400 / 1000 = 788.4 kWh

788.4 kWh x \$.127 = **\$100.13** per year



Economics of LED Lighting

9 bulbs x **9 watts** each = 81 w

81 w x 4 hours a day = 324 wh

324 wh x 365 days = 118,260 wh a year

118,260 / 1000 = 118.3 kWh

118.3 kWh x \$.127 = **\$15.02** per year



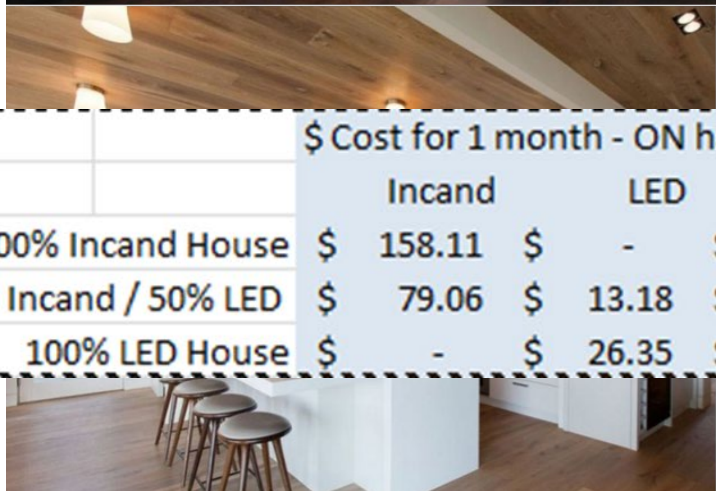
The Economics of Lighting for Builders



- It would take ~3 weeks to payback LEDs if half the lights are left on during construction
- Just ~10 days if all lights are left on!

Bulb Cost Assumption:	Electricity Rate:		0.12 \$/kwh		
Incandescent = \$0.25					
\$ Cost for 1 month - ON half the time			Simple Payback		
	Incand	LED	Total	\$ Savings (months)	(days)
100% Incand House	\$ 158.11	\$ -	\$ 158.11	0	
50% Incand / 50% LED	\$ 79.06	\$ 13.18	\$ 92.23	\$ 65.88	0.80 24.3
100% LED House	\$ -	\$ 26.35	\$ 26.35	\$ 131.76	0.80 24.3
50% LED House		30	30	\$ 52.50	60 10
100% LED House		0	60	\$ 105.00	60 10

	\$ Cost for 1 month - ON half the time			Simple Payback	
	Incand	LED	Total	\$ Savings (months)	(days)
100% Incand House	\$ 158.11	\$ -	\$ 158.11	0	
50% Incand / 50% LED	\$ 79.06	\$ 13.18	\$ 92.23	\$ 65.88	0.80 24.3
100% LED House	\$ -	\$ 26.35	\$ 26.35	\$ 131.76	0.80 24.3



Color Temperature

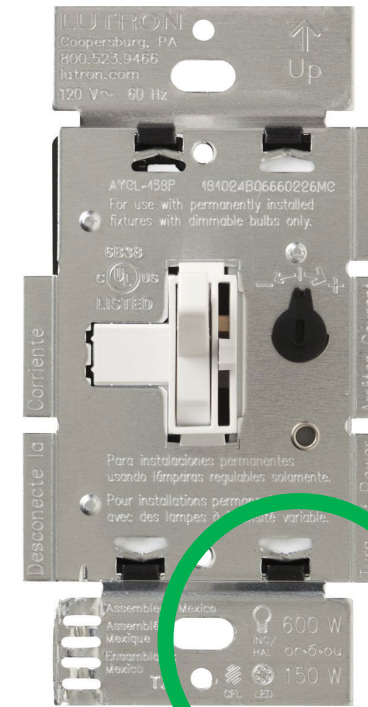
- LEDs are available in a wide range of color temperatures
- Some smart bulbs have color temperature ranges from 2000K-6500K + 16 million colors



westinghouselighting.com

LED Retrofit Issues

- “Dimmable” LEDs might not be compatible with all existing dimmer switches
 - LED bulbs may flicker, blink, hum or buzz
 - Problems are more prevalent in track lighting fixtures or other fixtures with multiple bulbs
- Recommendation – Replace dimmers with standard switches or LED compatible dimmers
- Smart bulbs offer dimming capability



Questions / Thoughts?

- When does code apply to additions and alterations (the short answer: **pretty much always**...the question is, how can you do it cost effectively)
- Historic preservation
- Mass wall improvements?

earthcraft.org



Register your EarthCraft Sustainable Preservation Project





FOCUSED ENERGY. *For life.*

