

# AIR HEAT

## Indirect-Fired Air Heat

### Problem: Direct-Fired Air Heat

#### Safety:

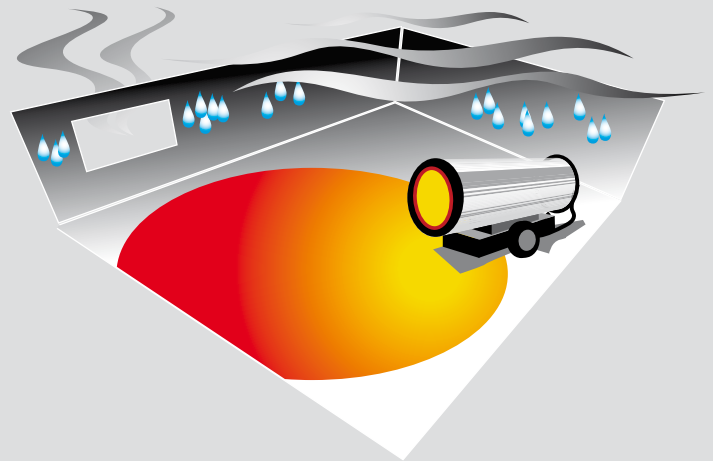
- Combustion by-products = Poor air quality
- Many fuel lines = Fire hazard

#### High Cost:

- Venting workspace = Higher fuel usage
- Added Moisture = Mold and bacteria growth
- Open flame = High insurance premiums

#### Poor Project Quality:

- Uneven heat distribution = Construction delays
- 100,000 BTUs of fuel burned = 1 gallon H<sub>2</sub>O
- Combustion by-products = Potential damage to materials



### Best Solution:

### Indirect-Fired Air Heat

**With indirect-fired air heat, combustion by-products and flame never enter the workspace.**

By placing the unit outside of the structure, warm, dry air can be routed safely to the inside via ducting or portable heat exchangers, thereby eliminating the need for additional ventilation.

Maintain even temperatures and minimize fuel consumption. Our unique Recircul-Air™ design re-uses warm, inside air, pressurizes, and provides even temperatures while saving up to 50 percent in fuel costs!

Dry, hot air removes excess moisture and helps keep projects on track while preventing a mold growth environment. The absence of an open flame helps reduce the risk of fire, and helps lower insurance costs.

### Arctic Bear™ Indirect-Fired Air Heat System.

#### Air-to-Air Heat Exchange.

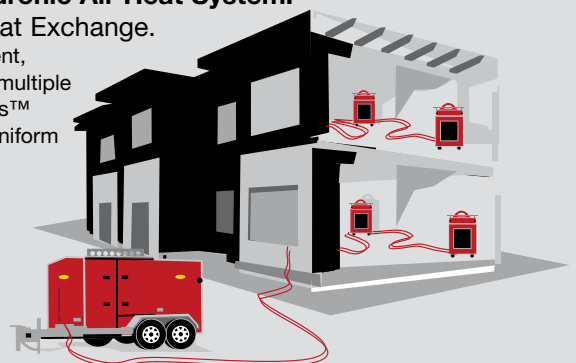
Unique adjustable Recircul-Air™ panel provides pressurization, while the unit maintains even temperatures and reduces fuel costs.



### Pureheat™ Hydronic Air Heat System.

#### Liquid-to-Air Heat Exchange.

Optimal air movement, pressurization, and multiple heat Heat Xchangers™ provide clean, dry uniform heat throughout.



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NEUSON**

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## Multiple Applications:



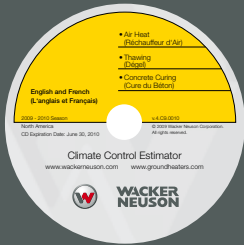
Indirect-fired air heat creates an ideal environment that allows contractors to work year round and extend the work season, even in harsh and cold weather. Whether it's residential or commercial

building construction, pipeline or oil field maintenance, special events, mining, or underground construction, indirect-fired air heat provides a consistent and safer heat source.

## Cost Estimator

Wacker Neuson Climate Control knows it's all about the bottom line. So we developed our electronic heat cost estimators for ground thawing, concrete curing, and air heat to help you bid jobs more accurately!

Please visit [www.groundheaters.com](http://www.groundheaters.com) to locate your local Wacker Neuson Climate Control dealer to see the value of using our equipment and try different scenarios to fully explore your cost options.



Ground Heaters, the Ground Heaters logo, Arctic Cub, Arctic Bear, Pureheat, Heat Xchanger, and Recircul-Air are trademarks of Wacker Neuson.

WACKER NEUSON Air Heat Cost Estimator												
Contractor: ABC Construction		Contact: Joe Contractor										
Project Site: Test Building in Green Bay, WI		Date: 09/09/2009										
Notes: Rick supplied the building and fuel data.												
Indoor Temperature: 50 F	Length of Building: 200 ft											
Begin Date: 10/01/09	Width: 100 ft											
Duration (Days): 60	Height: 10 ft											
Province/State: Wisconsin	Total Window Area: 4000 sq ft											
City: Green Bay	Average Wall R Value: 6											
Elevation: 752 ft	Average Ceiling R Value: 6											
Degree Days: 1,328	Cost of Fuel (1 therm=100 cu ft): 1.60											
Average Temp Outside: 18.2 F	Building Relative Tightness: Moderate (1 air change/hr)											
Average Temp Outside: F	Fuel Type Used: Natural Gas											
Design Low Temp: -12.6 F	Window Panes: Double Pane											
Design Low Temp Outside: F	Heat Minor: No											
		<table border="1"> <thead> <tr> <th colspan="2">@ Design Low Conditions</th> <th colspan="2">@ Average Conditions</th> </tr> <tr> <th>Direct Fired</th> <th>Wacker Neuson</th> <th>Direct Fired</th> <th>Wacker Neuson</th> </tr> </thead> </table>		@ Design Low Conditions		@ Average Conditions		Direct Fired	Wacker Neuson	Direct Fired	Wacker Neuson	
@ Design Low Conditions		@ Average Conditions										
Direct Fired	Wacker Neuson	Direct Fired	Wacker Neuson									
<b>Indoor Conditions: Air Recirculated, No Forced Ventilation to Outside</b>												
Outdoor Air Infiltration Rate (ach)	3.333	3.333	3.333	3.333								
Fuel Use Rate (x 100 cu ft)	6.64	8.20	3.27	6.06								
Initial Heat Required	948,843	948,843	948,843	948,843								
% Change	23.3%	23.3%	23.3%	23.3%								
Relative Humidity	54%	5%	50%	26%								
Dewpoint	34.8 F	-12.6 F	32.8 F	12.3 F								
Carbon Dioxide	5,051 ppm	400 ppm	7,683 ppm	400 ppm								
Carbon Monoxide	42 ppm	0 ppm	20 ppm	0 ppm								
Water added to building (gph)	7.5	0	3.7	0								
<b>Indoor Conditions: Forced Ventilation to Reduce Amounts of Combustion By-Products</b>												
Total Outside Air Intake (ach)	24.387	3.333	12.118	3.333								
% Change	23.1%	23.8%	23.1%	23.2%								
Relative Humidity	54%	5%	50%	26%								
Dewpoint	34.8 F	-12.6 F	32.8 F	12.3 F								
Carbon Dioxide	1,022 ppm	400 ppm	1,022 ppm	400 ppm								
Carbon Monoxide	5 ppm	0 ppm	5 ppm	0 ppm								
Water added to building (gph)	7.5	0	3.7	0								
Total BTU/Hr Heat Required	2,700,173	948,843	878,935	280,268								
Fuel Required per Season (No Ventilation) (x 100 cu ft)		4729		8911								
Additional Fuel Required per Season due to Ventilation (x 100 cu ft)				9628								
TOTAL FUEL COST			14,666	5,811								

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Page 1 of 2

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