ThermoTek
Heating & Ventilation Systems

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SUBJECT: TURNDOWN RATIO: DIRECT FIRED VS. INDIRECT FIRED

Since 1965 Thermotek has been a leading manufacturer of direct fired and indirect fired make-up air systems. Direct fired and indirect fired systems are unique because they have different performance characteristics. One of the major differences between these units is the turndown ratio. Understanding turndown ratios is critical for understanding the performance of the equipment.

The turndown ratio is defined as the maximum to minimum BTU output. Thermotek direct-fired makeup air units are capable of a maximum 30:1 turndown ratio. This means the burner can modulate between 3.33% and 100% of the maximum BTU rating. Table 1 below shows the maximum and minimum BTU for two sizes of direct-fired burners.

Table 1: Direct Fired Turndown Ratios

Burner Size (inches)	Minimum Firing Rate (BTU)	Maximum Firing Rate (BTU)	Turndown Ratio (Design BTU: Min BTU)
18	27,500	825,000	30.00:1
24	36,667	1,100,000	30.00:1

Thermotek indirect-fired units have turndown ratios ranging from 6:1 - 24:1 depending on how many heat exchangers are used. One of the benefits of adding additional heat exchangers is an increase in the turndown ratio. Higher turndown ratios allow the unit to respond appropriately to a greater range of outdoor conditions. Table 2 below shows how the number of heat exchangers impacts the maximum turndown ratio.

Table 2: Indirect Fired Turndown Ratios

Number of Heat Exchangers (400 MBH/exchanger)	Minimum Firing Rate (BTU)	Maximum Firing Rate (BTU)	Turndown Ratio (Design BTU: Min BTU)
1	53,333	320,001	6.00:1
2	53,333	640,001	12.00:1
3	53,333	960,001	18.00:1
4	53,333	1,280,001	24.00:1

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