Marketing Guide

Gas Heat

for M-Series and T-Series
Climate Changer™ Air Handler

March 2004  CLCH-SLM010-EN
Introduction

This marketing guide includes competitive analysis, pricing and ordering information for indirect fired gas heat.

Gas heat can be an economical source of heat in both M-Series and T-Series Climate Changer air handlers when compared to traditional sources of heating such as central plant boilers with hot water or steam coils installed inside air handlers, or electric resistance heating installed inside air handlers. Gas heat can be the preferred source of heating when:

- A building does not have central boiler plant and electric resistance heating would be more expensive than gas heating.
- Due to remote locations in a building, capacity lost through piping inefficiencies from central boiler plants cannot be cost effectively improved by increased boiler output.
- In climates or applications that have large heat load requirements and require high quantities of outdoor air to comply with ASHRAE 62.
- In those areas of the country where natural gas is less expensive than electricity.

Trane, in proposing these system design and application concepts, assumes no responsibility for the performance or desirability of any resulting system design. Design of the HVAC system is the prerogative and responsibility of the engineering professional.

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Gas Heat Configurations

Trane offers an indirect-fired gas heat module in the M-Series and T-Series Climate Changer air handlers. Some of our competitors choose to use direct-fired gas heat.

Direct gas heat uses burners in the draw-thru position for 100 percent outside air/makeup air applications. The gas/air mixture is ignited in the airstream thereby heating the air “directly.” (Note that gas combustion products are carried in the airstream.)

Indirect gas heat uses a heat exchanger to transfer heat from the gas flame to the airstream. Three types of heat exchangers are generally used in indirect heating:

- Clamshell and in-shot exchangers are used widely in residential gas heating furnaces or in smaller commercial applications (less than 320 MBh output).
- Drum-and-tube exchangers (see Figure 1) are typically used in larger commercial and industrial human comfort heating applications. This type of exchanger is used in the M-Series and T-Series Climate Changer air handlers.

All indirect gas heat exchangers are placed downstream of the fan, in a blow-thru configuration, to keep the gas heating section under positive static pressure. This configuration reduces the risk of gas combustion products entering the airstream.

Figure 1. Drum-and-tube indirect heat exchanger
Competitive Analysis

Trane offers a high-quality, flexible gas heat option for M-Series and T-Series air handlers. Below are five key air handling and gas heat success factors that can help close a gas heat order.

- Flexibility in unit size, unit configuration, and burner sizes
- Double-wall construction
- Chilled water (CW) or direct expansion (DX) split system cooling coils in the unit
- Commercial/industrial-grade heat exchangers manufactured with premium stainless steel components
- Full-modulation burners:
  - 3:1 turndown ratio (standard offering) available on 200-2,000 MBh output, forced draft burners
  - 10:1 turndown ratio (optional offering) available on 200-2,000 MBh output, forced draft burners
  - 20:1 turndown ratio (optional offering) available on 1,250-2,000 MBh output forced draft burners

Flexibility

Because of the number of burners and unit sizes available, Trane’s gas heat offering provides a more flexible solution. While our competitors may need to use a larger unit size to meet special heat requirements, Trane can meet those same requirements using a smaller, more appropriate unit size. As a result, Trane's flexibility may also provide a very competitive price.

Double-Wall Construction

Target jobs that require double-wall construction. Single-wall light commercial or packaged rooftop units are generally of lighter-duty construction and may not support the somewhat higher pricing demanded by premium units.
CW or DX Split System Coils

Applications with cooling coils may move the job away from gas heat specialists and into our Trane air handler market. Cooling coils also increase the unit’s cross sectional area to slow the air down approximately to the industry standard of 500 fpm to prevent moisture carryover. Please note that Trane coils have the industry’s leading high moisture carryover limits, which may allow higher velocities for unit downsizing and more competitive units. Use TOPSS (Trane Official Product Selection System) to downsize the units and push the airspeed through the cooling coils. The selection programs will only select coils within moisture carryover limits. This is a key strategy for all Trane units, but may be especially important with gas heat units.

VAV Application

One of the additional features of this gas heat option is the ability to apply these units in a VAV system. Please refer to the engineering bulletin (CLCH-SLM010EN) for details. The following is a brief list of issues that must be considered when planning to apply gas heat in a VAV system:

- An additional temperature sensor is required to monitor both the entering air temperature to the heat exchanger and leaving air temperature from the heat exchanger.
- Minimum airflow requirements must be maintained.
- Burner fire rate must modulate with airflow.

Commercial/Industrial Grade Heat Exchangers

A flat specification of commercial/industrial quality gas heat packages using 14-gauge, 409 stainless steel primary and secondary heat exchangers helps ensure long equipment life.
Full Modulating Burners

Stepped or staged burners are generally not acceptable in comfort heating applications. Specifying a fully modulating burner with an industry standard 3:1 nominal turndown means that the lowest heat output is 1/3 or 33 percent of the burner's rated capacity (MBh). This turndown meets many applications requirements.

If a higher turndown is required, ensure that the specification reads "greater than or equal to 10:1." Trane and many competitors, except Engineered Air, offer a 10:1 burner turndown (minimum nominal firing rate is 1/10 or 10 percent of the burner's rated capacity (MBh)). Engineered Air should be forced to use their 20:1 burner to meet 10:1 specifications. Most companies can do the 20:1 burner turndown (minimum firing rate is 1/20 or 5 percent), but be aware that the extra low fire rate may be of limited value and the extra burner first cost may not be worth the minimally lower firing rate. Also, frequent operation at turndowns greater than 10:1 can increase condensation formation in the heat exchanger, leading to corrosion failure. Prevention may require a more expensive corrosion-resistant heat exchanger. Therefore, push for nominal 3:1 or 10:1 turndowns that provide customers with the appropriate, more cost-effective turndown for most applications.

If even more turndown modulation capability is required, a 20:1 turndown option is available for 1,250 to 2,500 MBh capacity burners. This additional control may be required for industrial applications, but may not be needed and worth the added expense for comfort heating applications. Below is an example of the differences in the temperature rise at minimum fire with 10:1 and 20:1 turndown ratios on a unit delivering 30,000 cfm with a 2,000 MBh burner.

- The temperature rise at minimum fire on the 10:1 burner is 6 degrees F.
- The temperature rise at minimum fire on the 20:1 burner is 3 degrees F.

Table 1 is a brief summary of the predominant commercial gas heat supplier's casing, heat exchanger and burner features.

Be aware of the challenges of competing directly with Engineered Air, Air Wise, or McQuay. Engineered Air and Air Wise are Canadian gas heat specialists. These manufacturers build their own heat exchangers and, therefore, typically have lower cost structures. McQuay uses unitary style aluminized steel secondaries (stainless steel is optional) that are less expensive, but simply cannot match the quality of the Trane Climate Changer gas heat offering. Expect McQuay to push their 20:1 turndown SuperMod burner. The heat exchanger used on their 20:1 models must be fabricated from a higher quality stainless steel alloy to prevent condensate corrosion.

York uses purchased Jackson and Church™ gas heat packages for their outdoor air handlers with an optional 14-gauge primary drum but special option 14-gauge secondaries. Carrier and Temtrol should be able to package special gas heat sections in the field if not the factory.
# Table 1. Suppliers’ Gas Heat Features

<table>
<thead>
<tr>
<th>Vendor/Model</th>
<th>Casing</th>
<th>Heat Exchanger</th>
<th>Burner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trane</td>
<td>Indoor and outdoor 1,500 - 60,000 CFM UL listed</td>
<td>200 - 2,500 MBh output 409 stainless steel 14 ga primary and secondary</td>
<td>3:1 (200-2000 MBh) 10:1 (200-2000 MBh) 20:1 (1250-2500 MBh)</td>
</tr>
<tr>
<td>York</td>
<td>Outdoor only 1,000 - 60,000 CFM UL listed</td>
<td>150 - 2,000 MBh output 430 stainless steel 16 ga standard 14 ga option on primary only</td>
<td>2-stage 3:1 10:1</td>
</tr>
<tr>
<td>McQuay</td>
<td>Outdoor only ETL listed</td>
<td>200 - 2,000 MBh output Stainless steel Stainless steel secondaries are not standard, but optional</td>
<td>3:1 20:1 SuperMod</td>
</tr>
<tr>
<td>Carrier</td>
<td>Not cataloged</td>
<td></td>
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<tr>
<td>Temtrol</td>
<td>Not cataloged</td>
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<tr>
<td>Engineered Air</td>
<td>Indoor and outdoor units DJ and DJE commercial units 1,000 - 24,000 CFM DG industrial units 2,970 - 87,000 CFM Standard single wall, double wall optional Cross sectional areas of modules vary by components ETL listed or CSA certified</td>
<td>DJ and DJE commercial units 83 - 1120 MBh output DG industrial units 320 - 5,200 MBh output, used for applications above 1400 MBh</td>
<td>DJ and DJE commercial units 2.5:1 or 15:1 DG industrial units 4:1, 8:1, or expensive 20:1</td>
</tr>
<tr>
<td>Air Wise</td>
<td>Similar to Engineered Air</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Trane</td>
<td>Outdoor only 4,000 - 46,000 CFM Single wall only</td>
<td>400 - 800 MBh output Stainless steel primary and secondaries 16 ga primary, 18 ga secondaries</td>
<td>2-stage 3:1 limited modulating 4:1 full modulating</td>
</tr>
<tr>
<td>Trane</td>
<td>Outdoor only 1,080 - 16,500 CFM Single wall only</td>
<td>62 - 543 MBh output Aluminized steel</td>
<td>Single stage 2-stage</td>
</tr>
<tr>
<td>Trane FAXA Packaged</td>
<td>Outdoor unit 1,200 - 6,600 CFM Double wall only UL listed</td>
<td>80 - 640 MBh output Clamshell heat exchangers 20 ga 409 or 321 stainless steel</td>
<td>2-stage 2:1 modulating 4-stage 4:1 modulating</td>
</tr>
</tbody>
</table>
Application
Considerations

- No vaneaxial Q™ fans or plenum fans
- Stacking is okay if gas heat module is on the same level as the supply fan
- Burner/exchanger package design is approximately 80 percent efficient
- If sections are required downstream of gas heat module, a medium blank module is required after the gas heater. Components downstream must be capable of rated discharge temperatures.
- Blow-thru only
- 7- to 14-inch wg gas pressure with pressure regulator (except 1250-2000 MBh with 10:1 turndown requires 9- to 14-inch wg gas pressure).
- Condensate drain
- Flue
- BTU output must be derated above 2000 feet altitude
- Acoustics presently not available
- 0.5 inches water pressure drop through the gas heat module

Controls

The Trane Climate Changer gas heat package requires a binary output (BOP) dry contact to start/stop the burner and a 2-10 VDC analog output (AOP) to modulate the output of the burner (10 VDC is full heat). Trane’s MP580 air handler controller or field-provided controller is required to control the gas heat. If a factory-mounted controller is ordered on the main unit, allow for one BOP and one AOP to control the heater. Factory wiring of the gas heat package to a unit-mounted control system is not available at this time. This interface must be field wired.

Stainless Steel

Engineers may ask about differences in stainless steel grades. One source of stainless steel background information is a white paper by Stainless Plate Products, Inc. at www.sppusa.com/reference/white_paper/wp_ss.html. This site does a good job of describing the various types of stainless steel; however, it does not directly address their application in gas-fired drum-and-tube heat exchangers.

In the commercial and industrial markets, Trane Lexington believes both the primary and secondary tubes of the heat exchanger should be made from some type of stainless steel for longevity and corrosion resistance. Some market segments, like light commercial, accept gas heat packages made from materials other than stainless steel. If products with these other materials are allowed to be bid in a full stainless steel specification, it will give competition a price advantage.
Summary

Ensure the Climate Changer gas heat section is specified and educate Trane customers on why they should only accept bids matching the Trane specification. Remember the five critical success factors!

- Flexibility in unit size, unit configuration, and burner sizes
- Double-wall construction
- Chilled water (CW) or direct expansion (DX) split system cooling coils in the unit
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