Cool, Dry, Quiet

CDQ™
Dehumidification with Trane Rooftop Units

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The Trane CDQ™ desiccant wheel is used to enhance the dehumidification performance of a traditional cooling coil. The wheel is configured in series with the coil (see Figure 1) such that the “regeneration” side of the wheel is located upstream of the coil and the “process” side of the wheel is located downstream of the cooling coil. The wheel recirculates the water vapor trapped downstream of the cooling coil back into the air upstream of the coil where the coil removes it through condensation. This process is accomplished without the need for a second regeneration air stream. The addition of the CDQ desiccant wheel to the system enhances the dehumidification performance of the traditional cooling coil.

For units with less than 40 percent outside air, CDQ can greatly improve the latent capacity of the unit (see Figure 2). This results in a lower sensible heat ratio (SHR) without the addition of reheat.

**More water removed per ton of cooling and no field modifications required**

**Example: 55% more dehumidification at ARI conditions**

<table>
<thead>
<tr>
<th></th>
<th>5Ton RTU + CDQ</th>
<th>Standard 5Ton RTU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water Removed</td>
<td>2.0 GPH</td>
<td>1.8 GPH</td>
</tr>
<tr>
<td>Heat Removed</td>
<td>37MBH</td>
<td>46MBH</td>
</tr>
</tbody>
</table>

SHR = 0.74

SHR = 0.59

**Remove up to 200% more water vapor and drop dew points below 48 degrees F!**

Figure 1. RTU airflow path

Developed in collaboration with the U.S. Department of Energy through Oak Ridge National Laboratory
Trane CDQ™ (Cool, Dry, Quiet) System Concept

Figure 2. Latent capacity

Figure 3. RTU psychrometric conditions

Figure 4. Part-load operation comparison

Part Load Energy Savings

Adding part load humidity control will add more energy no matter how it is done. Trane CDQ™ differs from hot gas reheat because it will increase the latent capacity. Reheat does not effect the latent capacity of a unit, it simply makes the unit run longer. Thus CDQ will run less than hot gas reheat and produce drier air.

- **Standard 3-ton unit**
  - Unit SHR = 0.80
  - Run time = 40 min
  - Water removed = 5.0 lb

- **Standard 3-ton unit with reheat**
  - Unit SHR = 0.73
  - Run time = 60 min (+50%)
  - Water removed = 7.5 lb (+50%)

- **Standard 3-ton unit with CDQ™**
  - Unit SHR = 0.66
  - Run time = 50 min (+25%)
  - Water removed = 10.3 lb (+106%)

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<table>
<thead>
<tr>
<th>Cool</th>
<th>Dry</th>
<th>Quiet</th>
</tr>
</thead>
<tbody>
<tr>
<td>• No reheat</td>
<td>• Lower dew points</td>
<td>• 10-15dB discharge sound attenuation</td>
</tr>
<tr>
<td>• Efficient, all electric</td>
<td>• Lower SHRs</td>
<td></td>
</tr>
<tr>
<td>• Cool but drier</td>
<td>• Higher latent capacity</td>
<td></td>
</tr>
</tbody>
</table>
Humidity-Sensitive Application

For applications requiring humidity control 24/7 and 35-55 percent RH, a Trane high-efficiency rooftop unit (RTU) with CDQ dehumidification will:

- Allow downsizing 15-33 percent
- Improve latent capacity 40-160 percent
- Lower dew points 2-5 F
- Reduce cooling energy 10-30 percent
- Reduce reheat and total energy 30-90 percent

CDQ Curbs for Rooftop Units

To achieve these performance levels, a high-efficiency Trane rooftop unit must be used with a CDQ curb section. The CDQ curb section is manufactured by our partner, Thybar Corporation. The two components are designed to go together with no field modifications required. Together, they comprise a CDQ system that can be used for new installations and retrofit applications.

Energy Improvement
Trane RTU with CDQ vs Standard RTU with Reheat
Mixed Air Unit

Figure 5. Energy Use Comparison

<table>
<thead>
<tr>
<th>Space Relative Humidity</th>
<th>35%</th>
<th>50%</th>
<th>65%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improvement @Equal Total Capacity</td>
<td>0%</td>
<td>10%</td>
<td>20%</td>
</tr>
<tr>
<td>Min</td>
<td>35%</td>
<td>50%</td>
<td>65%</td>
</tr>
<tr>
<td>Max</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Savings</td>
<td></td>
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For more information, contact your local Trane office or e-mail us at comfort@trane.com