What problems come from the wrong size equipment?

Undersized equipment will not meet the customer’s comfort requirements at the design specifications.

Oversized equipment will create other problems:
- Degraded humidity control in the summer.
- Occupants may suffer the effects of an increased potential for mold growth. These same conditions also may contribute to asthma and other respiratory conditions.
- The temperature may feel right at the thermostat but the temperature in other rooms will suffer from the oversized equipment going through short operation cycles. Short cycles can cause temperature swings as the equipment over-conditions, stops, then over-conditions, etc...
- Hot and cold spots between rooms because the thermostat is satisfied but the room is not.
- Oversized equipment generally requires larger ducts, increased electrical circuit sizing and larger refrigeration tubing. These cause higher installed costs and increased operating expenses.
- The equipment starts and stops more frequently, this causes excessive wear and can increase maintenance costs / service calls.

In these unfavorable conditions occupants will experience discomfort and dissatisfaction.

What are some reasons for oversized equipment?
Manufacturers take great care in measuring and testing how well their equipment performs at different operating conditions. When contractors use this data to select the equipment they will meet the heating and cooling needs of their customers.

Two main reasons for oversized equipment are either that: (1) a guess was made on the equipment’s capacity at the design conditions or (2) mistakes were made in the selection process.

For a more detailed analysis on the design process visit www.acca.org for Bob’s House

To order ACCA Manual S 888-290-2220

Includes Equipment Selection Checklist & Example
### Equipment Selection Checklist

<table>
<thead>
<tr>
<th>#</th>
<th>Key Item</th>
<th>Verify</th>
<th>Verification Questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Design Conditions</td>
<td></td>
<td>Do the design conditions fall within the minimum standards for this region as found in Manual J8 Table 1A or 1B? A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>The design conditions fall within specifications.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Was the Total Heat Gain / Loss information used to evaluate equipment candidates? B</td>
</tr>
<tr>
<td>2</td>
<td>OEM’s Performance Data</td>
<td></td>
<td>Does the manufacturer’s performance parameters match the design parameters used to calculate the heat load?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Was the SHR used to find the proper airflow?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Was the Sensible Heat Ratio calculated? (Sensible Load / Total Load)?</td>
</tr>
<tr>
<td>3</td>
<td>Equipment Performance</td>
<td></td>
<td>Was the Total Heat Gain / Loss information used to evaluate equipment candidates? F</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>Was the SHR used to find the proper airflow?</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Does the heating capacity of the selected equipment ≤140% of the designed total heating load? (If so reduce equipment size) G</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Is the total heating capacity of the selected equipment ≤115% of the designed total heating load? (If so reduce equipment size) H</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Does the “Sensible” and/or “Latent” capacities of the selected equipment meet the load’s requirements? (medium fan speed) I</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>If a heat pump in a very cold climate (heating is primary concern) does the total cooling capacity of the selected equipment exceed 125% of the designed total cooling load? (medium fan speed) I</td>
</tr>
<tr>
<td>4</td>
<td>Auxiliary Heat</td>
<td></td>
<td>Does the design conditions fall within the minimum standards for this region as found in Manual J8 Table 1A or 1B? A</td>
</tr>
<tr>
<td></td>
<td>Heat Pump Balance Point</td>
<td></td>
<td>Does the electric auxiliary heat provide the necessary BTUs to make up the designed load? (medium fan speed) I</td>
</tr>
</tbody>
</table>

### Equipment Selection using an Example Checklist

#### Design

- **Winter Design Conditions**
  - Outdoor °F: 27°F
  - From Manual J8 Table 1A or 1B
  - Furnace Model Number: FU600300
  - Output BTUH: 52,000Btu/h
  - Total Heat Gain: 27,543Btu/h
  - Total Cooling Capacity (≤ 115%): 28,400Btu/h
  - Total Heat Gain: 27,543Btu/h
  - Total Cooling Capacity (≤ 115%): 28,400Btu/h

- **Summer Design Conditions**
  - Outdoor °F: 85°F
  - From Manual J8 Table 1A or 1B
  - Furnace Model Number: HP-030
  - Output BTUH: 52,000Btu/h
  - Total Heat Gain: 27,543Btu/h
  - Total Cooling Capacity (≤ 115%): 28,400Btu/h

#### Application Data: Equipment Capacity

- **A furnace was selected for comparing "heating only" design and performance. Other types of equipment may be used.**
- **A heat pump was selected for comparing cooling and heating design and performance. Other types of equipment may be used.**

#### Verification Questions

- **Verify Heat Pump Balance Points**
  - Does the electric auxiliary heat provide the necessary BTUs to make up the designed load? (medium fan speed)
  - Does the electric auxiliary heat provide the necessary BTUs to make up the designed load? (medium fan speed)

#### Refrigeration System Data

- **From Manual J8 Tables**
- **From Manual J8 Load Calculation**
- **From Equip. Performance Data**