4. Air Handler Heating

.1 Occupied Mode - The heating valve shall modulate to maintain the highest associated space temperature at an adjustable heating setpoint (initially 71F), subject to a discharge low limit of 55F. The heating valve shall not operate unless there is no demand for cooling, and the air handler dampers are shut to minimum position.

.2 Unoccupied Mode - A call for heating shall be initiated when the average space temperature drops below the heating setback setpoint (initially 60F). Upon a call for heating, the heating valve shall open fully. Full heating shall continue until the average space temperature has risen 2F above the heating setback setpoint, at which time the heating valve shall shut completely.

3. Additional Graphic Elements

.1 heating occupied setpoint
.2 heating unoccupied setpoint
.3 discharge low limit
.4 outside air temperature

7. Air Handler Mixing Dampers, basic control

.1 Occupied Mode

.1 Dampers shall modulate to maintain an adjustable mixed air temperature setpoint, initially 55F, subject to an adjustable minimum position percentage, initially 10%.

.2 When outside air temperature exceeds an adjustable outside air dry bulb override setpoint, initially 68F, the dampers shall close to minimum position.

.2 Unoccupied Mode

.1 While the fan is off, dampers shall remain fully shut.

.2 While the fan is on and cooling is required, dampers shall modulate to provide the maximum benefit from available free cooling, subject to a discharge low limit temperature of 55F. If the outside air temperature is above the outside air dry bulb override setpoint, the dampers shall remain fully shut.

.3 While the fan is on and heating is required, the dampers shall remain fully shut.

3. Additional Graphic Elements

.1 outside air temperature
.2 damper position setpoint
.3 damper minimum position setpoint
.4 mixed air temperature setpoint
.5 outside air dry bulb override setpoint

8. Air Handler Mixing Dampers, CO₂ control

.1 Occupied Mode

.1 Dampers shall modulate to maintain an adjustable mixed air temperature setpoint, initially 55F, subject to an adjustable maximum space or return air CO₂ setpoint, initially 600ppm.

.2 When outside air temperature exceeds an adjustable outside air dry bulb override setpoint, initially 68F, the dampers shall modulate to maintain the CO₂ setpoint.

.2 Unoccupied Mode

.1 While the fan is off, dampers shall remain fully shut.

.2 While the fan is on and cooling is required, dampers shall modulate to provide the maximum benefit from available free cooling, subject to a discharge low limit temperature of 55F. If the outside air temperature is above the outside air dry bulb override setpoint, the dampers shall remain fully shut.

.3 While the fan is on and heating is required, the dampers shall remain fully shut.

3. Additional Graphic Elements

.1 outside air temperature
.2 damper position setpoint
.3 space or return air CO₂ setpoint
.4 mixed air temperature setpoint
.5 outside air dry bulb override setpoint
9. Heating Pumps
   .1 The pumps shall operate when outside temperature is below an operator adjustable high-limit, initially 55F. On a rise in outside air temperature, the pumps shall shut off at 5F above the setpoint.
   .2 The pumps shall operate for one minute when they have been off for 24 hours.
   .3 Additional Graphic Elements
      .1 pumping high limit
      .2 outside air temperature

10. Cooling Pumps
    .1 The pumps shall operate when outside temperature is above an operator adjustable low-limit (initially 60F). The pumps shall operate for one minute when they have been off for 24 hours.
    .2 Additional Graphic Elements
       .1 pumping low limit
       .2 outside air temperature

11. Hot Water Boiler Staging

   The boilers shall be staged to maintain a primary loop hot water supply temperature according to a reset control schedule as shown, with a throttling range of 6F. Boiler circulators shall be sequenced with the burners such that a circulator starts two minutes prior to the corresponding burner firing and stops two minutes after the burner stops firing. The control system shall ensure a minimum of 15 minutes between stages. Boiler lead shall rotate between the two boilers, with the lead boiler changing weekly.

<table>
<thead>
<tr>
<th>Stage</th>
<th>Lead low fire</th>
<th>Lead high fire</th>
<th>Lag low fire</th>
<th>Lag high fire</th>
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<tr>
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Tomken Twin Arena

AHU #2

2nd Floor Meeting Hall Air Supply

Radiator Supply To Room 213

To 2nd Floor Meeting Hall

NOTE:
FS - Firestat
FZ - Freezestat

Refer to "DDC Notes" page for Point List note references
DDC Control Point List for AHU #4

<table>
<thead>
<tr>
<th>Control Point</th>
<th>DO</th>
<th>DI</th>
<th>AO</th>
<th>AI</th>
<th>Sub-Type</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Cooling valve control</td>
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Point Totals: 2 2 3 2

Refer to "DDC Notes" page for Point List note references
Hot Brine System (snow pit melting and subfloor heat)

Tomken Twin Arena
Arena Refrigeration Plant

Hot Brine System (snow pit melting and subfloor heat)

To Zamboni and DHW Heat Recovery

Compressor Jacket Cooling

Refer to "DDC Notes" page for Point List note references
### Strategies

#### Mechanical System

<table>
<thead>
<tr>
<th>AHU #1</th>
<th>AHU #2</th>
<th>AHU #3</th>
<th>AHU #4</th>
<th>HV #1</th>
<th>HV #2</th>
<th>HV #3</th>
<th>DEHUMIDIFIER #1</th>
<th>DEHUMIDIFIER #2</th>
<th>PACKAGED DEHUMIDIFIER #3</th>
<th>PACKAGED DEHUMIDIFIER #4</th>
<th>EXHAUST FAN #10</th>
<th>EXHAUST FAN #11</th>
<th>HOT WATER HEATING PLANT</th>
<th>DOMESTIC HOT WATER HEATING</th>
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#### Notes

- AHU #1
- AHU #2
- AHU #3
- AHU #4
- HV #1
- HV #2
- HV #3
- DEHUMIDIFIER #1
- DEHUMIDIFIER #2
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Excel Spreadsheet

Efficiency Engineering Inc.