



ADDENDA

**ASHRAE Addendum z to
ASHRAE Guideline 36-2021**

High-Performance Sequences of Operation for HVAC Systems

Approved by ASHRAE on December 3, 2024.

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FOREWORD

Note: In this addendum, changes to the current guideline are indicated in the text by underlining (for additions) and strikethrough (for deletions) unless the instructions specifically mention some other means of indicating the changes.

This addendum addresses high humidity challenges in new and existing buildings that are applying G36 logic with Multiple Zone VAV Air Handling Units. A new variable, referred to as the Humidity SAT Limit, is offered at the AHU level. If/when the Humidity SAT Limit is applied, the SAT setpoint shall be limited to no greater than the Humidity SAT Limit.

The basis of the Humidity SAT Limit is modular. The designer may elect to incorporate one, two, or all three of the following humidity limiting strategies:

1. Outdoor air dew point-based humidity limit
2. Return air dew point-based humidity limit
3. Zone dew point-based humidity limit

Addendum z to Guideline 36-2021

Add new Section 3.1.1.4:

If zone humidity is to be controlled based on zone dew point temperature, retain the following section. Delete otherwise.

3.1.1.4. Zone Dew Point Temperature (DPT) High Limits

For Climate Zones 0A, 1A, 2A, and 3A, ASHRAE Standard 90.1 requires supply air temperature reset to be unimpeded by dehumidification controls, thus implying the use of separate outdoor air cooling coil, dedicated outdoor air system, etc., all of which are currently outside the scope of ASHRAE Guideline 36.

For all other Climate Zones, ASHRAE Standard 90.1 allows humidity controls to adjust the supply air temperature reset in multiple-zone HVAC systems. ASHRAE Guideline 36 provides a means for this adjustment as described below. At the designer's option, this limit may be imposed based on outdoor air dew point, return air dew point, and/or dew point feedback from the zones. If other energy-conserving dehumidification strategies are included in the design, they should be deployed for humidity control before reducing the supply air temperature.

Dew point is used as the humidity variable, rather than relative humidity, based on the dew point high limits prescribed in Standard 62.1-2022 addendum k, which in turn were largely based on ASHRAE Handbook – Applications Chapter 64 Moisture and Mold which recommends controlling dew point temperature (rather than relative humidity) to mitigate mold growth. It is anticipated that Standard 90.1 will also limit the use of active dehumidification based on dew point temperature to correspond to Standard 62.1 limits. However, almost all commercial humidity sensors measure relative humidity; to determine dew point temperature, concurrent drybulb temperature must also be measured, and either the sensors must include psychrometric algorithms in firmware to generate a dew point signal, or psychrometric algorithms residing in the digital control system must make this conversion. Both are readily available although not yet commonly used.

The following limits apply to control based on zone dew point. See Section 3.1.4.6 for humidity limits based on outdoor air dew point and return air dew point.

Every zone that has a dew point high limit must be equipped with a humidity sensor.

For these humidity control strategies to be effective and efficient, accurate and reliable humidity sensors are essential. High quality sensors are strongly recommended.

Zones with humidity limits participate in a Trim & Respond loop based on the measured zone dew point. As a result, erroneous humidity sensors can easily create a rogue zone situation that locks the SAT reset loop and wastes energy. It is recommended that the designer set humidity limits only on those zones where it is essential, even if all zones are to be equipped with humidity sensors.

Zone Importance factors and the T&R loop Ignore value can be adjusted to ensure that critical zones get an immediate response to high detected high humidity. However, this strategy makes the creation of rogue zones even more likely.

- a. Dew point shall be limited in the following zones and zone types as provided in Table 3.1.1.4.

Table 3.1.1.4 Dew point Temperature High Limits for Zones		
<u>Zone Tag or Zone Type</u>	<u>Occupied</u>	<u>Unoccupied</u>
<u>Room #X</u>	<u>15.6°C (60°F) DPT</u>	<u>15.6°C (60°F) DPT</u>
<u>Room #Y</u>	<u>15.6°C (60°F) DPT</u>	<u>15.6°C (60°F) DPT</u>
<u>Operating Room</u>	<u>11.7°C (53°F) DPT</u>	<u>15.6°C (60°F) DPT</u>

- b. A dew point high limit value shall not be assigned to zones not listed above, or to zones which do not have a local humidity sensor.

Add new Section 3.1.4.6:

If humidity is to be controlled based on return air and/or outdoor air conditions, retain the following section. Delete otherwise.

3.1.4.6. Humidity Limits

For Climate Zones 0A, 1A, 2A, and 3A, ASHRAE Standard 90.1 requires supply air temperature reset to be unimpeded by dehumidification controls, thus implying the use of separate outdoor air cooling coil, dedicated outdoor air system, etc., all of which are currently outside the scope of ASHRAE Guideline 36.

For all other Climate Zones, ASHRAE Standard 90.1 allows humidity controls to adjust the supply air temperature reset in multiple-zone HVAC systems. ASHRAE Guideline 36 provides a means for this adjustment as described below. At the designer's option, this limit may be imposed based on outdoor air dew point, return air dew point, and/or dew point feedback from the zones. If other energy-conserving dehumidification strategies are included in the design, they should be deployed for humidity control before reducing the supply air temperature.

Dew point is used as the humidity variable, rather than relative humidity, based on the dew point high limits prescribed in Standard 62.1-2022 addendum k, which in turn were largely based on ASHRAE Handbook – Applications Chapter 64 Moisture and Mold, which also recommends controlling dew point temperature (rather than relative humidity) to mitigate mold growth. It is anticipated that Standard 90.1 will also limit the use of active dehumidification based on dew point temperature to correspond to Standard 62.1 limits. However, almost all commercial humidity sensors measure relative humidity; to measure dew point, concurrent drybulb temperature must also be measured, and either the sensors must include psychrometric algorithms in firmware to generate a dew point signal, or psychrometric algorithms residing in the digital control system must make this conversion. Both are readily available although not yet commonly used.

The following setpoints apply to control based on outdoor air dew point and/or return air dew point. Refer to Section 3.1.1.4 for zone humidity-based dew point limits. Note that using zone humidity sensors is the most direct and energy efficient humidity control logic but also has the highest first costs and maintenance costs.

For these humidity control strategies to be effective and efficient, accurate and reliable references for outdoor air dew point and return air dew point are required. High quality sensors are strongly recommended. For outdoor air dew point, another option is to reference the nearest airport or NOAA weather station in place of a local sensor.

Retain the following two parameters for humidity control that limits supply air temperature reset based on outside air dew point temperature. Delete otherwise.

- a. OADPT_Min, the lower value of the outdoor air dew point reset range
- b. OADPT_Max, the higher value of the outdoor air dew point reset range

When limiting humidity based on outdoor air conditions, OADPT_Min and OADPT_Max define the range of outdoor air dew point temperatures used in the humidity-limiting reset logic.

Values of OADPT_Min = 55°F and OADPT_Max = 60°F are appropriate for typical comfort cooling applications. Application-specific requirements such as healthcare, pharmaceutical, laboratory, ice rink, or museum exhibit spaces may dictate the use of a lower range of values.

Note that control based on outdoor air dew point will prevent the introduction of large volumes of humid ventilation air, but will not respond to elevated indoor humidity conditions caused by other latent loads.

Retain the following two parameters for humidity control that limits supply air temperature reset based on return air dew point temperature. Delete otherwise.

- c. RADPT_Min, the lower value of the return air dew point reset range
- d. RADPT_Max, the higher value of the return air dew point reset range

When limiting humidity based on return air conditions, RADPT_Min and RADPT_Max define the range of return air dew point temperatures used in the humidity-limiting reset logic.

Typical values are RADPT_Min = 55°F and RADPT_Max = 60°F, though application-specific requirements may dictate different values.

Note that control based on return air only responds to the average condition across the building. Individual zones with high humidity will most likely not be detected.

Add dew point sensors as optional points for zones and air handlers to Section 4:

4. LIST OF HARDWIRED POINTS

4.1 VAV Terminal Unit—Cooling Only

Required?	Description	Type	Device
<u>A</u>	<u>Zone dew point (if applicable)</u>	<u>AI</u>	<u>Room dew point sensor (or RH converted to DPT)</u>

4.2 VAV Terminal Unit with Reheat

Required?	Description	Type	Device
<u>A</u>	<u>Zone dew point (if applicable)</u>	<u>AI</u>	<u>Room dew point sensor (or RH converted to DPT)</u>

4.3 Fan-Powered Terminal Unit (Series or Parallel, Constant- or Variable-Speed Fan)

Required?	Description	Type	Device
<u>A</u>	<u>Zone dew point (if applicable)</u>	<u>AI</u>	<u>Room dew point sensor (or RH converted to DPT)</u>

4.4 Dual-Duct Terminal Unit with Inlet Sensors

Required?	Description	Type	Device
<u>A</u>	<u>Zone dew point (if applicable)</u>	<u>AI</u>	<u>Room dew point sensor (or RH converted to DPT)</u>

4.5 Dual-Duct Terminal Unit with Discharge Sensor

Required?	Description	Type	Device
<u>A</u>	<u>Zone dew point (if applicable)</u>	<u>AI</u>	<u>Room dew point sensor (or RH converted to DPT)</u>

4.6 Multiple-Zone VAV Air-Handling Unit

Required?	Description	Type	Device
<u>A</u>	<u>Return air dew point (if applicable)</u>	<u>AI</u>	<u>Return air dew point sensor (or RH converted to DPT)</u>

Required?	Description	Type	Device
<u>A</u>	<u>Outdoor air dew point (if applicable)</u>	<u>AI</u>	<u>OA dew point sensor (or RH converted to DPT), or web-based input from an external weather station</u>

Modify Section 5.1.20.1 as follows:

Time-based suppression is used to suppress reset requests and alarms after a change in setpoint. This includes automatic changes in setpoint, e.g., due to a change in window switch or occupancy sensor status, as well as changes made by occupants.

- a. For thermal zone temperature alarms: 18 minutes per °C (10 minutes per °F) of difference but no longer than 120 minutes

*For example, if setpoint changes from 20°C (68°F) to 21°C (70°F), and the zone temperature is 20.2°C (68.5°F) at the time of the change, inhibit alarm for 15 minutes (0.8°C*18 minutes per °C [1.5°F*10 minutes/°F]) after the change.*

- b. For thermal zone temperature cooling requests: 9 minutes per °C (5 minutes per °F) of difference but no longer than 30 minutes
- c. For thermal zone temperature heating requests: 9 minutes per °C (5 minutes per °F) of difference but no longer than 30 minutes
- d. For humidity SAT limit requests: 9 minutes per °C (5 minutes per °F) of difference but no longer than 30 minutes

Add high humidity alarms to Section 5.3.6:

If zone dew point is monitored and high humidity alarms are desired, retain the following section. Delete otherwise.

5.3.6.2. Zone Dew point Alarms

- a. See Section 3.1.1.4 for zone dew point high limits
- b. High dew point alarm
 1. If the zone is less than or equal to 1°C (2°F) above the dew point limit for 6 hours, generate a Level 4 alarm.
 2. If the zone is less than or equal to 1°C (2°F) above the dew point limit for 12 hours, generate a Level 3 alarm.
 3. If the zone is less than or equal to 1°C (2°F) above the dew point limit for 24 hours, generate a Level 2 alarm.
 4. If the zone is greater than 1°C (2°F) above the dew point limit for 2 hours, generate a Level 3 alarm.
 5. If the zone is greater than 2°C (4°F) above the dew point limit for 8 hours, generate a Level 2 alarm.

Add humidity supply air temperature reset requests to Section 5.5.8:

If zone dew point is used to limit AHU supply air temperature setpoint, retain the following section. Delete otherwise.

- 5.5.8.3. For zones with a humidity sensor and a dew point high limit assigned to the zone per Section 3.1.1.4, Humidity SAT Limit Requests
- a. If the zone dew point exceeds the limit by 3°C (5°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 3 requests.
 - b. Else if the zone dew point exceeds the limit by 2°C (3°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 2 requests.
 - c. Else if the zone dew point exceeds the limit for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 1 request until the zone dew point is less than the zone's high limit for 10 minutes.
 - d. Else if the zone dew point is less than or equal to the limit, send 0 requests.

Add humidity supply air temperature reset requests to Section 5.6.8:

If zone dew point is used to limit AHU supply air temperature setpoint, retain the following section. Delete otherwise.

- 5.6.8.5. For zones with a humidity sensor and a dew point high limit assigned to the zone per Section 3.1.1.4, Humidity SAT Limit Requests
- a. If the zone dew point exceeds the limit by 3°C (5°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 3 requests.
 - b. Else if the zone dew point exceeds the limit by 2°C (3°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 2 requests.
 - c. Else if the zone dew point exceeds the limit for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 1 request until the zone dew point is less than the zone's high limit for 10 minutes.
 - d. Else if the zone dew point is less than or equal to the limit, send 0 requests.

Add humidity supply air temperature reset requests to Section 5.7.8:

If zone dew point is used to limit AHU supply air temperature setpoint, retain the following section. Delete otherwise.

- 5.7.8.5. For zones with a humidity sensor and a dew point high limit assigned to the zone per Section 3.1.1.4, Humidity SAT Limit Requests
- a. If the zone dew point exceeds the limit by 3°C (5°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 3 requests.
 - b. Else if the zone dew point exceeds the limit by 2°C (3°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 2 requests.
 - c. Else if the zone dew point exceeds the limit for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 1 request until the zone dew point is less than the zone's high limit for 10 minutes.
 - d. Else if the zone dew point is less than or equal to the limit, send 0 requests.

Add humidity supply air temperature reset requests to Section 5.8.8:

If zone dew point is used to limit AHU supply air temperature setpoint, retain the following section. Delete otherwise.

- 5.8.8.5. For zones with a humidity sensor and a dew point high limit assigned to the zone per Section 3.1.1.4,

Humidity SAT Limit Requests

- a. If the zone dew point exceeds the limit by 3°C (5°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 3 requests.
- b. Else if the zone dew point exceeds the limit by 2°C (3°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 2 requests.
- c. Else if the zone dew point exceeds the limit for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 1 request until the zone dew point is less than the zone's high limit for 10 minutes.
- d. Else if the zone dew point is less than or equal to the limit, send 0 requests.

Add humidity supply air temperature reset requests to Section 5.9.8:

If zone dew point is used to limit AHU supply air temperature setpoint, retain the following section. Delete otherwise.

5.9.8.5. For zones with a humidity sensor and a dew point high limit assigned to the zone per Section 3.1.1.4, Humidity SAT Limit Requests

- a. If the zone dew point exceeds the limit by 3°C (5°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 3 requests.
- b. Else if the zone dew point exceeds the limit by 2°C (3°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 2 requests.
- c. Else if the zone dew point exceeds the limit for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 1 request until the zone dew point is less than the zone's high limit for 10 minutes.
- d. Else if the zone dew point is less than or equal to the limit, send 0 requests.

Add humidity supply air temperature reset requests to Section 5.10.8:

If zone dew point is used to limit AHU supply air temperature setpoint, retain the following section. Delete otherwise.

5.10.8.5. For zones with a humidity sensor and a dew point high limit assigned to the zone per Section 3.1.1.4, Humidity SAT Limit Requests

- a. If the zone dew point exceeds the limit by 3°C (5°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 3 requests.
- b. Else if the zone dew point exceeds the limit by 2°C (3°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 2 requests.
- c. Else if the zone dew point exceeds the limit for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 1 request until the zone dew point is less than the zone's high limit for 10 minutes.
- d. Else if the zone dew point is less than or equal to the limit, send 0 requests.

Add humidity supply air temperature reset requests to Section 5.11.8:

If zone dew point is used to limit AHU supply air temperature setpoint, retain the following section. Delete otherwise.

5.11.8.5. For zones with a humidity sensor and a dew point high limit assigned to the zone per Section 3.1.1.4, Humidity SAT Limit Requests

- a. If the zone dew point exceeds the limit by 3°C (5°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 3 requests.
- b. Else if the zone dew point exceeds the limit by 2°C (3°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 2 requests.
- c. Else if the zone dew point exceeds the limit for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 1 request until the zone dew point is less than the zone's high limit for 10 minutes.
- d. Else if the zone dew point is less than or equal to the limit, send 0 requests.

Add humidity supply air temperature reset requests to Section 5.12.8:

If zone dew point is used to limit AHU supply air temperature setpoint, retain the following section. Delete otherwise.

5.12.8.6. For zones with a humidity sensor and a dew point high limit assigned to the zone per Section 3.1.1.4, Humidity SAT Limit Requests

- a. If the zone dew point exceeds the limit by 3°C (5°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 3 requests.
- b. Else if the zone dew point exceeds the limit by 2°C (3°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 2 requests.
- c. Else if the zone dew point exceeds the limit for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 1 request until the zone dew point is less than the zone's high limit for 10 minutes.
- d. Else if the zone dew point is less than or equal to the limit, send 0 requests.

Add humidity supply air temperature reset requests to Section 5.13.8:

If zone dew point is used to limit AHU supply air temperature setpoint, retain the following section. Delete otherwise.

5.13.8.6. For zones with a humidity sensor and a dew point high limit assigned to the zone per Section 3.1.1.4, Humidity SAT Limit Requests

- a. If the zone dew point exceeds the limit by 3°C (5°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 3 requests.
- b. Else if the zone dew point exceeds the limit by 2°C (3°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 2 requests.
- c. Else if the zone dew point exceeds the limit for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 1 request until the zone dew point is less than the zone's high limit for 10 minutes.
- d. Else if the zone dew point is less than or equal to the limit, send 0 requests.

Add humidity supply air temperature reset requests to Section 5.14.8:

If zone dew point is used to limit AHU supply air temperature setpoint, retain the following section. Delete otherwise.

5.14.8.6. For zones with a humidity sensor and a dew point high limit assigned to the zone per Section 3.1.1.4, Humidity SAT Limit Requests

- a. If the zone dew point exceeds the limit by 3°C (5°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 3 requests.
- b. Else if the zone dew point exceeds the limit by 2°C (3°F) for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 2 requests.
- c. Else if the zone dew point exceeds the limit for 30 minutes and after suppression period due to setpoint change per Section 5.1.20, send 1 request until the zone dew point is less than the zone's high limit for 10 minutes.
- d. Else if the zone dew point is less than or equal to the limit, send 0 requests.

Add SAT setpoint limits for humidity control to Multiple Zone Air Handling Units in Section 5.16.2:

5.16.2. Supply Air Temperature Control

5.16.2.1. Control loop is enabled when the supply air fan is proven ON, and disabled ~~and output set to deadband (no heating, minimum economizer)~~ otherwise. When the loop is disabled, the output shall be set to deadband (no heating, minimum economizer).

5.16.2.2. Supply Air Temperature Setpoint

The default range of outdoor air temperatures [21°C (70°F) – 16°C (60°F)] used to reset the Occupied Mode SAT setpoint was chosen to maximize economizer hours. It may be preferable to use a lower range of OATs (e.g., 18°C [65°F] – 13°C [55°F]) to minimize fan energy if there is a 24/7 chiller plant that is running anyway, reheat is minimized, as in a VAV dual-fan dual-duct system, or the climate severely limits the number of available economizer hours. This lower range also can be used to indirectly limit zone humidity in humid climates, e.g. setting both Max_ClgSAT and OAT_Max to 16°C (60°F) ensures that supply air dew point temperature is always below 16°C (60°F), effectively maintaining space dew point temperature below that limit in zones with low latent loads such as offices. See Sections 5.16.2.3 for other more direct ways to limit zone humidity.

If using this logic, the engineer should oversize interior zones and rooms with high cooling loads (design them to be satisfied by the warmest SAT) so these zones do not drive the T&R block to the minimum SAT setpoint.

- a. See Section 3.1.4.1 for Min_ClgSAT, Max_ClgSAT, OAT_Min, and OAT_Max setpoints.
- b. During Occupied Mode and Setup Mode, setpoint shall be reset from Min_ClgSAT when the outdoor air temperature is OAT_Max and above, proportionally up to T-max when the outdoor air temperature is OAT_Min and below.
 1. T-max shall be reset using T&R logic (see Section 5.1.14) between Min_ClgSAT and Max_ClgSAT.

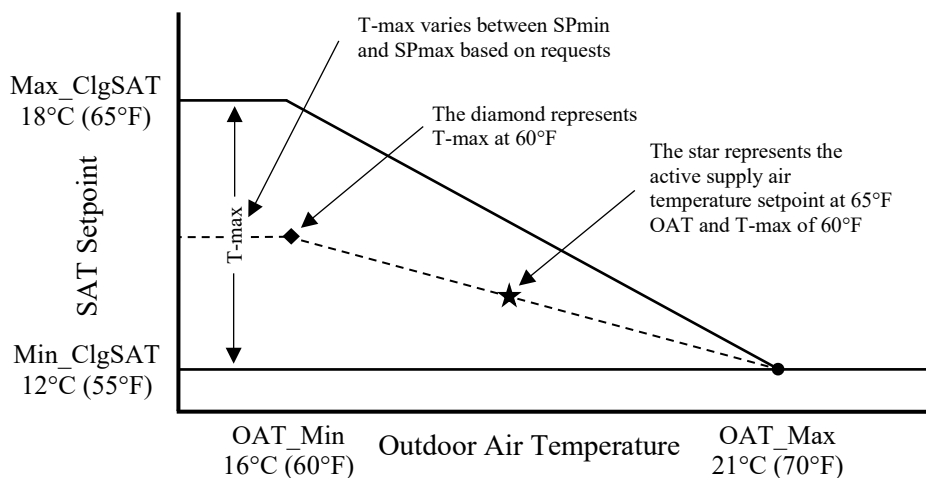
The T&R reset parameters in Table 5.16.2.2 are suggested as a starting place; they will most likely require adjustment during the commissioning/tuning phase.

Variable	Value
Device	Supply fan
SP ₀	SPmax
SP _{min}	Min_ClgSAT
SP _{max}	Max_ClgSAT
T _d	10 minutes
T	2 minutes
I	See note
R	Zone cooling SAT requests

SP_{trim}	+0.1°C (+0.2°F)
SP_{res}	-0.2°C (-0.3°F)
$SP_{res-max}$	-0.6°C (-1.0°F)

Informative note: The number of ignored requests can be adjusted to balance responsiveness to demand (fewer ignores) vs energy efficiency (more ignores). The value that is set should be considered as a function of the total number of downstream zones or systems that can send requests. As a default, set the number of ignored requests to 10% of the total downstream zones or systems, rounded to the nearest integer.

The net result of this SAT reset strategy is depicted in Figure 5.16.2.2 for $Min_ClgSAT = 12^{\circ}C (55^{\circ}F)$, $Max_ClgSAT = 18^{\circ}C (65^{\circ}F)$, $OAT_Max = 21^{\circ}C (70^{\circ}F)$, and $OAT_Min = 16^{\circ}C (60^{\circ}F)$.



Informative Figure 5.16.2.2 Example supply air temperature reset diagram.

- c. During Cooldown Mode, setpoint shall be Min_ClgSAT .

Note that the supply air temperature setpoint determined above for Occupied, Setup, and Cooldown Modes can be lowered by the humidity control logic in Section 5.16.2.3.

- d. During Warmup Mode and Setback Mode, setpoint shall be $35^{\circ}C (95^{\circ}F)$.

Raising the SAT setpoint in warmup will effectively lock out the economizer and cooling coil, which is desirable for warmup even if there is no heating coil at the AHU to meet the higher SAT.

This does not apply in the case of a DFDD AHU or if all the zones are equipped with fan-powered boxes such that the AHU is off in warmup and setback.

The engineer must specify the basis, if any, on which SAT setpoint is to be limited to control zone humidity.

If SAT setpoint is not to be limited based on humidity, delete Section 5.16.2.3.

If SAT is to be limited based on outdoor air dew point, retain Section 5.16.2.3.a.1.

If SAT is to be limited based on return air dew point, retain Section 5.16.2.3.a.2.

If SAT is to be limited based on requests from zones, retain Section 5.16.2.3.a.3.

Delete any subsections that do not apply.

5.16.2.3. Supply air temperature setpoint limit for humidity control

- a. The Humidity SAT Limit shall be the lowest value dictated by the following strategies:

Note that control based on outdoor air dew point will prevent the introduction of large volumes of humid ventilation air, but will not respond to elevated indoor humidity conditions.

1. Based on outdoor air dew point temperature

- i. See Sections 3.1.4.6 for OADPT_Min and OADPT_Max
- ii. Humidity SAT Limit shall be reset from Min_ClgSAT when the outdoor air dew point is OADPT_Max and above, proportionally up to Max_ClgSAT when the outdoor air dew point is OADPT_Min and below.

Note that control based on return air only responds to the average condition across the building. Individual zones with high relative humidity due to high zone latent loads will most likely not be detected.

2. Based on return air dew point

- i. See Sections 3.1.4.6 for RADPT_Min and RADPT_Max
- ii. Humidity SAT Limit shall be reset from Min_ClgSAT when the return air dew point is RADPT_Max and above, proportionally up to Max_ClgSAT when the return air dew point is RADPT_Min and below.

Limiting SAT based on zone requests has a high potential to create rogue zones and consequent ongoing energy waste. Use high quality humidity sensors and only use zone feedback where it is necessary to limit the potential for moisture related problems.

Zone importance factors can be adjusted to ensure that critical zones get an immediate response to high humidity, but doing so further increases the risk of rogue zones.

3. Based on zone requests

- i. See Section 3.1.1.4 for zone dew point high limits
- ii. Humidity SAT Limit shall be reset using T&R logic (see Section 5.1.14) between Min_ClgSAT and Max_ClgSAT based on Zone Humidity SAT Limit Requests.

The T&R reset parameters in Table 5.16.2.3 are suggested as a starting place; they will most likely require adjustment during the commissioning/tuning phase.

Table 5.16.2.3 Trim & Respond Variables

<u>Variable</u>	<u>Value</u>
<u>Device</u>	<u>Supply fan</u>
<u>SP0</u>	<u>SPmax</u>
<u>SPmin</u>	<u>Min_ClgSAT</u>
<u>SPmax</u>	<u>Max_ClgSAT</u>
<u>Td</u>	<u>10 minutes</u>
<u>T</u>	<u>2 minutes</u>
<u>I</u>	<u>See note</u>

<u>R</u>	<u>Zone Humidity SAT Limit Requests</u>
<u>SPtrim</u>	+0.1°C (+0.2°F)
<u>SPres</u>	-0.2°C (-0.3°F)
<u>SPres-max</u>	-0.6°C (-1.0°F)

Informative note: The number of ignored requests can be adjusted to balance responsiveness to demand (fewer ignores) vs energy efficiency (more ignores). The value that is set should be considered as a function of the total number of downstream zones or systems that can send requests. As a default, set the number of ignored requests to 10% of the total downstream zones or systems, rounded to the nearest integer.

- b. During all Modes except Warmup Mode and Setback Mode, the supply air temperature setpoint determined in Section 5.16.2.2 shall be limited to no greater than the Humidity SAT Limit.

Add zone humidity sensors to Informative Appendix A.

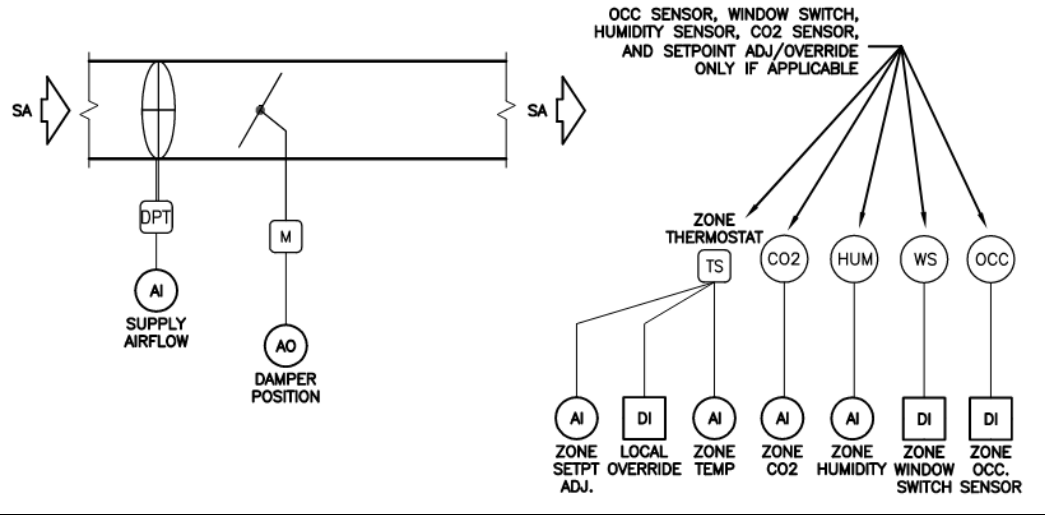


Figure A-1 VAV terminal unit, cooling only.

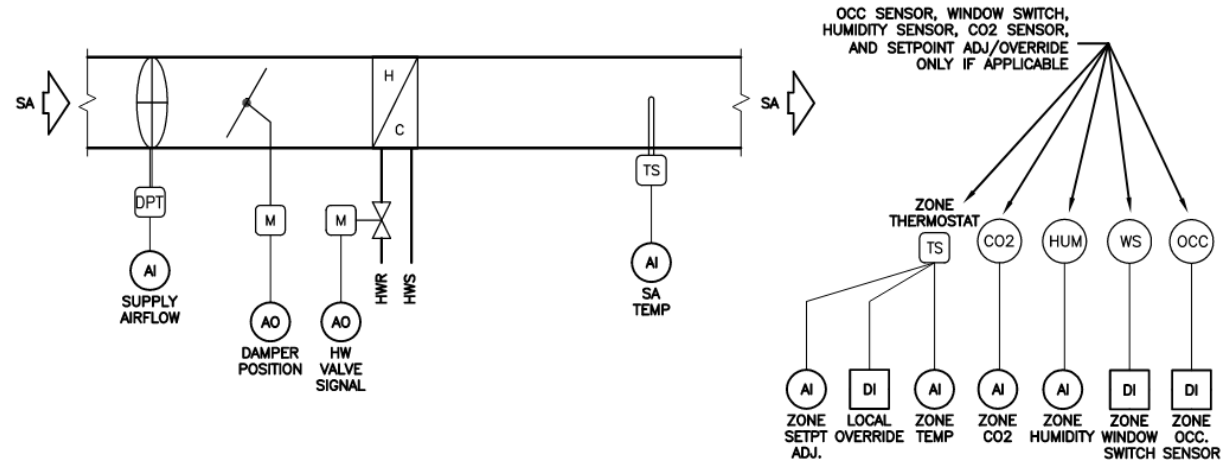


Figure A-2 VAV Terminal unit with reheat.

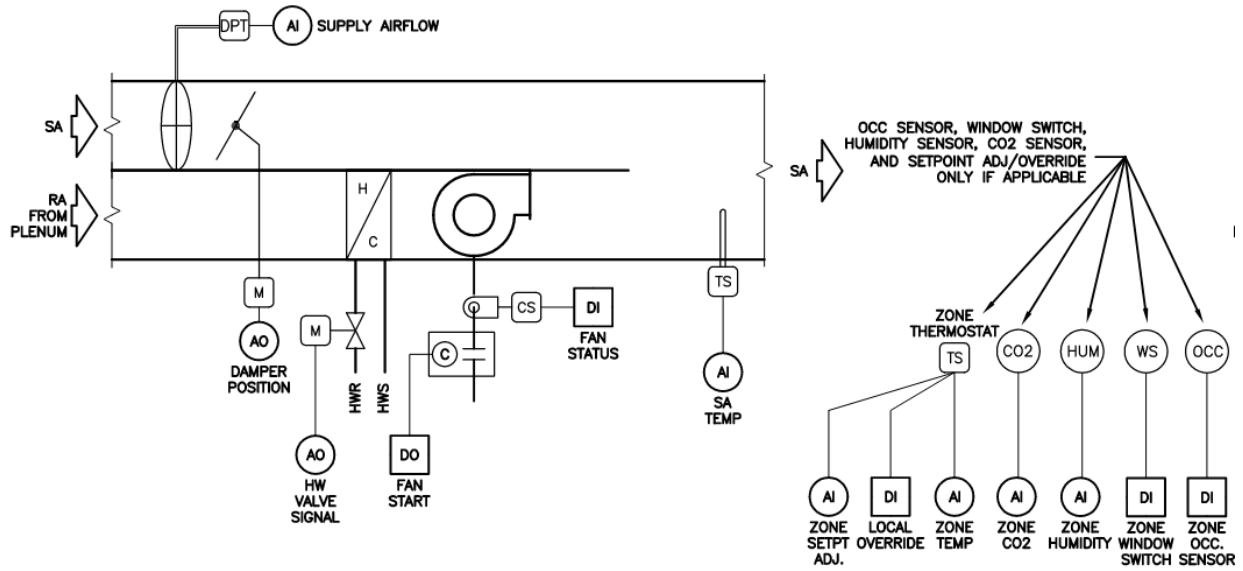


Figure A-3 Parallel fan-powered terminal unit, constant volume fan.

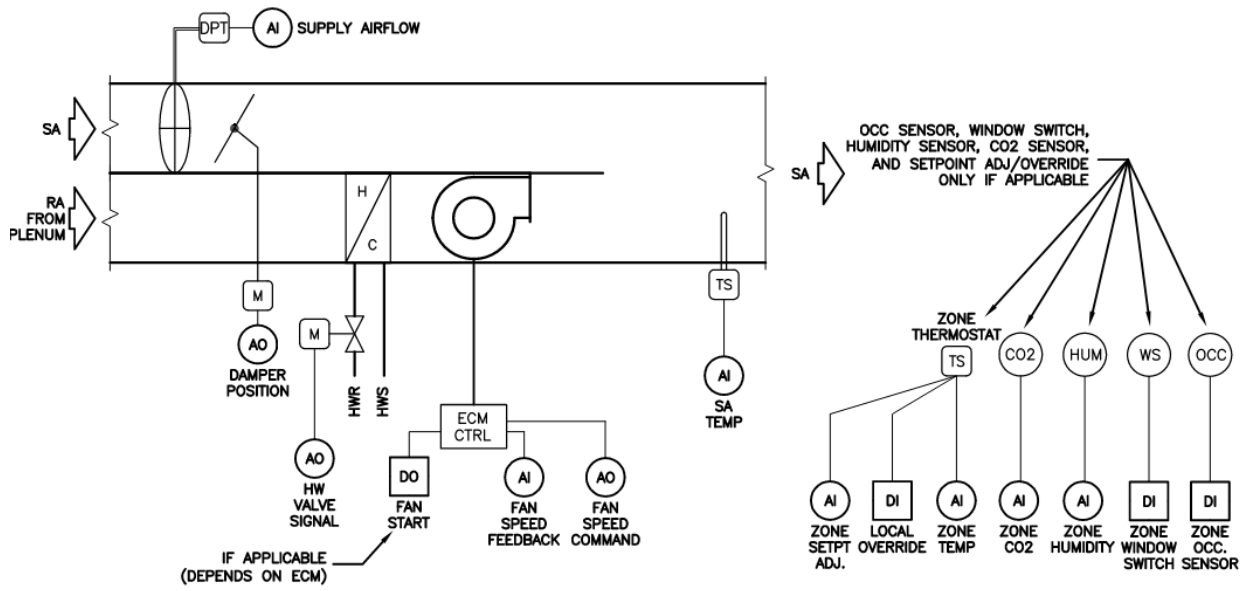


Figure A-4 Parallel fan-powered terminal unit, variable volume fan.

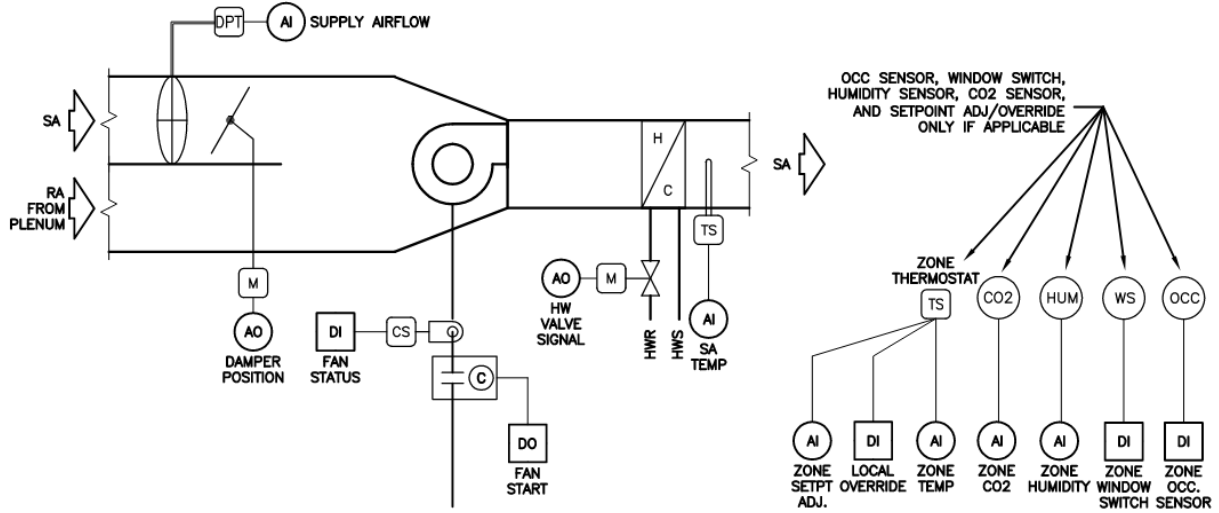


Figure A-5 Series fan-powered terminal unit, constant volume fan.

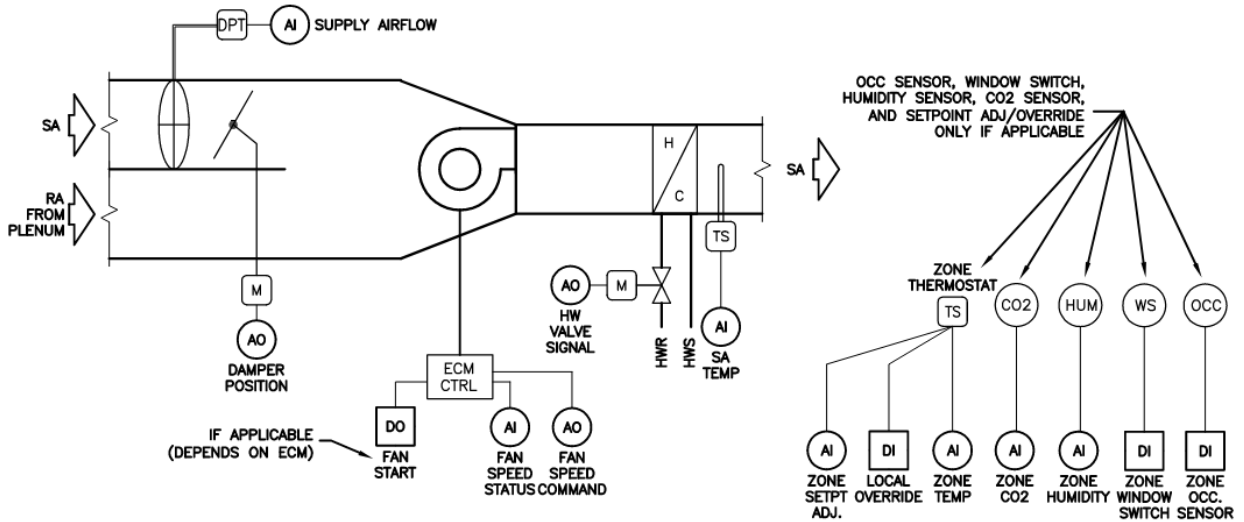


Figure A-6 Series fan-powered terminal unit, variable volume fan.

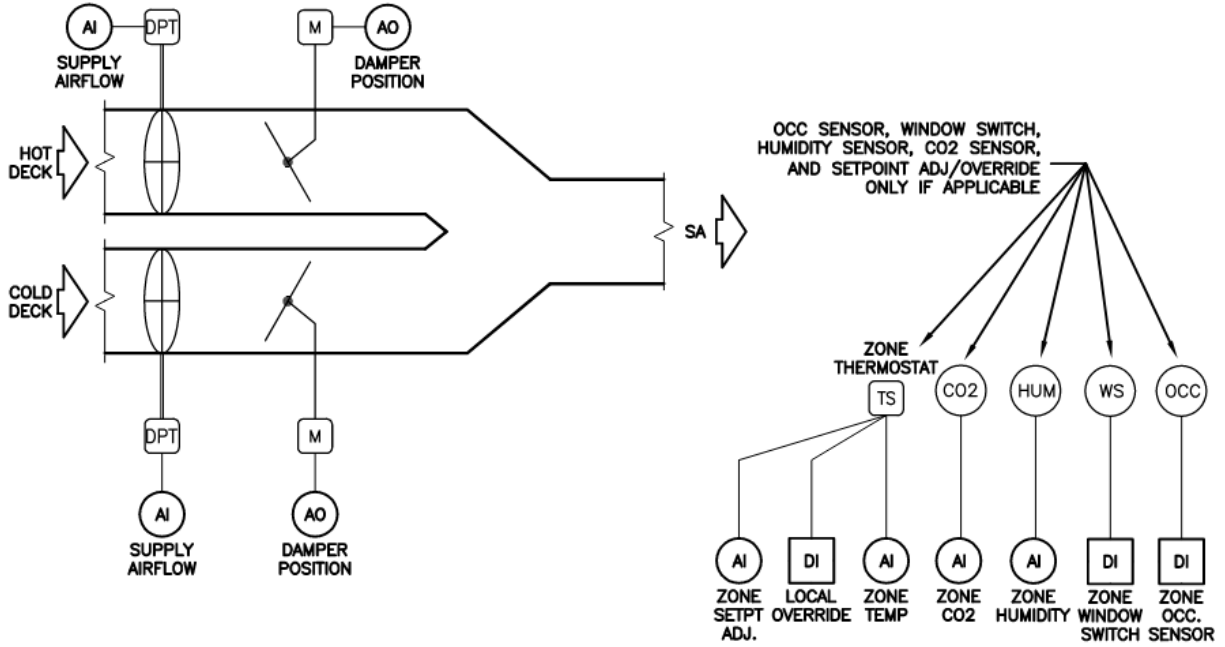


Figure A-7 Dual duct terminal unit with inlet sensors.

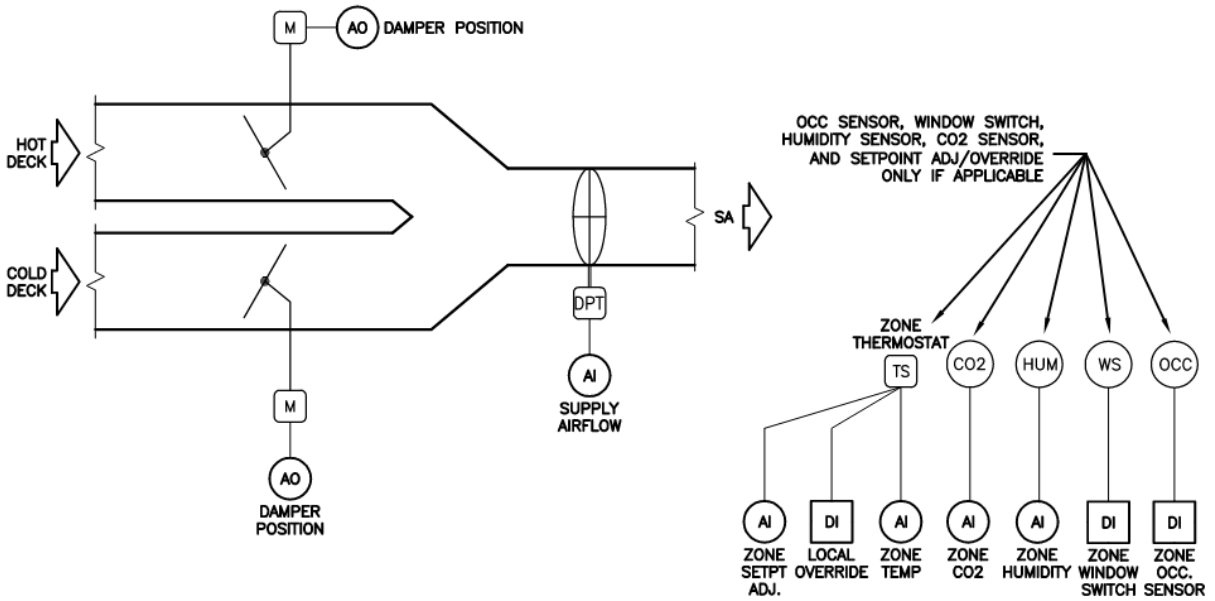


Figure A-8 Dual duct terminal unit with discharge sensor.

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ASHRAE is concerned with the impact of its members' activities on both the indoor and outdoor environment. ASHRAE's members will strive to minimize any possible deleterious effect on the indoor and outdoor environment of the systems and components in their responsibility while maximizing the beneficial effects these systems provide, consistent with accepted Standards and the practical state of the art.

ASHRAE's short-range goal is to ensure that the systems and components within its scope do not impact the indoor and outdoor environment to a greater extent than specified by the Standards and Guidelines as established by itself and other responsible bodies.

As an ongoing goal, ASHRAE will, through its Standards Committee and extensive Technical Committee structure, continue to generate up-to-date Standards and Guidelines where appropriate and adopt, recommend, and promote those new and revised Standards developed by other responsible organizations.

Through its *Handbook*, appropriate chapters will contain up-to-date Standards and design considerations as the material is systematically revised.

ASHRAE will take the lead with respect to dissemination of environmental information of its primary interest and will seek out and disseminate information from other responsible organizations that is pertinent, as guides to updating Standards and Guidelines.

The effects of the design and selection of equipment and systems will be considered within the scope of the system's intended use and expected misuse. The disposal of hazardous materials, if any, will also be considered.

ASHRAE's primary concern for environmental impact will be at the site where equipment within ASHRAE's scope operates. However, energy source selection and the possible environmental impact due to the energy source and energy transportation will be considered where possible. Recommendations concerning energy source selection should be made by its members.

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As an industry leader in research, standards writing, publishing, certification, and continuing education, ASHRAE and its members are dedicated to promoting a healthy and sustainable built environment for all, through strategic partnerships with organizations in the HVAC&R community and across related industries.

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