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

# Public Review Draft

# Proposed Addendum r to Guideline 36-2021, High-Performance Sequences of Operation for HVAC Systems

**First Public Review (November 2023)**
**(Draft shows Proposed Changes to Current Guideline)**

This draft has been recommended for public review by the responsible project committee. To submit a comment on this proposed standard, go to the ASHRAE website at www.ashrae.org/standards-research--technology/public-review-drafts and access the online comment database. The draft is subject to modification until it is approved for publication by the Board of Directors and ANSI. Until this time, the current edition of the standard (as modified by any published addenda on the ASHRAE website) remains in effect. The current edition of any standard may be purchased from the ASHRAE Online Store at www.ashrae.org/bookstore or by calling 404-636-8400 or 1-800-727-4723 (for orders in the U.S. or Canada).

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**(This foreword is not part of this guideline. It is merely informative and does not contain requirements necessary for conformance to the guideline.)**

# FOREWORD

This addendum prevents a potential issue where the condenser water supply temperature setpoint could get "stuck" if load were to suddenly increase, making it impossible for CWST to achieve setpoint + 0.5°F for hours on end. The logic would only get "unstuck" when load (or ambient wet bulb) decreased enough for CWST to drop to within 0.5°F of setpoint.

In practice, this shouldn't be an issue because the guideline includes informative text that states that this sequence should only be used in cases where loads are slow-changing. This addendum improves fault tolerance by incrementally resetting CWST upwards if the towers are unable to make setpoint.

***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. Only these changes are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed substantive changes.***

**Addendum r to Guideline 36-2021**

*(IP and SI Units)*

*Revise Section 5.20.12.2.b.6 as follows:*

6. At the end of every time interval, equal in length to the Chilled Water Plant Reset time step (see Section 5.20.5.2.a) plus 5 minutes, execute the following reset:

    i. After the initial time interval, reset CWSTsp down 1°F.

*There is no history when the plant is first enabled, so a direction to reset must be picked arbitrarily.*

    ii. For each subsequent time interval,

        (a) Reset CWSTsp up by 1°F if CWST is more than 0.5°F above present setpoint and tower fan speed is greater than 99%.
        (b) ~~For each subsequent time interval~~Else, reset CWSTsp down by 1°F if CWST is no more than 0.5°F above present setpoint, tower fan speed command is less than 95%, CHWST setpoint has not increased relative to the setpoint at the end of the previous interval, and either:

            (1) CWSTsp had reset down in the previous time interval and EffCh+T is now less than at the previous setpoint change.
            (2) CWSTsp had reset up in the previous time interval and EffCh+T is now greater than at the previous setpoint change.

        (c) Else, if CWST is no more than 0.5°F below present setpoint, reset CWSTsp up by 1°F.
        (d) Else, do not change CWSTsp.

*This logic attempts to optimize total chiller and tower efficiency. Since CW pump speed is fixed except when modulated for head pressure control (as applicable), CW pump power is not included in the optimization logic.*

*Two varying parameters can cofound this stepwise efficiency optimization routine: (1) varying plant load and (2) chilled water supply temperature setpoint reset. Both factors independently impact chiller efficiency and tower efficiency, making attribution of increases and decreases in efficiency to CWST setpoint reset alone impossible. As such, this approach is not recommended for plants with dynamic load profiles. Additionally, note that CWST setpoint is not allowed to reset down concurrently with CHWST setpoint resetting up since the latter typically outweighs the impact of the former making it impossible to tell whether the CWST reset did any good. A similar restriction is not placed on the CWST reset when CHWST setpoint is resetting down since chiller efficiency should continuously get worse in such a scenario, meaning the CWST setpoint will be self-correcting by repeatedly alternating setpoints within a 1°F range as efficiency continues to worsen until CHWST setpoint stabilizes.*