Automated Guideline 36 Validation

Final Report

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Disclaimer

Executive Summary

Building automation systems frequently underperform due to inconsistent control implementation, gaps in commissioning, and project-specific reprogramming that “reinvents the wheel.” American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE) Guideline 36 (G36) offers standardized, high-performance sequences of operation that can improve comfort, indoor air quality, and energy efficiency. Major building automation system manufacturers have also begun to release G36 programming libraries. However, in the absence of an objective, vendor-agnostic test standard, users cannot reliably assess their conformance, completeness, or robustness. Early field experience has shown inconsistencies and incomplete implementations, illustrating the need for a rigorous and repeatable validation method.

This project developed a draft method of test and demonstrated an automated, repeatable bench-scale validation approach to confirm that control programming conforms to G36 sequences of operation, thereby enabling scalable quality control, supporting codes and standards, and reducing deployment risk. The method uses a software testbed connected to a physical building automation system controller to apply scripted operating conditions and compare the controller’s outputs to expected results. The approach provides objective, vendor-neutral validation that can be performed by programming developers as well as independent testing organizations.

Key accomplishments include:

- Test architecture and scripts: Developed a modular test structure based on discrete test steps and test blocks, enabling detailed evaluation of controller responses across a range of G36 airside sequences. Machine-readable test input files include a point mapping index for a Building Automation and Control Network point translation, test script files providing detailed test conditions and expected responses, and a configuration file defining test selection and reporting intervals.
- Software tool enhancements: Collaborated with two federally funded research teams to develop software tools capable of implementing the new test procedures.
- Pilot testing: Conducted iterative pilot testing with a building automation system manufacturer's G36 variable air volume reheat program and with an open-source G36 programming implementation. These pilots confirmed the feasibility of automated conformance testing and informed refinements to the test scripts, point naming, and software requirements.
- Industry and standards engagement: Worked closely with building automation system manufacturers, ASHRAE G36 committee members, and California Title 24 stakeholders. The project team successfully proposed and formed ASHRAE SPC 236, a new standard committee dedicated to developing this method of test into an American National Standards Institute standard.

A standardized method of test will:

- Provide clear, objective criteria for evaluating G36 conformance.
- Improve quality and consistency of manufacturer programming libraries.
- Reduce the need for project-specific programming and troubleshooting.

- Support codes and standards, including future Title 24 cycles.
- Strengthen the foundation for utility programs seeking to promote advanced controls.

By validating control programming at the library level, the method of test enables scalable quality assurance before installation, reducing downstream commissioning burdens and improving long-term system performance.

To advance toward publication of ASHRAE Standard 236 and support broader market adoption, the following actions are recommended:

1. Continue refining test scripts and definitions through the Standard 236 project committee, prioritizing core G36 airside sequences.
2. Expand pilot testing to additional manufacturers' programming libraries to address architecture and point-exposure variations.
3. Secure dedicated funding for ongoing method of test development, which requires deep technical expertise and familiarity with G36.
4. Coordinate with California state codes (Title 24) and utility programs to establish pathways for integrating validated G36 programming into policy and incentive frameworks.

This project establishes the technical foundation and industry momentum necessary for a widely accepted, automated standard for validating G36 control programming, supporting a more reliable and efficient built environment.

Abbreviations and Acronyms

Acronym	Meaning
AFMS	Airflow measurement station
AHU	Air handling unit
ANSI	American National Standards Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BACnet	Building Automation and Control Network
BAS	Building automation system
BRO	Behavioral, retro-commissioning, or operational
BSP	Building static pressure
CASE	Codes and Standards Enhancement
CDL	Control Description Language
CEC	California Energy Commission
CoPPER	Control Product Performance Evaluation and Reporting
CO2	Carbon dioxide
CPUC	California Public Utilities Commission
DOE	Department of Energy
DCV	Demand controlled ventilation
DP	Differential pressure
EUL	Effective useful life
FPTM	Functional Performance Test Module
G36	Guideline 36
HVAC	Heating, ventilation, and air conditioning
IOU	Investor-owned utility
MOT	Method of test
MZVAV	Multiple zone VAV air handling unit
NIST	National Institute of Standards and Technology
NMEC	Normalized metered energy consumption
OA	Outdoor air
PFPB	Parallel fan powered box

Acronym	Meaning
SEM	Strategic energy management
SGPC	Standing Guideline Project Committee
SOO	Sequences of operation
SPC	Standing Project Committee
Std	Standard
SZVAV	Single zone VAV air handling unit
Title 24	California Building Energy Efficiency Standards
TPS	Title, Purpose, and Scope
TSB	Total System Benefit
VAV	Variable air volume
XML	Extensible markup language

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Introduction

As interest grows in American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) Guideline 36 (G36) *High-Performance Sequences of Operation for HVAC Systems*, many building automation system (BAS) manufacturers have begun to develop libraries of G36 control programming that are to be distributed to their installers across the nation (ASHRAE 2024). The use of pre-programmed and pre-tested control logic offers the potential to improve quality control and to significantly streamline programming and testing efforts on individual projects. However, in the absence of an objective test standard, it is difficult for users to know whether manufacturer G36 programming libraries are complete, robust, and conform with the intent of G36. Some early users of manufacturer G36 libraries have reported overstated claims of complete programming and programming errors that require extensive troubleshooting to resolve. This project will develop a method of test (MOT) to validate that control programming conforms with the control sequences in G36. When completed, the MOT is expected to encourage the use of manufacturer G36 programming libraries ensuring consistency and quality, through increased user confidence, and by establishing a standard that may be used in new codes and standards requirements.

This Draft Report presents the project background and objectives, a description of the project methodology and approach, and a summary of findings and recommendations for next steps. The appendix includes the draft MOT.

Background

Challenges with Building Automation Systems

Poorly implemented BAS are widely recognized as a major cause for heating, ventilation, and air conditioning (HVAC) systems that fail to meet their design intent, not maintaining thermal comfort and resulting in poor energy performance. Challenges stem from a variety of factors including lack of controls understanding by designers, poor workmanship by installers, and inadequate commissioning processes. Building energy code requirements and best practices are often missing from BAS designs, likely due to a lack of awareness and attention (Rosenberg, et al. 2017) (Singla, et al. 2023). Further, conventional practice involves a series of bespoke design and installation efforts that each require a high level of effort and quality control to perform as intended. Even when repeatedly applied to the same typical HVAC systems, subsequent projects commonly ‘reinvent the wheel’ for each BAS installation. A frequent outcome is that building HVAC systems fail to perform at maintaining comfort, indoor air quality, and energy efficiency due to a series of BAS related issues.

ASHRAE Guideline 36

G36 was developed to help address and overcome these issues with BAS design and installation by establishing a series of high-performance sequences of operation, which are descriptions for how HVAC systems are to be controlled. The use of G36 sequences provides the opportunity for significant energy efficiency and indoor environmental quality benefits when compared to standard practice. Since its initial publication in 2018, interest in G36 has grown rapidly, as indicated by numerous field demonstrations (Cheng, Singla and Paliaga 2022) (Kiriu and Stein 2021) and

simulation studies (Zhang, et al. 2022) completed and underway, marketing efforts by manufacturers, and its incorporation into facility design standards.

Moreover, industry standardization around G36 provides the potential for substantial streamlining and improvement in implementation quality by allowing the G36 logic to be programmed and tested centrally by the major BAS manufacturers. Written in English-language form, the sequences in G36 are intended to be comprehensible by human readers, but a tradeoff is that the sequences are sometimes ambiguous and subject to interpretation when translated into control programming. Rather than the current approach of having individual installers interpret the control sequences and program the control logic on a project-by-project basis, a process that is labor intensive and vulnerable to quality control issues, installers could instead draw from pre-programmed logic from within a library of manufacturer programming.

Most major BAS manufacturers have begun to program G36 centrally and some have released libraries of G36 control logic in their unique programming languages for use by their installers, but these G36 programming libraries are not yet widely used. Anecdotal feedback from some early applications indicates that some G36 libraries are incomplete and/or not robust. Objective testing is needed to spur the use of these pre-programmed libraries of control logic, assure that the libraries are robust and conform with G36, and help fully realize the potential of industry standardization around G36.

Market Landscape

The MOT developed as part of this effort would help fulfill market demand for clarity on how to interpret G36 and serve as an objective basis for confirming quality and programming completeness. Each manufacturer has its own internal testing processes for factory programming, but many use proprietary tools, are based on subjective testing, and are specific to each manufacturer's unique approach. This CalNEXT effort will improve existing processes by developing an automated, objective, and vendor-agnostic test method.

A study titled "Best in Class" completed in 2022 piloted an automated bench scale test approach for G36 programming that was well received by a range of stakeholders including manufacturers and commissioning providers (Cheng, Singla and Paliaga 2022). This CalNEXT project is a continuation of that effort and will expand and refine upon the previously developed approach. The National Institute of Standards and Technology (NIST) has also independently developed a software tool called the Functional Performance Test Module (FPTM) for testing control programming (Milesi-Ferretti, Galler and Bushby 2019). Though the FPTM can communicate directly with an HVAC system in a real building, it can also be connected to an individual controller to perform bench scale testing of programming by simulating a range of scripted test conditions. This CalNEXT effort will leverage an updated version of the FPTM for pilot testing and for establishing the minimum software requirements in the draft MOT.

Broader industry interest in developing standardized testing of G36 programming is indicated by the formation of an informal testing working group by ASHRAE Standing Guideline Project Committee (SGPC) 36, which oversees the continuous maintenance of G36. The testing working group was established in 2022 and generally meets three to five times per year, in addition to the main biennial SGPC 36 meetings. Within ASHRAE, there is also an effort underway to establish a research project to develop functional performance test procedures for G36. That effort will focus on test procedures

intended for a commissioning provider to execute on a project-specific basis whereas the MOT developed as part of this CalNEXT effort is intended to be automated and targeted to standardized programming libraries.

In addition, the California Energy Commission (CEC) adopted a change to the 2025 version of the California Building Energy Efficiency Standards (Title 24) that requires the use of a certified G36 programming library (California Energy Commission 2025). The MOT could potentially become the basis of the Title 24 certification requirement in future cycles. Ultimately, the MOT could be developed into an ASHRAE Standard which could pave the way for utility program and codes and standards integration.

Objectives

The primary objective of this project is to develop a draft test standard for validating that BAS control programming conforms with the sequences of operation in G36. The test is primarily intended for use by BAS manufacturers to validate control programming libraries through the use of an automated testing approach that is objective, repeatable, and vendor agnostic. Validation of G36 programming will help ensure quality, consistency, and comprehensiveness. It will also streamline the application of G36 through the use of centralized programming libraries that can be broadly shared with installers. The eventual goal is for the MOT to be developed into an ASHRAE standard and become the basis for requiring the use of G36 programming in codes and standards.

The project successfully met its objectives. This effort advanced an effective testing approach and developed a draft MOT, including detailed test scripts for key portions of the control sequences in G36. The test approach and draft test scripts were periodically shared with BAS manufacturers and other stakeholders throughout the effort, with feedback used to focus and refine the testing approach. The tests were successfully piloted with G36 control programming from one BAS manufacturer with software developed by NIST. The test procedure was also incorporated into an additional software workflow and piloted against an open-source implementation of G36 control programming. The project team proposed and led the establishment of the new ASHRAE Standard Project Committee (SPC) 236 *Method of Test for Control Programming Conformance with HVAC Sequences of Operation*. After the completion of this CalNEXT effort, the expectation is that SPC 236 will continue to develop and refine the draft method of test, working toward the publication of an American National Standards Institute (ANSI) standard that could be referenced in future codes and standards and become a prerequisite for controls-related utility programs.

Methodology & Approach

The overall project was comprised of two parallel efforts for test development and stakeholder outreach. The test development effort included subtasks for the software tool selection, detailed test procedures, pilot testing, and the development of the draft method of test. The stakeholder outreach effort included subtasks for stakeholder engagement and technology transfer.

Test Development

Software Tool

The automated testing of G36 programming relies upon a software interface that serves as the testbed platform and communicates with a BAS controller that is hosting the G36 programming. The MOT defines the software capabilities and detailed testing requirements. Pilot testing those definitions is a key part of ensuring that the test development is robust and rigorous. Though software tool development was not directly within the scope of this CalNEXT effort, this first task defined requirements for a software tool that allows for integration with BAS controllers for automated testing and identified a software tool that could be adapted to meet these requirements. The definition of the software tool requirements is integrated in the draft MOT along with the detailed test procedures.

Detailed Test Procedures

The first subtask in developing detailed test procedures was to review existing test standards to understand how other methods of tests are structured and to help inform the planning of this effort. This background review also includes an evaluation of existing test approaches and software tools employed by BAS manufacturers for internal testing. Review of these approaches and tools ensure that key functionality and lessons learned from decades of internal manufacturer research and development efforts are considered in the development of this test standard. Outreach leveraged the project team's strong network of contacts within the BAS industry and the SGPC 36 community.

The project team also developed the test architecture to establish the framework and overall organization of the test procedure including software requirements and test modularity. This project expanded on the approach outlined by the previous "Best in Class" study to address broader testing capabilities and include refinement to consider usability and market needs. This test architecture was developed with stakeholder input to help ensure a successful outcome and market compatibility.

Once the testing framework was established, the project team developed detailed test procedures, or scripts, which define the test conditions and expected outcomes on a step-by-step basis. The procedures define exhaustive lists of control points that are to be overridden and monitored for each equipment configuration to be tested. Detailed test steps were developed based on engineering judgment and interpretation of the G36 sequences, similar in concept to how a commissioning provider develops functional performance test scripts for individual commissioning projects. Just as G36 was developed in two main phases starting with the airside equipment first, and then later adding the waterside equipment, this effort focused first on developing tests for key aspects of the airside equipment only. Developing tests for the waterside equipment and less common airside equipment in G36 will be reserved for future efforts. Development of the detailed testing procedures was executed in parallel with the pilot testing task.

Pilot Testing

The automated testing procedure was pilot tested with G36 control programming from one BAS manufacturer's programming libraries. Pilot testing is a critical step to understanding the range of testing capabilities required and validating that the test procedures are robust and effective. The pilot testing was done incrementally and iteratively with the above detailed testing procedures to

refine the test architecture, test software, and the detailed test procedures. The CalNEXT project team also coordinated piloting of the test scripts with an open-source implementation of G36 control programming with a separate, federally funded project team, which allowed for an additional independent interpretation of the MOT procedures and evaluation of the test scripts against a second interpretation of the G36 control sequences.

Draft Method of Test

A draft MOT was developed and refined based on the results from pilot testing and stakeholder feedback. The MOT defines the test setup, definitions, and software requirements, along with the detailed testing procedures.

Stakeholder Outreach

Stakeholder Engagement

As this MOT is expected to be used by a diverse range of BAS manufacturers, extensive stakeholder engagement is critical for successful development and to help ensure that industry stakeholders will accept and use the test approach. Feedback is necessary at both a high level for architecture planning as well as for detailed test requirements. The project team proactively communicated with BAS manufacturers and other key industry stakeholders, including the SGPC 36 committee and the testing working group. Engagement efforts also aimed to promote the value proposition of the test method to encourage support and help build consensus toward the development of a new ASHRAE standard.

Technology Transfer

The long-term goal is to establish the MOT as an ASHRAE standard and have it become the basis for future codes and standards requirements and utility programs. The project team leveraged the stakeholder engagement efforts and existing working group efforts to promote the MOT and build support for establishing a proposed ASHRAE standard. The project team coordinated with the California Statewide Codes and Standards Enhancement (CASE) team and the CEC to explore the possibility of referencing the MOT for a future Title 24 code measure and find opportunities to support compliance with existing Title 24 requirements. The project team also leveraged the members' experience and contacts to evaluate deemed and custom utility program opportunities that may require the use of certified G36 programming.

Findings

Overview

This section presents the overall findings and results of the study. It outlines the test architecture and software tool requirements and integrates the detailed test procedures and components developed during this effort into a comprehensive testing methodology. The section also describes the piloting and iterative testing used to refine the process, summarizes feedback from key industry stakeholders, and highlights opportunities for technology transfer through industry adoption, codes and standards, and utility programs.

Test Architecture

The previous “Best in Class” project developed a proof-of-concept test approach in 2022. That effort characterized the primary goals of automated testing and evaluated different approaches before focusing on a bench scale test using Building Automation and Control Network (BACnet) communication. This CalNEXT project reviewed that work to confirm that the approach is still appropriate, particularly regarding the increased awareness and use of G36, and that it aligns with current industry needs including BAS manufacturer research and development efforts, and codes and standards requirements. The “Best in Class” proof-of-concept was developed with Python programming that read test procedures from a spreadsheet data file, but there was limited consideration of how the tests would be structured to effectively validate a comprehensive set of G36 programming.

Figure 1 illustrates the general concept for the testbed structure and approach. The testbed software is loaded on a computer with a network cable connection to a physical BAS controller that hosts the program to be tested. The testbed software reads from a set of scripted input overrides and expected responses from a data file, then communicates the overrides (writes) to the BAS controller to simulate a range of operating conditions. The testbed software monitors the responses from the controller and compares them to the expected responses to reach a pass/fail determination at each time step. The testing advances through a series of stepwise tests to exercise the control programming through the full range of operating conditions to determine conformance with G36 programming.

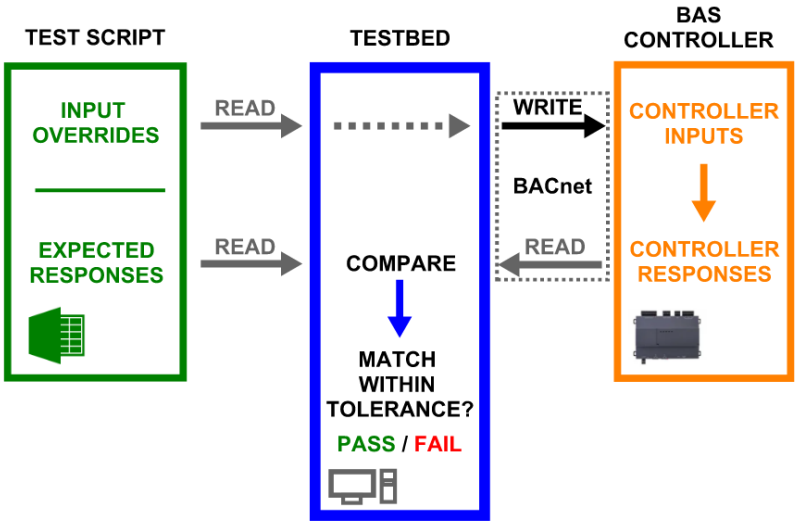

Figure 1: Testbed approach.

This project expanded on the proof-of-concept approach to include additional test organization and structure. A flow chart representing the overall test approach is shown in Figure 2.

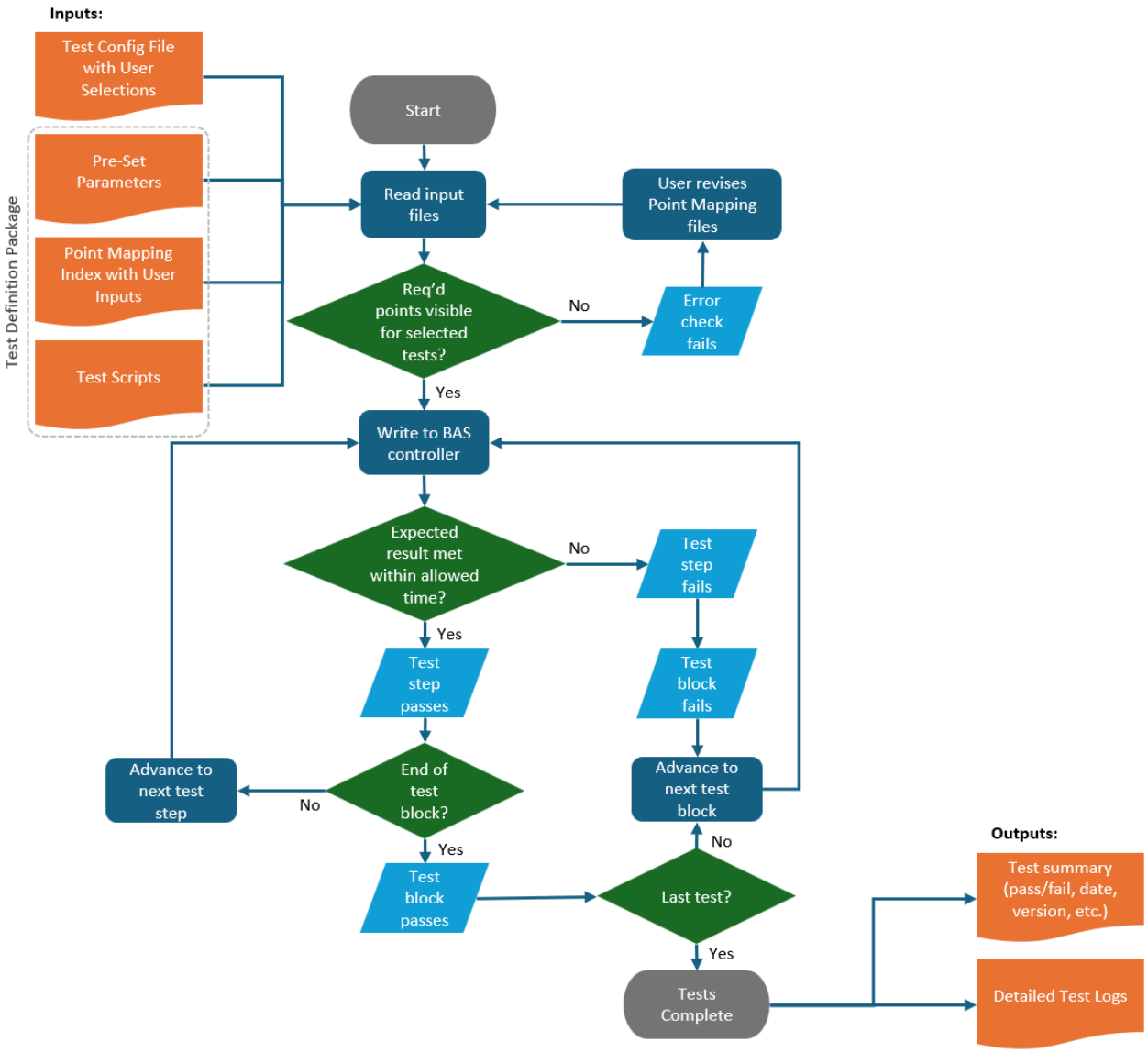

Figure 2: Testbed flow chart.

Test Steps

Testing of programming is executed in a series of individual test steps where one or more variables are changed, and the observed controller response is evaluated against the response expected based on the sequence logic. Each intervention may be a step change or a dynamic change (e.g., linear ramp or repetitive write command) to minimize control instability or achieve a specific test objective. Testing in discrete steps avoids the risk of false negatives due to transients in dynamic testing (e.g. multiple variables changing simultaneously and continuously).

Each test step defines step termination conditions, after which controller responses are read and evaluated. Every test includes a maximum time duration to allow for the controller under test to respond to input conditions. Some tests also include a variable to be monitored and a threshold

condition. When the specified variable meets the threshold condition, the test step ends, even if the time limit has not fully elapsed.

At the end of the test step, every monitored control point is evaluated to verify both the expected responses from control points affected by the intervention, and an absence of spurious response from control points which were expected to remain static. There is a binary pass/fail determination for each evaluated control point, and all responses must match expectation (within tolerance) in order for the test step to pass.

Test Blocks

Groups of individual test steps are organized functionally as a "test block" for convenience during testing. The first step in each test block is an initialization step that allows the controller to reach a known state, independent of history, before testing and evaluation begin. Subsequent test steps within the block continue from conditions in the previous step. If an individual test step is failed, the entire test block is considered failed and the remaining test steps within the block are aborted. Testing may continue to the next test block, as applicable.

Test blocks may be re-run individually, to allow users to focus troubleshooting efforts on relevant portions of tests that have failed and/or retest subsets of equipment tests as needed. Where G36 supports multiple interactive control options, the test blocks are organized to include continuous test steps for all interacting sequences.

Test Organization

G36 provides control sequences for a wide variety of HVAC equipment. It also supports multiple configurations and control options for each type of equipment, where some options are independent (e.g., occupancy or carbon dioxide (CO2) sensors) and others are mutually exclusive (e.g., return vs relief fans). To be both flexible and comprehensive, while keeping the number of distinct tests manageable, the project team defined an approach around the following principles:

- Proving conformance under the MOT requires testing a complete control sequence for that equipment, not a portion or isolated subroutine. Test blocks can be run individually (e.g., to troubleshoot a failure) but complete tests are required for conformance runs.
- Distinct equipment variations have corresponding distinct tests. Tests for specific equipment (e.g., cooling-only variable air volume (VAV), VAV reheat) can be run individually.
- Where control options are independent, the most complete configuration is assumed (e.g., terminal unit tests require occupancy and CO2 sensors).
- Where options are mutually exclusive, multiple tests must be combined to provide a comprehensive test of the sequence. This is required for the multizone variable air volume (MZVAV) air handling unit (AHU) test.
- Where distinct equipment shares substantial common control logic, separate tests are created for shared logic and for distinct configuration options. The appropriate combination of common and configuration-specific tests is selected to make a complete conformance test.

For example, for terminal units (see Table 1), the Generic Thermal Zones logic is the same for all terminal unit types, while the Generic Ventilation Zone logic differs based on the applicable code (Title 24 or ASHRAE Standard 62.1) and terminal logic depends on the type of terminal (e.g., VAV reheat or cooling-only VAV). Thus, a complete test for one terminal unit type (e.g., VAV reheat)

consists of a Thermal Zones test, a Ventilation Zones test, and a Terminal test (VAV reheat in this case). To claim conformance under the MOT, all three tests must be run and fully passed in a single test run.

G36 supports a wide variety of equipment configuration options for MZVAV AHUs (see Table 2). However, the logic for mode control, setpoint reset, duct static pressure reset, and alarms is identical across all of them. Accordingly, there is a "common equipment" test, plus a set of configuration-specific tests that between them cover all possible options (though not all possible combinations of options) supported by G36. Proving conformance for the G36 MZVAV AHU requires passing a series of complete tests, one for the "common equipment" and each of the supported configurations.

Draft tests have been developed for equipment and test blocks shown in black text. Test organization has been planned but not yet developed for test blocks shown in gray text.

Table 1: Tests for VAV terminal unit.

Equipment	Variation	Test Block
Generic Ventilation Zones	Std 62.1 - PFPB	A - Zone Minimum OA and Minimum Airflow Setpoints
		B - Zone CO2 DCV Response and Alarms
	Std 62.1 - SZVAV	A - Zone Minimum OA and Minimum Airflow Setpoints
		B - Zone CO2 DCV Response and Alarms
	Std 62.1 - Other Terminal	A - Zone Minimum OA and Minimum Airflow Setpoints
		B - Zone CO2 DCV Response and Alarms
	Title 24 - PFPB	A - Zone Minimum OA and Minimum Airflow Setpoints
		B - Zone CO2 DCV Response and Alarms
	Title 24 – SZVAV	A - Zone Minimum OA and Minimum Airflow Setpoints
		B - Zone CO2 DCV Response and Alarms
	Title 24 – Other Terminal	A - Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints
		B - Zone CO2 DCV Response and Alarms
Generic Thermal Zones	**General**	A - Zone Mode Setpoint Tests
		B - High Temperature Zone Alarm
		C - Low Temperature Zone Alarm
		D - Occupancy Sensor, Demand Limits & Setpoint Hierarchy
		E - Zone Setpoint Overlap Restrictions
Terminal: VAV Reheat	**General**	A - Cooling Airflow Setpoints & SAT Reset Requests
		B - Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
		C - Heating Airflow Setpoint
		D - Reheat Valve Control, Heating Hot Water Reset Request & Low DAT Alarm
		E - Zone Mode
	General	A - Cooling Airflow Setpoints & SAT Reset Requests

Equipment	Variation	Test Block
Terminal: VAV Cooling Only		B - Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
		C - Heating Airflow Setpoint
		D - Zone Mode
Terminal: Parallel FPB	General	A - Cooling Airflow Setpoints & SAT Reset Requests
		B - Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
		C - Heating Airflow Setpoint, DAT Control & Fan Control
		D - Reheat Valve Control, Heating Hot Water Reset Request & Low DAT Alarm
		E - Zone Mode
Terminal: Series FPB	General	A - Cooling Airflow Setpoints & SAT Reset Requests
		B - Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
		C - DAT Control & Fan Control
		D - Reheat Valve Control, Heating Hot Water Reset Request & Low DAT Alarm
		E - Zone Mode
Terminal: SZVAV	General	TBD

Notes:
Equipment and equipment instances correspond to options supported and described in G36. Draft tests have been developed for test blocks in black text. Test organization has been planned but not yet developed for test blocks in gray text.

Table 2: Tests for multizone variable air volume air handling units.

Equipment Configuration	Test Block
AHU Common Equipment Tests	A - AHU System Mode Tests
	B - Duct Static Pressure Setpoint Reset Test
	C - SAT Setpoint Reset Test
	D - Alarm Tests
AHU Equipment Configuration: Return Fan with Tracking Separate OA Damper, DP Control Std 62.1 Ventilation Logic	Fan Speed Control
	SAT Control – Separate OA Damper - Return Fan Tracking
	Ventilation – Std 62.1
	OA Control – DP
	BSP - Return Fan with Tracking
AHU Equipment Configuration: Return Fan with Tracking Single OA Damper, AFMS Control Title 24 Ventilation Logic	Fan Speed Control
	SAT Control – Single OA Damper - Return Fan with Tracking
	Ventilation – Title 24
	OA Control – AFMS
	BSP - Return Fan with Tracking
AHU Equipment Configuration: Return Fan with Building Pressure Separate OA Damper, DP Control Title 24 Ventilation Logic	Fan Speed Control
	SAT Control – Separate OA Damper – Return Fan with Direct Building Pressure Control
	Ventilation – Title 24
	OA Control – DP
	BSP - Return Fan with Direct Building Pressure Control
AHU Equipment Configuration: Relief Fan (Single Fan) Single OA Damper, AFMS Control Title 24 Ventilation Logic	Fan Speed Control
	SAT Control – Single OA damper - Relief Fan
	Ventilation – Title 24
	OA Control – AFMS
	BSP - Relief Fan (Single Fan)
AHU Equipment Configuration: Relief Fan (Multiple Fans, Common Inlet) Separate OA Damper, DP Control Std 62.1 Ventilation Logic	Fan Speed Control
	SAT Control – Separate OA Damper - Relief Fan
	Ventilation – Std 62.1
	OA Control – DP
	BSP - Relief Fan (Multiple Relief Fans, Common Inlet)
AHU Equipment Configuration: Relief Fan (Multiple Fans, Separate Inlets) Separate OA Damper, AFMS Control Title 24 Ventilation Logic	Fan Speed Control
	SAT Control – Separate OA damper - Relief Fan
	Ventilation – Title 24
	OA Control – AFMS
	BSP – Relief Fan (Multiple Relief Fans, Separate Inlets)
	Fan Speed Control

Equipment Configuration	Test Block
AHU Equipment Configuration: Actuated Relief Without Fan Single OA Damper, DP Control Std 62.1 Ventilation Logic	Single OA Damper - Relief Ventilation – Std 62.1 OA Control – DP BSP - Actuated Relief Without Fan

Notes:
Equipment and equipment instances correspond to options supported and described in G36. Draft tests have been developed for test blocks in black text. Test organization has been planned but not yet developed for test blocks in gray text.

Software Tool

A goal of this project was to define the requirements and capabilities of a software tool to execute the automated tests, without mandating the use of a specific tool. That specification has been included in the draft MOT.

For use in the project, the team identified NIST's Functional Performance Test Module (FPTM) as a software tool that could be used to pilot the automated G36 conformance testing. The FPTM is a Windows-based computer program (Figure 3) that communicates with control programming on a physical BAS controller through a BACnet network connection. NIST actively modified the FPTM in close collaboration with the project team to meet the software tool testing requirements. NIST's efforts were supported independently with federal funding, and the software tool is to remain freely available in the public domain.

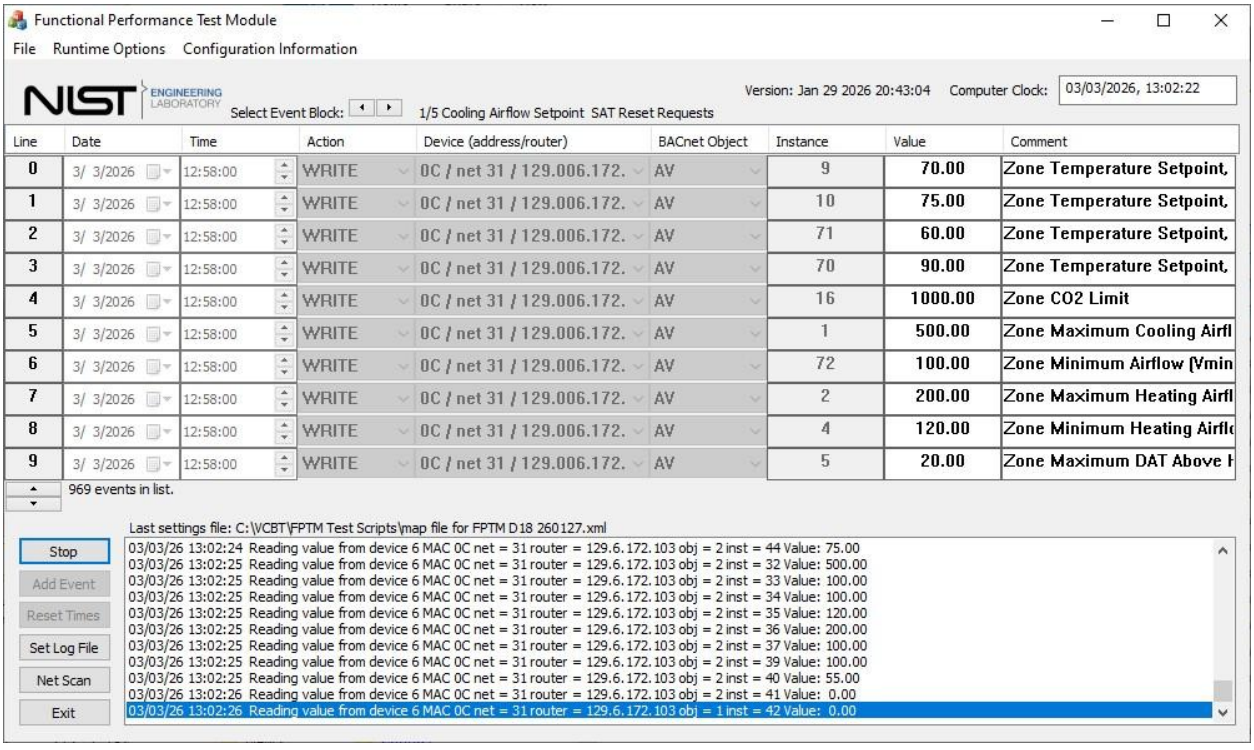

Figure 3: Screenshot of FPTM user interface.

The FPTM can be configured with a series of control points to be overridden on a certain schedule to the controller and then monitor the controller's automatic responses in real time. This testing approach simulates how the control programming on the controller would respond as if it were connected to a real HVAC system and determines whether the responses match expectations. The process of overriding input conditions and comparing controller responses against expectations mirrors the functional performance testing (FPT) that is commonly executed during the commissioning of HVAC systems, though the testbed approach is fully automated whereas FPTs are generally manually executed by commissioning providers.

The FPTM has a basic user interface, but it is primarily used for test setup rather than monitoring. As the FPTM conducts tests of the controller programming in real time, many of the equipment tests can take multiple hours to run to completion. The FTPM is meant to run unattended, and test performance is evaluated by review of the test output files.

Though the core FPTM functionality matched the needs of the conformance testing, there were several additional features and capabilities that were needed to fulfill the anticipated testing requirements. Below is a summary of some of the FPTM software tool updates that were made to support this effort.

- Ability to read extensible markup language (XML) test scripts, structured in spreadsheet format, with lists of inputs to be simultaneously written and outputs to be monitored at each time step. Previously, the FPTM executed write and read steps one point at a time.
- Ability to read a BACnet control point mapping input file and read/report point names. Previously, the FPTM expected read/write actions to be directly associated with BACnet point addressing, rather than point names that are more readily understandable by human operators. The BACnet point identification and address for a given control point (e.g. supply air temperature) may also be different for each program. For ease of set up and operation using point names, the tool needs to be able to accept an input file that allows users to provide BACnet point addressing for each of the required read/write control points and to map these addresses to point names.
- Ability to read and process defined functions and variable references. This includes basic math functions (addition, subtraction, multiplication, and division), write functions "ramp", "periodic" and interpolate. See Appendix A for full descriptions of function definitions.
- Ability to read monitored points and evaluate against expected values within a defined tolerance as part of a test step, after either a time limit or a monitored variable has met a threshold criterion.
- Ability to perform sequential testing. Previously, the FPTM would read or write to individual control points on a set schedule. The revised functionality executes an individual test step, then automatically proceeds to the next test step once a pass/fail determination has been made.
- Detailed test log outputs of all monitored control points at regular time steps as well as test summaries showing passed and failed tests.

The software tool capabilities and requirements are described in detail in the draft MOT in Appendix A. As of this writing, the FPTM can execute the primary test capabilities, however it does not use the

Point Mapping Index or Test Configuration File described below. The FPTM uses slightly different approaches for mapping control points and selecting tests to run.

Draft Method of Test

The test procedures from the original proof-of-concept were refined by the project as part of this effort based on feedback from industry stakeholders and detailed, iterative pilot testing. The detailed test procedures developed as part of this effort were organized into a draft MOT. The body of the MOT describes the testing process, software requirements, and input files. The appendices to the MOT include detailed test scripts, control point mapping indices, and configuration files. The draft MOT is included as Appendix A to this report.

This section describes some of the key components and facets of the MOT.

Point Mapping Index

Each piece of equipment will have a list of required control points that must be exposed for reading or writing over BACnet (Figure 4). Each control point is identified by a verbose Control Point Description that generally corresponds to the naming convention in G36. Each control point is also identified by a Control Point Name, a shorter variable name used for the purpose of streamlining test operation. As there is no standardization around BACnet Object Names or Point IDs used in programming for G36, users are to provide BACnet Object Names and Point IDs for each required control point, so that the testbed can map these correctly during testing. BACnet Addresses and Device Instance Numbers must also be provided for the testbed to effectively communicate with the controller under test. The Point Mapping Index is a machine-readable XML file that is part of the MOT with limited fields that require user input.

Control Point Description	Control Point Name	Type	Units	BACnet Object Name	Device Address	BACnet Device Instance Number	BACnet Object ID	Binary/MSV Mapping Override
WRITABLE POINTS								
Zone Temperature Setpoint, Occupied Heating	OccHeatSp	AV/AI	F					
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp	AV/AI	F					
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp	AV/AI	F					
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp	AV/AI	F					
Zone CO2 Limit	ZoneCO2Limit	AV/AI	PPM					
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax	AV/AI	CFM					
Zone Minimum Airflow (Vmin)	Vmin	AV/AI	CFM					
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax	AV/AI	CFM					
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin	AV/AI	CFM					
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT	AV/AI	F					
VAV Box Controllable Minimum (Vm)	Vm	AV/AI	CFM					
Zone Discharge Airflow	ZoneSupAirflow	AV/AI	CFM					
Zone Discharge Air Temperature	ZoneDAT	AV/AI	F					
Zone Temperature	ZoneTemp	AV/AI	F					
Zone CO2 Level	ZoneCO2	AV/AI	PPM					
Occupancy Sensor	ZoneOccSensor	BV/BI	-					
Window Switch	ZoneWinSwitch	BV/BI	-					
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT	AV/AI	-					
Static Pressure Reset Requests Importance Multiplier	IM_DSP	AV/AI	-					
Hot Water Supply Temperature Reset Requests Importance	IM_HWST	AV/AI	-					
Hot Water Plant Requests Importance Multiplier	IM_HWP	AV/AI	-					
AHU Supply Fan Status	AHUSupFanStatus	BV/BI	-					
AHU Supply Air Temperature Setpoint	AHUSATSp	AV/AI	F					
AHU Supply Air Temperature	AHUSAT	AV/AI	F					
Hot Water Plant Status	HWPlantStatus	BV/BI	-					
Zone Group Mode	ZoneGrpMode	AI/MSV	-					

Figure 4: Annotated excerpt of example Point Mapping Index.

Pre-Set Parameters

Some control points must be set to a specified value for tests to have predictable outputs but need not be changed over the course of testing and need not be exposed over BACnet. These parameters and their expected values are indicated in the Pre-Set Parameters file. For the purposes of the testing, these parameters may be hardcoded or manually set to the expected values prior to testing. Parameter values generally match the default values provided in G36, otherwise typical industry settings are listed.

Test Script Files

The Test Script files detail the step-by-step evaluation of controller tests. For each test step, a Test Script includes:

- Definition of all the control point values that are to be written to establish a particular control condition on the controller.
- Conditions to determine the end of a test step when controller responses are to be evaluated.
- Expected results for all the control point values that are to be read.

Test Script data files are saved in an XML file format, which allows them to be readily viewed and written by developers in common productivity software tools while maintaining machine-readability during test execution (Figure 5). Test execution is meant to be fully automated and unattended, with no user intervention over the course of the test.

Each data column defines a single test step, with tests progressing in time from left to right. The Test Scripts include narratives of each test's title, purpose, and a verbose description of the test and expected response. These informative notes are not used by the testbed during test execution and only provided for human readability and comprehension. Shading is also applied to indicate where inputs or outputs change, and to focus the user's attention when reviewing the test scripts.

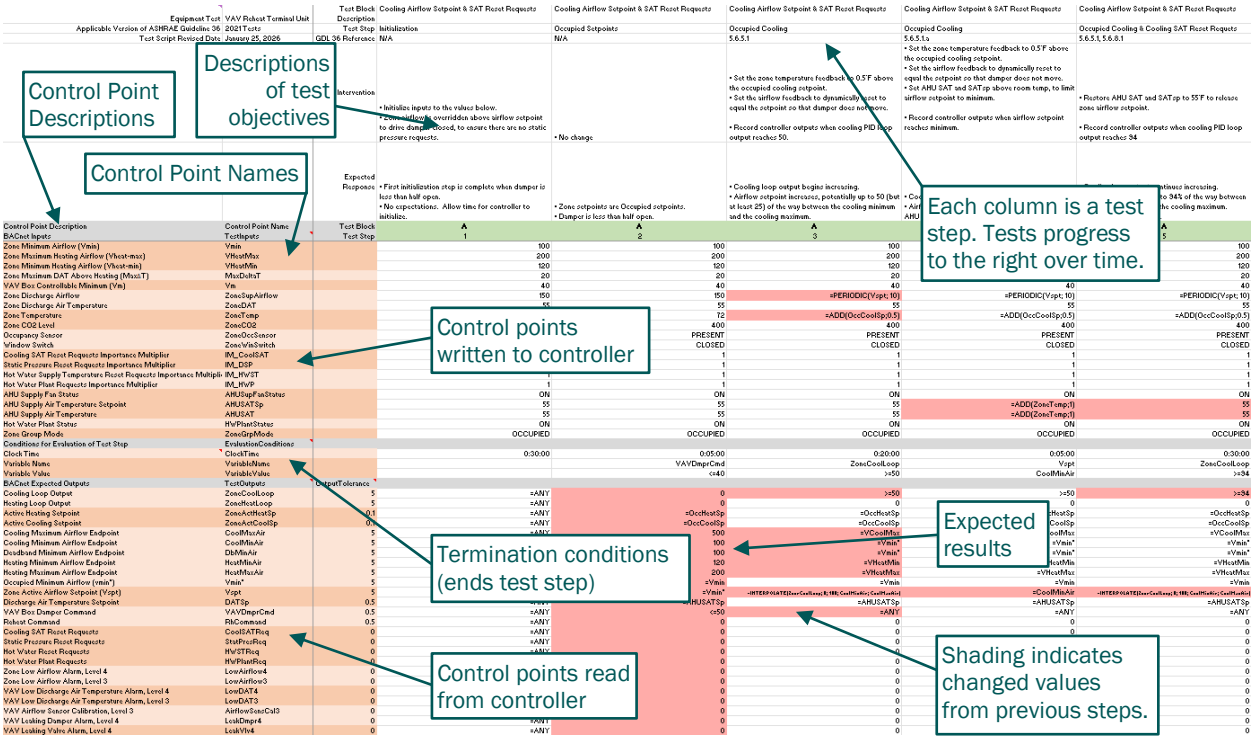

Figure 5: Annotated Excerpt of example Test Script.

Test Script files are organized as one file for each equipment, rather than one large data file. Test Scripts for different versions of the sequences (e.g. G36-2021 vs G36-2024) will also have distinct files.

Test Scripts were carefully written by the project team for key portions of the most common airside HVAC equipment supported in G36. Test Scripts were reviewed internally for accuracy, posted to the SGPC 36 committee for review, and further reviewed through the pilot testing process.

The Point Mapping Index and Pre-Set Parameters files are specific to that script, and all three files are required to run a test. The three files together constitute a Test Definition Package, which is maintained under version control as part of the MOT. Substantive change to any of the files triggers a version increment for the entire Test Definition Package.

Each Test Definition Package must be used as is. User modification of any file, aside from the explicit user entry fields of the Point Mapping Index, invalidates the test.

Test Configuration File

The Test Configuration File is a machine-readable file that allows users to select test(s) for different equipment and different versions to be run to match the sequences that are installed in the testbed's controller.

The Test Configuration File is part of the MOT but includes a set of user input fields to specify which tests are to be executed, and details about the test run such as company name, contact information, name of library, library version, and date of test. The use of a configuration file reduces the complexity of the user interface that is required to allow for user selection of test parameters.

Output Logs

Two output log files were primarily used for the initial review of test results. The output log files described here are specific to the FPTM software implementation. The "T1" output is a text file reporting pass/fail results for each individual test, test step, and test block, along with overall summary results (Figure 6). The "T3" output is a detailed comma-separated values file that reports the value of all control points that are read and written by the FPTM at 10 second intervals (Figure 7).

```
01/20/26 18:28:58       Start T1 log file.
01/20/26 18:28:58       Files entered:
01/20/26 18:28:58       C:\VCBT\FPTM Test Scripts\map file for FPTM D14 251204.xml
01/20/26 18:28:58       C:\VCBT\FPTM Test Scripts\2025-10-31 - VAVRH Test Script Draft 16.xml
01/20/26 18:30:10       Threshold Evaluation B:1 (VAVDmprCmd:  0.00) LT (Value: 40.00). Test result: PASS.
01/20/26-18:30:12       Evaluate Test # A:1:1 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:2 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:3 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:4 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:5 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:6 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:7 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:8 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:9 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:10 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:11 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:12 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:13 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:14 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:15 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:16 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:17 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:18 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:19 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:20 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:21 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:22 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:23 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:24 Result: PASS (ANY)
01/20/26-18:30:12       Evaluate Test # A:1:25 Result: PASS (ANY)
01/20/26-18:35:22       Evaluate Test # A:2:1 Result: PASS (CoolLoopOut:  0.00) EQ (Value:  0.00)
01/20/26-18:35:22       Evaluate Test # A:2:2 Result: PASS (HeatLoopOut:  0.00) EQ (Value:  0.00)
01/20/26-18:35:22       Evaluate Test # A:2:3 Result: PASS (ActHeatSp: 70.00) EQ (OccHeatSp: 70.00)
01/20/26-18:35:22       Evaluate Test # A:2:4 Result: PASS (ActCoolSp: 75.00) EQ (OccCoolSp: 75.00)
01/20/26-18:35:22       Evaluate Test # A:2:5 Result: PASS (CoolMaxAir: 500.00) EQ (Value: 500.00)
01/20/26-18:35:22       Evaluate Test # A:2:6 Result: PASS (CoolMinAir: 100.00) EQ (Value: 100.00)
01/20/26-18:35:22       Evaluate Test # A:2:7 Result: PASS (DbMinAir: 100.00) EQ (Value: 100.00)
01/20/26-18:35:22       Evaluate Test # A:2:8 Result: PASS (HeatMinAir: 120.00) EQ (Value: 120.00)
01/20/26-18:35:22       Evaluate Test # A:2:9 Result: PASS (HeatMaxAir: 200.00) EQ (Value: 200.00)
01/20/26-18:35:22       Evaluate Test # A:2:10 Result: PASS (VminStar: 100.00) EQ (Vmin: 100.00)
01/20/26-18:35:22       Evaluate Test # A:2:11 Result: PASS (ZoneAirflowSp: 100.00) EQ (VminStar: 100.00)
01/20/26-18:35:22       Evaluate Test # A:2:12 Result: PASS (DATSp: 55.00) EQ (AHUSupAirTempSp: 55.00)
```

Figure 6: Excerpt from example FPTM “T1” output file.

Date	Time	Offset	Block	Step	OccHeatSp	OccCoolSp	UnoccHeatSp	UnoccCoolSp	ZoneCO2Max	VCoolMax	Vmin	VHeatMax	VHeatMin	MaxDeltaT	Vm	ZoneSupAirflow	ZoneDisAirTemp	ZoneTemp	ZoneCO2
1/20/26	19:44:20	4460	A	9	70	75	60	90	1000	500	100	200	120	20	40	500	55	78.1	400
1/20/26	19:44:30	4470	A	9	70	75	60	90	1000	500	100	200	120	20	40	500	55	78.1	400
1/20/26	19:44:40	4480	A	9	70	75	60	90	1000	500	100	200	120	20	40	500	55	78.1	400
1/20/26	19:44:50	4490	A	10	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:45:00	4500	A	10	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:45:10	4510	A	10	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:45:20	4520	A	10	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:45:30	4530	A	10	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:45:40	4540	A	10	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:45:50	4550	A	10	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:46:00	4560	A	10	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:46:10	4570	A	10	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:46:20	4580	A	10	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:46:30	4590	A	11	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:46:40	4600	A	11	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:46:50	4610	A	11	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:47:00	4620	A	12	70	75	60	90	1000	500	100	200	120	20	40	500	55	79.9	400
1/20/26	19:47:10	4630	A	12	70	75	60	90	1000	500	100	200	120	20	40	500	55	79.9	400
1/20/26	19:47:20	4640	A	12	70	75	60	90	1000	500	100	200	120	20	40	500	55	79.9	400
1/20/26	19:47:30	4650	A	13	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:47:40	4660	A	13	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:47:50	4670	A	13	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:48:00	4680	A	14	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:48:10	4690	A	14	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:48:20	4700	A	14	70	75	60	90	1000	500	100	200	120	20	40	500	55	80.1	400
1/20/26	19:48:30	4710	A	15	70	75	60	90	1000	500	100	200	120	20	40	500	55	78.1	400
1/20/26	19:48:40	4720	A	15	70	75	60	90	1000	500	100	200	120	20	40	500	55	78.1	400
1/20/26	19:48:50	4730	A	15	70	75	60	90	1000	500	100	200	120	20	40	500	55	78.1	400
1/20/26	19:49:00	4740	A	16	70	75	60	90	1000	500	100	200	120	20	40	500	55	77.9	400
1/20/26	19:49:10	4750	A	16	70	75	60	90	1000	500	100	200	120	20	40	500	55	77.9	400
1/20/26	19:49:20	4760	A	16	70	75	60	90	1000	500	100	200	120	20	40	500	55	77.9	400
1/20/26	19:49:30	4770	A	17	70	75	60	90	1000	500	100	200	120	20	40	500	55	77.7357	400
1/20/26	19:49:40	4780	A	17	70	75	60	90	1000	500	100	200	120	20	40	500	55	77.4161	400
1/20/26	19:49:50	4790	A	17	70	75	60	90	1000	500	100	200	120	20	40	500	55	76.9635	400
1/20/26	19:50:00	4800	A	17	70	75	60	90	1000	500	100	200	120	20	40	500	55	76.4105	400
1/20/26	19:50:10	4810	A	17	70	75	60	90	1000	500	100	200	120	20	40	500	55	75.7962	400
1/20/26	19:50:20	4820	A	17	70	75	60	90	1000	500	100	200	120	20	40	500	55	75.1617	400
1/20/26	19:50:30	4830	A	17	70	75	60	90	1000	500	100	200	120	20	40	500	55	74.5452	400

Figure 7: Excerpt from example FPTM "T3" output file.

Pilot Testing

Iterative Testing

Detailed test scripts for a VAV reheat terminal were iteratively developed and pilot tested using the FPTM with one BAS manufacturer's G36 VAV reheat control program. The control program was slightly modified to allow necessary control points to be overridden by the testing process. The FPTM was also iteratively modified by NIST during the pilot testing process as issues with the software implementation and test definition were identified and resolved. Detailed test output logs (Figure 6 and Figure 7) were exhaustively and iteratively reviewed and used to identify issues with the control point mapping, FPTM test software, the test script definitions, and incorrect control programming. An Excel macro was developed and used to apply formatting to the T3 output file to facilitate careful review of the test operation against the intended definitions in the test script.

Figure 8 shows the test passing rate for the test blocks for the VAV reheat terminal test script over time as the test software and test scripts were refined. As the FPTM was substantially revised by NIST to accommodate the testing requirements, failed tests represented in Figure 8 were predominantly due to issues with the test software implementation. Over time, as those issues were identified and addressed, a larger portion of the failed tests were found to be associated with test definitions, test script issues, or incorrect control programming. The control programming itself

largely matched the expected performance in the test scripts and was not modified beyond ensuring that each of the required points was exposed and writeable, where required, over BACnet. Thus, changes in the passing rates generally reflect updates to the FPTM test software, test procedures, and test scripts. The low passing rate for tests in Block B (green) was due to an issue that prevented the controller from entering Unoccupied Mode, leading to a large number of failed tests. That issue was resolved in the final update in a late February retest.

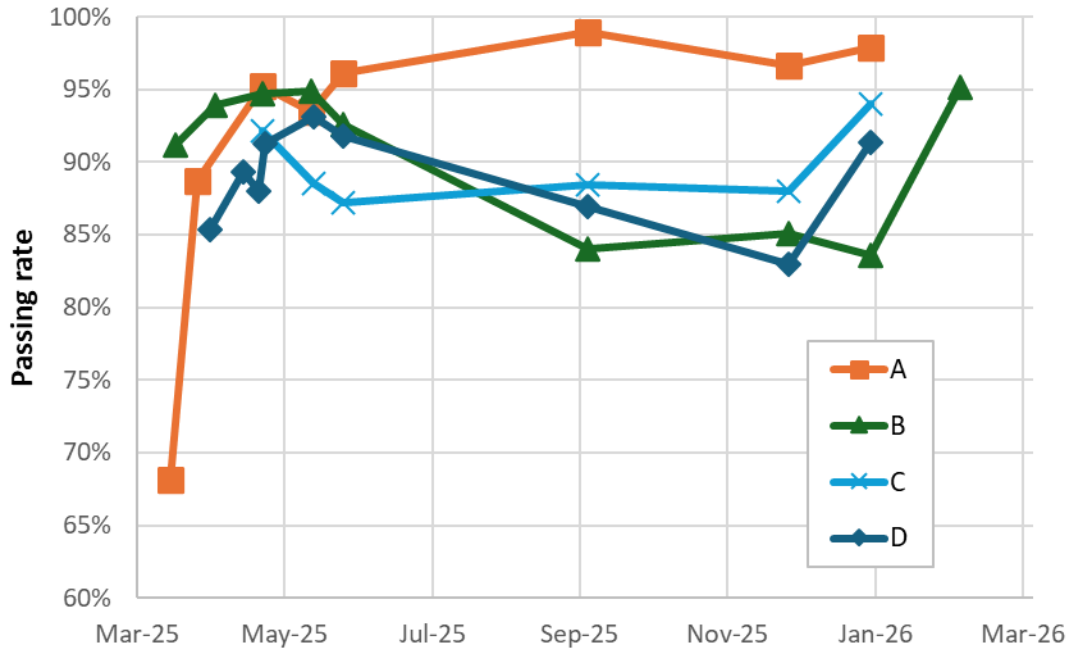

Figure 8: Test passing rate for VAV reheat terminal test blocks.

In the pilot testing of the G36 VAV reheat program, few issues were observed where the controller response was inconsistent with the expected result as written in the draft tests. Two examples of programming issues are summarized below:

- Leaking damper alarm: The time delay is not located in the correct position in the programming logic.
- Cooling requests: The program incorrectly suppresses the generation of the first cooling request if the setpoint was recently changed. There should be no suppression for this logic; the request generation is only based on the damper position exceeding the listed threshold.

It is important to note that the detailed test scripts were written solely based on close reading of the control sequences in G36. Though the pilot testing was primarily performed with one manufacturer's programs, most of the zone tests were drafted before the capability was available to pilot them against any particular programs. In other words, the draft tests were not crafted specifically toward that one manufacturer's interpretation of the sequences. And just as the program was not modified to resolve differences in interpretations from the tests (failures were simply noted), the tests also were not modified to resolve differences in interpretations. Rather, the updates and revisions to the test scripts were generally for tests that did not achieve the desired intervention or typographical

mistakes. Detailed review of the test scripts and monitored test output logs uncovered a few key differences between test intent and implementation, leading to refinement to aspects of the MOT definitions as well.

The point mapping step was also repeated with another BAS manufacturer's G36 zone programs. Of the 65 unique control points required, 55 were available in the existing program, though a few of those points were used in a way that varied from the project team's interpretation of G36.

Testing with CoPPER

The Building Technologies Office (BTO) of the U.S. Department of Energy (DOE) recently established a new program titled Control Product Performance Evaluation and Reporting (CoPPER). One initiative of the CoPPER program is led by researchers at Lawrence Berkeley National Laboratory and Pacific Northwest National Laboratory. The goal of this initiative is to specifically support testing of G36 control programming, which overlaps with goals of this CalNEXT effort. The CalNEXT project team was in close coordination throughout the duration of the project with the CoPPER team to explore synergies.

The CoPPER effort builds upon DOE's past projects which developed the Control Description Language (CDL), a specification for implementing control programming in a digital format that is defined as part of ASHRAE Standard 231. The CDL specification is a subset of the Modelica language specification. CDL-compliant sequence implementations can be integrated in dynamic simulation models of systems written in Modelica, which allows for detailed modeling and simulation of advanced control sequences including G36 using Modelica-based simulation tools.

The CoPPER team is developing open-source testing software that leverages this CalNEXT project's test scripts, point mapping, and test definitions, automatically reading them into the software through a suite of open-source Python tools. The software has two targeted functions. The first function is to test in simulation the G36 control logic implemented in CDL against the CalNEXT test scripts. This function provides a mechanism for validating the G36 programming in CDL that is part of the open-source Modelica Buildings Library (Wetter, et al. 2014, Lawrence Berkeley National Laboratory n.d.). The CDL implementation also serves as another G36 programming library that can be used to help pilot this CalNEXT testing approach. Because this function is executed in simulation, the tests can be run much more quickly – in a few minutes compared to a few hours when executed in real time on a physical controller. The second function is for the software to test control logic on a physical controller over a BACnet network connection, directly analogous to the approach in the FPTM and directly extending the Python-based automated bench scale test approach piloted in the previous "Best in Class" project. The open-source software with both target functions is in active development at the time of this writing (Lawrence Berkeley National Laboratory and Pacific Northwest National Laboratory n.d.).

The simulation-based testing functionality was prototyped in 2025, with the CalNEXT MOT source materials successfully loaded and applied to the G36 zone logic in the CDL G36 implementation. Multiple iterations of pilot tests were completed in simulation, leading to clarifications and adjustments to the point mapping process and test procedures. This work was invaluable to the CalNEXT effort to have a separate software tool developed independently based on the procedures and specifications in the draft MOT, highlighting areas that needed revision or more clarification. The

pilot testing also identified at least one instance where the programming in the CDL G36 implementation did not align with the interpretations in the test scripts.

The need for this work is demonstrated by the fact that DOE has funded an effort to accomplish the same G36 testing as this CalNEXT effort.The project team anticipates further opportunities for synergy and collaboration. The multiple efforts will also help encourage BAS manufacturer support by attracting more attention and by providing momentum for consensus building.

Expected Challenges

The project team anticipates that there will be some challenges faced when future efforts expand the testing to other manufacturer's programs and are advancing the MOT toward publication as a standard. Some of the anticipated challenges include:

- Control loop tuning: The purpose of the testing is to confirm whether control programming conforms with the sequences of operation in G36. Control loop tuning is explicitly out of scope, but as the testing is done on real controllers, control loop tuning inherently impacts some test results. The test approach aims to accommodate a range of loop tuning by separating tests into discrete test steps and providing a generous time allowance for test steps where a loop response is expected. Nevertheless, it is possible for a test to fail because a slow loop does not reach the expected result in time, even though the control logic was correct. In this situation, it would be necessary to re-test the controller after adjusting the loop tuning.
- Point mapping: The testing requires that certain control points be exposed for reading and writing over the BACnet network connection. Though most common control points will generally be exposed over BACnet, there is no standardization of this list of points and different programs may not have every control point exposed. In some cases, exposing additional points may be simple to do by manufacturers or programmers. In other cases, the required control points may be built into a control block (or custom subroutine) and not easily exposed. The project team expects that most BAS manufacturers may need to revise their G36 programming to expose the requisite points to accommodate this testing. Lists of required control points were shared for BAS manufacturer review in mid-2025 but the team did not receive any comments about difficult-to-add points. It is likely that the points lists were only superficially reviewed and that detailed review in the future will uncover some challenges.
- Sequence interpretation: The control sequences in G36 are written to be clear and explicit. Nevertheless, there is room for interpretation for programming the sequences in different ways to accomplish the same or similar end result. Paragraph 5.1.1 in G36 states: "These sequences are intended to be performance based. Implementations that provide the same functional result using different underlying detailed logic will be acceptable." Some programmers and manufacturers rely on this flexibility for interpreting the sequences differently than explicitly written. However, the MOT sets objective pass/fail criteria for each control sequence that constrains the range of allowable interpretations. That is the core purpose of this effort. The project team expects that most interpretations will be straightforward and uncontroversial, but there may be some sequences that individual manufacturers have interpreted and implemented differently in their programming. The project team has aimed to focus on writing tests for key sequences first, those with the largest impact and best chance for achieving consensus. Future efforts will need to find compromise and ways to define tests that provide a reasonable degree of flexibility.

- Test script development: The current approach to developing test scripts involves manual interpretation of the control sequences and definition of the individual test conditions. While careful review and pilot testing can help ensure quality, this approach to test script development is time-consuming and may be difficult to scale, particularly for more complex control sequences like those for the chilled water plant. Digital reference implementations of the G36 logic could potentially be used in the future to aid with this process.
- Programming architecture: The current testing approach assumes a distributed programming architecture corresponding to how sequences are organized by equipment in G36 (e.g., all zone programming resides on the zone controller), but not all BAS platforms may follow this approach. If there are different architectures, the planned testing approach may need to be modified to accommodate. Also, the testing approach assumes that there isn't other logic on the controllers that may interfere. At least one manufacturer has standard diagnostics that may potentially interfere with testing. Future efforts will need to explore these potential conflicts and find solutions.

Stakeholder Feedback

The project team has proactively communicated and engaged with a diverse range of stakeholders to help guide MOT development, support the software tool development and pilot testing, and to help ensure the likelihood of reaching a consensus when adapting the MOT into a draft ASHRAE standard. Below is a summary of some of the main stakeholder engagement and outcomes.

ASHRAE, SGPC 36, and BAS Manufacturers

The project team engaged with members of the SGPC 36 committee through quarterly meetings and email communications with its testing working group, which is largely comprised of representatives from BAS manufacturers, and biennial updates to the main SGPC 36 committee at ASHRAE conferences. The project team presented an overview of the project scope and discussed alternative testing approaches, as well as varying industry needs around testing. In 2025, the project team also developed a title, purpose, and scope (TPS) and began to advocate for establishing a new ASHRAE standard MOT.

Industry agreement about the need for additional G36 testing resources is evident by the creation of and continued interest in the testing working group, and the overwhelmingly positive support for the establishment of a new ASHRAE Standard. Discussions among the testing working group have generally covered testing through this CalNEXT automated bench-scale test, informal self-performed testing by manufacturers, and standardized functional test scripts for use by commissioning providers for on-site system testing. The new requirement for the use certified G36 programming library in Title 24-2025 also led to increased interest and urgency for test development.

Feedback from various communications with BAS Manufacturers is summarized below:

- After draft test scripts for VAV reheat terminals were shared with the working group, at least two manufacturers transferred the test conditions to their own internal testing platforms for examination, sharing results and feedback to the working group. One manufacturer expressed positive feedback: the tests were well thought out and he "liked the format a lot." He noted though that there would likely eventually be some differences in interpretation. Another manufacturer was impressed by how the tests aligned with "exactly what they would do" and

felt that it covered the right level of detail. At least one manufacturer was using elements from the CalNEXT test scripts for documenting compliance with the new Title 24-2025 requirement for certified G36 programming libraries.

- Multiple manufacturers were strongly supportive of this effort and the effort to establish a new ASHRAE standard, providing verbal comments to a critical ASHRAE committee in support of the new proposed standard.
- Multiple manufacturers expressed the need for additional clarity around G36. Though the control sequences in G36 are very detailed, much more so than is typical, there is still room for interpretation and flexibility for how the English-language descriptions are translated into control logic. This ambiguity is a challenge for manufacturers, particularly regarding code-required programming libraries. One manufacturer expressed the need for a "level playing field." Another was supportive of "clear interpretation" of the sequences.
- Several stakeholders, including manufacturers, designers, and commissioning providers, acknowledged the complexity of G36 control sequences, the challenges that installers face when using G36 in projects, and the need for more efforts like this to streamline implementation.
- In older feedback from the earlier "Best in Class" project, one manufacturer expressed business value in being able to "certify" their own factory programming library based on third-party testing. Doing so would instill trust in the factory programming among its dealers' programmers. In those previous discussions, the manufacturer expressed difficulty with encouraging dealers to use the factory libraries. The previous programming libraries were developed around 1999 but were not heavily used. The dealers did not use the factory libraries because they were old and out of date, and the factory did not update their libraries because they were seldom used. The publication of G36 and the promise of standardized control sequences was an external motivator for the manufacturer to invest in the development of an updated programming library based on G36.
- The Title 24-2025 prescriptive requirement for the use of certified G36 programming libraries was adopted without detailed or objective criteria on what is specifically required of these libraries or independent confirmation that the libraries are properly functional. Given the uncertainty in expectations and minimum requirements in that standard, multiple manufacturers felt that an objective testing approach would be needed to provide clarity on the statutory requirements. One manufacturer stated: "Without a MOT the self-certification process is the wild west and at the discretion of the CEC review committee."
- In the context of creating a new ASHRAE Standard Method of Test, some manufacturers were very supportive, while others were ambivalent. Among the latter, one manufacturer expressed concerns about inclusion and enforcement of certain elements in G36 like alarming, time-based suppression, and fault detection and diagnostics. Some building owners may have their own unique standards for alarming and would not want to use the alarming approach in G36, some building owners may be less sophisticated and not as well suited for some advanced features in G36. The manufacturer expressed the need for flexibility in project applications (i.e., not mandating the use of all of G36) and support for an approach that focused on key elements of G36, rather than only a comprehensive top-to-bottom approach that might not be a good fit for all applications. In subsequent discussions among a larger ASHRAE committee, there was additional support for this differentiation, to either establish multiple tiers of testing

(subset of key measures vs. comprehensive scope) or to focus on the key measures first and then expand later in time to testing other sequences. This feedback was significant in helping to shape this project's focus and the narrative for successfully proposing a new ASHRAE standard. Instead of attempting to write comprehensive tests for all of G36, and which may include less-important items that delay achieving consensus, the team focused on key equipment and sequences first, along with robust test procedures, to help build support and momentum.

- Multiple manufacturers expressed strong support for this effort and the willingness to pilot the tests on their programs. The NIST Engineering Lab possessed BAS controllers which facilitated pilot testing of one manufacturer's programming. The project team has shared the software installation files and test scripts with additional manufacturers but has not yet received feedback.
- Control point mapping was one of the project team's concerns, that some of the required control points would not be exposed through BACnet for reading or writing, as the team found with the programs that were tested. In some cases, it is trivial to expose additional points through BACnet. In other cases, this may require more significant re-programming that may be a barrier, particularly if points are embedded in custom programming blocks. One manufacturer expressed that most required points were already exposed and that it would be easy to add others. They noted that additional clarity on point references would be helpful. Another manufacturer noted that most point names were clear but that some were ambiguous. Based on this feedback, the project team carefully reviewed and revised the point naming. Wherever practical, the point naming aimed to match the naming in G36 verbatim. However, point naming in G36 is sometimes inconsistent or incomplete. The project team also provided additional details on control points, including point type and units of measurement to help provide further clarity. Future updates should consider the addition of semantic modeling to inform the point mapping step.

Utility Programs

The project team conducted interviews with two California utility program managers to explore opportunities for integrating G36-based control strategies into utility programs, seeking to leverage automated G36 validation as a tool to support energy efficiency incentives tied to these strategies. Discussions covered various utility program pathways, including deemed, custom, normalized metered energy consumption (NMEC), and strategic energy management (SEM).

Utility program customers receive financial incentives based on the energy savings estimates of a measure.

- Deemed measures rely on predefined savings estimates based on historical data and technical reference manuals, making them ideal for simple, standardized projects like lighting upgrades, where savings can be easily predicted.
- Custom measures are designed for unique energy efficiency projects and require detailed engineering and energy savings analysis. This pathway is ideal for complex retrofits, specialized equipment upgrades, or process improvements that cannot be addressed with standardized savings estimates.

- NMEC uses metered energy data to estimate savings by comparing baseline and post-intervention consumption, normalizing for factors like weather and operational changes. This method is well-suited for projects involving multiple measures or behavioral adjustments.
- SEM focuses on organizational practices and continuous improvement, emphasizing training, energy tracking, and cultural shifts to reduce waste. SEM programs typically span one to three years, providing organizations with the time and support needed to implement energy management practices and achieve measurable savings. Similar to NMEC, SEM programs use "whole facility" regression modelling to verify energy savings impacts.

The main differences between these approaches lie in their methodology. Deemed measures use fixed savings estimates, custom measures require site-specific analysis, NMEC relies on real-time data, and SEM prioritizes behavioral and operational changes over equipment upgrades.

The following bulleted list summarizes key findings from the interview(s):

- Quality control and compliance: The interviewed utility program managers focus on ensuring that energy savings calculations are accurate and projects comply with rules, regulations, codes, and standards set by the California Public Utilities Commission (CPUC). They do not develop measures themselves but rely on third-party implementers for this task.
- Types of measures and programs: HVAC retro-commissioning (RCx) measures typically appear in custom and NMEC programs. SEM programs, which have a deeper history in industrial facilities, are relatively new to commercial customers. RCx implementations with VAV systems are usually classified as behavioral, retro-commissioning, or operational (BRO) measures. Zone-level controls are not typically implemented as standalone measures but instead are integrated into larger projects.
- G36 and cost-effective measures: G36 is not directly referenced in SEM programs but may influence implementers' recommendations. Implementers often prioritize low-cost, quick measures to build customer confidence, aiming for larger projects later. Through this discussion, reduced VAV minimums may be applicable, but this should be discussed with third party implementers.
- Common measures and challenges: Top measures include supply air temperature reset, chilled water temperature reset, and condenser water temperature reset control strategies. RCx measures may address zone-level problems but these are typically limited to fixing fault conditions in larger projects/facilities that have sufficient savings potential to justify the field labor.
- Baseline, effective useful life (EUL), and measure classification: Baselines vary by measure type, with RCx measures using existing conditions and BRO measures requiring fine classification. EUL is limited by host equipment, typically maxing out at 15 years. Add-on measures are capped at one-third of host equipment EUL (e.g., capping at 5 years). Multi-year maintenance plans are key for BRO measures.
- Evaluation and persistence: Savings evaluations rely on custom spreadsheets, trend analysis, and meter-based evaluations for NMEC. SEM uses bottom-up calculations, while NMEC primarily relies on meter-based methods. Measure persistence remains a challenge, as controls measures see performance degradation often due to post-retrofit adjustment.

Market Opportunities

Industry Standardization

With growing awareness and interest in G36, and pressure from the new Title 24-2025 requirements, BAS manufacturers are developing and expanding their programming libraries for G36. With this shift, there is a growing need for common tests that can provide objective interpretations of the G36 control sequences. This is potentially beneficial for manufacturers to have a clear development target, particularly where there are code mandated requirements. This is potentially also beneficial for designers, installers, and building owners, to have trust that different programming libraries are robust, comprehensive, and follow the same interpretations. The strong manufacturer participation in the G36 testing working group and interest in the work products of this CalNEXT effort demonstrates this need. Development of a MOT, even if not referenced further in building energy efficiency standards, provides value to industry and an opportunity for aligning interpretations and implementations of the G36 control sequences.

ASHRAE Standards

The ultimate goal of this effort is to develop a draft MOT that can become the basis of a future ASHRAE Standard. In the first year of the project, the project team conducted extensive outreach to key industry stakeholders about the effort and its value proposition to raise awareness and build support for the effort. In 2025, the project team developed an initial TPS for the MOT and proposed the establishment of a new ANSI/ASHRAE Standard. The project team shepherded the proposal through a series of ASHRAE committee reviews and votes as described in the Procedures for ASHRAE Standards Action (ASHRAE 2025). The project team successfully advocated for the consideration and support of the proposal through a series of procedural committee votes by Standing Guideline Project Committee (SGPC) 36 (17 yea, 0 no, 1 abstained, 4 no response), Technical Committee 1.4 Control Theory and Application (6-0-1 chair not voting), the Planning, Policy and Interpretations Subcommittee of the Standards Committee (4-0-1 chair not voting), the full Standards Committee (unanimous, except chair not voting), and the Technology Council (unanimous, except chair not voting). There were no negative votes through any of the committee votes. Names of voting committee members and manufacturers are withheld for policy and privacy reasons.

Following the successful committee votes, Standing Project Committee (SPC) 236 Method of Test for Control Programming Conformance with HVAC Sequences of Operation was subsequently established.

The initial TPS was revised and refined based on committee member comments through the ASHRAE Standards Action process. The official TPS is listed below:

Title: Method of Test for Control Programming Conformance with HVAC Sequences of Operation

Purpose: This standard specifies a Method of Test to verify that control programming logic conforms with the functional intent of standardized HVAC control sequences.

Scope:

1. This standard applies to the programming of building automation system controllers intended to implement standardized control sequences such as are included in ASHRAE G36.

2. This standard defines a series of test scripts detailing test conditions for applicable control points to be evaluated against expected responses, with pass/fail criteria for each test.
3. This standard defines a bench-scale procedure and software tool requirements that test control programming hosted on physical controllers through BACnet network communication protocols with no physical sensors or devices involved.
4. This standard does not apply to programming for which test scripts have not yet been specifically included in this standard.

Though the MOT was intended to focus on testing G36, feedback was received during the ASHRAE Standards Action process to make the standard be more open and inclusive for testing other control sequences as well. Concern was also expressed about having a standard be based on a guideline. Thus, G36 is not referenced in the Title or Purpose sections, and only listed as an example in the Scope. In practice, this level of testing can only realistically be performed for standardized HVAC control sequences where there is an economy of scale to make the test development worthwhile, and G36 is effectively the only set of openly published standardized HVAC control sequences to date.

The project team anticipates sharing the draft MOT and the knowledge gained as part of this CalNEXT effort with the newly formed SPC 236 and using the momentum established to advance the MOT toward publication. Feedback received by key stakeholders during discussions has helped shape the approach laid out by the project team and has helped focus the effort on an approach that aims to achieve the maximum positive benefit, by developing a MOT that focuses first on testing key sequences in G36, where there is strong consensus. Advancing the MOT toward publication as soon as possible with tests for this key subset of sequences provides value sooner and to a broader group of applications. After publication, tests for additional sequences can continue to be added. Industry would be better served by this approach, compared to the alternative of trying to establish comprehensive tests for all of the sequences, delaying the initial publication.

Codes

The CEC recently adopted a change to the 2025 version of Title 24 that requires the use of a certified G36 programming library. The initial certification is based on requirements in Joint Appendix 18 that effectively amounts to a checklist for companies to self-certify that their G36 programming libraries include logic for each of the required elements. Ultimately, the goal is to establish a more rigorous certification to ensure that programming conforms with G36. This MOT could potentially become the basis of the Title 24 certification requirement in future cycles.

Through engagement with Title 24 compliance stakeholders, the project team has identified that multiple BAS manufacturers are already leveraging the draft test scripts developed by this effort to demonstrate G36 compliance and certify their programming libraries for JA18 requirements. Early feedback confirms that these test scripts are streamlining what has otherwise been a highly manual and resource-intensive compliance review process. Currently, this process requires human review of programming libraries, points lists, test descriptions, and test results provided by each manufacturer. The growing demand to certify new BAS libraries, along with the need to recertify updated ones, underscores the importance of implementing an efficient, accurate, and scalable solution — one that automated validation is uniquely positioned to deliver.

The Statewide CASE team considered a measure for Title 24 2028 Code Cycle to update JA18 to reference a new MOT but that was deferred to a future cycle because a MOT would not be published in time for the CASE timeline. Nevertheless, if the MOT is further developed, even if not fully published by 2028, it could potentially be used by manufacturers and the CEC to streamline approval of JA18 submissions, replacing the time-consuming, manual reviews that have been needed for the 2025 requirement.

Publication of Standard 236 would also provide a possible mechanism for Standard 90.1 to effectively require the use of sequences from G36. The 90.1 committee has previously considered adding G36 requirements but has refrained from doing so, partly due to concerns about referencing a guideline with an ANSI standard. Standard 236 would overcome that barrier as an ANSI standard.

Utility Programs:

The core impact of this technology lies in its ability to streamline the validation of BAS programming libraries against G36. This promotes the adoption of standardized, high-performance control sequences of operation (SOO) across the industry. By introducing an automated and repeatable quality control process, the technology provides key stakeholders with the confidence to implement best-in-class control strategies that maximize energy efficiency without compromising occupant comfort. As market adoption grows and vendor competition increases, we expect to see reduced installation costs alongside significant improvements in energy efficiency and operational savings.

In addition to its financial and energy benefits, G36 SOO standardization reduces the complexity of long-term facility management. By establishing common rules and providing clear documentation, it simplifies troubleshooting and optimization efforts for engineers and facility operators. This is especially valuable in addressing the challenges posed by historically inconsistent SOOs across buildings, across individual floors within a building, and even across zones on the same floor. For organizations managing diverse property portfolios, the use of pre-validated libraries ensures scalability and delivers consistent, high-reliability operations across all sites, irrespective of the specific vendor hardware deployed.

The adoption of G36 in existing building retrofits has faced resistance from industry stakeholders and remains underutilized by utility programs, except when required by code in new construction or alterations. Key barriers to implementation include the complexity of control sequences, cost concerns, lack of awareness, inadequate training, and uncertainty regarding performance outcomes. For retrofits where BAS upgrades do not trigger code compliance, utility program requirements for automatically validated programming libraries could serve as a valuable tool to encourage adoption of G36 sequences. These efforts could be integrated into existing commercial building programs, such as Custom, NMEC, and SEM programs.

POTENTIAL PROGRAM IMPACTS

State energy policies, regulators, and utility programs drive advancement in HVAC controls by establishing energy code requirements (e.g., 2025 Title 24 G36 mandate), and offering rebates, incentives, and technical support for various upgrades. These include full BAS upgrades, software-only retrofits, retro-commissioning, and demand response capabilities. Advanced SOOs enhance HVAC performance across multiple levels, from zone-level control to AHUs, heating water plants, and chilled water plants. The advanced zone-level SOOs outlined in G36 often create a cascading effect, delivering energy savings across all system levels. Key G36 control measures are:

- Dual Maximum VAV Logic with Low Minimums
- Duct Static Pressure Reset with Trim & Respond Logic
- Supply Air Temperature Reset with Trim & Respond Logic
- Optimum Start and Morning Warmup
- Off-hour Control Strategies
- Demand Controlled Ventilation
- Occupied Standby
- Zone Heating and Cooling Setpoints with Demand Levels and Limits
- Economizer High Limit Setpoint
- Dynamic Minimum Outdoor Airflow Setpoint
- Chilled Water Supply Temperature Reset with Trim & Respond Logic
- Condenser Water Reset
- Hot Water Supply Temperature Reset with Trim & Respond Logic

These measures are typically cost-effective solutions to improve the performance of existing HVAC systems. However, for utility programs, there are several barriers in the current program delivery model that make it challenging to effectively implement G36 measures (Paliaga, et al. 2020). The following bulleted list summarizes key barriers and describes opportunities to address each barrier.

- Legacy controls infrastructure in the buildings limits the implementation of G36. To help overcome implementation challenges, California's emerging technology program (CalNEXT n.d.) is funding the development of a simplified HVAC control retrofit guide ("G36 Lite") which will provide simplified implementation steps and recommended controls logic focused on key measures, SOOs for various HVAC system types, and SOO workarounds for existing system constraints. This study (ET25SWE0013) is scheduled to be completed in 2026.
- Equipment replacements may trigger a code baseline such as California's Title 24. Utility programs often treat equipment replacement projects as end-of-life replacements or accelerated replacements and use active building energy code (i.e., applicable state codes such as Title 24 or ASHRAE 90.1) to establish a baseline condition. California's policy on measure baselines is outlined in CPUC Resolution E-4818, Feb. 9, 2017 (Table 3). A comprehensive analysis of BAS upgrade baselining requirements is beyond the scope of this report. However, a thorough dialogue on the topic between Massachusetts Program Administrators, subject matter experts (Massachusetts Energy Efficiency Advisory Council), and a program evaluator was documented in an exchange of reports and memorandums between 2019 and 2021.[1,2,3]

[1] Available at: https://ma-eeac.org/wp-content/uploads/MA_CIEC_P73B_EMS_OpinionMemo_FINAL_190215.pdf

[2] Available at: https://ma-eeac.org/wp-content/uploads/MA-EEAC.PA-EMS-Baseline-Opinion-Statement-20.07.23.pdf

[3] Available at: https://ma-eeac.org/wp-content/uploads/MA20C03-B-EMSISP-EMS-ISP-Study-Final-Report-Clean.pdf

Table 3: Adopted default baseline policy for all sectors.

Alteration Type	Delivery	Savings Determination	Shell & Bldg System and Add-On Equipment	Behavioral, Retro-commissioning, and Operational	Normal replacement	Accelerated replacement and repair eligible
New construction, expansions, added load	Any	Any	Code	N/A	Code	N/A
Existing buildings, including major alterations	Upstream & Midstream	Any	Code	N/A	Code	N/A
	Downstream	Calculated	Existing	Existing	Code	Dual
		Deemed	Existing	Existing	Code	Dual
		NMEC	Existing	Existing	Existing, Program Design	Existing
		RCT/ experimental	Existing	Existing	Existing	Existing
Non-building projects, including industrial and agricultural processes	Any	Any	N/A	Existing	Standard Practice	Dual

Source: CPUC Resolution E-4818, Feb. 9, 2017

- Program cost effectiveness issues relating to measure persistence and program cost-effectiveness metrics: California investor-owned utility (IOU) programs currently base their performance and incentives on Total System Benefit (TSB). Gas savings and EUL have the biggest impacts on TSB. The positive impacts of gas savings include direct energy savings, avoided gas infrastructure costs, and site greenhouse gas emission reductions. Peak electric savings increase TSB, though not as much as gas savings. Low EULs bring down TSB. The EUL for RCx measures is 3 years for Custom programs and 5 years for SEM programs. These low EULs reduce TSB for both gas and electric savings. A persistence study by Michael Energy (C2117, 2023) suggests that BAS control measures can range from 5 to 7 years.[4] We anticipate that specific G36-based control measures, such as reduced VAV minimum airflow setpoints, will align with these greater EUL values for multiple reasons. For example, these measures are less reliant on existing building conditions that may hinder long-term performance. Also, because these measures are based on specific controller settings that typically remain unchanged for the system's lifespan, they are less prone to human interference and "backsliding" over time. Further research is required to better understand longer RCx measure EULs and the potential for higher gas savings, specifically VAV control improvements.
- Lack of simplified calculation tools. Programs use a variety of calculated approaches to estimate energy savings. Custom spreadsheet calculations are common in estimating HVAC control savings but often require extensive review and data collection. Existing building

[4] Available at: https://www.energizect.com/eeb-evaluation-reports-and-studies

simulation tools have limitations to accurately estimating energy savings for full BAS retrofits, and modeling assumptions related to building operation. Standardized calculations, especially for low rigor measures, can help programs streamline measure savings evaluations, especially when final verification is metered based, as in the case of NMEC and SEM programs. CalNEXT research has tested (Phase 1) and is enhancing (Phase 2) a publicly available spreadsheet tool used by RCx programs in California (Chu, et al. 2024). The enhancement work is scheduled to be completed in 2026. This tool calculates savings for many key HVAC control measures.

- Overall program review process can be burdensome to the project cycle. The process by which program administrators perform technical review of projects is time intensive and requires significant commitment from the customer and the designer. Aligning program engagement and reporting requirements with this process is critical to providing meaningful technical and financial program support. Evaluation studies have shown that for RCx projects the technical resources provided to a customer are often of greater value and importance than savings-based incentives (Tso, Baker and Willems 2010).
- Limited trending capabilities and lack of good baseline data result in inaccurate estimate of savings potential. For screening potential program candidates, research has shown that complex HVAC control measures can be reliably evaluated using a simplified estimation tool, which maintains flexibility for various building designs and offers a quantifiable level of accuracy (DeBlois, et al. 2024).

UTILITY PROGRAM OPPORTUNITIES

G36 provides a cost-effective and scalable solution to reduce energy consumption in existing buildings while maintaining occupant comfort. However, its market adoption has been slower than anticipated and could benefit from greater support through utility programs. Automating the validation of vendor programming libraries offers significant advantages, establishing critical benchmarks for utility programs aimed at improving HVAC controls. While certified libraries that define best practices can increase the likelihood of successful outcomes in existing building projects, they do not guarantee that system performance will meet anticipated energy efficiency goals, particularly in retrofits that do not trigger code compliance. For example, a G36-validated library alone cannot ensure that appropriate setpoints (e.g., VAV minimum airflow setpoints) are implemented or that controllers are effectively communicating over the network to send, receive, and compile necessary data. Nevertheless, the findings from this project, along with ongoing research, can help establish a foundational framework to achieve full or near-full G36 compliance in current and future utility program designs. This can be accomplished by significantly reducing the labor required to validate that control programs are correctly implemented within each HVAC controller. To effectively promote and ensure G36 compliance or the application of best practices in existing building retrofits, automated library validation should be complemented by additional program requirements and resources, such as:

- A simplified G36 retrofit guide
- Standardized HVAC estimation tools
- Site screening data analytics
- Use of Title 24 compliance forms for non-code triggering BAS upgrades
- Collaboration with certified trade allies

Unfavorable opinions and challenges surrounding G36 generally focus on its complexity, steep learning curve, higher initial implementation cost, and general lack of awareness. The efficacy of a utility program is contingent upon the market's understanding, willingness, confidence, and technical capability to adopt G36 measures. Consequently, education and training are crucial to facilitate wider adoption of G36 in existing buildings. Without adequate resources and clear implementation pathways, utility programs will struggle to realize the deeper energy savings potential of G36 measures. This research lays the groundwork for evolving vendor library certification into more modular, site-specific validation and commissioning tools, such automated modular site validation scripts. These advancements could further streamline the adoption of G36 and enhance its effectiveness in achieving energy efficiency goals.

Recommendations

The following steps are recommended following the completion of this project to advance the future publication of ASHRAE Standard 236 – *Method of Test for Control Programming Conformance with HVAC Sequences of Operation* and to further support industry standardization in G36 programming:

1. Transition the work products and knowledge gained from this CalNEXT effort to the newly formed ASHRAE SPC 236. There is strong momentum with the CalNEXT effort and separately funded efforts at NIST and BTO. Manufacturers are also interested and motivated given the new requirement for G36 programming libraries in Title 24. SPC 236 should focus on establishing a robust MOT that is flexible and accommodating for the wide range of existing approaches, yet sufficiently rigorous and comprehensive to ensure quality. It should prioritize development of the test process and detailed test procedures for a subset of key elements of G36 to reach publication as soon as possible, deferring tests for secondary aspects of G36 to future addenda.
2. Secure funding for additional development. The general test approach is well-established at this point with two software tools in development. Continued refinement of the test approach and the MOT are needed, but the largest effort will be required for writing and reviewing additional test scripts. Writing and reviewing test scripts is detailed and tedious work. It can only effectively be done by subject matter experts with deep expertise and understanding of G36. This is a bigger effort than can be done by volunteer effort.
3. Expand testing to different programming libraries. Each G36 programming library will have idiosyncrasies and challenges to overcome. Some of these challenges will require the proposed MOT to be revised, others will require revisions to the programming libraries. The challenge for SPC 236 will be to find a balance, a middle ground, that allows for the effort to advance without undue burden on any particular stakeholder. Some of the challenges will not be known until the testing is expanded to other programming libraries.
4. Continue to refine the draft MOT. All of the key elements and framework are expressed in the draft MOT. However, additional review and revision is expected to shape the document into a robust MOT that is clear, repeatable, and effective.
5. Continue stakeholder engagement. This effort addresses a key industry need that has been identified in past projects and is the target of multiple publicly funded projects. Nevertheless,

this is a rapidly evolving area with awareness and perception of G36 growing and changing quickly. For a broadly distributed industry that is slow to adapt to changes, it will be critical to stay tuned to current challenges, barriers, and perceptions around G36 programming libraries to help ensure that the end product meets industry needs and is likely to be accepted by diverse stakeholders.

6. Technology transfer. Developing a robust MOT is just the first step. Promoting its use is needed to drive impact. There is some indication from BAS manufacturers that they would voluntarily use the MOT, and some manufacturers are already using components of it. Nevertheless, future efforts should continue to coordinate with the California Statewide CASE team for potential updates to future Title 24 cycles, as well as similar updates to ASHRAE Standard 90.1. Efforts should also explore opportunities to integrate the MOT into future utility programs, where validated G36 programming may streamline implementation, improve quality, and extend measure life.

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Appendix A: Draft Method of Test

DRAFT

Method of Test for Control Programming Conformance with HVAC Sequences of Operation

CONTENTS

Method of Test for Control Programming Conformance with HVAC Sequences of Operation

FOREWORD

Building automation systems (BAS) frequently underperform due to inconsistent control implementation, gaps in the commissioning process, and project-specific programming that duplicates effort and introduces avoidable variation. Standardization around detailed HVAC sequences of operation provides an opportunity to improve quality control, increase consistency, and streamline development and deployment of control programming. When such sequences are defined in natural language, however, translation into executable control logic remains subjective, labor intensive, and prone to differences in interpretation. A standardized method of test can reduce this ambiguity by providing an objective basis for evaluating whether implemented control programming conforms to the functional intent of the underlying sequence.

This method of test (MOT) is intended to verify the conformance of control programming logic with standardized HVAC control sequences. The tests are intended to be automated, objective, repeatable, and vendor-neutral. When applied as described, the tests provide a clear pass or fail result for the equipment and sequences being tested. The primary target of the tests is programming libraries developed by BAS manufacturers, though the tests may also be applicable to other collections of programming. For users of such programming, including designers, installers, and building owners, this MOT may provide assurance that the programming is complete, robust, and consistent with the intent of the associated standardized sequences. For developers of control programming, this method of test may provide an unambiguous interpretation of the standardized sequences as a reference during software development. This method of test may also serve as an objective metric where the use of standardized control programming is required by building energy efficiency standards or project specifications.

This standard is intended to support a flexible conformance-testing ecosystem. The method is defined by the requirements of this standard and by the normative test files included herein, rather than by any single software implementation. Test software may therefore be developed by manufacturers, independent third parties, or other entities, provided that the software meets the requirements of this standard and executes the approved test scripts as specified.

This method of test is a bench-scale procedure that tests control programming hosted on physical controllers through BACnet network communication protocols, with no physical sensors or devices involved. Test conditions are written to the controller through scripted BACnet overrides, and monitored controller responses are evaluated against expected responses for each discrete test step to determine conformance. When all of the applicable tests for a particular piece of equipment are successfully completed, that equipment's programming is deemed to be in conformance with the standard. Conformance with the standard may be determined for an entire programming library or at the individual equipment level.

This procedure is generally not intended to be applied to project-specific programming for an individual building. The test scripts included herein assume coverage of the complete set of features required by the applicable standardized sequence and therefore may not be suitable for project-specific implementations that cover only a subset of those features or that include custom programming outside the scope of this standard.

Though the use of programming that has been successfully tested to this procedure may reduce effort and improve quality, this method of test is not a substitute for project-specific functional testing and commissioning. It does not address sensor calibration, end-to-end point mapping, control loop tuning, programming outside the scope of the test scripts, or many other factors that may need to be evaluated during the commissioning process. This procedure verifies programming conformance with standardized control sequences; it should not be construed as validating the energy performance or effectiveness of the control sequences themselves.

ASHRAE Guideline 36 is one example of a standardized sequence document that may be evaluated using this method. At present, the test scripts included in this standard address only a portion of the sequences associated with Guideline 36, and only those portions for which normative test scripts have been provided as part of this standard may be validated for conformance under this standard.

1. PURPOSE

This standard specifies a Method of Test to verify that control programming logic conforms with the functional intent of standardized HVAC control sequences.

2. SCOPE

2.1 This standard applies to the programming of building automation system controllers intended to implement standardized control sequences such as are included in ASHRAE Guideline 36.

2.2 This standard defines a series of test scripts detailing test conditions for applicable control points to be evaluated against expected responses, with pass/fail criteria for each test.

2.3 This standard defines a bench-scale procedure and software tool requirements that test control programming hosted on physical controllers through BACnet network communication protocols with no physical sensors or devices involved.

2.4 This standard does not apply to programming for which test scripts have not yet been specifically included in this standard.

3. DEFINITIONS

analog: a type of control point that holds an analog numerical value

binary: a type of control point that holds binary (0 or 1) value.

comma separated values (CSV): a text file format for representing tabular data as records separated by line breaks, with fields separated by commas

continuously: occurring every cycle of the testbed sampling rate.

control point: a discrete element representing state within a building automation system controller, which may correspond to an input, output or internal value

controller under test: the specific physical controller that hosts the logic under test and is exercised during testing.

current value: the value of a variable as of the most recent testbed cycle.

extensible markup language (XML): a text-based markup language and file format for representing structured data using tagged elements and attributes. XML files that reflect data structured as a logical table can be read and edited using common spreadsheet applications.

input variable: a control point whose value is set by the testbed software over BACnet as specified by the test script

logical table: a tabular representation of data consisting of rows, columns, and cell values (i.e., spreadsheet structure), independent of file format.

logic under test: the control programming logic that implements the *sequence under test* on the *controller under test*. The Method of Test described by this Standard evaluates whether the logic under test follows (conforms to) the sequence under test**.**

monitored variable: see *output variable*

multi-state value (MSV): a type of control point that holds an integer value within a predefined range. In practice, analog points may be used as MSV points if the associated software enforces integer-only values for the point.

output variable: a control point whose value is read by the testbed software over BACnet and evaluated against an expected response

parameter: a control point whose value is set manually before the test begins, and does not change during the course of a given test.

previous value: the value of a variable as of the end of the previous test step.

sequence under test: the specific version of a standardized control sequence referenced by the applicable test script used for conformance evaluation under this Standard.

testbed: the complete system required for testing sequences under this Standard, including controller under test, testbed software, and a network connection that will allow BACnet communication to the controller under test.

testbed software: test software on a computer that is used to communicate with building automation system controllers and execute the test procedures

testbed sampling rate: the frequency with which the testbed software updates real time input variables and monitors threshold value limits

test block: a collection of test steps, generally for related logic, that are grouped together for testing continuity or convenience

test step: a discrete test event, that begins when one or more input variables are overridden to predefined values to establish a test condition, and ends when output values are compared to expected values to determine pass/fail status for that test step.

4. DATA VALUES

4.1 Analog values

4.1.1. Expressed in the inch-pound unit system as follows:

4.1.1.1. Airflow: cubic feet per minute (cfm)

4.1.1.2. Temperature: degrees Fahrenheit (F)

4.1.1.3. Carbon dioxide concentration: parts per million (ppm)

4.1.1.4. Water flow: gallons per minute (gpm)

4.1.1.5. Air pressure: inches of water column (in.W.C.)

4.1.1.6. Water pressure: pounds per square inch (psi)

4.1.1.7. Valve/Damper command: percent expressed from 0 to 100 (%)

4.1.1.8. Loop output: percent expressed from 0 to 100 (%)

4.1.1.9. Time: seconds

4.2 Binary values

4.2.1. English words indicating state of a two-position switch. By default the testbed software shall map these paired expressions as 1 / 0 where used but this mapping may be overridden in the populated version of the Point Mapping Index.

4.2.1.1. Boolean: True/False

4.2.1.2. Occupancy: Present/Absent

4.2.1.3. Status: Enabled/disabled

4.2.1.4. Commanded State: Start/Stop

4.2.1.5. Run State: On/Off

4.2.1.6. Window switch: Closed/Open

4.3 Multi-state values (MSV)

4.3.1. Values indicating switch states with more than two positions.

4.3.2. MSVs presented numerically as whole numbers shall be defined as follows but these definitions may be overridden in the populated version of the Point Mapping Index.

4.3.2.1. Demand Limit Level (0, 1, 2, or 3)

4.3.3. MSVs represented as English-language values shall be mapped to numerical values as follows but this mapping may be overridden in the populated version of the Point Mapping Index.

4.3.3.1. Mode (Occupied = 1, Cooldown = 2, Setup = 3, Warmup = 4, Setback = 5, Unoccupied = 6, None = 7)

5. REQUIRED TEST FILES

5.1 Overview

5.1.1. A Test Definition Package shall define tests in accordance with this Method of Test. There shall be a separate, distinct Test Definition Package for each sequence for which tests have been included under this Standard.

5.1.1.1. Each Test Definition Package is specific to the type of equipment being controlled (e.g. single-duct VAV reheat) and the sequence under test.

5.1.1.2. A Test Definition Package shall consist of the following:

a. The Pre-Set Parameters file specifies static states which must be set in the controller under test before testing commences.

b. The Test Script file specifies control point input values and expected output values (pass/fail conditions) for each step of the test.

c. The Point Mapping Index associates the control point inputs and outputs listed in the test script with their corresponding BACnet point IDs on the controller under test. The Point Mapping Index must be populated with required user inputs in order to configure the testbed prior to running any tests.

5.1.1.3. All files constituting a given Test Definition Package shall have the same scope and version. Each file in the Test Definition Package shall include the following information:

a. Applicable equipment configuration: e.g. single-duct VAV reheat terminal unit, or Air Handler with Return Fans

b. Applicable version of sequence under test: e.g. Guideline 36-2021

c. Last-revised date

d. The version number of the Test Definition Package of which the file is part.

5.1.1.4. Each file constituting a Test Definition Package shall be a human-legible and machine-readable data file structured as a logical table and provided in XML format.

5.1.2. Executing a test run also requires a Test Configuration file, which references one or more Test Definition Packages and specifies which tests and/or test blocks are to be executed for that run.

5.2 Pre-Set Parameters

5.2.1. The Pre-Set Parameters file specifies static states for parameters that must be set in the controller under test before testing commences.

5.2.2. Logical table structure: Each row of the table after the header rows shall identify a single state condition from the sequence under test and specify the static value to which it must be set before testing begins.

5.2.2.1. For simple cases, these settings may be expressed rigorously in terms of a value assigned to a specified control point.

5.2.2.2. Where manufacturers' implementations differ, required settings may be abstracted from specific control points. For example, the economizer lockout setting may be based on climate zone, without specifying the exact variable(s) used to program the lockout.

5.2.3. Pre-Set Parameters shall be set manually within the controller under test before testing commences.

5.2.4. Pre-Set Parameters do not change value during the testing process and are not subject to pass/fail evaluation.

5.2.5. Each Pre-Set Parameters file corresponds to a specific Test Script as part of a Test Definition Package and is versioned with that Test Definition Package as a normative part of this Standard. Pre-Set Parameters files are included in Appendix A.

5.3 Point Mapping Index

5.3.1. The Point Mapping Index associates the input and output control points listed in the test script with their corresponding BACnet point IDs on the controller under test, so that the testbed can read and write values to control points as dictated by the Test Script.

5.3.2. The Point Mapping Index shall be populated with required user inputs, specific to the BACnet schema of the controller under test, prior to initiating a test.

5.3.3. Logical Table Structure: The first four columns shall be defined as a normative part of the Standard. The points descriptions, point names, and point type shall exactly match the corresponding Test Script. The subsequent six columns are user inputs fields.

5.3.3.1. Normative Information Fields shall match the corresponding information in the Test Script.

a. Control Point Description: Verbose point names.

b. Control Point Name: Short point (variable) names.

c. Control Point Data Type: Each control point shall be identified as *analog* (A), binary (B), or multi-state value (MSV).

d. Units: Each analog control point shall have the expected units defined.

5.3.3.2. User Input Fields shall be populated before commencing testing, based on the controller and sequence under test.

a. Device Network Address: The BACnet device address of the controller under test when connected to the testbed.

b. BACnet Device Instance Number: The BACnet device instance of the controller under test when connected to the testbed.

c. BACnet Object Name: The name of the equivalent control point in the sequence under test.

d. BACnet Object ID: The BACnet Object ID number for the corresponding control point on the controller under test.

e. Binary/MSV Mapping: Definition of the mapping between values used in the Test Script and their numerical equivalents where different from the defaults. For binary and multistate variables only, blank otherwise.

f. Notes: Human-legible notes and explanations about individual control points. Optional.

5.3.4. After the column titles, each row represents a single control point, with columns divided between normative information and user input fields. Rows shall be grouped as input points followed by output points, exactly matching the list of points in the corresponding Test Script.

5.3.5. Each Point Mapping Index corresponds to a specific Test Script as part of a Test Definition Package and is versioned with that Test Definition Package as a normative part of this Standard. Point Mapping Index files are provided for each equipment test in Appendix B.

5.4 Test Script

5.4.1. The Test Script controls the testbed's execution and evaluation of the conformance test.

5.4.1.1. It is organized as a logical table that identifies input control points to be written to the controller under test and output points to be monitored, along with expected responses for each test step.

5.4.1.2. Test steps shall be enumerated sequentially and organized into test blocks.

5.4.2. Logical table structure: Starting with the leftmost column, the columns of the Test Script file shall be organized as follows:

5.4.2.1. Control Point Description: Verbose point names that match, as closely as practicable, those used in the sequence under test.

5.4.2.2. Control Point Name: Short names that do not contain spaces or special characters. May be referenced directly or used in test calculations (see Expressions & Functions).

5.4.2.3. Tolerance: For monitored (output) variables, the amount by which the measured value may deviate from the expected value without causing the test to fail. (For input variables this column is null.)

5.4.2.4. Test Steps: Each column after the third represents a single test step. Test steps are organized into test blocks identified by letter (A, B, etc.) and enumerated within each block. Any test step can be uniquely identified by its block-number index, e.g., C-12 is the twelfth step of the third test block.

5.4.3. Test step structure, within the logical table:

5.4.3.1. Each column title shall describe the intent and expected response for that test step, and shall provide a section reference to the relevant logic in the sequence under test.

5.4.3.2. After the column titles, each of a series of rows (quantity varies by test) shall represent one input variable.

5.4.3.3. After the input variables, the next three rows shall specify the termination conditions for that step, which consist of a time limit, and optionally a monitored variable with a limit value.

5.4.3.4. After the termination condition, each of a series of rows (quantity varies by test) shall represent one output variable.

5.4.3.5. For each input or output control point and at each test step (each cell of the logical table), the Test Script shall assign a simple data value or a function/expression value.

5.4.4. Simple data values are decimal numbers or all-caps words (e.g., OPEN, OCCUPIED, which are mapped to numerical values by the testbed software). Simple data values may appear as inputs or outputs.

5.4.4.1. Analog values: See Paragraph 4.1

5.4.4.2. Binary values: See Paragraph 4.2

5.4.4.3. MSVs. See Paragraph 4.3. For MSVs defined in 4.3.3, the Test Script shall reference the English-language representations.

5.4.5. Expressions and Functions: A cell containing an expression or function shall be prefixed with an equals sign "=" if it is an input or a comparison operator (>, <, >=, <=, =) if it is an output.

5.4.5.1. Expressions. Applies to inputs and outputs.

a. Variable references. A variable reference represents the value of the referenced control point during the test step. Variable references may be used in isolation or embedded in functions or expressions.

b. Math operations. Simple math operations for addition, subtraction, multiplication, and division shall be defined with an all-caps function call and two values contained within parentheses, which may be input variables, output variables or decimals.

1. Addition: ADD(A; B) = A + B

2. Subtraction: SUB(A; B) = A - B

3. Multiplication: MULT(A; B) = A * B

4. Division: DIV(A; B) = A / B

c. LAST: Denotes the value of that variable at the end of the previous test step. The effect is logically equivalent to the variable referencing itself.

5.4.5.2. Input functions apply to inputs variables only. They are defined with an all-caps function call followed by values in parentheses. Input functions are real-time calculations that update continuously, based on the current value of any referenced variables.

a. RAMP(start_value; end_value; duration)

1. The RAMP function writes 'start_value' to the target control point at the beginning of the test step and then continuously updates the value until it reaches 'end_value' after a total of 'duration' seconds or until it reaches the end of the test step, whichever comes sooner.

2. Either or both of 'start_value' and 'end_value' may be expressions. However, only expressions that are fixed for the duration of the test step should be used, in order to avoid logic conflicts in the testbed software. If an expression varies in value during the test step, use PERIODIC instead.

3. Example: RAMP(ZoneTemp; 74.1; 60)

i. Commands the testbed to increase or decrease the target variable from the value of ZoneTemp to 74.1°F over a duration of one minute (60 seconds). This is useful for simulating (simple, linear) changing physical conditions.

b. PERIODIC(value)

1. The PERIODIC function writes the value of a specified variable or expression to the target control point repeatedly for the duration of the test step. When PERIODIC references a variable, the value of that variable is updated each cycle before the value of the function is recalculated.

2. This function is typically used to simulate simple physical feedback that would occur in a real building system, by referencing another control point whose value is itself changing over the duration of the test step.

3. Example: PERIODIC(SUB(AirSp;5))

i. If this function is applied to the Zone Supply Airflow control point, the value of Zone Supply Airflow is continuously set to 5 CFM less than the current value of the Airflow Setpoint control point. This is useful if Airflow Setpoint is changing in real time due to e.g. a setpoint reset in the sequence under test.

5.4.5.3. Output operators and functions apply to output variables only.

a. Comparisons: A comparison operator (>, <, >=, <=, =) can be applied to any output variable, expression, or function and are operative in determining pass/fail status for that variable at that test step.

b. ANY: Shall denote that any value for that output variable is accepted as passing for that test step. (Choice of comparison operator is irrelevant; typically prefixed with "=".)

c. INTERPOLATE(x; x0; x1; y0; y1; [min_out]; [max_out]) shall return a linearly interpolated (or extrapolated) value y from x using points (x0,y0) and (x1,y1), computed as:

$$y = y_0 + (y_1 - y_0) * \frac{(x - x_0)}{(x_1 - x_0)}$$

If MIN_OUT and/or MAX_OUT are provided, the result shall be clamped to the corresponding limit(s). If both are provided, the result shall be clamped to the interval. When MAX_OUT alone is provided, MIN_OUT shall be "N/A".

5.4.6. Each Test Script corresponds to the specific to the type of equipment being controlled (e.g. single-duct VAV-reheat) and the sequence under test, defining the scope of the Test Definition Package of which it is part. Test Scripts are maintained under version control as part of the normative Standard and shall not be modified by the user. Test scripts are included in Appendix C.

5.5 Test Configuration File

5.5.1. The Test Configuration file is used to specify which tests and/or test blocks are to be executed in a test run.

5.5.2. There shall be one Test Configuration file for each major equipment type (e.g., cooling-only VAV terminal, VAV reheat terminal, multiple-zone VAV AHU) for which tests have been defined under this Standard.

5.5.3. Test Configuration files are organized into one or more Test Series. A Test Series is a set of tests for a single equipment instance/configuration. For example:

5.5.3.1. A single Test Series for a VAV reheat terminal test might reference separate Test Definition Packages for zone thermal control, zone ventilation logic, and VAV box damper/coil airflow control.

5.5.3.2. A second Test Series in the same Test Configuration file might reference a similar set of three Test Definition Packages, but with different ventilation logic (e.g., Title 24 vs. Standard 62.1 requirements).

5.5.3.3. In this way, modular or configurable control sequences that support multiple equipment or control logic variations can be comprehensively tested as complete, functional sequences, as is required to Demonstrate Conformance under this Standard (see Paragraph 10).

5.5.4. Each Test Series references one or more Test Definition Packages, specified by control sequence version and Test Definition Package version.

5.5.4.1. The version of the control sequence under test shall be specified by the user and shall be the same for all tests in the Test Configuration file.

5.5.4.2. The version of the Test Definition Package shall be the latest included with this Standard.

5.5.4.3. The user shall indicate specific test blocks to be tested from among the list of blocks corresponding to each Test Definition Package.

5.5.5. Logical Table Structure:

5.5.5.1. Each Test Configuration file is part of the normative standard but includes a limited number of user-entry fields:

5.5.5.2. Test Information, user-entry fields:

a. Organization

b. Product Line: the name of the manufacturer and product line of the controller under test

c. Control Program Version: the version of the BAS software running on the controller under test

d. Contact Person Name

e. Contact Person Phone

f. Contact Person Email

g. Control Sequence Version: the control sequence under test; all tests in the Test Configuration file shall reference the same control sequence under test

5.5.5.3. Test Selection:

a. Run. A user-entry field to indicate which test blocks to run

b. Equipment

c. Equipment Instance

d. Sequence Version: the Test Configuration file automatically reproduces the Control Sequence Version selected above

e. Test Version

f. Test Block

5.5.6. For any single run, the user shall only select test blocks within a single Test Series.

5.5.7. Test Configuration files are included in Normative Appendix D.

6. TESTBED REQUIREMENTS

6.1 Overview

6.1.1. The testbed consists of the complete system required to execute and evaluate conformance tests under this Standard. It includes:

6.1.1.1. The logic under test (see Definitions)

6.1.1.2. The controller under test (see Definitions)

6.1.1.3. The sequences under test (see Definitions)

6.1.1.4. The testbed software (see Definitions)

6.1.1.5. A network connection that will allow BACnet communication between the testbed software and the controller under test.

6.1.1.6. One or more Test Definition Packages (Test Script, Pre-Set Parameters, and Point Mapping Index – see Required Test Files) corresponding to the sequences under test.

6.1.1.7. A single Test Configuration file (see Required Test Files).

6.1.2. The testbed shall not require or provide for connection to physical sensors or devices. All tests are conducted through BACnet communication with the controller under test.

6.2 BACnet Networking

6.2.1. Testbed shall support communication via BACnet/IP.

6.2.2. The workstation running the testbed software shall connect to the controller via hardwired RJ-45 cable to avoid potential timing issues introduced by network latency.

6.3 Controller Under Test

6.3.1. The controller under test may consist of one or more physical or logical devices, but shall consist of the minimum equipment required to attain functionality for the test.

6.3.2. The controller under test shall be configured in accordance with this Standard prior to testing.

6.3.2.1. The logic under test shall be fully loaded and enabled on the controller under test.

6.3.2.2. All state conditions specified in the Pre-Set Parameters file shall be programmed or set.

6.3.2.3. All points listed in the selected test scripts and point mapping index files shall be exposed via

BACnet. All output points shall be available to read, and all input points shall be available read and write.

6.3.3. The controller under test shall be in an operational state suitable for executing the logic under test using the input stimulation provided by the testbed software.

6.4 Testbed Software Required Capabilities

6.4.1. The testbed software shall support BACnet communication capabilities sufficient to execute the selected test scripts, including:

6.4.1.1. discovery or addressing sufficient to locate mapped points on the controller under test

6.4.1.2. reading values from mapped input and output points

6.4.1.3. writing values to mapped input points.

6.4.2. The testbed software shall autonomously connect to the controller under test based on the information provided in the Point Mapping Index (See Required Test Files). The testbed software shall:

6.4.2.1. Use the provided device network address or BACnet device instance number to connect to the controller under test.

6.4.2.2. Use the provided BACnet object names and IDs to connect to each specified control point.

6.4.2.3. Provide verification failsafes for accurate point mapping:

a. If it cannot confirm access (read access for outputs or read/write access for inputs) to all required points for selected tests prior to execution, the test run shall terminate immediately with an informative error message.

b. Upon verification of mapping, it shall output the list of BACnet Object Names discovered on the controller under test, along with the associated variable names from Point Mapping Index file, to allow the user to manually verify that the mapping is correct.

6.4.3. The testbed software shall, upon user initiation, autonomously execute the Test Scripts specified in the Test Configuration file (See Required Test Files).

6.4.3.1. For each test block specified in the Test Configuration, the testbed software shall execute each test step in sequential order as specified in the Test Script.

6.4.3.2. Once initiated, the testbed software shall require no further user intervention or oversight until the test process is complete.

6.4.4. The testbed software shall perform read and write operations at the testbed sampling rate, which shall be six cycles per minute (one cycle per 10 seconds).

7. TEST PROTOCOL

7.1 Test Structure

7.1.1. The sequence of actions within each Test Script shall be organized into test blocks. Each test block is a set of test steps that are logically or procedurally related to a specific control function (e.g., supply air temperature control).

7.1.2. Each test block shall be organized such that it can be executed in isolation, without dependence on other blocks within the same Test Script.

7.1.3. The first step within a test block shall be an initialization step that defines a consistent starting condition and which is maintained sufficiently for the controller to stabilize from any starting state.

7.1.4. Subsequent steps within a test block shall proceed successively based on the conditions from the previous test step, except where otherwise noted.

7.2 Test Step Lifecycle

7.2.1. Test Step Start

7.2.1.1. The testbed software shall store the previous value of each output variable from the controller under test, and load the specified value or function of each input variable in the Test Script.

7.2.1.2. The software shall calculate the values of any functions assigned to input variables, using the input and output variable values just obtained.

7.2.1.3. The software shall then write specified or calculated values to the input control points on the controller under test.

a. Binary values referenced in the Test Script as English language words shall be written as digital values (1 or 0) per the Point Mapping Index.

b. MSVs referenced in the Test Script as English language words shall be written as numerical values per the Point Mapping Index.

7.2.2. Test Step Duration

7.2.2.1. The test step shall continue until it achieves a termination condition specified in the Test Script.

a. If the termination condition includes a monitored variable and limit value, the testbed software shall sample that variable continuously for the duration of the test step.

7.2.2.2. For the duration of the test step, the testbed software shall continuously evaluate and update the values of any real-time input functions. All other input variables shall remain at their specified values.

a. Before updating an input function that references another variable, the software shall read the current value of that variable and use that value in the calculation.

7.2.3. Test Step End (Termination Condition)

7.2.3.1. Each test step shall end when the specified time limit has elapsed or when the specified variable reaches the limit value, whichever comes first. A time limit shall be specified for each test step. A limit value shall be optionally specified.

7.2.3.2. At the end of the test step, the testbed software shall read the current value of each input and output variable.

7.2.3.3. The end-of-step values shall be recorded to the output file with a timestamp.

7.3 Test Evaluation and Continuation

7.3.1. Before beginning the next test step, the testbed software shall evaluate the test step as a PASS or a FAIL.

7.3.1.1. The testbed software shall compare the recorded value for each output variable to the expected value as specified for that test step in the Test Script.

7.3.1.2. An output shall PASS if the recorded value and the expected value differ by no more than the specified tolerance. Otherwise, the output shall FAIL.

7.3.1.3. The testbed software shall record the expected value, tolerance, comparison operator, and pass/fail status of each output variable adjacent to the variable's end-of-step value.

7.3.1.4. A test step shall PASS only if every output variable in that test step does PASS. Otherwise, the test step shall FAIL.

7.3.2. If the test step does PASS, the software shall proceed directly to the next test step. Successful test steps shall proceed until the entire test block is completed.

7.3.3. If the test step does FAIL, the current test block shall FAIL and be terminated, processing no additional test

steps in that block.

7.3.4. At the end of each test block, PASS or FAIL, the software shall proceed directly to the next test block indicated in the Configuration File.

7.3.5. For each Test Definition Package in the Test Configuration file, the software shall evaluate PASS or FAIL for the Test Script as a whole, if and only if all test blocks for that Test Definition Package have been selected for execution.

7.3.5.1. A Test Script shall PASS only if every block in that Test Script does PASS. Otherwise, the Test Script shall FAIL.

7.3.5.2. If any test blocks have been omitted from the test run, the Test Script results shall evaluate as N/A.

7.3.6. When all specified test blocks are complete, the software shall generate the required output files.

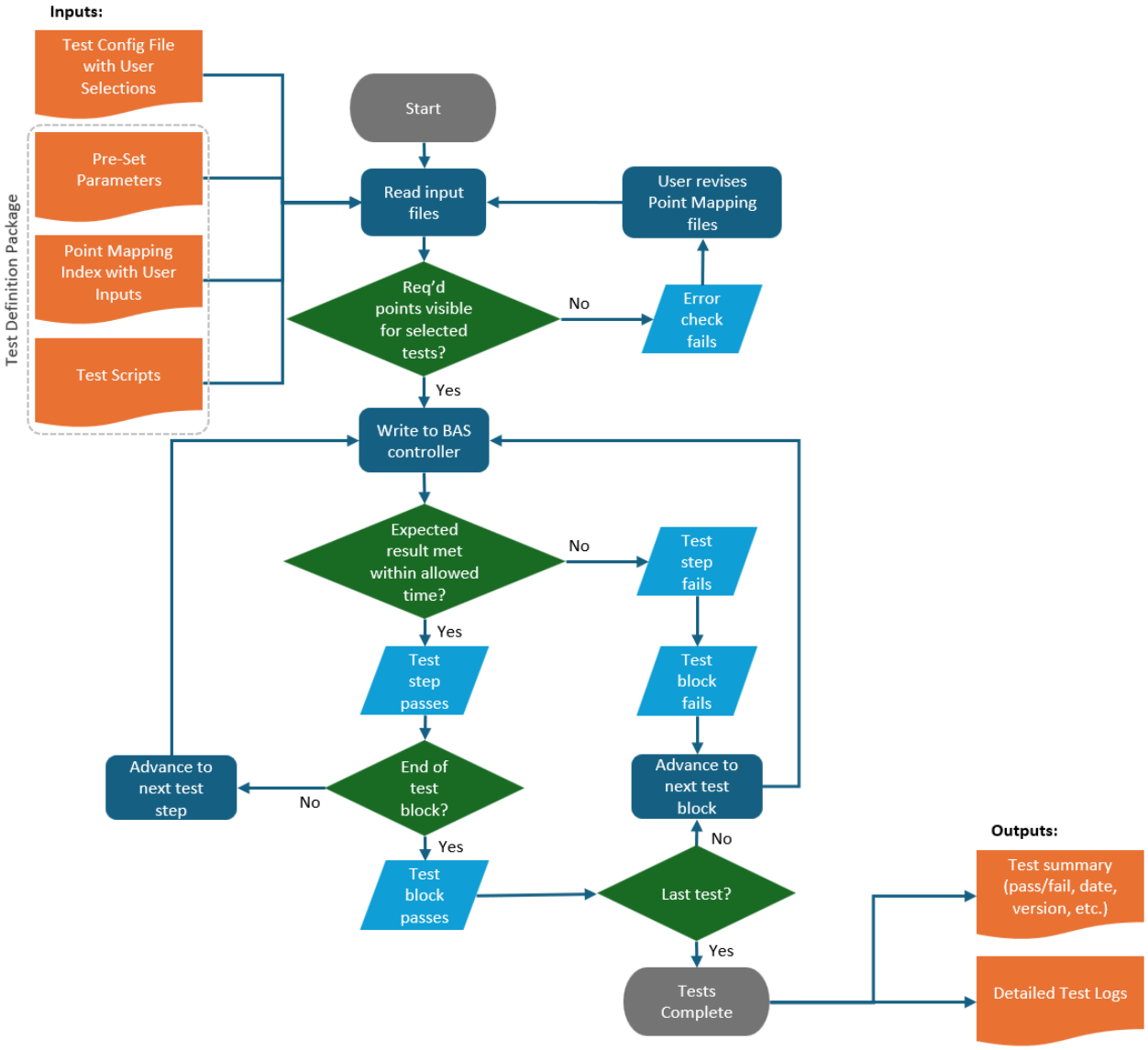

Figure 1 Test Flow Chart

8. TEST PROCEDURE

8.1 Prepare Testbed

8.1.1. Select the Test Configuration file corresponding to the relevant equipment and sequences under test.

8.1.2. Specify test blocks to be run in the Test Configuration file.

8.1.2.1. All blocks specified for a given run shall be from the same Test Series.

8.1.2.2. If the purpose of the test is to demonstrate Conformance under this Standard, then all test blocks for the relevant Test Series must be selected.

8.1.3. Populate user-input fields of Point Mapping Index for the controller under test.

8.1.4. Prepare the controller under test.

8.1.4.1. Set parameters in the control programming to the values expected in the Pre-Set Parameters file.

8.1.4.2. Load the control programming for the sequences under test.

8.1.4.3. Connect controller to testbed.

8.2 Reading Input Files

8.2.1. Load each Point Mapping Index file and execute point mapping check

8.2.2. Load each Test Script file. Test Script shall be used as provided, without user edits or modifications.

8.2.3. Load Test Configuration file.

8.2.4. Initiate test. Test shall run without user intervention.

8.2.5. When test is complete, the testbed software shall generate the specified output files.

9. REQUIRED OUTPUTS

9.1 Test record. A CSV file providing the following information:

9.1.1. Listing of equipment tests executed and number passed or failed, by tests and test blocks

9.1.2. Time elapsed for each test

9.1.3. For failed tests, recorded vs expected values which resulted in test failure.

9.1.4. Summary of testing information indicated in the Test Configuration File (Paragraph 5.5.5.2).

9.1.5. Date of test

9.2 Detailed test log. A CSV file, organized by test block, with timestamped values reported at the testbed sampling interval for each of the following:

9.2.1. Inputs written

9.2.2. Outputs read

9.2.3. Expected outputs

9.2.4. Failed tests

10. CONFORMANCE TESTING

10.1 This Standard defines a Method of Test for demonstrating that a particular control sequence implementation (the logic under test) conforms to the functional intent of the sequence of operations on which the logic was based (the sequence under test). This shall require:

10.1.1. Comprehensively testing all equipment variations for which tests have been developed under this Standard.

10.1.2. Testing complete, fully-functional control logic implementations that support all features required by the applicable tests.

10.2 In order to demonstrate Conformance under this standard:

10.2.1. The logic under test shall be tested in accordance with unmodified Test Scripts that are a normative part of

this Standard.

10.2.2. Testing shall be performed using a testbed system and testbed software that meet the requirements of this Standard.

10.2.3. For each Test Series in the applicable Test Configuration file, the logic under test shall PASS every test step in every test block in all Test Definition Packages specified for that Test Series.

10.2.3.1. Each Test Series in the applicable Test Configuration file shall achieve this in a single autonomous and continuous testing run, without interruption or user intervention. Test runs may be performed on a subset of test blocks for evaluation or pre-testing purposes, but such fractional testing shall not demonstrate Conformance under this standard.

10.2.4. Each Test Series shall be performed as a single, distinct testing run, and every Test Series in the Test Configuration file shall PASS.

10.2.4.1. The logic under test shall be interchanged as required between Test Series runs, in order to reflect the equipment variations being tested in each Test Series.

10.2.4.2. Logic implementations that do not support all of the equipment variations for which tests have been defined under this standard, shall not be deemed to Conform under this Standard.

NORMATIVE APPENDIX A
PRE-SET PARAMETER FILES

PARAMETER NAME	VALUE	UNITS
Cooling Offset, Demand Limit Level 1	1	F
Cooling Offset, Demand Limit Level 2	2	F
Cooling Offset, Demand Limit Level 3	4	F
Heating Offset, Demand Limit Level 1	1	F
Heating Offset, Demand Limit Level 2	2	F
Heating Offset, Demand Limit Level 3	4	F
Cooling Supply Air Temperature T&R Initial Setpoint	65	F
Cooling Supply Air Temperature T&R Minimum Setpoint	55	F
Cooling Supply Air Temperature T&R Maximum Setpoint	65	F
Cooling Supply Air Temperature T&R Delay Timer	600	seconds
Cooling Supply Air Temperature T&R Time Step	120	seconds
Cooling Supply Air Temperature T&R Number of Ignored Requests	2	
Cooling Supply Air Temperature T&R Trim Amount	0.2	F
Cooling Supply Air Temperature T&R Respond Amount	-0.3	F
Cooling Supply Air Temperature T&R Maximum Response	-1.0	F
Duct Static Pressure T&R Initial Setpoint	0.5	
Duct Static Pressure T&R Minimum Setpoint	0.1	
Duct Static Pressure T&R Maximum Setpoint	2.0	inWG
Duct Static Pressure T&R Delay Timer	600	seconds
Duct Static Pressure T&R Time Step	120	seconds
Duct Static Pressure T&R Number of Ignored Requests	2	
Duct Static Pressure T&R Trim Amount	-0.05	inWG
Duct Static Pressure T&R Respond Amount	0.06	inWG
Duct Static Pressure T&R Maximum Response	0.13	inWG
Lowest Cooling SAT Setpoint	55	F
Highest Cooling SAT Setpoint	65	F
OAT Reset Lower Bound	60	F
OAT Reset Upper Bound	70	F
Economizer Lockout Climate Zone	3	
Economizer Lockout Method	Fixed Drybulb	
Standard 62.1 Design Total Outdoor Airflow, DesVot		CFM
MinOA Damper DP for Design Minimum Airflow		inWG
MinOA Damper DP for Absolute Minimum Airflow		inWG
Building Pressure Setpoint	0.05	inWG
Relief Fan Minimum Speed		%
Return Fan Minimum Speed		%
Return Fan Discharge Static Pressure Setpoint, Minimum		inWG
Return Fan Discharge Static Pressure Setpoint, Maximum		inWG
Supply-Return Airflow Differential		CFM
Return Fan Maximum Airflow Rate		CFM

NORMATIVE APPENDIX B
POINT MAPPING INDEX FILES

Generic Ventilation Zones

Generic Thermal Zones

Variable Air Volume Reheat Terminal

Variable Air Volume Reheat Terminal (populated example)

Multiple Zone VAV Air Handling Unit – Common Tests

Control Point Description	Control Point Name	Type	Units	Device Network Address	BACnet Device Instance Number	BACnet Object Name	BACnet Object ID	Binary/MSV Mapping Override
WRITABLE POINTS								
Zone Temperature Setpoint, Occupied Heating	OccHeatSp	analog	F					
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp	analog	F					
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp	analog	F					
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp	analog	F					
Zone Minimum Outdoor Airflow for Building Area (Varea-min	VAreaMin	analog	CFM					
Zone Minimum Outdoor Airflow for Occupants (Vocc-min)	VOccMin	analog	CFM					
Zone CO2 Limit	ZoneCO2Limit	analog	PPM					
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax	analog	CFM					
Zone Minimum Airflow (Vmin)	Vmin	analog	CFM					
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax	analog	CFM					
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin	analog	CFM					
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT	analog	F					
VAV Box Controllable Minimum (Vm)	Vm	analog	CFM					
Zone Discharge Airflow	ZoneSupAirflow	analog	CFM					
Zone Discharge Air Temperature	ZoneDAT	analog	F					
Zone Temperature	ZoneTemp	analog	F					
Zone CO2 Level	ZoneCO2	analog	PPM					
Local Override	ZoneOverSwitch	binary	-					
Occupancy Sensor	ZoneOccSensor	binary	-					
Window Switch	ZoneWinSwitch	binary	-					
AHU Supply Fan Status	AHUSupFanStatus	binary	-					
AHU Supply Air Temperature Setpoint	AHUSATSp	analog	F					
AHU Supply Air Temperature	AHUSAT	analog	F					
Hot Water Plant Status	HWPlantStatus	binary	-					
Zone Group Mode	ZoneGrpMode	analog/ multistate	-					

Control Point Description	Control Point Name	Type	Units	Device Network Address	BACnet Device Instance Number	BACnet Object Name	BACnet Object ID	Binary/MSV Mapping Override
READABLE POINTS								
CO2 Control Loop Output	ZoneCO2Loop	analog	%					
Cooling Maximum Airflow Endpoint	CoolMaxAir	analog	CFM					
Cooling Minimum Airflow Endpoint	CoolMinAir	analog	CFM					
Deadband Minimum Airflow Endpoint	DbMinAir	analog	CFM					
Heating Minimum Airflow Endpoint	HeatMinAir	analog	CFM					
Heating Maximum Airflow Endpoint	HeatMaxAir	analog	CFM					
Occupied Minimum Airflow (vmin*)	Vmin*	analog	CFM					
Zone Active Airflow Setpoint (Vspt)	Vspt	analog	CFM					
Zone Absolute Minimum Outside Airflow	ZoneAbsOAmin	analog	CFM					
Zone Design Minimum Outside Airflow	ZoneDesOAmin	analog	CFM					
CO2 Sensor Calibration Alarm, Level 3	CO2SensCal3	binary	-					
High CO2 Concentration Alarm, Level 3	HiCO23	binary	-					

Control Point Description	Control Point Name	Type	Units	Device Network Address	BACnet Device Instance Number	BACnet Object Name	BACnet Object ID	Binary/MSV Mapping Override
WRITABLE POINTS								
Zone Temperature Setpoint, Occupied Heating	OccHeatSp	analog	F					
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp	analog	F					
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp	analog	F					
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp	analog	F					
Demand Limit Level	DemandLimit	analog/ multistate	-					
Zone CO2 Limit	ZoneCO2Limit	analog	PPM					
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax	analog	CFM					
Zone Minimum Airflow (Vmin)	Vmin	analog	CFM					
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax	analog	CFM					
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin	analog	CFM					
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT	analog	F					
VAV Box Controllable Minimum (Vm)	Vm	analog	CFM					
Zone Discharge Airflow	ZoneSupAirflow	analog	CFM					
Zone Discharge Air Temperature	ZoneDAT	analog	F					
Zone Temperature	ZoneTemp	analog	F					
Zone CO2 Level	ZoneCO2	analog	PPM					
Local Override	ZoneOverSwitch	binary	-					
Occupancy Sensor	ZoneOccSensor	binary	-					
Window Switch	ZoneWinSwitch	binary	-					
AHU Supply Fan Status	AHUSupFanStatus	binary	-					
AHU Supply Air Temperature Setpoint	AHUSATSp	analog	F					
AHU Supply Air Temperature	AHUSAT	analog	F					
Hot Water Plant Status	HWPlantStatus	binary	-					
Zone Group Mode	ZoneGrpMode	analog/ multistate	-					

Control Point Description	Control Point Name	Type	Units	Device Network Address	BACnet Device Instance Number	BACnet Object Name	BACnet Object ID	Binary/MSV Mapping Override
READABLE POINTS								
Cooling Loop Output	ZoneCoolLoop	analog	%					
Heating Loop Output	ZoneHeatLoop	analog	%					
CO2 Control Loop Output	ZoneCO2Loop	analog	%					
Active Heating Setpoint	ZoneActHeatSp	analog	F					
Active Cooling Setpoint	ZoneActCoolSp	analog	F					
Zone Active Airflow Setpoint (Vspt)	Vspt	analog	CFM					
Discharge Air Temperature Setpoint	DATSp	analog	F					
Zone High Temperature Alarm, Level 4	HighZnTemp4	binary	-					
Zone High Temperature Alarm, Level 3	HighZnTemp3	binary	-					
Zone Low Temperature Alarm, Level 4	LowZnTemp4	binary	-					
Zone Low Temperature Alarm, Level 3	LowZnTemp3	binary	-					
Open Window Alarm, Level 4	OpenWin4	binary	-					

Control Point Description	Control Point Name	Type	Units	Device Network Address	BACnet Device Instance Number	BACnet Object Name	BACnet Object ID	Binary/MSV Mapping Override
WRITABLE POINTS								
Zone Temperature Setpoint, Occupied Heating	OccHeatSp	analog	F					
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp	analog	F					
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp	analog	F					
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp	analog	F					
Zone CO2 Limit	ZoneCO2Limit	analog	PPM					
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax	analog	CFM					
Zone Minimum Airflow (Vmin)	Vmin	analog	CFM					
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax	analog	CFM					
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin	analog	CFM					
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT	analog	F					
VAV Box Controllable Minimum (Vm)	Vm	analog	CFM					
Zone Discharge Airflow	ZoneSupAirflow	analog	CFM					
Zone Discharge Air Temperature	ZoneDAT	analog	F					
Zone Temperature	ZoneTemp	analog	F					
Zone CO2 Level	ZoneCO2	analog	PPM					
Occupancy Sensor	ZoneOccSensor	binary	-					
Window Switch	ZoneWinSwitch	binary	-					
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT	analog	-					
Static Pressure Reset Requests Importance Multiplier	IM_DSP	analog	-					
Hot Water Supply Temperature Reset Requests Importance	IM_HWST	analog	-					
Hot Water Plant Requests Importance Multiplier	IM_HWP	analog	-					
AHU Supply Fan Status	AHUSupFanStatus	binary	-					
AHU Supply Air Temperature Setpoint	AHUSATSp	analog	F					
AHU Supply Air Temperature	AHUSAT	analog	F					
Hot Water Plant Status	HWPlantStatus	binary	-					
Zone Group Mode	ZoneGrpMode	analog/ multistate	-					

Control Point Description	Control Point Name	Type	Units	Device Network Address	BACnet Device Instance Number	BACnet Object Name	BACnet Object ID	Binary/MSV Mapping Override
READABLE POINTS								
Cooling Loop Output	ZoneCoolLoop	analog	%					
Heating Loop Output	ZoneHeatLoop	analog	%					
Active Heating Setpoint	ZoneActHeatSp	analog	F					
Active Cooling Setpoint	ZoneActCoolSp	analog	F					
Cooling Maximum Airflow Endpoint	CoolMaxAir	analog	CFM					
Cooling Minimum Airflow Endpoint	CoolMinAir	analog	CFM					
Deadband Minimum Airflow Endpoint	DbMinAir	analog	CFM					
Heating Minimum Airflow Endpoint	HeatMinAir	analog	CFM					
Heating Maximum Airflow Endpoint	HeatMaxAir	analog	CFM					
Occupied Minimum Airflow (vmin*)	Vmin*	analog	CFM					
Zone Active Airflow Setpoint (Vspt)	Vspt	analog	CFM					
Discharge Air Temperature Setpoint	DATSp	analog	F					
VAV Box Damper Command	VAVDmprCmd	analog	%					
Reheat Command	RhCommand	analog	%					
Cooling SAT Reset Requests	CoolSATReq	analog	-					
Static Pressure Reset Requests	StatPresReq	analog	-					
Hot Water Reset Requests	HWSTReq	analog	-					
Hot Water Plant Requests	HWPlantReq	analog	-					
Zone Low Airflow Alarm, Level 4	LowAirflow4	binary	-					
Zone Low Airflow Alarm, Level 3	LowAirflow3	binary	-					
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	binary	-					
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	binary	-					
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	binary	-					
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	binary	-					
VAV Leaking Valve Alarm, Level 4	LeakVlv4	binary	-					

Control Point Description	Control Point Name	Type	Units	Device Network Address	BACnet Device Instance Number	BACnet Object Name	BACnet Object ID	Binary/MSV Mapping Override
WRITABLE POINTS								
Zone Temperature Setpoint, Occupied Heating	OccHeatSp	analog	F	*129.6.172.112*	*1*	*occ_ht_stpt*	*AV 9*	
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp	analog	F	*129.6.172.112*	*1*	*occ_cl_stpt*	*AV 10*	
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp	analog	F	*129.6.172.112*	*1*	*unocc_hsp*	*AV 71*	
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp	analog	F	*129.6.172.112*	*1*	*unocc_csp*	*AV 70*	
Zone CO2 Limit	ZoneCO2Limit	analog	PPM	*129.6.172.112*	*1*	*zn_co2_setpt*	*AV 16*	
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax	analog	CFM	*129.6.172.112*	*1*	*cmax_min*	*AV 1*	
Zone Minimum Airflow (Vmin)	Vmin	analog	CFM	*129.6.172.112*	*1*	*vmin*	*AV 72*	
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax	analog	CFM	*129.6.172.112*	*1*	*hmax_min*	*AV 2*	
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin	analog	CFM	*129.6.172.112*	*1*	*h_min*	*AV 4*	
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT	analog	F	*129.6.172.112*	*1*	*max_delta_t*	*AV 5*	
VAV Box Controllable Minimum (Vm)	Vm	analog	CFM	*129.6.172.112*	*1*	*vm*	*AV 6*	
Zone Discharge Airflow	ZoneSupAirflow	analog	CFM	*129.6.172.112*	*1*	*airflow*	*AV 15*	
Zone Discharge Air Temperature	ZoneDAT	analog	F	*129.6.172.112*	*1*	*da_temp*	*AI 14*	
Zone Temperature	ZoneTemp	analog	F	*129.6.172.112*	*1*	*zone_temp*	*AI 13*	
Zone CO2 Level	ZoneCO2	analog	PPM	*129.6.172.112*	*1*	*zone_co2*	*AI 17*	
Occupancy Sensor	ZoneOccSensor	binary	-	*129.6.172.112*	*1*	*occ_status*	*BV 21*	
Window Switch	ZoneWinSwitch	binary	-	*129.6.172.112*	*1*	*window_switch*	*BI 19*	
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT	analog	-	*129.6.172.112*	*1*	*cool_request_x*	*AV 25*	
Static Pressure Reset Requests Importance Multiplier	IM_DSP	analog	-	*129.6.172.112*	*1*	*static_request_x*	*AV 26*	
Hot Water Supply Temperature Reset Requests Importance	IM_HWST	analog	-	*129.6.172.112*	*1*	*heat_request_x*	*AV 58*	
Hot Water Plant Requests Importance Multiplier	IM_HWP	analog	-	*129.6.172.112*	*1*	*hw_request_x*	*AV 28*	
AHU Supply Fan Status	AHUSupFanStatus	binary	-	*129.6.172.112*	*1*	*ahu_status*	*BV 20*	
AHU Supply Air Temperature Setpoint	AHUSATSp	analog	F	*129.6.172.112*	*1*	*m2113*	*AV 21*	
AHU Supply Air Temperature	AHUSAT	analog	F	*129.6.172.112*	*1*	*m2095*	*AV 22*	
Hot Water Plant Status	HWPlantStatus	binary	-	*129.6.172.112*	*1*	*m2084*	*BV 55*	
Zone Group Mode	ZoneGrpMode	analog/ multistate	-	*129.6.172.112*	*1*	*zg_mode*	*AV 24*	

Control Point Description	Control Point Name	Type	Units	Device Network Address	BACnet Device Instance Number	BACnet Object Name	BACnet Object ID	Binary/MSV Mapping Override
READABLE POINTS								
Cooling Loop Output	ZoneCoolLoop	analog	%	*129.6.172.112*	*1*	*m737*	*AV 29*	
Heating Loop Output	ZoneHeatLoop	analog	%	*129.6.172.112*	*1*	*m736*	*AO 30*	
Active Heating Setpoint	ZoneActHeatSp	analog	F	*129.6.172.112*	*1*	*effective_ht_stpt*	*AV 43*	
Active Cooling Setpoint	ZoneActCoolSp	analog	F	*129.6.172.112*	*1*	*effective_cl_stpt*	*AV 44*	
Cooling Maximum Airflow Endpoint	CoolMaxAir	analog	CFM	*129.6.172.112*	*1*	*vcool-max*	*AV 32*	
Cooling Minimum Airflow Endpoint	CoolMinAir	analog	CFM	*129.6.172.112*	*1*	*cool_min*	*AV 33*	
Deadband Minimum Airflow Endpoint	DbMinAir	analog	CFM	*129.6.172.112*	*1*	*min*	*AV 34*	
Heating Minimum Airflow Endpoint	HeatMinAir	analog	CFM	*129.6.172.112*	*1*	*vheat-min*	*AV 35*	
Heating Maximum Airflow Endpoint	HeatMaxAir	analog	CFM	*129.6.172.112*	*1*	*vheat-max*	*AV 36*	
Occupied Minimum Airflow (vmin*)	Vmin*	analog	CFM	*129.6.172.112*	*1*	*vmin_eff*	*AV 37*	
Zone Active Airflow Setpoint (Vspt)	Vspt	analog	CFM	*129.6.172.112*	*1*	*vmin_eff*	*AV 37*	
Discharge Air Temperature Setpoint	DATSp	analog	F	*129.6.172.112*	*1*	*sat_hesp*	*AV 40*	
VAV Box Damper Command	VAVDmprCmd	analog	%	*129.6.172.112*	*1*	*dmpr_pos*	*AV 41*	
Reheat Command	RhCommand	analog	%	*129.6.172.112*	*1*	*hw_valve*	*AO 42*	
Cooling SAT Reset Requests	CoolSATReq	analog	-	*129.6.172.112*	*1*	*cool_request*	*AV 45*	
Static Pressure Reset Requests	StatPresReq	analog	-	*129.6.172.112*	*1*	*air_request*	*AV 18*	
Hot Water Reset Requests	HWSTReq	analog	-	*129.6.172.112*	*1*	*heat_request*	*AV 47*	
Hot Water Plant Requests	HWPlantReq	analog	-	*129.6.172.112*	*1*	*boiler_run_req*	*AV 48*	
Zone Low Airflow Alarm, Level 4	LowAirflow4	binary	-	*129.6.172.112*	*1*	*low_airflow_alm2*	*BV 9*	
Zone Low Airflow Alarm, Level 3	LowAirflow3	binary	-	*129.6.172.112*	*1*	*low_airflow_alm1*	*BV 8*	
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	binary	-	*129.6.172.112*	*1*	*dat_low2*	*BV 11*	
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	binary	-	*129.6.172.112*	*1*	*dat_low1*	*BV 10*	
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	binary	-	*129.6.172.112*	*1*	*airflow_sensor_alm*	*BV 12*	
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	binary	-	*129.6.172.112*	*1*	*leaking_dmpr*	*BV 13*	
VAV Leaking Valve Alarm, Level 4	LeakVlv4	binary	-	*129.6.172.112*	*1*	*valve_leak*	*BV 15*	

Control Point Description	Control Point Name	Type	Units	Device Network Address	BACnet Device Instance Number	BACnet Object Name	BACnet Object ID	Binary/MSV Mapping Override
WRITABLE POINTS								
AHU Supply Fan Status	AHU_SFstatus	binary	-					
Supply Air Temperature	AHU_SAT	analog	F					
Return Air Temperature	AHU_RAT	analog	F					
Mixed Air Temperature	AHU_MAT	analog	F					
Outdoor Air Temperature	OAT	analog	F					
Duct Static Pressure Requests	DSP_Req	analog	-					
Cooling SAT Requests	CoolSAT_Req	analog	-					
Duct Static Pressure	AHU_DSP	analog	inWG					
Filter Pressure Drop	FilterDP	analog	inWG					
AHU System Mode	AHUMode	analog/ multistate	-					
Building Static Pressure, Instantaneous	BldDP	analog	inWG					

Control Point Description	Control Point Name	Type	Units	Device Network Address	BACnet Device Instance Number	BACnet Object Name	BACnet Object ID	Binary/MSV Mapping Override
READABLE POINTS								
AHU Supply Fan Start/Stop	SF_SS	binary	-					
Supply Fan Speed	SF_Speed	analog	%					
Duct Static Pressure Setpoint	AHU_DSPsp	analog	inWG					
Supply Air Temperature Setpoint	AHU_SATsp	analog	F					
Economizer Outdoor Air Damper Command	AHUDamperEconOA	analog	%					
Supply Fan Alarm, Level 4	SupFanAl4	binary	-					
Supply Fan Alarm, Level 2	SupFanAl2	binary	-					
Filter Pressure Drop Alarm	FilterDpAl	binary	-					
High Building Pressure Alarm	HighBpAl	binary	-					
Low Building Pressure Alarm	LowBpAl	binary	-					

NORMATIVE APPENDIX C
TEST SCRIPTS

Generic Ventilation Zones (Title 24)

Generic Thermal Zones

Variable Air Volume Reheat Terminal

Multiple Zone VAV Air Handling Unit – Common Equipment

Equipment Configuration	Generic Ventilation Zones VAV-RH with CO2 Sensor	Test Block Description	Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints	Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints	Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Initialization	Zone OA Variable Calculation Test	Zone OA Variable Calculation Test
Test Definition Package Version	DRAFT 6	SOO Reference	N/A	5.2.1.4	5.2.1.4
Test Script Revision Date	March 3, 2026	Intervention	• This test assumes CO2 sensor is installed. • Initialize inputs to the values below. • Test starts with zone in Occupied Mode.	• Window switch is closed. • Occupancy sensor indicates presence. • Vmin is as scheduled (equals Varea-min).	• Set Vocc-min < Varea-min.
		Expected Response	• No expectations. Wait 5 minutes to allow controller to initialize.	• Zone-Abs-OA-min is equal to Varea-min. • Zone-Des-OA-min is equal to Vocc-min (> Varea-min). • Vmin* equals Vmin. • Zone airflow setpoint Vspt equals deadband endpoint DbMinAir. • DbMinAir equals Vmin*. • CoolMinAir equals Vmin*.	• Zone-Des-OA-min is equal to Zone-Abs-OA-min is equal to Varea-min, because Vocc-min < Varea-min.
Control Point Description	Control Point Name	Test Block	A	A	A
BACnet Inputs	TestInputs	Test Step	1	2	3
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone Minimum Outdoor Airflow for Building Area (Varea-min)	VAreaMin		60	60	60
Zone Minimum Outdoor Airflow for Occupants (Vocc-min)	VOccMin		120	120	50
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		=VAreaMin	=VAreaMin	=VAreaMin
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		0	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
CO2 Control Loop Output	ZoneCO2Loop	0.5	=ANY	0	0
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=ANY	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=ANY	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=ANY	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=ANY	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=ANY	=VHeatMax	=VHeatMax
Zone Active Airflow Setpoint (Vspt)	Vmin*	5	=ANY	=Vmin	=Vmin
Zone Airflow Setpoint (Vspt)	Vspt	5	=ANY	=DbMinAir	=DbMinAir
Zone Absolute Minimum Outside Airflow	ZoneAbsOAmin	5	=ANY	=VAreaMin	=VAreaMin
Zone Design Minimum Outside Airflow	ZoneDesOAmin	5	=ANY	=VOccMin	=VAreaMin
CO2 Sensor Calibration Alarm, Level 3	CO2SensCal3	0	=ANY	0	0
High CO2 Concentration Alarm, Level 3	HiCO23	0	=ANY	0	0

Equipment Configuration	Generic Ventilation Zones VAV-RH with CO2 Sensor	Test Block Description	Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints	Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints	Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Zone OA Variable Calculation Test	Window Switch & Occupancy Sensor Tests	Window Switch & Occupancy Sensor Tests
Test Definition Package Version	DRAFT 6	SOO Reference	5.2.1.4	5.2.1.4	5.2.1.4
Test Script Revision Date	March 3, 2026	Intervention	• Restore original value of Vocc-min.	• Set window switch to OPEN.	• Set window switch to CLOSED.
		Expected Response	• Zone-Abs-OA-min is equal to Varea-min. • Zone-Des-OA-min is equal to Vocc-min (> Varea-min).	• Zone-Abs-OA-min equals 0. • Zone-Des-OA-min equals 0. • Vmin* equals 0. • Vspt equals 0. • CoolMinAir equals 0. • DbMinAir equals 0.	• Zone-Abs-OA-min is equal to Varea-min. • Zone-Des-OA-min is equal to Vocc-min. • Vmin* equals Vmin. • Vspt equals DbMinAir. • CoolMinAir equals Vmin*. • DbMinAir equals Vmin*.
Control Point Description	Control Point Name	Test Block	A	A	A
BACnet Inputs	TestInputs	Test Step	4	5	6
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone Minimum Outdoor Airflow for Building Area (Varea-min)	VAreaMin		60	60	60
Zone Minimum Outdoor Airflow for Occupants (Vocc-min)	VOccMin		120	120	120
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		=VAreaMin	=VAreaMin	=VAreaMin
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	OPEN	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	0	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	0	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Zone Active Airflow Setpoint (Vspt)	Vmin*	5	=Vmin	0	=Vmin
Zone Airflow Setpoint (Vspt)	Vspt	5	=DbMinAir	0	=DbMinAir
Zone Absolute Minimum Outside Airflow	ZoneAbsOAmin	5	=VAreaMin	0	=VAreaMin
Zone Design Minimum Outside Airflow	ZoneDesOAmin	5	=VOccMin	0	=VOccMin
CO2 Sensor Calibration Alarm, Level 3	CO2SensCal3	0	0	0	0
High CO2 Concentration Alarm, Level 3	HiCO23	0	0	0	0

Equipment Configuration	Generic Ventilation Zones VAV-RH with CO2 Sensor	Test Block Description	Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints	Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints	Zone CO2 DCV Response and CO2 Sensor Alarm Tests FOR 2021
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Window Switch & Occupancy Sensor Tests	Window Switch & Occupancy Sensor Tests	Initialization
Test Definition Package Version	DRAFT 6	SOO Reference	5.2.1.4	5.2.1.4	N/A
Test Script Revision Date	March 3, 2026	Intervention	• Set occupancy sensor to UNPOPULATED.	• Set occupancy sensor to PRESENT.	• Initialize inputs to the values below.
		Expected Response	• Zone-Abs-OA-min equals 0. • Zone-Des-OA-min equals 0. • Vmin* equals 0. • Vspt equals 0. • CoolMinAir equals 0. • DbMinAir equals 0.	• Zone-Abs-OA-min is equal to Varea-min. • Zone-Des-OA-min is equal to Vocc-min. • Vmin* equals Vmin. • Vspt equals DbMinAir. • CoolMinAir equals Vmin*. • DbMinAir equals Vmin*.	• No expectations. Wait 5 minutes to allow for initialization
Control Point Description	Control Point Name	Test Block	A	A	B
BACnet Inputs	TestInputs	Test Step	7	8	1
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone Minimum Outdoor Airflow for Building Area (Varea-min)	VAreaMin		60	60	60
Zone Minimum Outdoor Airflow for Occupants (Vocc-min)	VOccMin		120	120	120
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		=VAreaMin	=VAreaMin	=VAreaMin
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		UNPOPULATED	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:30:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	=ANY
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=ANY
Cooling Minimum Airflow Endpoint	CoolMinAir	5	0	=Vmin*	=ANY
Deadband Minimum Airflow Endpoint	DbMinAir	5	0	=Vmin*	=ANY
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=ANY
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=ANY
Zone Active Airflow Setpoint (Vspt)	Vmin*	5	0	=Vmin	=ANY
Zone Airflow Setpoint (Vspt)	Vspt	5	0	=DbMinAir	=ANY
Zone Absolute Minimum Outside Airflow	ZoneAbsOAmin	5	0	=VAreaMin	=ANY
Zone Design Minimum Outside Airflow	ZoneDesOAmin	5	0	=VOccMin	=ANY
CO2 Sensor Calibration Alarm, Level 3	CO2SensCal3	0	0	0	=ANY
High CO2 Concentration Alarm, Level 3	HiCO23	0	0	0	=ANY

Equipment Configuration	Generic Ventilation Zones VAV-RH with CO2 Sensor	Test Block Description	Zone CO2 DCV Response and CO2 Sensor Alarm Tests	Zone CO2 DCV Response and CO2 Sensor Alarm Tests	Zone CO2 DCV Response and CO2 Sensor Alarm Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Initialization	CO2 Sensor Calibration Alarm Test	CO2 DCV Response Test
Test Definition Package Version	DRAFT 6	SOO Reference	N/A	5.2.2.3	5.2.1.4.d.3
Test Script Revision Date	March 3, 2026	Intervention	• No change.	• Set Zone CO2 to 290 PPM.	• Set Zone CO2 to 800 PPM.
		Expected Response	• Zone is in deadband. • Zone-Abs-OA-min is equal to Varea-min. • Zone-Des-OA-min is equal to Vocc-min (> Varea-min). • Vmin* equals Vmin. • Zone airflow setpoint Vspt equals deadband endpoint DbMinAir. • DbMinAir equals Vmin*. • CoolMinAir equals Vmin*.	• CO2 sensor calibration alarm.	• CO2 sensor calibration alarm clears. • No DCV response as CO2 level below DCV range.
Control Point Description	Control Point Name	Test Block	B	B	B
BACnet Inputs	TestInputs	Test Step	2	3	4
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone Minimum Outdoor Airflow for Building Area (Varea-min)	VAreaMin		60	60	60
Zone Minimum Outdoor Airflow for Occupants (Vocc-min)	VOccMin		120	120	120
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		=VAreaMin	=VAreaMin	=VAreaMin
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	290	800
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Zone Active Airflow Setpoint (Vspt)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Airflow Setpoint (Vspt)	Vspt	5	=DbMinAir	=DbMinAir	=DbMinAir
Zone Absolute Minimum Outside Airflow	ZoneAbsOAmin	5	=VAreaMin	=VAreaMin	=VAreaMin
Zone Design Minimum Outside Airflow	ZoneDesOAmin	5	=VOccMin	=VOccMin	=VOccMin
CO2 Sensor Calibration Alarm, Level 3	CO2SensCal3	0	0	1	0
High CO2 Concentration Alarm, Level 3	HiCO23	0	0	0	0

Equipment Configuration	Generic Ventilation Zones VAV-RH with CO2 Sensor	Test Block Description	Zone CO2 DCV Response and CO2 Sensor Alarm Tests	Zone CO2 DCV Response and CO2 Sensor Alarm Tests	Zone CO2 DCV Response and CO2 Sensor Alarm Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	CO2 DCV Response Test	CO2 DCV Response Test	CO2 DCV Response Test
Test Definition Package Version	DRAFT 6	SOO Reference	5.2.1.4.d.3	5.2.1.4.d.3	5.2.1.4.d.3
Test Script Revision Date	March 3, 2026	Intervention	• Set Zone CO2 to 825 PPM.	• Set Zone CO2 to 850 PPM.	• Set Zone CO2 to 900 PPM.
		Expected Response	• CO2 Loop is 12.5%. • Vmin* is reset one quarter of the way between minimum and maximum endpoints. • HeatMinAir = Vmin* because Vmin* > Vheat-min.	• CO2 Loop is 25%. • Vmin* is reset halfway between minimum and maximum endpoints. • HeatMinAir = Vmin* because Vmin* > Vheat-min. • HeatMaxAir = Vmin* because Vmin* > Vheat-max.	• CO2 Loop is 50%. • Vmin* is reset to maximum cooling endpoint. • HeatMinAir = HeatMaxAir = Vmin* = VCoolMax.
Control Point Description	Control Point Name	Test Block	**B**	**B**	**B**
BACnet Inputs	TestInputs	Test Step	5	6	7
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone Minimum Outdoor Airflow for Building Area (Varea-min)	VAreaMin		60	60	60
Zone Minimum Outdoor Airflow for Occupants (Vocc-min)	VOccMin		120	120	120
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		=VAreaMin	=VAreaMin	=VAreaMin
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		825	850	900
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
CO2 Control Loop Output	ZoneCO2Loop	0.5	12.5	25	50
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=Vmin*	=Vmin*	=VCoolMax
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=Vmin*	=VCoolMax
Zone Active Airflow Setpoint (Vspt)	Vmin*	5	=INTERPOLATE(ZoneCO2Loop; 0; 50; Vmin; CoolMaxAir)	=INTERPOLATE(ZoneCO2Loop; 0; 50; Vmin; CoolMaxAir)	=VCoolMax
Zone Airflow Setpoint (Vspt)	Vspt	5	=DbMinAir	=DbMinAir	=DbMinAir
Zone Absolute Minimum Outside Airflow	ZoneAbsOAmin	5	=VAreaMin	=VAreaMin	=VAreaMin
Zone Design Minimum Outside Airflow	ZoneDesOAmin	5	=VOccMin	=VOccMin	=VOccMin
CO2 Sensor Calibration Alarm, Level 3	CO2SensCal3	0	0	0	0
High CO2 Concentration Alarm, Level 3	HiCO23	0	0	0	0

Equipment Configuration	Generic Ventilation Zones VAV-RH with CO2 Sensor	Test Block Description	Zone CO2 DCV Response and CO2 Sensor Alarm Tests	Zone CO2 DCV Response and CO2 Sensor Alarm Tests	Zone CO2 DCV Response and CO2 Sensor Alarm Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	CO2 DCV Response Test	CO2 Conentration Alarm	CO2 DCV Response Test
Test Definition Package Version	DRAFT 6	SOO Reference	5.2.1.4.d.3	5.2.2.3	5.2.1.4.d.3
Test Script Revision Date	March 3, 2026	Intervention	• Set Zone CO2 to 1,000 PPM.	• Set Zone CO2 to 1,100 PPM. • Wait 10 minutes.	• Set Zone CO2 to 400 PPM.
		Expected Response	• CO2 Loop is 100% • No other effect as zone-level DCV response already at maximum.	• Level 3 CO2 concentration alarm.	• CO2 Loop is 0%. • Vmin* is reset to Vmin. • Level 3 CO2 concentration alarm clears.
Control Point Description	Control Point Name	Test Block	**B**	**B**	**B**
BACnet Inputs	TestInputs	Test Step	8	9	10
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone Minimum Outdoor Airflow for Building Area (Varea-min)	VAreaMin		60	60	60
Zone Minimum Outdoor Airflow for Occupants (Vocc-min)	VOccMin		120	120	120
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		=VAreaMin	=VAreaMin	=VAreaMin
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		1000	1100	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:10:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
CO2 Control Loop Output	ZoneCO2Loop	0.5	100	100	0
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VCoolMax	=VCoolMax	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VCoolMax	=VCoolMax	=VHeatMax
Zone Active Airflow Setpoint (Vspt)	Vmin*	5	=VCoolMax	=VCoolMax	=Vmin
Zone Airflow Setpoint (Vspt)	Vspt	5	=DbMinAir	=DbMinAir	=DbMinAir
Zone Absolute Minimum Outside Airflow	ZoneAbsOAmin	5	=VAreaMin	=VAreaMin	=VAreaMin
Zone Design Minimum Outside Airflow	ZoneDesOAmin	5	=VOccMin	=VOccMin	=VOccMin
CO2 Sensor Calibration Alarm, Level 3	CO2SensCal3	0	0	0	0
High CO2 Concentration Alarm, Level 3	HiCO23	0	0	1	0

Equipment Configuration	Generic Thermal Zones	Test Block Description	Zone Mode Setpoint Tests	Zone Mode Setpoint Tests	Zone Mode Setpoint Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Initialization	Occupied Mode Setpoint Test	Setup Mode Setpoint Test
Test Definition Package Version	DRAFT 4	SOO Reference	N/A	5.3.2.3	5.3.2.3
Test Script Revision Date	March 3, 2026	Intervention	• Initialize inputs to the values below.	• Put zone in Occupied Mode	• Put zone in Setup Mode
		Expected Response	• No expectations. Wait 5 minutes to allow controller to initialize.	• Active zone temperature setpoints are Occupied setpoints	• Active zone temperature setpoints are Unoccupied setpoints.
Control Point Description	Control Point Name	Test Block	**A**	**A**	**A**
BACnet Inputs	TestInputs	Test Step	1	2	3
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	0
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		UNOCCUPIED	OCCUPIED	SETUP
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	=ANY	0	0
Heating Loop Output	ZoneHeatLoop	5	=ANY	0	0
CO2 Control Loop Output	ZoneCO2Loop	0.5	=ANY	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=ANY	=OccHeatSp	=UnoccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=ANY	=OccCoolSp	=UnoccCoolSp
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=ANY	=ANY	=ANY
Discharge Air Temperature Setpoint	DATSp	0.5	=ANY	=ANY	=ANY
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	=ANY	0	0
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	=ANY	0	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	=ANY	0	0
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	=ANY	0	0
Open Window Alarm, Level 4	OpenWin4	0	=ANY	0	0

Equipment Configuration	Generic Thermal Zones	Test Block Description	Zone Mode Setpoint Tests	Zone Mode Setpoint Tests	Zone Mode Setpoint Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Setup Mode Window Switch Alarm Test	Occupied Mode Window Switch Alarm Test	Setback Mode Window Switch Alarm Test
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.2.3 & 5.3.2.8	5.3.2.3 & 5.3.2.8	5.3.2.3 & 5.3.2.8
Test Script Revision Date	March 3, 2026	Intervention	• Set window switch to OPEN	• Put zone in Occupied Mode	• Put zone in Setback Mode.
		Expected Response	• Active zone temperature setpoints are 40F/120F due to window switch. • Open Window Alarm generated.	• Active zone temperature setpoints are 40F/120F due to window switch. • Window alarm clears.	• Active zone temperature setpoints are 40F/120F due to window switch. • Open Window Alarm resumes.
Control Point Description	Control Point Name	Test Block	**A**	**A**	**A**
BACnet Inputs	TestInputs	Test Step	4	5	6
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		0	=Vspt	0
Zone Discharge Air Temperature	ZoneDAT		55	=DATSp	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		OPEN	OPEN	OPEN
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		SETUP	OCCUPIED	SETBACK
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	40	40	40
Active Cooling Setpoint	ZoneActCoolSp	0.1	120	120	120
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=ANY	=ANY	=ANY
Discharge Air Temperature Setpoint	DATSp	0.5	=ANY	=ANY	=ANY
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	0	0
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	0	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	0	0
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	0	0
Open Window Alarm, Level 4	OpenWin4	0	1	0	1

Equipment Configuration	Generic Thermal Zones	Test Block Description	Zone Mode Setpoint Tests	Zone Mode Setpoint Tests	Zone Mode Setpoint Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Setback Mode Setpoint Test	Occupied Mode Window Switch Alarm Test	Cooldown Mode Setpoint Test
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.2.3	5.3.2.3 & 5.3.2.8	5.3.2.3
Test Script Revision Date	March 3, 2026	Intervention	• Set Window Switch to CLOSED	• Put zone in Occupied Mode	• Put zone in Cooldown Mode.
		Expected Response	• Active zone temperature setpoints are Unoccupied setpoints. • Open Window Alarm clears.	• Active zone temperature setpoints are Occupied setpoints	• Active zone temperature setpoints are Unoccupied setpoints.
Control Point Description	Control Point Name	Test Block	**A**	**A**	**A**
BACnet Inputs	TestInputs	Test Step	7	8	9
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		0	=Vspt	0
Zone Discharge Air Temperature	ZoneDAT		55	=DATSp	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		SETBACK	OCCUPIED	COOLDOWN
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=UnoccHeatSp	=OccHeatSp	=UnoccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=UnoccCoolSp	=OccCoolSp	=UnoccCoolSp
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=ANY	=ANY	=ANY
Discharge Air Temperature Setpoint	DATSp	0.5	=ANY	=ANY	=ANY
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	0	0
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	0	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	0	0
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	0	0
Open Window Alarm, Level 4	OpenWin4	0	0	0	0

Equipment Configuration	Generic Thermal Zones	Test Block Description	Zone Mode Setpoint Tests	Zone Mode Setpoint Tests	High Temperature Zone Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupied Mode Setpoint Test	Warmup Mode Setpoint Test	Initialization
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.2.3	5.3.2.3	N/A
Test Script Revision Date	March 3, 2026	Intervention	• Put zone in Occupied Mode	• Put zone in Warmup Mode	• Initialize inputs to the values below.
		Expected Response	• Active zone temperature setpoints are Occupied setpoints	• Active zone temperature setpoints are Unoccupied setpoints.	• No expectations. Wait 5 minutes to allow controller to initialize.
Control Point Description	Control Point Name	Test Block	**A**	**A**	**B**
BACnet Inputs	TestInputs	Test Step	10	11	1
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	0	=RAMP(0;Vmin;120)
Zone Discharge Air Temperature	ZoneDAT		=DATSp	55	=DATSp
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	WARMUP	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:30:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	=ANY
Heating Loop Output	ZoneHeatLoop	5	0	0	=ANY
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	=ANY
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=UnoccHeatSp	=ANY
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=UnoccCoolSp	=ANY
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=ANY	=ANY	=ANY
Discharge Air Temperature Setpoint	DATSp	0.5	=ANY	=ANY	=ANY
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	0	=ANY
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	0	=ANY
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	0	=ANY
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	0	=ANY
Open Window Alarm, Level 4	OpenWin4	0	0	0	=ANY

Equipment Configuration	Generic Thermal Zones	Test Block Description	High Temperature Zone Alarm	High Temperature Zone Alarm	High Temperature Zone Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	High Temperature Alarm	High Temperature Alarm	High Temperature Alarm
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.6.1a	5.3.6.1a	5.3.6.1a
Test Script Revision Date	March 3, 2026	Intervention	• Test starts with zone in Occupied Mode, in deadband.	• Set zone temperature to 4°F above cooling setpoint. • Wait 9 minutes	• Wait 2 additional minutes
		Expected Response	• Active zone temperature setpoints are Occupied setpoints. • Zone airflow setpoint is Vmin. • DATSp is AHU supply air temperature. • Heating Loop and Cooling Loop signals are zero.	• Cooling Loop and airflow setpoint respond to elevated zone temperature. • No alarm as 10 minute timer has not expired.	• Level 4 High Zone Temperature alarm is set.
Control Point Description	Control Point Name	Test Block	**B**	**B**	**B**
BACnet Inputs	TestInputs	Test Step	2	3	4
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vmin	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	=DATSp
Zone Temperature	ZoneTemp		72	=ADD(OccCoolSp;4)	=ADD(OccCoolSp;4)
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:05:00	0:09:00	0:02:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	>0	>=LAST
Heating Loop Output	ZoneHeatLoop	5	0	0	0
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=Vmin	>LAST	>=LAST
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSAT	=AHUSAT	=AHUSAT
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	0	1
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	0	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	0	0
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	0	0
Open Window Alarm, Level 4	OpenWin4	0	0	0	0

Equipment Configuration	Generic Thermal Zones	Test Block Description	High Temperature Zone Alarm	High Temperature Zone Alarm	High Temperature Zone Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	High Temperature Alarm	High Temperature Alarm	High Temperature Alarm
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.6.1a	5.3.6.1a	5.3.6.1c
Test Script Revision Date	March 3, 2026	Intervention	• Set zone temperature to 6°F above cooling setpoint. • Wait 9 minutes	• Wait 2 additional minutes	• Put zone in Cooldown Mode.
		Expected Response	• Cooling Loop and airflow setpoint respond to elevated zone temperature if not already at max. • No new alarm as 10 minute timer has not expired.	• Level 3 High Zone Temperature alarm is set.	• High Zone Temperature alarm is suppressed by Mode. • Cooling Loop and airflow remain elevated.
Control Point Description	Control Point Name	Test Block	**B**	**B**	**B**
BACnet Inputs	TestInputs	Test Step	5	6	7
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	=DATSp
Zone Temperature	ZoneTemp		=ADD(OccCoolSp;6)	=ADD(OccCoolSp;6)	=ADD(OccCoolSp;6)
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	COOLDOWN
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:09:00	0:02:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	>=LAST	>=LAST	>=LAST
Heating Loop Output	ZoneHeatLoop	5	0	0	0
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Zone Active Airflow Setpoint (Vspt)	Vspt	5	>=LAST	>=LAST	>=LAST
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSAT	=AHUSAT	=AHUSAT
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	1	1	0
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	1	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	0	0
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	0	0
Open Window Alarm, Level 4	OpenWin4	0	0	0	0

Equipment Configuration	Generic Thermal Zones	Test Block Description	High Temperature Zone Alarm	High Temperature Zone Alarm	Low Temperature Zone Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	High Temperature Alarm	High Temperature Alarm	Initialization
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.6.1c	5.3.6.1c	N/A
Test Script Revision Date	March 3, 2026	Intervention	• Put zone in Occupied Mode.	• Restore zone temperature to deadband. • Wait 5 minutes.	• Initialize inputs to the values below.
		Expected Response	• High Zone Temperature alarms are restored by Mode change.	• Cooling Loop and zone airflow start to decrease. • High Zone Temperature alarms clear.	• No expectations. Wait 5 minutes to allow controller to initialize.
Control Point Description	Control Point Name	Test Block	**B**	**B**	**C**
BACnet Inputs	TestInputs	Test Step	8	9	1
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=PERIODIC(Vspt)	=RAMP(0;Vmin;120)
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	=DATSp
Zone Temperature	ZoneTemp		=ADD(OccCoolSp;6)	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:10:00	0:05:00	0:30:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	>=LAST	<LAST	=ANY
Heating Loop Output	ZoneHeatLoop	5	0	0	=ANY
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	=ANY
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=ANY
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=ANY
Zone Active Airflow Setpoint (Vspt)	Vspt	5	>=LAST	<LAST	=ANY
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSAT	=AHUSAT	=ANY
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	1	0	=ANY
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	1	0	=ANY
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	0	=ANY
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	0	=ANY
Open Window Alarm, Level 4	OpenWin4	0	0	0	=ANY

Equipment Configuration	Generic Thermal Zones	Test Block Description	Low Temperature Zone Alarm	Low Temperature Zone Alarm	Low Temperature Zone Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Low Temperature Alarm	Low Temperature Alarm	Low Temperature Alarm
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.6.1c	5.3.6.1c	5.3.6.1c
Test Script Revision Date	March 3, 2026	Intervention	• Test starts with zone in Occupied Mode, in deadband.	• Set zone temperature to 4F below heating setpoint. • Wait 9 minutes	• Wait 2 additional minutes
		Expected Response	• Active zone temperature setpoints are Occupied setpoints. • Zone airflow setpoint is Vmin. • DATSp is AHU supply air temperature. • Heating Loop and Cooling Loop signals are zero.	• Heating Loop and DAT setpoint respond to elevated zone temperature. Airflow setpoint may or may not respond as well. • No alarm as 10 minute timer has not expired.	• Level 4 Low Zone Temperature alarm is set.
Control Point Description	Control Point Name	Test Block	**C**	**C**	**C**
BACnet Inputs	TestInputs	Test Step	2	3	4
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vmin	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	=DATSp
Zone Temperature	ZoneTemp		72	=SUB(OccHeatSp;4)	=SUB(OccHeatSp;4)
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:05:00	0:09:00	0:02:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	>0	>=LAST
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=Vmin	>=LAST	>=LAST
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSAT	>LAST	>=LAST
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	0	0
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	0	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	0	1
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	0	0
Open Window Alarm, Level 4	OpenWin4	0	0	0	0

Equipment Configuration	Generic Thermal Zones	Test Block Description	Low Temperature Zone Alarm	Low Temperature Zone Alarm	Low Temperature Zone Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Low Temperature Alarm	Low Temperature Alarm	Low Temperature Alarm
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.6.1c	5.3.6.1c	5.3.6.1c
Test Script Revision Date	March 3, 2026	Intervention	• Set zone temperature to 6F below heating setpoint. • Wait 9 minutes	• Wait 2 additional minutes	• Put zone in Warmup Mode.
		Expected Response	• Heating Loop, DAT setpoint and airflow setpoint respond to elevated zone temperature if not already at max. • No new alarm as 10 minute timer has not expired.	• Level 3 Low Zone Temperature alarm is set.	• Low Zone Temperature alarms are suppressed by Mode. • Heatng Loop and, DAT setpoint and airflow setpoint remain elevated.
Control Point Description	Control Point Name	Test Block	**C**	**C**	**C**
BACnet Inputs	TestInputs	Test Step	5	6	7
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	=DATSp
Zone Temperature	ZoneTemp		=SUB(OccHeatSp;6)	=SUB(OccHeatSp;6)	=SUB(OccHeatSp;6)
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	WARMUP
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:09:00	0:02:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	>=LAST	>=LAST	>=LAST
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Zone Active Airflow Setpoint (Vspt)	Vspt	5	>=LAST	>=LAST	>=LAST
Discharge Air Temperature Setpoint	DATSp	0.5	>=LAST	>=LAST	>=LAST
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	0	0
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	0	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	1	1	0
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	1	0
Open Window Alarm, Level 4	OpenWin4	0	0	0	0

Equipment Configuration	Generic Thermal Zones	Test Block Description	Low Temperature Zone Alarm	Low Temperature Zone Alarm	Occupancy Sensor, Demand Limits & Setpoint Hierarchy
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Low Temperature Alarm	Low Temperature Alarm	Initialization
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.6.1c	5.3.6.1c	N/A
Test Script Revision Date	March 3, 2026	Intervention	• Put zone in Occupied Mode.	• Restore zone temperature to deadband. • Wait 5 minutes.	• Initialize inputs to the values below.
		Expected Response	• Low Zone Temperature alarms are restored by Mode change.	• Heating Loop, DAT setpoint, and zone airflow setpoint start to decrease. • Low Zone Temperature alarms clear.	• No expectations. Wait 5 minutes to allow controller to initialize.
Control Point Description	Control Point Name	Test Block	C	C	D
BACnet Inputs	TestInputs	Test Step	8	9	1
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=PERIODIC(Vspt)	=Vspt
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	=DATSp
Zone Temperature	ZoneTemp		=SUB(OccHeatSp;6)	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:10:00	0:05:00	0:30:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	=ANY
Heating Loop Output	ZoneHeatLoop	5	>=LAST	<LAST	=ANY
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	=ANY
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=ANY
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=ANY
Zone Active Airflow Setpoint (Vspt)	Vspt	5	>=LAST	<LAST	=ANY
Discharge Air Temperature Setpoint	DATSp	0.5	>=LAST	<=LAST	=ANY
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	0	=ANY
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	0	=ANY
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	1	0	=ANY
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	1	0	=ANY
Open Window Alarm, Level 4	OpenWin4	0	0	0	=ANY

Equipment Configuration	Generic Thermal Zones	Test Block Description	Occupancy Sensor, Demand Limits & Setpoint Hierarchy	Occupancy Sensor, Demand Limits & Setpoint Hierarchy	Occupancy Sensor, Demand Limits & Setpoint Hierarchy
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupancy Sensor Test	Occupancy Sensor Test	Demand Limit Test
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.2.9	5.3.2.9	5.3.2.6/7
Test Script Revision Date	March 3, 2026	Intervention	• Set occupany sensor to UNPOPULATED. • Wait 3 minutes.	• Wait additional 3 minutes.	• Set Demand Limit Level 1
		Expected Response	• No change in setpoint because 5 minute timer has not expired.	• Active heating setpoint decreases by 1°F and active cooling setpoint increases by 1°F due to occupancy sensor signal.	• Active heating setpoint decreases by 1°F and active cooling setpoint increases by 1°F due to Demand Limit, cumulative with the offset from the occupany sensor.
Control Point Description	Control Point Name	Test Block	**D**	**D**	**D**
BACnet Inputs	TestInputs	Test Step	2	3	4
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	1
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	=DATSp
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		UNPOPULATED	UNPOPULATED	UNPOPULATED
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:03:00	0:03:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=SUB(OccHeatSp;1)	=SUB(OccHeatSp;2)
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=ADD(OccCoolSp; 1)	=ADD(OccCoolSp;2)
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=ANY	=ANY	=ANY
Discharge Air Temperature Setpoint	DATSp	0.5	=ANY	=ANY	=ANY
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	0	0
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	0	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	0	0
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	0	0
Open Window Alarm, Level 4	OpenWin4	0	0	0	0

Equipment Configuration	Generic Thermal Zones	Test Block Description	Occupancy Sensor, Demand Limits & Setpoint Hierarchy	Occupancy Sensor, Demand Limits & Setpoint Hierarchy	Occupancy Sensor, Demand Limits & Setpoint Hierarchy
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Demand Limit Test	Demand Limit Test	Setpoint Hierarchy Test
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.2.6/7	5.3.2.6/7	5.3.2.10
Test Script Revision Date	March 3, 2026	Intervention	• Set Demand Limit Level 2	• Set Demand Limit Level 3	• Set window switch to OPEN.
		Expected Response	• Active heating setpoint decreases by 2°F and active cooling setpoint increases by 2°F due to Demand Limit, cumulative with the offset from the occupany sensor.	• Active heating setpoint decreases by 4°F and active cooling setpoint increases by 4°F due to Demand Limit, cumulative with the offset from the occupany sensor.	• Active zone temperature setpoints are 40F/120F due to window switch. • No Open Window Alarm because zone is Occupied.
Control Point Description	Control Point Name	Test Block	**D**	**D**	**D**
BACnet Inputs	TestInputs	Test Step	5	6	7
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		2	3	3
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	=DATSp
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		UNPOPULATED	UNPOPULATED	UNPOPULATED
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	OPEN
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=SUB(OccHeatSp;3)	=SUB(OccHeatSp;5)	40
Active Cooling Setpoint	ZoneActCoolSp	0.1	=ADD(OccCoolSp;3)	=ADD(OccCoolSp;5)	120
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=ANY	=ANY	=ANY
Discharge Air Temperature Setpoint	DATSp	0.5	=ANY	=ANY	=ANY
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	0	0
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	0	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	0	0
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	0	0
Open Window Alarm, Level 4	OpenWin4	0	0	0	0

Equipment Configuration	Generic Thermal Zones	Test Block Description	Occupancy Sensor, Demand Limits & Setpoint Hierarchy	Occupancy Sensor, Demand Limits & Setpoint Hierarchy	Occupancy Sensor, Demand Limits & Setpoint Hierarchy
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Setpoint Hierarchy Test	Occupancy Sensor Test	Occupancy Sensor Test
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.2.10	5.3.2.9	5.3.2.9
Test Script Revision Date	March 3, 2026	Intervention	• Set window switch to CLOSED.	• Set occupancy sensor to PRESENT. • Wait 30 seconds.	• Wait additional 1 minute.
		Expected Response	• Active setpoint values revert to demand-limited values as window is CLOSED.	• No change as 1 minute timer has not expired.	• Occupancy sensor setback is removed from active setpoints as timer has elapsed.
Control Point Description	Control Point Name	Test Block	D	D	D
BACnet Inputs	TestInputs	Test Step	8	9	10
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		3	3	3
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	=DATSp
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		UNPOPULATED	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:00:30	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=SUB(OccHeatSp;5)	=SUB(OccHeatSp;5)	=SUB(OccHeatSp;4)
Active Cooling Setpoint	ZoneActCoolSp	0.1	=ADD(OccCoolSp;5)	=ADD(OccCoolSp;5)	=ADD(OccCoolSp;4)
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=ANY	=ANY	=ANY
Discharge Air Temperature Setpoint	DATSp	0.5	=ANY	=ANY	=ANY
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	0	0
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	0	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	0	0
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	0	0
Open Window Alarm, Level 4	OpenWin4	0	0	0	0

Equipment Configuration	Generic Thermal Zones	Test Block Description	Occupancy Sensor, Demand Limits & Setpoint Hierarchy	Zone Setpoint Overlap Restrictions	Zone Setpoint Overlap Restrictions
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Demand Limit Test, Setpoint Hierarchy Test	Initialization	Unoccupied Setpoint Mode Test
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.2.6/7, 5.3.2.10		5.3.2.3f
Test Script Revision Date	March 3, 2026	Intervention	• Release Demand Limit.	• Initialize inputs to the values below.	• Test starts with zone in Unoccupied Mode.
		Expected Response	• Demand Limit is removed from active setpoints. • Setpoints return to default values.	• No expectations. Wait 5 minutes to allow controller to initialize.	• Active zone temperature setpoints are Unoccupied setpoints.
Control Point Description	Control Point Name	Test Block	D	E	E
BACnet Inputs	TestInputs	Test Step	11	1	2
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	=DATSp
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	UNOCCUPIED	UNOCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:30:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	=ANY	0
Heating Loop Output	ZoneHeatLoop	5	0	=ANY	0
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	=ANY	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=ANY	=UnoccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=ANY	=UnoccCoolSp
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=ANY	=ANY	0
Discharge Air Temperature Setpoint	DATSp	0.5	=ANY	=ANY	=AHUSAT
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	=ANY	0
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	=ANY	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	=ANY	0
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	=ANY	0
Open Window Alarm, Level 4	OpenWin4	0	0	=ANY	0

Equipment Configuration	Generic Thermal Zones	Test Block Description	Zone Setpoint Overlap Restrictions	Zone Setpoint Overlap Restrictions	Zone Setpoint Overlap Restrictions
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Setpoint Anti-Overlap Logic Test	Setpoint Anti-Overlap Logic Test	Occupied Setpoint Mode Test
Test Definition Package Version	DRAFT 4	SOO Reference	5.3.2.4b, 5.3.2.4c	5.3.2.4a	5.3.2.3a
Test Script Revision Date	March 3, 2026	Intervention	• Set Unoccupied cooling setpoint equal to the Occupied heating setpoint. • Set Unoccupied heating setpoint equal to the Occupied cooling setpoint.	• Restore original Unoccupied setpoints. • Set Mode to Occupied. • Set BOTH Occupied heating setpoint and Occupied cooling setpoint equal to 72F.	• Restore original Occupied setpoints.
		Expected Response	• Active zone heating setpoint is Occupied heating setpoint. • Active zone cooling setpoint is Occupied cooling setpoint.	• Active zone cooling setpoint is 72.5. • Active zone heating setpoint is 71.5. • Zone airflow setpoint equals Vmin. Heating and cooling loops are zero because zone is in deadband.	• Active zone temperature setpoints are Occupied setpoints.
Control Point Description	Control Point Name	Test Block	**E**	**E**	**E**
BACnet Inputs	TestInputs	Test Step	3	4	5
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	72.5	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	72.5	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		=OccCoolSp	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		=OccHeatSp	90	90
Demand Limit Level	DemandLimit		0	0	0
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		=DATSp	=DATSp	=DATSp
Zone Temperature	ZoneTemp		72	72	72
Zone CO2	ZoneCO2		400	400	400
Local Override	ZoneOverSwitch		OFF	OFF	OFF
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		UNOCCUPIED	OCCUPIED	OCCUPIED
#Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
#BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
CO2 Control Loop Output	ZoneCO2Loop	0.5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=SUB(OccCoolSp;1)	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Zone Active Airflow Setpoint (Vspt)	Vspt	5	0	=Vmin	=Vmin
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSAT	=AHUSAT	=AHUSAT
Zone High Temperature Alarm, Level 4	HighZnTemp4	0	0	0	0
Zone High Temperature Alarm, Level 3	HighZnTemp3	0	0	0	0
Zone Low Temperature Alarm, Level 4	LowZnTemp4	0	0	0	0
Zone Low Temperature Alarm, Level 3	LowZnTemp3	0	0	0	0
Open Window Alarm, Level 4	OpenWin4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Initialization	Occupied Setpoints	Occupied Cooling
Test Definition Package Version	DRAFT 20	SOO Reference	N/A	N/A	5.6.5.1
Test Script Revision Date	March 3, 2026	Intervention	• Initialize inputs to the values below. • Zone airflow is overridden above airflow setpoint to drive damper closed, to ensure there are no static pressure requests.	• No change	• Set the zone temperature feedback to 0.5°F above the occupied cooling setpoint. • Set the airflow feedback to dynamically reset to equal the setpoint so that damper does not move. • Record controller outputs when cooling PID loop output reaches 50.
		Expected Response	• First initialization step is complete when damper is less than half open. • No expectations. Allow time for controller to initialize.	• Zone setpoints are Occupied setpoints. • Damper is less than half open.	• Cooling loop output begins increasing. • Airflow setpoint increases, potentially up to 50 (but at least 25) of the way between the cooling minimum and the cooling maximum.
Control Point Description	Control Point Name	Test Block	A	A	A
BACnet Inputs	TestInputs	Test Step	1	2	3
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		150	150	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	=ADD(OccCoolSp;0.5)
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:05:00	0:20:00
Variable Name	VariableName			VAVDmprCmd	ZoneCoolLoop
Variable Value	VariableValue			<=40	>=50
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	=ANY	0	>=50
Heating Loop Output	ZoneHeatLoop	5	=ANY	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=ANY	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=ANY	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=ANY	500	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=ANY	100	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=ANY	100	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=ANY	120	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=ANY	200	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=ANY	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=ANY	=Vmin*	=INTERPOLATE(ZoneCoolLoop; 0; 100; CoolMinAir; CoolMaxAir)
Discharge Air Temperature Setpoint	DATSp	0.5	=ANY	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	=ANY	<=50	=ANY
Reheat Command	RhCommand	0.5	=ANY	0	0
Cooling SAT Reset Requests	CoolSATReq	0	=ANY	0	0
Static Pressure Reset Requests	StatPresReq	0	=ANY	0	0
Hot Water Reset Requests	HWSTReq	0	=ANY	0	0
Hot Water Plant Requests	HWPlantReq	0	=ANY	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	=ANY	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	=ANY	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	=ANY	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	=ANY	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	=ANY	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	=ANY	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	=ANY	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupied Cooling	Occupied Cooling & Cooling SAT Reset Requets	Occupied Cooling & Cooling SAT Reset Requets
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.5.1.a	5.6.5.1, 5.6.8.1	5.6.5.1, 5.6.8.1
Test Script Revision Date	March 3, 2026	Intervention	• Set the zone temperature feedback to 0.5°F above the occupied cooling setpoint. • Set the airflow feedback to dynamically reset to equal the setpoint so that damper does not move. • Set AHU SAT and SATsp above room temp, to limit airflow setpoint to minimum. • Record controller outputs when airflow setpoint reaches minimum.	• Restore AHU SAT and SATsp to 55°F to release zone airflow setpoint. • Record controller outputs when cooling PID loop output reaches 94	• Record controller outputs when cooling PID loop output reaches 96
		Expected Response	• Cooling loop output continues to increase. • Airflow setpoint goes to minimum, due to elevated AHU SAT.	• Cooling loop output continues increasing. • Airflow setpoint resets to 94% of the way between the cooling minimum and the cooling maximum. • 0 cooling SAT requests.	• Cooling loop output continues increasing. • Airflow setpoint resets to 96% of the way between the cooling minimum and the cooling maximum. • 1 cooling SAT request since cooling loop output exceeds 95.
Control Point Description	Control Point Name	Test Block	A	A	A
BACnet Inputs	TestInputs	Test Step	4	5	6
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		=ADD(OccCoolSp;0.5)	=ADD(OccCoolSp;0.5)	=ADD(OccCoolSp;0.5)
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		=ADD(ZoneTemp;1)	55	55
AHU Supply Air Temperature	AHUSAT		=ADD(ZoneTemp;1)	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:05:00	0:30:00	0:10:00
Variable Name	VariableName		Vspt	ZoneCoolLoop	ZoneCoolLoop
Variable Value	VariableValue		CoolMinAir	>=94	>=96
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	>=50	>=94	>=96
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=CoolMinAir	=INTERPOLATE(ZoneCoolLoop; 0; 100; CoolMinAir; CoolMaxAir)	=INTERPOLATE(ZoneCoolLoop; 0; 100; CoolMinAir; CoolMaxAir)
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	=ANY	=ANY	=ANY
Reheat Command	RhCommand	0.5	0	0	0
Cooling SAT Reset Requests	CoolSATReq	0	0	0	1
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	0	0	0
Hot Water Plant Requests	HWPlantReq	0	0	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupied Cooling & Cooling SAT Reset Requets	Occupied Cooling & Cooling SAT Reset Requets	Occupied Cooling & Cooling SAT Reset Requets
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.5.1, 5.6.8.1	5.6.8.1	5.6.8.1
Test Script Revision Date	March 3, 2026	Intervention	• Record controller outputs when cooling PID loop output reaches 100	• Override zone temperature to 3.1°F above the occupied cooling setpoint. • Record result 1m:40s after the override.	• Record result 0m:30s after the end of the preceding step.
		Expected Response	• Cooling loop reaches maximum value. • Airflow setpoint resets to cooling maximum. • 1 cooling SAT request	• Cooling loop output remains pegged at 100. • No additional cooling SAT requests generated yet since the zone temperature has not been >=3°F above setpoint for 2 minutes.	• Cooling loop output remains pegged at 100. • 2 total cooling SAT requests generated since the zone temperature has been >=3°F above setpoint for 2 minutes.
Control Point Description	Control Point Name	Test Block	A	A	A
BACnet Inputs	TestInputs	Test Step	7	8	9
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		=ADD(OccCoolSp;0.5)	=ADD(OccCoolSp;3.1)	=ADD(OccCoolSp;3.1)
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:10:00	0:01:40	0:00:30
Variable Name	VariableName		ZoneCoolLoop		
Variable Value	VariableValue		100		
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	100	100	100
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=CoolMaxAir	=CoolMaxAir	=CoolMaxAir
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	=ANY	=ANY	=ANY
Reheat Command	RhCommand	0.5	0	0	0
Cooling SAT Reset Requests	CoolSATReq	0	1	1	2
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	0	0	0
Hot Water Plant Requests	HWPlantReq	0	0	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupied Cooling & Cooling SAT Reset Requets	Occupied Cooling & Cooling SAT Reset Requets	Occupied Cooling & Cooling SAT Reset Requets
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.8.1	5.6.8.1	5.6.8.1
Test Script Revision Date	March 3, 2026	Intervention	• Override zone temperature to 5.1°F above the occupied cooling setpoint. • Record results 1m:40s after the override.	• Record result 0m:30s after the end of the preceding step.	• Override the zone temperature to 4.9°F above the occupied cooling setpoint.
		Expected Response	• Cooling loop output remains pegged at 100. • No additional cooling SAT requests since the zone temperature has not been >=5°F above setpoint for 2 minutes.	• Cooling loop output remains pegged at 100. • 3 total cooling requests generated since the zone temperature has been >=5°F above setpoint for 2 minutes.	• Cooling loop output remains pegged at 100. • 2 total cooling requests generated since zone temp is no longer >= 5°F above setpoint.
Control Point Description	Control Point Name	Test Block	A	A	A
BACnet Inputs	TestInputs	Test Step	10	11	12
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		=ADD(OccCoolSp;5.1)	=ADD(OccCoolSp;5.1)	=ADD(OccCoolSp;4.9)
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:40	0:00:30	0:00:30
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	100	100	100
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=CoolMaxAir	=CoolMaxAir	=CoolMaxAir
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	=ANY	=ANY	=ANY
Reheat Command	RhCommand	0.5	0	0	0
Cooling SAT Reset Requests	CoolSATReq	0	2	3	2
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	0	0	0
Hot Water Plant Requests	HWPlantReq	0	0	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupied Cooling & Cooling SAT Reset Requets	Occupied Cooling & Cooling SAT Reset Requets	Occupied Cooling & Cooling SAT Reset Requets
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.8.1	5.6.8.1	5.6.8.1
Test Script Revision Date	March 3, 2026	Intervention	• Set Cooling SAT Request Importance to 3. • Record result 0m:30s after the end of the preceding step.	• Set Cooling SAT Request Importance to 0. • Record result 0m:30s after the end of the preceding step.	• Set Cooling SAT Request Importance to 1. • Override the zone temperature to 3.1°F above the occupied cooling setpoint.
		Expected Response	• Cooling loop output remains pegged at 100. • 6 total cooling requests due to importance multiplier.	• Cooling loop output remains pegged at 100. • 0 total cooling requests due to importance multiplier.	• Cooling loop output remains pegged at 100. • 2 total cooling SAT requests remain active because zone temperature is still >=3°F above setpoint.
Control Point Description	Control Point Name	Test Block	A	A	A
BACnet Inputs	TestInputs	Test Step	13	14	15
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		=ADD(OccCoolSp;5.1)	=ADD(OccCoolSp;5.1)	=ADD(OccCoolSp;3.1)
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		3	0	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:00:30	0:00:30	0:00:30
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	100	100	100
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=CoolMaxAir	=CoolMaxAir	=CoolMaxAir
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	=ANY	=ANY	=ANY
Reheat Command	RhCommand	0.5	0	0	0
Cooling SAT Reset Requests	CoolSATReq	0	6	0	2
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	0	0	0
Hot Water Plant Requests	HWPlantReq	0	0	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests	Cooling Airflow Setpoint & SAT Reset Requests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupied Cooling & Cooling SAT Reset Requets	Occupied Cooling & Cooling SAT Reset Requets	Occupied Cooling & Cooling SAT Reset Requets
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.8.1	5.6.5.1, 5.6.8.1	5.6.5.1, 5.6.8.1
Test Script Revision Date	March 3, 2026	Intervention	• Override the zone temperature to 2.9°F above the occupied cooling setpoint.	• =RAMP the zone temperature feedback down from 2.9°F above the occupied cooling setpoint to the deadband over a span of approx 6 minutes. • Record results when the cooling PID loop reaches 90.	• Continue zone temperature =RAMP started in preceding test. • Record results from preceding step when the cooling PID loop reaches 84.
		Expected Response	• Cooling loop output remains pegged at 100. • Decrease to 1 cooling SAT request since zone temp is no longer >= 3°F above setpoint.	• Cooling loop output begins decreasing as zone temperature drops. • Airflow setpoint begins decreasing from the cooling maximum to the cooling minimum. • 1 cooling SAT request since loop output is still >=85.	• Cooling loop output continues decreasing as zone temperature drops. • Airflow setpoint continues decreasing from the cooling maximum to the active minimum. • 0 cooling SAT requests since loop output is <85.
Control Point Description	Control Point Name	Test Block	A	A	A
BACnet Inputs	TestInputs	Test Step	16	17	18
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		=ADD(OccCoolSp;2.9)	=RAMP(LAST; 72; 360)	=RAMP(LAST; 72; 300)
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:00:30	0:30:00	0:05:00
Variable Name	VariableName			ZoneCoolLoop	ZoneCoolLoop
Variable Value	VariableValue			<=90	<=84
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	100	>=85	<=84
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=CoolMaxAir	=INTERPOLATE(ZoneCoolLoop; 0; 100; CoolMinAir; CoolMaxAir)	=INTERPOLATE(ZoneCoolLoop; 0; 100; CoolMinAir; CoolMaxAir)
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	=ANY	=ANY	=ANY
Reheat Command	RhCommand	0.5	0	0	0
Cooling SAT Reset Requests	CoolSATReq	0	1	1	0
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	0	0	0
Hot Water Plant Requests	HWPlantReq	0	0	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

		Test Block Description	Cooling Airflow Setpoint & SAT Reset Requests	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
Equipment Configuration	VAV Reheat Terminal Unit	Test Step Purpose	Occupied Cooling & Cooling SAT Reset Requets	Initialization	Occupied Setpoints
Sequences Under Test	Guideline 36-2021	SOO Reference	5.6.5.1	N/A	N/A
Test Definition Package Version	DRAFT 20				
Test Script Revision Date	March 3, 2026				
		Intervention	• Set zone temperature to mid-deadband if not there already • Record results when cooling loop is fully unwound.	• Zone airflow is set above airflow setpoint to drive damper fully. closed, to prepare for the test.	• Zone airflow is set above airflow setpoint to drive damper fully. closed, to prepare for the test.
		Expected Response	• Cooling loop output continues decreasing to zero. • Airflow setpoint continues decreasing from the cooling maximum to the cooling minimum.	• No expectations. Allow time for controller to initialize.	• Zone setpoints are Occupied setpoints. • Zone damper is closed.
Control Point Description	Control Point Name	Test Block	A	B	B
BACnet Inputs	TestInputs	Test Step	19	1	2
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=MULT(Vspt; 1.5)	=MULT(Vspt; 1.5)
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:30:00	0:05:00
Variable Name	VariableName		Vspt		VAVDmprCmd
Variable Value	VariableValue		CoolMinAir		0
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	=ANY	0
Heating Loop Output	ZoneHeatLoop	5	0	=ANY	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=ANY	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=ANY	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=ANY	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=ANY	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=ANY	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=ANY	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=ANY	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=ANY	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=Vmin*	=ANY	=Vmin*
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=ANY	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	=ANY	=ANY	0
Reheat Command	RhCommand	0.5	0	=ANY	0
Cooling SAT Reset Requests	CoolSATReq	0	0	=ANY	0
Static Pressure Reset Requests	StatPresReq	0	0	=ANY	0
Hot Water Reset Requests	HWSTReq	0	0	=ANY	0
Hot Water Plant Requests	HWPlantReq	0	0	=ANY	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	=ANY	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	=ANY	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	=ANY	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	=ANY	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	=ANY	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	=ANY	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	=ANY	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Airflow Sensor Calibration Alarm, Leaking Valve Alarm	Airflow Sensor Calibration Alarm, Leaking Valve Alarm	Airflow Sensor Calibration Alarm
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.6.3, 5.6.6.5	5.6.6.3, 5.6.6.5	5.6.6.3
Test Script Revision Date	March 3, 2026	Intervention	• Set zone to Unoccupied, to make airflow setpoint 0. • Set zone airflow feedback to 55 CFM to stimulate calibration alarm. • Set zone DAT to 60F to stimulate leaking valve alarm. • Record controller outputs after 12 minutes.	• Maintain conditions. • Record controller outputs after additional 4 minutes	• Set AHU fan to off. • Restore zone DAT to 55F. • Maintain other conditions. • Record controller outputs after additional 15 minutes.
		Expected Response	• Damper stays closed. • Reheat valve stays closed. • No alarms because timers have not elapsed. • Vmin* and all Airflow Endpoints are zero due to Unoccupied Mode.	• Damper stays closed. • Reheat valve stays closed. • Leaking valve alarm is triggered when timer expires. • No airflow sensor calibration alarm because 30 minute timer has not elapsed.	• Leaking valve alarm clears. • Airflow sensor calibration alarm is triggered when timer expires.
Control Point Description	Control Point Name	Test Block	B	B	B
BACnet Inputs	TestInputs	Test Step	3	4	5
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		55	55	55
Zone Discharge Air Temperature	ZoneDAT		60	60	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	OFF
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		UNOCCUPIED	UNOCCUPIED	UNOCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:12:00	0:04:00	0:15:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=UnoccHeatSp	=UnoccHeatSp	=UnoccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=UnoccCoolSp	=UnoccCoolSp	=UnoccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	0	0	0
Cooling Minimum Airflow Endpoint	CoolMinAir	5	0	0	0
Deadband Minimum Airflow Endpoint	DbMinAir	5	0	0	0
Heating Minimum Airflow Endpoint	HeatMinAir	5	0	0	0
Heating Maximum Airflow Endpoint	HeatMaxAir	5	0	0	0
Occupied Minimum Airflow (vmin*)	Vmin*	5	0	0	0
Zone Active Airflow Setpoint (Vspt)	Vspt	5	0	0	0
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	0	0	0
Reheat Command	RhCommand	0.5	0	0	0
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	0	0	0
Hot Water Plant Requests	HWPlantReq	0	0	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	1
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	1	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Leaking Damper Alarm	Leaking Damper Alarm	Leaking Damper Alarm
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.6.4	5.6.6.4	5.6.6.4
Test Script Revision Date	March 3, 2026	Intervention	• Turn on AHU fan. • Record controller outputs after 8 minutes.	• Maintain conditions. • Record controller outputs after additional 3 minutes.	• Set zone to Occupied. • RAMP zone airflow feedback from 50 CFM to setpoint over 2 minutes, allowing damper to open somewhat but not too much. • Record controller outputs after 4 minutes or when damper is partly open.
		Expected Response	• Airflow sensor calibration alarm clears due to fan start. • Leaking damper alarm is not triggered because 10 minute timer has not elapsed.	• Leaking damper alarm is triggered when timer expires.	• Leaking damper alarm is cleared by damper opening. • Vmin* and all Airflow Endpoints return to default Occupied values due to Mode change.
Control Point Description	Control Point Name	Test Block	B	B	B
BACnet Inputs	TestInputs	Test Step	6	7	8
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		55	55	=RAMP(50; Vspt; 120)
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		UNOCCUPIED	UNOCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:08:00	0:03:00	0:04:00
Variable Name	VariableName				VAVDmprCmd
Variable Value	VariableValue				>=20
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=UnoccHeatSp	=UnoccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=UnoccCoolSp	=UnoccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	0	0	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	0	0	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	0	0	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	0	0	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	0	0	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	0	0	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	0	0	=Vmin*
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	0	0	>LAST
Reheat Command	RhCommand	0.5	0	0	0
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	0	0	0
Hot Water Plant Requests	HWPlantReq	0	0	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	1	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Damper Modulation	Damper Modulation & Static Pressure Reset Request	Static Pressure Reset Request & Low Airflow Alarm
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.5.5	5.6.5.5, 5.6.8.2	5.6.8.2, 5.6.6.1
Test Script Revision Date	March 3, 2026	Intervention	• Reset zone airflow to 10 below setpoint, to drive open damper • Record controller outputs when damper is 85% open or when timer expires.	• Continue to drive damper open • Record controller outputs when damper is 96 open.	• Reset zone airflow to 35 below setpoint • Continue to drive damper open • Record controller outputs after 30 seconds
		Expected Response	• Damper continues to open. • No pressure reset requests because damper is less than 95% open.	• Damper opens more than 95. • One pressure reset request generated based on damper position.	• Damper continues to open, until maximum. • No additional pressure reset requests because 1 minute timer has not expired.
Control Point Description	Control Point Name	Test Block	B	B	B
BACnet Inputs	TestInputs	Test Step	9	10	11
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=MULT(Vspt; 0.9)	=MULT(Vspt; 0.9)	=MULT(Vspt; 0.65)
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:10:00	0:00:30
Variable Name	VariableName		VAVDmprCmd	VAVDmprCmd	
Variable Value	VariableValue		>=85	>=96	
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=Vmin*	=Vmin*	=Vmin*
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	>LAST	>=95	>LAST
Reheat Command	RhCommand	0.5	0	0	0
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	0	1	1
Hot Water Reset Requests	HWSTReq	0	0	0	0
Hot Water Plant Requests	HWPlantReq	0	0	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Static Pressure Reset Request & Low Airflow Alarm	Static Pressure Reset Request & Low Airflow Alarm	Static Pressure Reset Request & Low Airflow Alarm
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.8.2, 5.6.6.1	5.6.8.2, 5.6.6.1	5.6.8.2, 5.6.6.1
Test Script Revision Date	March 3, 2026	Intervention	• Maintain conditions. • Record controller outputs after 1 minute.	• Maintain conditions. • Record controller outputs after 10 minutes.	• Set Static Pressure Reset Request importance to 3. • Record controller outputs after 10 minutes.
		Expected Response	• Damper continues to open, until maximum. • One additional pressure reset requests because 1 minute timer has expired. • No low airflow alarm because 10 minute timer has not expired.	• Damper continues to open, until maximum. • No additional pressure requests. • Level 4 low airflow alarm triggers because 10 minute timer has expired.	• Damper continues to open, until maximum. • 6 pressure requests due to importance multiplier. • Level 4 low airflow alarm.
Control Point Description	Control Point Name	Test Block	B	B	B
BACnet Inputs	TestInputs	Test Step	12	13	14
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=MULT(Vspt; 0.65)	=MULT(Vspt; 0.65)	=MULT(Vspt; 0.65)
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	3
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:10:00	0:10:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=Vmin*	=Vmin*	=Vmin*
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	>LAST	>LAST	>LAST
Reheat Command	RhCommand	0.5	0	0	0
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	2	2	6
Hot Water Reset Requests	HWSTReq	0	0	0	0
Hot Water Plant Requests	HWPlantReq	0	0	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	1	1
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Static Pressure Reset Request & Low Airflow Alarm	Static Pressure Reset Request & Low Airflow Alarm	Static Pressure Reset Request & Low Airflow Alarm
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.8.2, 5.6.6.1	5.6.8.2, 5.6.6.1	5.6.8.2, 5.6.6.1
Test Script Revision Date	March 3, 2026	Intervention	• Reset zone airflow to 55 below setpoint • Set Static Pressure Reset Request importance to 1. • Record controller outputs after 30 seconds	• Maintain conditions. • Record controller outputs after 1 minute.	• Maintain conditions. • Record controller outputs after 10 minutes.
		Expected Response	• No additional pressure reset requests because 1 minute timer has not expired.	• One additional pressure reset requests because 1 minute timer has expired. • No new low airflow alarm because 10 minute timer has not expired.	• Pressure reset requests remain unchanged. • Level 3 low airflow alarm triggers because 10 minute timer has expired.
Control Point Description	Control Point Name	Test Block	B	B	B
BACnet Inputs	TestInputs	Test Step	15	16	17
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=MULT(Vspt; 0.45)	=MULT(Vspt; 0.45)	=MULT(Vspt; 0.45)
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:00:30	0:01:00	0:10:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=Vmin*	=Vmin*	=Vmin*
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	>LAST	>LAST	>LAST
Reheat Command	RhCommand	0.5	0	0	0
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	2	3	3
Hot Water Reset Requests	HWSTReq	0	0	0	0
Hot Water Plant Requests	HWPlantReq	0	0	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	1	1	1
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	1
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms	Heating Airflow Setpoint	Heating Airflow Setpoint
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Importance Factor Test	Initialization	Initialization
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.8.2, 5.6.6.1	N/A	N/A
Test Script Revision Date	March 3, 2026				
		Intervention	• Maintain conditions. • Set zone importance factor to 0. • Record controller outputs.	• Initialize inputs to the values below. • Zone airflow is overridden above airflow setpoint to drive damper closed, to ensure there are no static pressure requests.	• No change
		Expected Response	• All pressure reset requests and low airflow alarms are suppressed by zero importance factor.	• No expectations. Allow time for controller to initialize.	• Zone setpoints are Occupied setpoints. • Damper is less than half open.
Control Point Description	Control Point Name	Test Block	B	C	C
BACnet Inputs	TestInputs	Test Step	18	1	2
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=MULT(Vspt; 0.45)	=MULT(Vspt; 1.5)	=MULT(Vspt; 1.5)
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		0	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:00:10	0:30:00	0:05:00
Variable Name	VariableName				VAVDmprCmd
Variable Value	VariableValue				<=40
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	=ANY	0
Heating Loop Output	ZoneHeatLoop	5	0	=ANY	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=ANY	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=ANY	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=ANY	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=ANY	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=ANY	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=ANY	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=ANY	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=ANY	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=Vmin*	=ANY	=Vmin*
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=ANY	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	>LAST	=ANY	<=50
Reheat Command	RhCommand	0.5	0	=ANY	0
Cooling SAT Reset Requests	CoolSATReq	0	0	=ANY	0
Static Pressure Reset Requests	StatPresReq	0	0	=ANY	0
Hot Water Reset Requests	HWSTReq	0	0	=ANY	0
Hot Water Plant Requests	HWPlantReq	0	0	=ANY	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	=ANY	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	=ANY	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	=ANY	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	=ANY	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	=ANY	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	=ANY	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	=ANY	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Heating Airflow Setpoint	Heating Airflow Setpoint	Heating Airflow Setpoint
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupied Deadband	Occupied Heating	Occupied Heating
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.5.2	5.6.5.3	5.6.5.3
Test Script Revision Date	March 3, 2026	Intervention	• Zone airflow is equal to airflow setpoint to allow the damper position to stabilize • Record controller outputs with zone in deadband	• Set the zone temperature feedback to 0.5°F below the occupied heating setpoint. • Set the airflow feedback to dynamically reset to equal the setpoint so that damper does not move. • Set the discharge air temperature feedback to dynamically reset to equal the zone temperature - too low for heating. • Record controller outputs when heating PID loop output reaches 25.	• Maintain conditions and record controller outputs when heating PID loop output reaches 50
		Expected Response	• Damper stops moving • Airflow setpoint is at active minimum because zone temperature is in deadband	• Heating loop output begins increasing. • Airflow setpoint increases to heating minimum then stop increasing. • DAT setpoint increases, potentially up to 50 (but at least 25) of the way the to max DAT. • Ignore HW valve position and heating plant/reset requests. HW valve is wild due to manipulation of zone DAT.	• Heating loop output reaches 50. • Airflow setpoint remains at heating minimum. • DAT setpoint increases to maximum.
Control Point Description	Control Point Name	Test Block	C	C	C
BACnet Inputs	TestInputs	Test Step	3	4	5
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=PERIODIC(Vspt)	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	=PERIODIC(ZoneTemp)	=PERIODIC(ZoneTemp)
Zone Temperature	ZoneTemp		72	=SUB(OccHeatSp;0.5)	=SUB(OccHeatSp;0.5)
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:30:00	0:30:00
Variable Name	VariableName			ZoneHeatLoop	ZoneHeatLoop
Variable Value	VariableValue			>=25	>=50
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	>=25	>=50
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=Vmin*	=HeatMinAir	=HeatMinAir
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=ADD(OccHeatSp; MaxDeltaT)
VAV Box Damper Command	VAVDmprCmd	0.5	=LAST	=LAST	=LAST
Reheat Command	RhCommand	0.5	0	=ANY	=ANY
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	0	=ANY	=ANY
Hot Water Plant Requests	HWPlantReq	0	0	=ANY	=ANY
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Heating Airflow Setpoint	Heating Airflow Setpoint	Heating Airflow Setpoint
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupied Heating	Occupied Heating	Occupied Heating
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.5.3	5.6.5.3	5.6.5.3
Test Script Revision Date	March 3, 2026	Intervention	• Maintain conditions and record controller outputs when heating PID loop output reaches 65.	• Set the discharge air temperature feedback to the DAT setpoint, to allow heating. • Maintain conditions and record controller outputs when heating PID loop output reaches 75.	• Maintain conditions and record controller outputs when heating PID loop output reaches 100.
		Expected Response	• Heating loop output continues increasing. • Airflow setpoint remains at heating minimum due to low DAT. • DAT setpoint remains at maximum.	• Heating loop output continues increasing. • Airflow setpoint increases, potentially up to 50 (but at least 25) of the way to heating maximum. • DAT setpoint remains at maximum.	• Heating loop output reaches 100. • Airflow setpoint increases to heating maximum. • DAT setpoint remains at maximum.
Control Point Description	Control Point Name	Test Block	C	C	C
BACnet Inputs	TestInputs	Test Step	6	7	8
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		=PERIODIC(ZoneTemp)	=DATSp	=DATSp
Zone Temperature	ZoneTemp		=SUB(OccHeatSp;0.5)	=SUB(OccHeatSp;0.5)	=SUB(OccHeatSp;0.5)
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:30:00	0:30:00
Variable Name	VariableName		ZoneHeatLoop	ZoneHeatLoop	ZoneHeatLoop
Variable Value	VariableValue		>=65	>=75	100
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	>=65	>=75	100
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=HeatMinAir	=INTERPOLATE(ZoneHeatLoop; 50; 100; HeatMinAir; HeatMaxAir; HeatMinAir; HeatMaxAir)	=HeatMaxAir
Discharge Air Temperature Setpoint	DATSp	0.5	=ADD(OccHeatSp; MaxDeltaT)	=ADD(OccHeatSp; MaxDeltaT)	=ADD(OccHeatSp; MaxDeltaT)
VAV Box Damper Command	VAVDmprCmd	0.5	=LAST	=LAST	=LAST
Reheat Command	RhCommand	0.5	=ANY	=ANY	=ANY
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	=ANY	=ANY	=ANY
Hot Water Plant Requests	HWPlantReq	0	=ANY	=ANY	=ANY
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Heating Airflow Setpoint	Heating Airflow Setpoint	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupied Heating	Occupied Heating	Initialization
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.5.3	5.6.5.3	N/A
Test Script Revision Date	March 3, 2026	Intervention	• =RAMP zone temperature from 0.5°F below the occupied heating setpoint to the deadband over a span of 5 minutes. • Record controller outputs when heating loop output decays to 50.	• Continue zone temperature =RAMP from previous step. • Record controller outputs when heating loop output decays to 0	• Initialize inputs to the values below. • Zone airflow is overridden above airflow setpoint to drive damper closed, to ensure there are no static pressure requests.
		Expected Response	• Heating loop output reaches 50. • Airflow setpoint decreases to heating minimum. • DAT setpoint may decrease but remains near maximum. • Heating plant/reset requests should be zero, but HW valve position remains unknown.	• Heating loop output reaches 0. • Airflow setpoint decreases to cooling minimum. • DAT setpoint decreases to minimum.	• No expectations. Allow time for controller to initialize.
Control Point Description	Control Point Name	Test Block	C	C	D
BACnet Inputs	TestInputs	Test Step	9	10	1
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=Vspt	=MULT(Vspt; 1.5)
Zone Discharge Air Temperature	ZoneDAT		=PERIODIC(DATSp)	=PERIODIC(DATSp)	55
Zone Temperature	ZoneTemp		=RAMP(LAST; 72; 300)	=RAMP(LAST; 72; 300)	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:30:00	0:30:00
Variable Name	VariableName		ZoneHeatLoop	ZoneHeatLoop	
Variable Value	VariableValue		<=50	0	
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	=ANY
Heating Loop Output	ZoneHeatLoop	5	<=50	0	=ANY
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=ANY
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=ANY
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=ANY
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=ANY
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=ANY
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=ANY
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=ANY
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=ANY
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=HeatMinAir	=Vmin*	=ANY
Discharge Air Temperature Setpoint	DATSp	0.5	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=AHUSATSp	=ANY
VAV Box Damper Command	VAVDmprCmd	0.5	=LAST	=LAST	=ANY
Reheat Command	RhCommand	0.5	=ANY	=ANY	=ANY
Cooling SAT Reset Requests	CoolSATReq	0	0	0	=ANY
Static Pressure Reset Requests	StatPresReq	0	0	0	=ANY
Hot Water Reset Requests	HWSTReq	0	0	0	=ANY
Hot Water Plant Requests	HWPlantReq	0	0	0	=ANY
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	=ANY
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	=ANY
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	=ANY
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	=ANY
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	=ANY
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	=ANY
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	=ANY

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Initialization	Minimum DAT in Occupied Deadband	Minimum DAT in Occupied Deadband
Test Definition Package Version	DRAFT 20	SOO Reference	N/A	5.6.5.4	5.6.5.2
Test Script Revision Date	March 3, 2026	Intervention	• No change	• Zone airflow is equal to airflow setpoint to allow the damper position to stabilize. • Override discharge air temperature to 45°F to trigger reheat valve for minimum DAT control. • Record controller outputs when reheat valve starts to open or timer expires.	• Override discharge air temperature to 51°F to release minimum DAT control. • Record controller outputs when reheat valve closes or timer expires.
		Expected Response	• Zone setpoints are Occupied setpoints. • Damper is less than half open.	• Damper stops moving. • Airflow setpoint is at active minimum because zone temperature is in deadband. • Reheat valve opens to maintain minimum DAT.	• Reheat valve closes because discharge air temperature is above 50°F minmum even though it is below DAT setpoint.
Control Point Description	Control Point Name	Test Block	D	D	D
BACnet Inputs	TestInputs	Test Step	2	3	4
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=MULT(Vspt; 1.5)	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	45	51
Zone Temperature	ZoneTemp		72	72	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:05:00	0:05:00	0:10:00
Variable Name	VariableName		VAVDmprCmd	RhCommand	RhCommand
Variable Value	VariableValue		<=40	>=20	0
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=Vmin*	=Vmin*	=Vmin*
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	<=50	=LAST	=LAST
Reheat Command	RhCommand	0.5	0	>=10	0
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	0	0	0
Hot Water Plant Requests	HWPlantReq	0	0	0	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Heating Valve Modulation	Heating Valve Modulation	Heating Valve Modulation
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.5.3, 5.6.8.3, 5.6.8.4	5.6.5.3, 5.6.8.3, 5.6.8.4	5.6.5.3, 5.6.8.3, 5.6.8.4
Test Script Revision Date	March 3, 2026	Intervention	• =RAMP the zone temperature feedback to 2°F below the occupied heating setpoint over a span of 10 minutes to trigger heating. • Set the airflow feedback to dynamically reset to equal the setpoint so that damper does not move. • Set the discharge air temperature feedback to 5°F less than the setpoint to drive open reheat valve. • Record controller outputs when reheat valve is 94 open.	• =RAMP zone temperature to just below heating setpoint over a span of 3 minutes, to stablize non-zero heating loop signal. • Maintain discharge air temperature feedback at 5°F less than the setpoint to drive open reheat valve. • Record controller outputs when reheat valve is 85% open.	• Maintain zone temperature slightly below heating setpoint. • Maintain discharge air temperature feedback at 5°F less than the setpoint to drive open reheat valve. • Record controller outputs when reheat valve is 96% open.
		Expected Response	• Heating loop output begins increasing. • DAT setpoint increases. • Airflow setpoint goes to heating minimum. • Reheat valve opens. • No HHW request. • No heating plant request.	• Heating loop output mostly stabilizes. • DAT setpoint increases. • Airflow setpoint may increase but probably not. • Reheat valve continues to open. • No HHW request. • No heating plant request.	• Heating loop output mostly stabilizes. • DAT setpoint stabilizes. • Airflow setpoint may increase but probably not. • Reheat valve continues to open. • 1 HHW request. • 1 heating plant request.
Control Point Description	Control Point Name	Test Block	D	D	D
BACnet Inputs	TestInputs	Test Step	5	6	7
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		=SUB(DATSp; 5)	=SUB(DATSp; 5)	=SUB(DATSp; 5)
Zone Temperature	ZoneTemp		=RAMP(LAST; 68; 600)	=RAMP(LAST;69.5;180)	69.5
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:30:00	0:10:00
Variable Name	VariableName		ZoneHeatLoop	RhCommand	RhCommand
Variable Value	VariableValue		>=20	>=85	>=96
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	>=20	>LAST	>=LAST
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=HeatMinAir	>=LAST	>=LAST
Discharge Air Temperature Setpoint	DATSp	0.5	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))
VAV Box Damper Command	VAVDmprCmd	0.5	=LAST	=LAST	=LAST
Reheat Command	RhCommand	0.5	>=LAST	>=94	>=96
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	0	0	1
Hot Water Plant Requests	HWPlantReq	0	0	0	1
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Heating Valve Modulation	Heating Valve Modulation	Heating Valve Modulation
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.5.3, 5.6.8.3, 5.6.8.4	5.6.5.3, 5.6.8.3, 5.6.8.4	5.6.5.3, 5.6.8.3, 5.6.8.4
Test Script Revision Date	March 3, 2026	Intervention	• Maintain zone temperature slightly below heating setpoint. • Reduce discharge air temperature feedback to 16°F beow setpoint. • Record controller outputs after 4 minutes.	• Maintain conditions. • Record controller outputs after 2 minutes.	• Maintain conditions. • Record controller outputs after 5 minutes.
		Expected Response	• DAT setpoint remains elevated. • Reheat valve opens to maximum. • 1 HHW request. No additional requests because 5 minute timer has not expired. • 1 heating plant request.	• DAT setpoint remains elevated. • Reheat valve opens to maximum. • 2 HHW requests. • 1 heating plant request. • No low DAT alarm because 10 minute timer has not expired.	• DAT setpoint remains elevated. • Reheat valve opens to maximum. • 2 HHW requests. • 1 heating plant request. • Level 4 Low DAT alarm.
Control Point Description	Control Point Name	Test Block	D	D	D
BACnet Inputs	TestInputs	Test Step	8	9	10
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		=SUB(DATSp; 16)	=SUB(DATSp; 16)	=SUB(DATSp; 16)
Zone Temperature	ZoneTemp		69.5	69.5	69.5
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:04:00	0:02:00	0:05:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	>=LAST	>=LAST	>=LAST
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	>=LAST	>=LAST	>=LAST
Discharge Air Temperature Setpoint	DATSp	0.5	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))
VAV Box Damper Command	VAVDmprCmd	0.5	=LAST	=LAST	=LAST
Reheat Command	RhCommand	0.5	>=96	>=96	>=96
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	1	2	2
Hot Water Plant Requests	HWPlantReq	0	1	1	1
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	1
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Heating Valve Modulation	Heating Valve Modulation	Heating Valve Modulation
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.5.3, 5.6.8.3, 5.6.8.4	5.6.5.3, 5.6.8.3, 5.6.8.4	5.6.5.3, 5.6.8.3, 5.6.8.4
Test Script Revision Date	March 3, 2026	Intervention	• Reduce discharge air temperature feedback to 31°F beow setpoint. • Record controller outputs after 4 minutes.	• Maintain conditions. • Record controller outputs after 2 minutes.	• Set Heating Reset and Heating Plant Request Importances to 2. • Record controller outputs after 5 minutes.
		Expected Response	• Reheat valve opens to maximum. • 2 HHW requests. No additional requests because 5 minute timer has not expired. • 1 heating plant request. • Level 4 Low DAT alarm.	• Reheat valve opens to maximum. • 3 HHW requests. • 1 heating plant request. • Level 4 Low DAT alarm. No additional alarms because 10 minute timer has not expired.	• Reheat valve opens to maximum. • 6 HHW requests due to multiplier. • 2 heating plant request due to multiplier. • Level 4 Low DAT alarm. • Level 3 Low DAT alarm.
Control Point Description	Control Point Name	Test Block	D	D	D
BACnet Inputs	TestInputs	Test Step	11	12	13
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		=SUB(DATSp; 31)	=SUB(DATSp; 31)	=SUB(DATSp; 31)
Zone Temperature	ZoneTemp		69.5	69.5	69.5
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	2
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	2
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:04:00	0:02:00	0:05:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	>=LAST	>=LAST	>=LAST
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	>=LAST	>=LAST	>=LAST
Discharge Air Temperature Setpoint	DATSp	0.5	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))
VAV Box Damper Command	VAVDmprCmd	0.5	=LAST	=LAST	=LAST
Reheat Command	RhCommand	0.5	>=96	>=96	>=96
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	2	3	6
Hot Water Plant Requests	HWPlantReq	0	1	1	2
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	1	1	1
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	1
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Heating Valve Modulation	Heating Valve Modulation	Heating Valve Modulation
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.5.3, 5.6.8.3, 5.6.8.4	5.6.5.3, 5.6.8.3, 5.6.8.4	5.6.5.3, 5.6.8.3, 5.6.8.4
Test Script Revision Date	March 3, 2026	Intervention	• Set Heating Reset and Heating Plant Request Importances to 0.	• Set Heating Reset and Heating Plant Request Importances to 1.	• Increase discharge air temperature feedback to 29°F beow setpoint. • Record controller outputs after 1 minute.
		Expected Response	• Reheat valve opens to maximum. • 0 HHW requests or heating plant requests, due to multiplier. • Low DAT alarms suppressed by 0 Importance Factor.	• Reheat valve opens to maximum. • 3 HHW requests. • 1 heating plant request. • Level 4 Low DAT alarm. • Level 3 Low DAT alarm.	• Reheat valve opens to maximum. • 2 HHW requests. 1 request clears due to increased DAT. • 1 heating plant request. • Level 4 Low DAT alarm. Level 3 alarm clears due to increased DAT.
Control Point Description	Control Point Name	Test Block	D	D	D
BACnet Inputs	TestInputs	Test Step	14	15	16
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		=SUB(DATSp; 31)	=SUB(DATSp; 31)	=SUB(DATSp; 29)
Zone Temperature	ZoneTemp		69.5	69.5	69.5
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		0	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		0	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:00:30	0:00:30	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	>=LAST	>=LAST	>=LAST
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	>=LAST	>=LAST	>=LAST
Discharge Air Temperature Setpoint	DATSp	0.5	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))
VAV Box Damper Command	VAVDmprCmd	0.5	=LAST	=LAST	=LAST
Reheat Command	RhCommand	0.5	>=96	>=96	>=96
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	0	3	2
Hot Water Plant Requests	HWPlantReq	0	0	1	1
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	1	1
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	1	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm	Reheat Valve Control, Heating Hot Water Reset Request, & Low DAT Alarm
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Heating Valve Modulation	Heating Valve Modulation	Heating Valve Modulation
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.5.3, 5.6.8.3, 5.6.8.4	5.6.5.3, 5.6.8.3, 5.6.8.4	5.6.5.3, 5.6.8.3, 5.6.8.4
Test Script Revision Date	March 3, 2026	Intervention	• Increase discharge air temperature feedback to 5°F beow setpoint. • Record controller outputs after 1 minute.	• =RAMP zone temperature to deadband over a span of 10 minutes to allow heating loop to relax. • Set discharge air temperature to 5°F above setpoint to drive reheat valve closed. • Record controller outputs after valve is less than 85 open.	• Maintain conditions. • Record controller outputs after valve is less than 10 open.
		Expected Response	• Reheat valve opens to maximum. • 1 HHW requests. 1 request clears due to increased DAT. • 1 heating plant request. • Level 4 DAT alarm clears due to increased DAT.	• Heating loop value decreases. • Airflow setpoint decreases if elevated. • DAT setpoint decreases. • Reheat valve starts to close. • Final HHW request clears due to valve position. • 1 heating plant request.	• Airflow setpoint decreases if elevated. • DAT setpoint decreases. • Reheat valve continues to close. • Heating plant request clears due to valve position.
Control Point Description	Control Point Name	Test Block	D	D	D
BACnet Inputs	TestInputs	Test Step	17	18	19
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=PERIODIC(Vspt)	=PERIODIC(Vspt)	=PERIODIC(Vspt)
Zone Discharge Air Temperature	ZoneDAT		=SUB(DATSp; 14)	=ADD(DATSp; 5)	=ADD(DATSp; 5)
Zone Temperature	ZoneTemp		69.5	=RAMP(LAST; 72; 600)	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:30:00	0:30:00
Variable Name	VariableName			RhCommand	RhCommand
Variable Value	VariableValue			<=84	<=9
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	>=LAST	<=LAST	<=LAST
Active Heating Setpoint	ZoneActHeatSp	0.1	=OccHeatSp	=OccHeatSp	=OccHeatSp
Active Cooling Setpoint	ZoneActCoolSp	0.1	=OccCoolSp	=OccCoolSp	=OccCoolSp
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	=Vmin*	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	=Vmin*	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	=Vmin	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	>=LAST	<=LAST	<=LAST
Discharge Air Temperature Setpoint	DATSp	0.5	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))	=INTERPOLATE(ZoneHeatLoop; 0; 50; AHUSATSp; ADD(OccHeatSp; MaxDeltaT); AHUSATSp; ADD(OccHeatSp; MaxDeltaT))
VAV Box Damper Command	VAVDmprCmd	0.5	=LAST	=LAST	=LAST
Reheat Command	RhCommand	0.5	>=96	<=84	<=9
Cooling SAT Reset Requests	CoolSATReq	0	0	0	0
Static Pressure Reset Requests	StatPresReq	0	0	0	0
Hot Water Reset Requests	HWSTReq	0	1	0	0
Hot Water Plant Requests	HWPlantReq	0	1	1	0
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Zone Mode	Zone Mode	Zone Mode
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Initialization	Occupied Mode Airflow Endpoints and Setpoint	Warmup Mode Airflow Endpoints and Setpoint
Test Definition Package Version	DRAFT 20	SOO Reference	N/A	5.6.4, 5.4.6.1	5.6.4, 5.4.6.2
Test Script Revision Date	March 3, 2026	Intervention	• Initialize inputs to the values below. • Zone starts in Occupied Mode.	• Record controller outputs with zone in deadband	• Set Zone Mode to Warmup.
		Expected Response	• No expectations. Allow time for controller to initialize.	• Zone airflow endpoints are default Occupied values.	• Zone airflow endpoints are Warmup values.
Control Point Description	Control Point Name	Test Block	E	E	E
BACnet Inputs	TestInputs	Test Step	1	2	3
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	OCCUPIED	WARMUP
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	=ANY	0	0
Heating Loop Output	ZoneHeatLoop	5	=ANY	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=ANY	=ANY	=ANY
Active Cooling Setpoint	ZoneActCoolSp	0.1	=ANY	=ANY	=ANY
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=ANY	=VCoolMax	0
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=ANY	=Vmin*	0
Deadband Minimum Airflow Endpoint	DbMinAir	5	=ANY	=Vmin*	0
Heating Minimum Airflow Endpoint	HeatMinAir	5	=ANY	=VHeatMin	=VHeatMax
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=ANY	=VHeatMax	=VCoolMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=ANY	=Vmin	0
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=ANY	=Vmin*	0
Discharge Air Temperature Setpoint	DATSp	0.5	=ANY	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	=ANY	=ANY	=ANY
Reheat Command	RhCommand	0.5	=ANY	=ANY	=ANY
Cooling SAT Reset Requests	CoolSATReq	0	=ANY	=ANY	=ANY
Static Pressure Reset Requests	StatPresReq	0	=ANY	=ANY	=ANY
Hot Water Reset Requests	HWSTReq	0	=ANY	=ANY	=ANY
Hot Water Plant Requests	HWPlantReq	0	=ANY	=ANY	=ANY
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	=ANY	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	=ANY	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	=ANY	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	=ANY	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	=ANY	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	=ANY	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	=ANY	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Zone Mode	Zone Mode	Zone Mode
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupied Mode Airflow Endpoints and Setpoint	Cooldown Mode Airflow Endpoints and Setpoint	Occupied Mode Airflow Endpoints and Setpoint
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.4, 5.4.6.1	5.6.4, 5.4.6.2	5.6.4, 5.4.6.1
Test Script Revision Date	March 3, 2026				
		Intervention	• Set Zone Mode to Occupied.	• Set Zone Mode to Cooldown.	• Set Zone Mode to Occupied.
		Expected Response	• Zone airflow endpoints are default Occupied values.	• Zone airflow endpoints are Cooldown values.	• Zone airflow endpoints are default Occupied values.
Control Point Description	Control Point Name	Test Block	E	E	E
BACnet Inputs	TestInputs	Test Step	4	5	6
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		OCCUPIED	COOLDOWN	OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=ANY	=ANY	=ANY
Active Cooling Setpoint	ZoneActCoolSp	0.1	=ANY	=ANY	=ANY
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*	0	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*	0	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin	=VHeatMin	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax	=VHeatMax	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin	0	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=Vmin*	0	=Vmin*
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	=ANY	=ANY	=ANY
Reheat Command	RhCommand	0.5	=ANY	=ANY	=ANY
Cooling SAT Reset Requests	CoolSATReq	0	=ANY	=ANY	=ANY
Static Pressure Reset Requests	StatPresReq	0	=ANY	=ANY	=ANY
Hot Water Reset Requests	HWSTReq	0	=ANY	=ANY	=ANY
Hot Water Plant Requests	HWPlantReq	0	=ANY	=ANY	=ANY
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Zone Mode	Zone Mode	Zone Mode
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Setback Mode Airflow Endpoints and Setpoint	Occupied Mode Airflow Endpoints and Setpoint	Setup Mode Airflow Endpoints and Setpoint
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.4, 5.4.6.2	5.6.4, 5.4.6.1	5.6.4, 5.4.6.2
Test Script Revision Date	March 3, 2026				
		Intervention	• Set Zone Mode to Setback.	• Set Zone Mode to Occupied.	• Set Zone Mode to Setup.
		Expected Response	• Zone airflow endpoints are Setback values.	• Zone airflow endpoints are default Occupied values.	• Zone airflow endpoints are Setup values.
Control Point Description	Control Point Name	Test Block	E	E	E
BACnet Inputs	TestInputs	Test Step	7	8	9
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70	70	70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75	75	75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60	60	60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90	90	90
Zone CO2 Limit	ZoneCO2Limit		1000	1000	1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500	500	500
Zone Minimum Airflow (Vmin)	Vmin		100	100	100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200	200	200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120	120	120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20	20	20
VAV Box Controllable Minimum (Vm)	Vm		40	40	40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt	=Vspt	=Vspt
Zone Discharge Air Temperature	ZoneDAT		55	55	55
Zone Temperature	ZoneTemp		72	72	72
Zone CO2 Level	ZoneCO2		400	400	400
Occupancy Sensor	ZoneOccSensor		PRESENT	PRESENT	PRESENT
Window Switch	ZoneWinSwitch		CLOSED	CLOSED	CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1	1	1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1	1	1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1	1	1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1	1	1
AHU Supply Fan Status	AHUSupFanStatus		ON	ON	ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55	55	55
AHU Supply Air Temperature	AHUSAT		55	55	55
Hot Water Plant Status	HWPlantStatus		ON	ON	ON
Zone Group Mode	ZoneGrpMode		SETBACK	OCCUPIED	SETUP
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
Cooling Loop Output	ZoneCoolLoop	5	0	0	0
Heating Loop Output	ZoneHeatLoop	5	0	0	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=ANY	=ANY	=ANY
Active Cooling Setpoint	ZoneActCoolSp	0.1	=ANY	=ANY	=ANY
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	0	=VCoolMax	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	0	=Vmin*	0
Deadband Minimum Airflow Endpoint	DbMinAir	5	0	=Vmin*	0
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMax	=VHeatMin	0
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VCoolMax	=VHeatMax	0
Occupied Minimum Airflow (vmin*)	Vmin*	5	0	=Vmin	0
Zone Active Airflow Setpoint (Vspt)	Vspt	5	0	=Vmin*	0
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp	=AHUSATSp	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	=ANY	=ANY	=ANY
Reheat Command	RhCommand	0.5	=ANY	=ANY	=ANY
Cooling SAT Reset Requests	CoolSATReq	0	=ANY	=ANY	=ANY
Static Pressure Reset Requests	StatPresReq	0	=ANY	=ANY	=ANY
Hot Water Reset Requests	HWSTReq	0	=ANY	=ANY	=ANY
Hot Water Plant Requests	HWPlantReq	0	=ANY	=ANY	=ANY
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0	0	0

Equipment Configuration	VAV Reheat Terminal Unit	Test Block Description	Zone Mode
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Occupied Mode Airflow Endpoints and Setpoint
Test Definition Package Version	DRAFT 20	SOO Reference	5.6.4, 5.4.6.1
Test Script Revision Date	March 3, 2026		
		Intervention	• Set Zone Mode to Occupied.
		Expected Response	• Zone airflow endpoints are default Occupied values.

Control Point Description	Control Point Name	Test Block	E
BACnet Inputs	TestInputs	Test Step	10
Zone Temperature Setpoint, Occupied Heating	OccHeatSp		70
Zone Temperature Setpoint, Occupied Cooling	OccCoolSp		75
Zone Temperature Setpoint, Unoccupied Heating	UnoccHeatSp		60
Zone Temperature Setpoint, Unoccupied Cooling	UnoccCoolSp		90
Zone CO2 Limit	ZoneCO2Limit		1000
Zone Maximum Cooling Airflow (Vcool-max)	VCoolMax		500
Zone Minimum Airflow (Vmin)	Vmin		100
Zone Maximum Heating Airflow (Vheat-max)	VHeatMax		200
Zone Minimum Heating Airflow (Vheat-min)	VHeatMin		120
Zone Maximum DAT Above Heating (MaxΔT)	MaxDeltaT		20
VAV Box Controllable Minimum (Vm)	Vm		40
Zone Discharge Airflow	ZoneSupAirflow		=Vspt
Zone Discharge Air Temperature	ZoneDAT		55
Zone Temperature	ZoneTemp		72
Zone CO2 Level	ZoneCO2		400
Occupancy Sensor	ZoneOccSensor		PRESENT
Window Switch	ZoneWinSwitch		CLOSED
Cooling SAT Reset Requests Importance Multiplier	IM_CoolSAT		1
Static Pressure Reset Requests Importance Multiplier	IM_DSP		1
Hot Water Supply Temperature Reset Requests Importance Multiplier	IM_HWST		1
Hot Water Plant Requests Importance Multiplier	IM_HWP		1
AHU Supply Fan Status	AHUSupFanStatus		ON
AHU Supply Air Temperature Setpoint	AHUSATSp		55
AHU Supply Air Temperature	AHUSAT		55
Hot Water Plant Status	HWPlantStatus		ON
Zone Group Mode	ZoneGrpMode		OCCUPIED
Conditions for Evaluation of Test Step	EvaluationConditions		
Clock Time	ClockTime		0:01:00
Variable Name	VariableName		
Variable Value	VariableValue		
BACnet Expected Outputs	TestOutputs	OutputTolerance	
Cooling Loop Output	ZoneCoolLoop	5	0
Heating Loop Output	ZoneHeatLoop	5	0
Active Heating Setpoint	ZoneActHeatSp	0.1	=ANY
Active Cooling Setpoint	ZoneActCoolSp	0.1	=ANY
Cooling Maximum Airflow Endpoint	CoolMaxAir	5	=VCoolMax
Cooling Minimum Airflow Endpoint	CoolMinAir	5	=Vmin*
Deadband Minimum Airflow Endpoint	DbMinAir	5	=Vmin*
Heating Minimum Airflow Endpoint	HeatMinAir	5	=VHeatMin
Heating Maximum Airflow Endpoint	HeatMaxAir	5	=VHeatMax
Occupied Minimum Airflow (vmin*)	Vmin*	5	=Vmin
Zone Active Airflow Setpoint (Vspt)	Vspt	5	=Vmin*
Discharge Air Temperature Setpoint	DATSp	0.5	=AHUSATSp
VAV Box Damper Command	VAVDmprCmd	0.5	=ANY
Reheat Command	RhCommand	0.5	=ANY
Cooling SAT Reset Requests	CoolSATReq	0	=ANY
Static Pressure Reset Requests	StatPresReq	0	=ANY
Hot Water Reset Requests	HWSTReq	0	=ANY
Hot Water Plant Requests	HWPlantReq	0	=ANY
Zone Low Airflow Alarm, Level 4	LowAirflow4	0	0
Zone Low Airflow Alarm, Level 3	LowAirflow3	0	0
VAV Low Discharge Air Temperature Alarm, Level 4	LowDAT4	0	0
VAV Low Discharge Air Temperature Alarm, Level 3	LowDAT3	0	0
VAV Airflow Sensor Calibration, Level 3	AirflowSensCal3	0	0
VAV Leaking Damper Alarm, Level 4	LeakDmpr4	0	0
VAV Leaking Valve Alarm, Level 4	LeakVlv4	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	AHU System Mode Tests	AHU System Mode Tests	AHU System Mode Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Initialization	Fan Start and SAT setpoint	Test Fan Start and SAT setpoint
Test Definition Package Version	DRAFT 4	SOO Reference	N/A	5.16.1.1, 5.16.2.2.c & 5.16.2.2.d	5.16.1.1, 5.16.2.2.c & 5.16.2.2.d
Test Script Revision Date	March 3, 2026	Intervention	• This test assumes AHU is configured to serve perimeter VAV boxes. • Initialize inputs to the values below. • Test starts with system in Unoccupied Mode.	• No change. AHU is in Unoccupied Mode	• Set AHU to SETUP Mode
		Expected Response	• No expectations. Wait 5 minutes to allow controller to initialize.	• Fan remains off (S/S point is OFF). • SAT setpoint and DSP setpoint are null or undefined. • Outdoor air damper is shut due to system Mode.	• Supply fan starts. • SAT setpoint is 65°F (Max_ClgSAT) because fan has been on for less than Td minutes. • DSP setpoint is 0.5in.wc. (DSP SPo) because fan has been on for less than Td minutes. • Outdoor air damper opens for cooling because AHU_SAT > 65°F (Max_ClgSAT) and OAT is below lockout.
Control Point Description	Control Point Name	Test Block	**A**	**A**	**A**
BACnet Inputs	TestInputs	Test Step	1	2	3
AHU Supply Fan Status	AHU_SFstatus		OFF	OFF	ON
Supply Air Temperature	AHU_SAT		70	70	70
Return Air Temperature	AHU_RAT		70	70	70
Mixed Air Temperature	AHU_MAT		70	70	70
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		0	0	0
Duct Static Pressure	AHU_DSP		0.00	0.00	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.00	0.00	0.25
AHU System Mode	AHUMode		UNOCCUPIED	UNOCCUPIED	SETUP
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:05:00	0:04:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	=ANY	OFF	ON
Supply Fan Speed	SF_Speed	5	=ANY	0	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ANY	=ANY	0.5
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ANY	=ANY	65
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	0	>0
Supply Fan Alarm, Level 4	SupFanAl4	N/A	=ANY	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	=ANY	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	=ANY	0	0
High Building Pressure Alarm	HighBpAl	N/A	=ANY	0	0
Low Building Pressure Alarm	LowBpAl	N/A	=ANY	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	AHU System Mode Tests	AHU System Mode Tests	AHU System Mode Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Test Fan Start and SAT setpoint	Test Fan Start and SAT setpoint	Test Fan Start and SAT setpoint
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.1.1, 5.16.2.2.c & 5.16.2.2.d	5.16.1.1, 5.16.2.2.c & 5.16.2.2.d	5.16.1.1, 5.16.2.2.c & 5.16.2.2.d
Test Script Revision Date	March 3, 2026	Intervention	• Set AHU to SETBACK Mode	• Set AHU to UNOCCUPIED Mode	• Set AHU to COOLDOWN Mode
		Expected Response	• Supply fan remains on. • SAT setpoint is 95°F because system is in SETBACK Mode. • DSP setpoint is 0.5in.wc. (DSP SPo) because fan has been on for less than Td minutes. • Outdoor air damper is shut due to system Mode.	• Fan stops (S/S point is OFF). • SAT setpoint and DSP setpoint are null or undefined. • Outdoor air damper is shut due to system Mode.	• Supply fan starts. • SAT setpoint is 55°F (Min_ClgSAT) because system is in COOLDOWN Mode. • DSP setpoint is 0.5in.wc. (DSP SPo) because fan has been on for less than Td minutes. • Outdoor air damper opens for cooling because AHU_SAT > 65°F (Max_ClgSAT) and OAT is below lockout.
Control Point Description	Control Point Name	Test Block	**A**	**A**	**A**
BACnet Inputs	TestInputs	Test Step	4	5	6
AHU Supply Fan Status	AHU_SFstatus		ON	OFF	ON
Supply Air Temperature	AHU_SAT		70	70	70
Return Air Temperature	AHU_RAT		70	70	70
Mixed Air Temperature	AHU_MAT		70	70	70
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		0	0	0
Duct Static Pressure	AHU_DSP		=AHU_DSPsp	0.00	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.25	0.00	0.25
AHU System Mode	AHUMode		SETBACK	UNOCCUPIED	COOLDOWN
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:04:00	0:10:00	0:03:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	OFF	ON
Supply Fan Speed	SF_Speed	5	=ANY	0	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	0.5	=ANY	0.5
Supply Air Temperature Setpoint	AHU_SATsp	0.5	95	=ANY	55
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	0	0	>0
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0	0
High Building Pressure Alarm	HighBpAl	N/A	0	0	0
Low Building Pressure Alarm	LowBpAl	N/A	0	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	AHU System Mode Tests	AHU System Mode Tests	AHU System Mode Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Test Fan Start and SAT setpoint	Test Fan Start and SAT setpoint	Test Fan Start and SAT setpoint
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.1.1, 5.16.2.2.c & 5.16.2.2.d	5.16.1.1, 5.16.2.2.c & 5.16.2.2.d	5.16.1.1, 5.16.2.2.c & 5.16.2.2.d
Test Script Revision Date	March 3, 2026	Intervention	• Set OAT to 60°F. • Set AHU to WARMUP Mode.	• Set AHU to UNOCCUPIED Mode	• Set AHU to OCCUPIED Mode
		Expected Response	• Supply fan remains on. • SAT setpoint is 95°F because system is in Warmup Mode. • DSP setpoint is 0.5in.wc. (DSP SPo) because fan has been on for less than Td minutes. • Outdoor air damper is shut due to system Mode.	• Fan stops (S/S point is OFF). • SAT setpoint and DSP setpoint are null or undefined. • Outdoor air damper is shut due to system Mode.	• Supply fan starts. • SAT setpoint is 65°F (Max_ClgSAT) because fan has been on for less than Td minutes. • DSP setpoint is 0.5in.wc. (DSP SPo) because fan has been on for less than Td minutes. • Outdoor air damper opens for cooling because AHU_SAT > 65°F (Max_ClgSAT) and OAT is below lockout.
Control Point Description	Control Point Name	Test Block	**A**	**A**	**A**
BACnet Inputs	TestInputs	Test Step	7	8	9
AHU Supply Fan Status	AHU_SFstatus		ON	OFF	ON
Supply Air Temperature	AHU_SAT		70	70	70
Return Air Temperature	AHU_RAT		70	70	70
Mixed Air Temperature	AHU_MAT		70	70	70
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		0	0	0
Duct Static Pressure	AHU_DSP		=AHU_DSPsp	0.00	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.25	0.00	0.25
AHU System Mode	AHUMode		WARMUP	UNOCCUPIED	SETUP
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:03:00	0:10:00	0:04:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	OFF	ON
Supply Fan Speed	SF_Speed	5	=ANY	0	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	0.5	=ANY	0.5
Supply Air Temperature Setpoint	AHU_SATsp	0.5	95	=ANY	65
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	0	0	>0
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0	0
High Building Pressure Alarm	HighBpAl	N/A	0	0	0
Low Building Pressure Alarm	LowBpAl	N/A	0	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	Duct Static Pressure Setpoint Reset Test	Duct Static Pressure Setpoint Reset Test	Duct Static Pressure Setpoint Reset Test
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Initialization	AHU Duct Static Pressure Setpoint	AHU Duct Static Pressure Setpoint
Test Definition Package Version	DRAFT 4	SOO Reference	N/A	5.16.1.2	5.16.1.2
Test Script Revision Date	March 3, 2026	Intervention	• Initialize inputs to the values below. • Test starts with system in Unoccupied Mode.	• Set system to Occupied Mode.	• Wait
		Expected Response	• No expectations. Wait 5 minutes to allow controller to initialize. • SAT setpoint is ignored - out of scope for this test. • Economizer Outdoor Air Damper position is ignored - out of scope for this test.	• Supply fan starts. • DSP setpoint is 0.5in.wc. (DSP SPo) because fan has been on for less than Td minutes.	• DSP setpoint is 0.5in.wc. (DSP SPo) because fan has been on for less than Td minutes.
Control Point Description	Control Point Name	Test Block	**B**	**B**	**B**
BACnet Inputs	TestInputs	Test Step	1	2	3
AHU Supply Fan Status	AHU_SFstatus		OFF	ON	ON
Supply Air Temperature	AHU_SAT		70	=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		70	=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		70	=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		0	0	0
Duct Static Pressure	AHU_DSP		0.00	=AHU_DSPsp	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.00	0.25	0.25
AHU System Mode	AHUMode		UNOCCUPIED	OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:01:00	0:08:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	=ANY	ON	ON
Supply Fan Speed	SF_Speed	5	=ANY	=ANY	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ANY	0.5	0.5
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ANY	=ANY	=ANY
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	=ANY	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	=ANY	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	=ANY	0	0
High Building Pressure Alarm	HighBpAl	N/A	=ANY	0	0
Low Building Pressure Alarm	LowBpAl	N/A	=ANY	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	Duct Static Pressure Setpoint Reset Test	Duct Static Pressure Setpoint Reset Test	Duct Static Pressure Setpoint Reset Test
Sequences Under Test	Guideline 36-2021	Test Step Purpose	AHU Duct Static Pressure Setpoint	AHU Duct Static Pressure Setpoint	AHU Duct Static Pressure Setpoint
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.1.2	5.16.1.2	5.16.1.2
Test Script Revision Date	March 3, 2026	Intervention	• Wait.	• Set 2 Static Pressure Requests. • Wait.	• Set 2 Static Pressure Requests. • Wait.
		Expected Response	• DSP Setpoint decreases by 0.2in.wc. because there have been four trim cycles since the reset loop became active and no requests.	• DSP Setpoint decreases by 0.1in.wc. because there have been two additional trim cycles and R = I.	• DSP Setpoint decreases to 0.1in.wc. (DSP SPmin) because there have been two additional trim cycles and R = I.
Control Point Description	Control Point Name	Test Block	**B**	**B**	**B**
BACnet Inputs	TestInputs	Test Step	4	5	6
AHU Supply Fan Status	AHU_SFstatus		ON	ON	ON
Supply Air Temperature	AHU_SAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	2	2
Cooling SAT Requests	CoolSAT_Req		0	0	0
Duct Static Pressure	AHU_DSP		=AHU_DSPsp	=AHU_DSPsp	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.25	0.25	0.25
AHU System Mode	AHUMode		OCCUPIED	OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:09:00	0:04:00	0:04:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	ON	ON
Supply Fan Speed	SF_Speed	5	=ANY	=ANY	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=SUB(LAST;0.2)	=SUB(LAST;0.1)	0.1
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ANY	=ANY	=ANY
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0	0
High Building Pressure Alarm	HighBpAl	N/A	0	0	0
Low Building Pressure Alarm	LowBpAl	N/A	0	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	Duct Static Pressure Setpoint Reset Test	Duct Static Pressure Setpoint Reset Test	Duct Static Pressure Setpoint Reset Test
Sequences Under Test	Guideline 36-2021	Test Step Purpose	AHU Duct Static Pressure Setpoint	AHU Duct Static Pressure Setpoint	AHU Duct Static Pressure Setpoint
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.1.2	5.16.1.2	5.16.1.2
Test Script Revision Date	March 3, 2026	Intervention	• Set 3 Static Pressure Requests. • Wait.	• Set 4 Static Pressure Requests. • Wait.	• Set 8 Static Pressure Requests. • Wait.
		Expected Response	• DSP Setpoint increases by 0.12in.wc. because two cycles have passed with R = I +1.	• DSP Setpoint increases by 0.24in.wc. because two cycles have passed with R = I +2.	• DSP Setpoint increases by 0.26in.wc. because two cycles have passed with R = I + 6, but maximum response is limited to +0.13in.wc. Per cycle.
Control Point Description	Control Point Name	Test Block	**B**	**B**	**B**
BACnet Inputs	TestInputs	Test Step	7	8	9
AHU Supply Fan Status	AHU_SFstatus		ON	ON	ON
Supply Air Temperature	AHU_SAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		3	4	8
Cooling SAT Requests	CoolSAT_Req		0	0	0
Duct Static Pressure	AHU_DSP		=AHU_DSPsp	=AHU_DSPsp	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.25	0.25	0.25
AHU System Mode	AHUMode		OCCUPIED	OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:04:00	0:04:00	0:04:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	ON	ON
Supply Fan Speed	SF_Speed	5	=ANY	=ANY	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ADD(LAST;0.12)	=ADD(LAST;0.24)	=ADD(LAST;0.26)
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ANY	=ANY	=ANY
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0	0
High Building Pressure Alarm	HighBpAl	N/A	0	0	0
Low Building Pressure Alarm	LowBpAl	N/A	0	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	Duct Static Pressure Setpoint Reset Test	Duct Static Pressure Setpoint Reset Test	Duct Static Pressure Setpoint Reset Test
Sequences Under Test	Guideline 36-2021	Test Step Purpose	AHU Duct Static Pressure Setpoint	AHU Duct Static Pressure Setpoint	AHU Duct Static Pressure Setpoint
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.1.2	5.16.1.2	5.16.1.2
Test Script Revision Date	March 3, 2026	Intervention	• Wait.	• Set 2 Static Pressure Requests. • Wait.	• Wait.
		Expected Response	• DSP Setpoint increases to 1.0in.wc. (DSP SPmax) because six cycles have passed with maximum response of +0.13in.wc.	• DSP Setpoint decreases by 0.2in.wc. because four cycles have passed with R=I.	• DSP Setpoint decreases to 0.1in.wc. (DSP SPmin) because 16 cycles have passed with R=I.
Control Point Description	Control Point Name	Test Block	**B**	**B**	**B**
BACnet Inputs	TestInputs	Test Step	10	11	12
AHU Supply Fan Status	AHU_SFstatus		ON	ON	ON
Supply Air Temperature	AHU_SAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		8	2	2
Cooling SAT Requests	CoolSAT_Req		0	0	0
Duct Static Pressure	AHU_DSP		=AHU_DSPsp	=AHU_DSPsp	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.25	0.25	0.25
AHU System Mode	AHUMode		OCCUPIED	OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:06:00	0:08:00	0:32:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	ON	ON
Supply Fan Speed	SF_Speed	5	=ANY	=ANY	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	1	=SUB(LAST;0.2)	0.1
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ANY	=ANY	=ANY
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0	0
High Building Pressure Alarm	HighBpAl	N/A	0	0	0
Low Building Pressure Alarm	LowBpAl	N/A	0	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	SAT Setpoint Reset Test	SAT Setpoint Reset Test	SAT Setpoint Reset Test
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Initialization	AHU SAT Setpoint Reset	AHU SAT Setpoint Reset
Test Definition Package Version	DRAFT 4	SOO Reference	N/A	5.16.2.2	5.16.2.2
Test Script Revision Date	March 3, 2026	Intervention	• Initialize inputs to the values below. • Test starts with system in Unoccupied Mode.	• Set system to Occupied Mode.	• Set 4 Cooling Requests • Wait
		Expected Response	• No expectations. Wait 5 minutes to allow controller to initialize. • DSP setpoint is ignored - out of scope for this test. • Economizer Outdoor Air Damper position is ignored - out of scope for this test.	• Supply fan starts. • SAT is 65°F (SAT SPo = Max_ClgSAT) because fan has been on for less than Td minutes.	• SAT is 65°F (SAT SPo = Max_ClgSAT) because fan has been on for less than Td minutes.
Control Point Description	Control Point Name	Test Block	C	C	C
BACnet Inputs	TestInputs	Test Step	1	2	3
AHU Supply Fan Status	AHU_SFstatus		OFF	ON	ON
Supply Air Temperature	AHU_SAT		70	=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		70	=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		70	=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		0	0	4
Duct Static Pressure	AHU_DSP		0.00	=AHU_DSPsp	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.00	0.25	0.25
AHU System Mode	AHUMode		UNOCCUPIED	OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:01:00	0:08:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	=ANY	ON	ON
Supply Fan Speed	SF_Speed	5	=ANY	=ANY	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ANY	=ANY	=ANY
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ANY	65	65
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	=ANY	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	=ANY	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	=ANY	0	0
High Building Pressure Alarm	HighBpAl	N/A	=ANY	0	0
Low Building Pressure Alarm	LowBpAl	N/A	=ANY	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	SAT Setpoint Reset Test	SAT Setpoint Reset Test	SAT Setpoint Reset Test
Sequences Under Test	Guideline 36-2021	Test Step Purpose	AHU SAT Setpoint Reset	AHU SAT Setpoint Reset	AHU SAT Setpoint Reset
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.2.2	5.16.2.2	5.16.2.2
Test Script Revision Date	March 3, 2026	Intervention	• Wait.	• Set 8 Cooling Requests • Wait	• Wait
		Expected Response	• SAT Setpoint decreases by 2.4°F because there have been four trim cycles since the reset loop became active and R = I + 2.	• SAT Setpoint decreases by 4°F because because four cycles have passed with R = I + 6, but maximum response is limited to -1.0°F.	• SAT Setpoint decreases to 55°F (Min_ClgSAT) minimum because there have been four additional trim cycles and R = I + 6.
Control Point Description	Control Point Name	Test Block	C	C	C
BACnet Inputs	TestInputs	Test Step	4	5	6
AHU Supply Fan Status	AHU_SFstatus		ON	ON	ON
Supply Air Temperature	AHU_SAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		4	8	8
Duct Static Pressure	AHU_DSP		=AHU_DSPsp	=AHU_DSPsp	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.25	0.25	0.25
AHU System Mode	AHUMode		OCCUPIED	OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:07:00	0:08:00	0:08:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	ON	ON
Supply Fan Speed	SF_Speed	5	=ANY	=ANY	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ANY	=ANY	=ANY
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=SUB(LAST;2.4)	=SUB(LAST;4)	55
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0	0
High Building Pressure Alarm	HighBpAl	N/A	0	0	0
Low Building Pressure Alarm	LowBpAl	N/A	0	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	SAT Setpoint Reset Test	SAT Setpoint Reset Test	SAT Setpoint Reset Test
Sequences Under Test	Guideline 36-2021	Test Step Purpose	AHU SAT Setpoint Reset	AHU SAT Setpoint Reset	AHU SAT Setpoint Reset
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.2.2	5.16.2.2	5.16.2.2
Test Script Revision Date	March 3, 2026	Intervention	• Set 0 Cooling Requests • Wait	• Set 2 Cooling Requests • Wait	• Wait
		Expected Response	• SAT Setpoint increases by 2.0°F because there have been ten trim cycles with R = 0.	• SAT Setpoint increases by 4.0°F because there have been twenty trim cycles with R = I.	• SAT Setpoint increases to 65°F (Max_ClgSAT) because there have been twenty trim cycles with R = I.
Control Point Description	Control Point Name	Test Block	C	C	C
BACnet Inputs	TestInputs	Test Step	7	8	9
AHU Supply Fan Status	AHU_SFstatus		ON	ON	ON
Supply Air Temperature	AHU_SAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		0	2	2
Duct Static Pressure	AHU_DSP		=AHU_DSPsp	=AHU_DSPsp	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.25	0.25	0.25
AHU System Mode	AHUMode		OCCUPIED	OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:20:00	0:40:00	0:40:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	ON	ON
Supply Fan Speed	SF_Speed	5	=ANY	=ANY	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ANY	=ANY	=ANY
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ADD(LAST;2)	=ADD(LAST;4)	65
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0	0
High Building Pressure Alarm	HighBpAl	N/A	0	0	0
Low Building Pressure Alarm	LowBpAl	N/A	0	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	SAT Setpoint Reset Test	Alarm Tests	Alarm Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	AHU SAT Setpoint Reset	Initialization	Fan Status Alarms
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.2.2	N/A	5.16.13.2
Test Script Revision Date	March 3, 2026	Intervention	• Set 3 Cooling Requests • Wait	• Initialize inputs to the values below. • Test starts with system in Unoccupied Mode.	• Set Fan Status to ON
		Expected Response	• SAT Setpoint decreases by 3.0°F because there have been ten cycles and R = I + 1.	• No expectations. Wait 5 minutes to allow controller to initialize. • SAT setpoint and DSP setpoint are ignored - out of scope for this test. • Economizer Outdoor Air Damper position is ignored - out of scope for this test.	• Fan Alarm Level 4
Control Point Description	Control Point Name	Test Block	C	D	D
BACnet Inputs	TestInputs	Test Step	10	1	2
AHU Supply Fan Status	AHU_SFstatus		ON	OFF	ON
Supply Air Temperature	AHU_SAT		=AHU_SATsp	70	70
Return Air Temperature	AHU_RAT		=AHU_SATsp	70	70
Mixed Air Temperature	AHU_MAT		=AHU_SATsp	70	70
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		3	0	0
Duct Static Pressure	AHU_DSP		=AHU_DSPsp	0.00	0.00
Filter Pressure Drop	FilterDP		0.25	0.00	0.00
AHU System Mode	AHUMode		OCCUPIED	UNOCCUPIED	UNOCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:20:00	0:30:00	0:01:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	=ANY	OFF
Supply Fan Speed	SF_Speed	5	=ANY	=ANY	0
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ANY	=ANY	=ANY
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=SUB(LAST;3)	=ANY	=ANY
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	=ANY	1
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	=ANY	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	=ANY	0
High Building Pressure Alarm	HighBpAl	N/A	0	=ANY	0
Low Building Pressure Alarm	LowBpAl	N/A	0	=ANY	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	Alarm Tests	Alarm Tests	Alarm Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Fan Status Alarms	Fan Status Alarms	High Building Pressure Alarm
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.13.2	5.16.13.2	5.16.13.4
Test Script Revision Date	March 3, 2026	Intervention	• Set system to Occupied Mode. • Set Fan Status to OFF.	• Set Fan Status to ON.	• Set Building Pressure to 0.12in.wc. • Wait 4 minutes.
		Expected Response	• Supply fan starts. • Fan Alarm Level 2.	• Fan alarm clears	• No Building Pressure Alarm yet because timer has not expired.
Control Point Description	Control Point Name	Test Block	D	D	D
BACnet Inputs	TestInputs	Test Step	3	4	5
AHU Supply Fan Status	AHU_SFstatus		OFF	ON	ON
Supply Air Temperature	AHU_SAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		0	0	0
Duct Static Pressure	AHU_DSP		=AHU_DSPsp	=AHU_DSPsp	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.25	0.25	0.25
AHU System Mode	AHUMode		OCCUPIED	OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.12
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:01:00	0:01:00	0:04:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	ON	ON
Supply Fan Speed	SF_Speed	5	=ANY	=ANY	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ANY	=ANY	=ANY
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ANY	=ANY	=ANY
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	1	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0	0
High Building Pressure Alarm	HighBpAl	N/A	0	0	0
Low Building Pressure Alarm	LowBpAl	N/A	0	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	Alarm Tests	Alarm Tests	Alarm Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	High Building Pressure Alarm	High Building Pressure Alarm	Low Building Pressure Alarm
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.13.4	5.16.13.4	5.16.13.5
Test Script Revision Date	March 3, 2026	Intervention	• Wait 2 minutes.	• Set Building Pressure to 0.05in.wc.	• Set Building Pressure to -0.05in.wc.
		Expected Response	• High Building Pressure Alarm set.	• High Building Pressure Alarm clears.	• No Building Pressure Alarm yet because timer has not expired.
Control Point Description	Control Point Name	Test Block	D	D	D
BACnet Inputs	TestInputs	Test Step	6	7	8
AHU Supply Fan Status	AHU_SFstatus		ON	ON	ON
Supply Air Temperature	AHU_SAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		0	0	0
Duct Static Pressure	AHU_DSP		=AHU_DSPsp	=AHU_DSPsp	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.25	0.25	0.25
AHU System Mode	AHUMode		OCCUPIED	OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.12	0.05	-0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:02:00	0:01:00	0:04:00
Variable Name	VariableName				
Variable Value	VariableValue				
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	ON	ON
Supply Fan Speed	SF_Speed	5	=ANY	=ANY	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ANY	=ANY	=ANY
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ANY	=ANY	=ANY
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0	0
High Building Pressure Alarm	HighBpAl	N/A	1	0	0
Low Building Pressure Alarm	LowBpAl	N/A	0	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	Alarm Tests	Alarm Tests	Alarm Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Low Building Pressure Alarm	Low Building Pressure Alarm	Filter DP Test
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.13.5	5.16.13.5	5.16.13.3
Test Script Revision Date	March 3, 2026	Intervention	• Wait	• Set Building Pressure to 0.05in.wc.	• Set static pressure to 0.5in.wc. above setpoint.
		Expected Response	• Low Building Pressure Alarm set.	• Low Building Pressure Alarm clears.	• Fan slows to minimum speed. (setup for next test)
Control Point Description	Control Point Name	Test Block	**D**	**D**	**D**
BACnet Inputs	TestInputs	Test Step	9	10	10
AHU Supply Fan Status	AHU_SFstatus		ON	ON	ON
Supply Air Temperature	AHU_SAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		0	0	0
Duct Static Pressure	AHU_DSP		=AHU_DSPsp	=AHU_DSPsp	=ADD(AHU_DSPsp;0.5)
Filter Pressure Drop	FilterDP		0.25	0.25	0.25
AHU System Mode	AHUMode		OCCUPIED	OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		-0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:02:00	0:01:00	0:30:00
Variable Name	VariableName				SF_Speed
Variable Value	VariableValue				<30
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	ON	ON
Supply Fan Speed	SF_Speed	5	=ANY	=ANY	<30
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ANY	=ANY	=ANY
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ANY	=ANY	=ANY
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0	0
High Building Pressure Alarm	HighBpAl	N/A	0	0	0
Low Building Pressure Alarm	LowBpAl	N/A	1	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	Alarm Tests	Alarm Tests	Alarm Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Filter DP Test	Filter DP Test	Filter DP Test
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.13.3	5.16.13.3	5.16.13.3
Test Script Revision Date	March 3, 2026	Intervention	• Set static pressure to 0.1in.wc. below setpoint.	• Set static pressure equal to setpoint, to stabilize fan speed. • Set filter dP to 1.5 in.wc. (75% of DP100). • Wait 9 minutes.	• Wait 2 minutes
		Expected Response	• Fan speeds up to 60%	• No alarm because 10 minute timer has not expired.	• Filter Pressure Drop Alarm is set.
Control Point Description	Control Point Name	Test Block	D	D	D
BACnet Inputs	TestInputs	Test Step	11	12	13
AHU Supply Fan Status	AHU_SFstatus		ON	ON	ON
Supply Air Temperature	AHU_SAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		=AHU_SATsp	=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60	60
Duct Static Pressure Requests	DSP_Req		0	0	0
Cooling SAT Requests	CoolSAT_Req		0	0	0
Duct Static Pressure	AHU_DSP		=SUB(AHU_DSPsp;0.1)	=AHU_DSPsp	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.25	1.50	1.50
AHU System Mode	AHUMode		OCCUPIED	OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.05	0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions				
Clock Time	ClockTime		0:30:00	0:09:00	0:01:00
Variable Name	VariableName		SF_Speed		
Variable Value	VariableValue		=60		
BACnet Expected Outputs	TestOutputs	OutputTolerance			
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	ON	ON
Supply Fan Speed	SF_Speed	5	>=60	=LAST	=LAST
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ANY	=ANY	=ANY
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ANY	=ANY	=ANY
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0	1
High Building Pressure Alarm	HighBpAl	N/A	0	0	0
Low Building Pressure Alarm	LowBpAl	N/A	0	0	0

Equipment Configuration	AHU Common Equipment Tests	Test Block Description	Alarm Tests	Alarm Tests
Sequences Under Test	Guideline 36-2021	Test Step Purpose	Filter DP Test	Filter DP Test
Test Definition Package Version	DRAFT 4	SOO Reference	5.16.13.3	5.16.13.3
Test Script Revision Date	March 3, 2026	Intervention	• Set static pressure to 0.1" below setpoint.	• Set Fan Speed to 20%
		Expected Response	• Fan speeds up to 100%. • Filter Pressure Drop Alarm clears because FilterDP is below high limit for this fan speed.	• Filter Pressure Drop Alarm clears because alarm is disabled by low fan speed.
Control Point Description	Control Point Name	Test Block	**D**	**D**
BACnet Inputs	TestInputs	Test Step	14	15
AHU Supply Fan Status	AHU_SFstatus		ON	ON
Supply Air Temperature	AHU_SAT		=AHU_SATsp	=AHU_SATsp
Return Air Temperature	AHU_RAT		=AHU_SATsp	=AHU_SATsp
Mixed Air Temperature	AHU_MAT		=AHU_SATsp	=AHU_SATsp
Outdoor Air Temperature	OAT		60	60
Duct Static Pressure Requests	DSP_Req		0	0
Cooling SAT Requests	CoolSAT_Req		0	0
Duct Static Pressure	AHU_DSP		=SUB(AHU_DSPsp;0.1)	=AHU_DSPsp
Filter Pressure Drop	FilterDP		0.40	0.40
AHU System Mode	AHUMode		OCCUPIED	OCCUPIED
Building Static Pressure, Instantaneous	BldDP		0.05	0.05
Conditions for Evaluation of Test Step	EvaluationConditions			
Clock Time	ClockTime		0:30:00	0:01:00
Variable Name	VariableName		SF_Speed	
Variable Value	VariableValue		100	
BACnet Expected Outputs	TestOutputs	OutputTolerance		
AHU Supply Fan Start/Stop	SF_SS	N/A	ON	ON
Supply Fan Speed	SF_Speed	5	100	=ANY
Duct Static Pressure Setpoint	AHU_DSPsp	0.05	=ANY	=ANY
Supply Air Temperature Setpoint	AHU_SATsp	0.5	=ANY	=ANY
Economizer Outdoor Air Damper Command	AHUDamperEconOA	5	=ANY	=ANY
Supply Fan Alarm, Level 4	SupFanAl4	N/A	0	0
Supply Fan Alarm, Level 2	SupFanAl2	N/A	0	0
Filter Pressure Drop Alarm	FilterDpAl	N/A	0	0
High Building Pressure Alarm	HighBpAl	N/A	0	0
Low Building Pressure Alarm	LowBpAl	N/A	0	0

NORMATIVE APPENDIX D
TEST CONFIGURATION FILES

VAV Reheat Terminal

VAV Reheat Terminal (populated example)

Cooling-Only VAV Terminal

Multiple Zone VAV Air Handling Unit

Organization:	
Product Line:	
Control Program Version:	
Contact Person Name:	
Contact Person Phone:	
Contact Person Email:	

Control Sequence Version:	

Test Series #1

Run?	Equipment	Equipment Instance	Sequence Version	Test Version	Test Block
	Generic Ventilation Zones	Std 62.1 - Other terminal		n/a	A - Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints
					B - Zone CO2 DCV Response and Alarms
	Generic Thermal Zones	General		4	A - Zone Mode Setpoint Tests
	Terminal: VAV Reheat	General		19	A - Cooling Airflow Setpoints & SAT Reset Requests
					B - Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
					C - Heating Airflow Setpoint
					D - Reheat Valve Control, Heating Hot Water Reset Request & Low DAT Alarm
					E - Zone Mode

Test Series #2

Run?	Equipment	Equipment Instance	Sequence Version	Test Version	Test Block
	Generic Ventilation Zones	Title 24 - Other terminal		6	A - Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints
					B - Zone CO2 DCV Response and Alarms
	Generic Thermal Zones	General		4	A - Zone Mode Setpoint Tests
	Terminal: VAV Reheat	General		19	A - Cooling Airflow Setpoints & SAT Reset Requests
					B - Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
					C - Heating Airflow Setpoint
					D - Reheat Valve Control, Heating Hot Water Reset Request & Low DAT Alarm
					E - Zone Mode

Organization:	*Best Controls Corporation*
Product Line:	*Superia*
Control Program Version:	*4.3*
Contact Person Name:	*John Doe*
Contact Person Phone:	*123-456-7890*
Contact Person Email:	*jdoe@bestcontrols.com*

Control Sequence Version:	*G36-2021*

Test Series #1

Run?	Equipment	Equipment Instance	Sequence Version	Test Version	Test Block
X	**Generic Ventilation Zones**	Std 62.1 - Other terminal	G36-2021	n/a	A - Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints
X					B - Zone CO2 DCV Response and Alarms
X	**Generic Thermal Zones**	General	G36-2021	4	A - Zone Mode Setpoint Tests
X	**Terminal: VAV Reheat**	General	G36-2021	18	A - Cooling Airflow Setpoints & SAT Reset Requests
X					B - Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
X					C - Heating Airflow Setpoint
X					D - Reheat Valve Control, Heating Hot Water Reset Request & Low DAT Alarm
X					E - Zone Mode

Test Series #2

Run?	Equipment	Equipment Instance	Sequence Version	Test Version	Test Block
X	**Generic Ventilation Zones**	Title 24 - Other terminal	G36-2021	6	A - Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints
X					B - Zone CO2 DCV Response and Alarms
X	**Generic Thermal Zones**	General	G36-2021	4	A - Zone Mode Setpoint Tests
X	**Terminal: VAV Reheat**	General	G36-2021	19	A - Cooling Airflow Setpoints & SAT Reset Requests
X					B - Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
X					C - Heating Airflow Setpoint
X					D - Reheat Valve Control, Heating Hot Water Reset Request & Low DAT Alarm
X					E - Zone Mode

Organization:	
Product Line:	
Control Program Version:	
Contact Person Name:	
Contact Person Phone:	
Contact Person Email:	

Control Sequence Version:	

Test Series #1

Run?	Test Definition Package	Equipment Instance	Sequence Version	Test Version	Test Block
X	**Generic Ventilation Zones**	Std 62.1 - Other terminal		n/a	A - Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints
					B - Zone CO2 DCV Response and Alarms
X	**Generic Thermal Zones**	General		4	A - Zone Mode Setpoint Tests
X	**Terminal: VAV Cooling Only**	General		n/a	A - Cooling Airflow Setpoints & SAT Reset Requests
					B - Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
					C - Heating Airflow Setpoint
					D - Zone Mode

Test Series #2

Run?	Equipment	Equipment Instance	Sequence Version	Test Version	Test Block
	Generic Ventilation Zones	Title 24 - Other terminal		6	A - Zone Minimum Outdoor Airflow and Minimum Airflow Setpoints
					B - Zone CO2 DCV Response and Alarms
X	**Generic Thermal Zones**	General		4	A - Zone Mode Setpoint Tests
X	**Terminal: VAV Cooling Only**	General		n/a	A - Cooling Airflow Setpoints & SAT Reset Requests
					B - Damper Control, Pressure Reset Requests, Airflow Alarms & Damper Alarms
					C - Heating Airflow Setpoint
					D - Zone Mode

Organization:	
Product Line:	
Control Program Version:	
Contact Person Name:	
Contact Person Phone:	
Contact Person Email:	

Control Sequence Version:	

Test Series #1

Run?	Equipment	Equipment Instance	Sequence Version	Test Version	Test Block
	MZVAV	AHU Common Equipment Tests		4	A - AHU System Mode Tests
					B - Duct Static Pressure Setpoint Reset Test
					C - SAT Setpoint Reset Test
					D - Alarm Tests
		Ret. Fan Tracking - Sep. OA Damper - DP - Std 62.1		n/a	Fan speed control
					SAT Control - Sep. OA damper - Ret. Fan Tracking
					Ventilation - Std 62.1
					OA Control - DP
					BSP - Return Fan w/ Tracking
					Freeze Protection
					Alarms
					Requests

Test Series #2

	MZVAV	AHU Common Equipment Tests		4	A - AHU System Mode Tests
					B - Duct Static Pressure Setpoint Reset Test
					C - SAT Setpoint Reset Test
					D - Alarm Tests
		Return Fan w/ Tracking - Single OA Damper - AFMS - T24		n/a	Fan speed control
					SAT Control - Single OA damper - Return Fan w/ Tracking
					Ventilation - Title 24
					OA Control - AFMS
					BSP - Return Fan w/ Tracking
					Freeze Protection
					Alarms
					Requests

Test Series #3

	MZVAV	AHU Common Equipment Tests		4	A - AHU System Mode Tests
					B - Duct Static Pressure Setpoint Reset Test
					C - SAT Setpoint Reset Test
					D - Alarm Tests
		Return Fan w/ Direct Building Pressure Control - Separat		n/a	Fan speed control
					SAT Control - Separate OA damper - Return Fan w/ Direct Building Pressure Control
					Ventilation - Title 24
					OA Control - DP
					BSP - Return Fan w/ Direct Building Pressure Control
					Freeze Protection
					Alarms
					Requests

Test Series #4

	MZVAV	AHU Common Equipment Tests		4	A - AHU System Mode Tests
					B - Duct Static Pressure Setpoint Reset Test
					C - SAT Setpoint Reset Test
					D - Alarm Tests
		Relief Fan (single fan) - Single OA Damper - AFMS - T24		n/a	Fan speed control
					SAT Control - Single OA damper - Relief Fan
					Ventilation - Title 24
					OA Control - AFMS
					BSP - Relief Fan (single fan)
					Freeze Protection
					Alarms
					Requests

Test Series #5

	MZVAV	AHU Common Equipment Tests		4	A - AHU System Mode Tests
					B - Duct Static Pressure Setpoint Reset Test
					C - SAT Setpoint Reset Test
					D - Alarm Tests
		Relief Fan (multiple relief fans, common inlet) - Separat		n/a	Fan speed control
					SAT Control - Separate OA damper - Relief Fan
					Ventilation - Std 62.1
					OA Control - DP
					BSP - Relief Fan (multiple relief fans, common inlet)
					Freeze Protection
					Alarms
					Requests

Run?	Equipment	Equipment Instance	Sequence Version	Test Version	Test Block
Test Series #6					
	MZVAV	AHU Common Equipment Tests		4	A - AHU System Mode Tests
					B - Duct Static Pressure Setpoint Reset Test
					C - SAT Setpoint Reset Test
					D - Alarm Tests
		Relief Fan (multiple relief fans, separate inlets) - Separa		n/a	Fan speed control
					SAT Control - Separate OA damper - Relief Fan
					Ventilation - Title 24
					OA Control - AFMS
					BSP - Relief Fan (multiple relief fans, separate inlets)
					Freeze Protection
					Alarms
					Requests
Test Series #7					
	MZVAV	AHU Common Equipment Tests		4	A - AHU System Mode Tests
					B - Duct Static Pressure Setpoint Reset Test
					C - SAT Setpoint Reset Test
					D - Alarm Tests
		Actuated Relief w/o fan - Single OA Damper - DP - Std 62		n/a	Fan speed control
					Single OA damper - Relief
					Ventilation - Std 62.1
					OA Control - DP
					BSP - Actuated Relief w/o fan
					Freeze Protection
					Alarms
					Requests