The AHRI Approach to Air Handling Unit Certification

A Technical Performance Verification & Specification Guide for MEP Engineers

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1. Executive Summary

This publication provides a structured engineering framework for evaluating Air Handling Unit (AHU) testing methodologies. It highlights the importance of validating component performance across the full operating envelope and application-specific pressure performance verification rather than relying on limited duty-point testing. The guide is intended to support MEP consultants, specifiers, regulators, and project engineers in developing technically robust AHU specifications.

2. Fundamentals of Air Handling Unit Engineering

AHUs are custom-engineered modular HVAC assemblies designed to treat, condition, and distribute air in large commercial buildings, industrial facilities, healthcare environments, data centers, cleanrooms, and other mission-critical applications. Unlike factory-assembled packaged air-conditioning units that operate within a relatively narrow performance envelope, AHUs are configured individually for each project based on specific airflow requirements, system resistance characteristics, thermal loads, ventilation standards, and indoor air quality objectives.

The engineering design of an AHU is therefore inherently application-driven, where the performance of the overall system is governed by the integrated operation of multiple sub-components. These components must operate cohesively across varying operating conditions such as peak load, part-load, seasonal variations, and dynamic building occupancy patterns.

From a thermodynamic and fluid-mechanical perspective, AHUs perform several essential functions within HVAC systems:

- Sensible and latent heat exchange to achieve desired indoor temperature and humidity conditions
- Air pressurization and distribution to overcome duct system resistance
- Filtration and contaminant removal to meet ventilation and health standards
- Structural containment to minimize leakage losses and maintain energy efficiency

Since AHUs handle large volumes of air, even small deviations in component performance can significantly impact overall system energy consumption and indoor environmental quality. Consequently, the design and testing philosophy must consider wide operating envelopes rather than single rating conditions.

3. Key AHU Performance Components

3.1 Aerodynamic performance of fans

Fans are the primary drivers of airflow within AHUs and must be selected based on system resistance curves and operating duty points. Their performance is influenced by impeller geometry, rotational speed, drive configuration, and installation effects. Accurate fan performance prediction across the entire pressure-flow envelope is essential to control:

- Specific fan power and electrical energy consumption
- Airflow stability and distribution uniformity
- Part-load efficiency under variable air volume operation

3.2 Thermal performance of coils

Cooling and heating coils determine the thermal conditioning capacity of the AHU. Coil performance depends on air-side heat transfer coefficients, fin and tube geometry, type of fluid, fluid temperature, flow rate, and face velocity. Variations in entering air dry-bulb temperature, humidity ratio, and chilled water conditions can significantly alter coil capacity, bypass factor, and latent heat removal capability.

From a heat-transfer engineering perspective, coil capacity is influenced by several interdependent parameters, including:

- Air-side heat transfer coefficient, which varies with face velocity, fin geometry, and airflow turbulence
- Tube-side heat transfer characteristics, affected by fluid temperature, flow regime, internal tube design, and circuiting pattern
- Fin spacing, fin thickness, and material thermal conductivity, which directly impact overall surface efficiency
- Number of rows and coil depth, influencing sensible cooling effectiveness and latent heat removal potential
- Entering air dry-bulb temperature and humidity ratio, which define the psychrometric load and dehumidification requirement
- Chilled water or refrigerant temperature differential and flow rate, which determine the coil log-mean temperature difference (LMTD)

Proper engineering evaluation must therefore consider multiple climatic and operating scenarios.

3.3 Mechanical integrity and leakage performance of casing

AHU casing construction maintains structural rigidity, controlling air leakage, acts as a thermal barrier ensuring overall system performance under varying operating conditions. As these units are subjected to both positive and negative static pressures depending on system configuration, fan placement, and filtration stages, the structural response of casing panels becomes a key determinant of long-term reliability and energy efficiency. Panel deflection under elevated pressure differentials can progressively increase joint gaps, gasket deformation, and access door leakage, leading to unintended air losses from the conditioned airflow path. Such leakage not only reduces the effective airflow delivered to occupied spaces but also increases the fan power required to maintain design air quantities, thereby raising the overall specific fan power of the system. In addition, uncontrolled air infiltration or exfiltration may alter the thermal conditioning process within the AHU, reducing cooling or heating effectiveness and compromising indoor environmental control.

In high-pressure applications such as hospitals, cleanrooms, pharmaceutical production facilities, and industrial ventilation systems, the verification of casing structural strength and leakage performance becomes particularly critical. Consequently, casing performance must be validated at pressure levels, representative of actual operating conditions rather than generalized fixed test values.

3.4 Filtration efficiency

Air filtration stages are integrated within AHUs to achieve required indoor air quality levels and protect downstream components. Filter selection affects pressure drop, energy consumption, and contaminant removal efficiency. These aspects must be considered as part of the holistic engineering design and performance validation process.

4. Engineering Limitations of Single Duty-Point Testing for Custom-Built AHUs Across Applications

Custom-built Air Handling Units are inherently variable systems, engineered to meet specific project requirements across diverse applications such as comfort HVAC, healthcare, data centers, industrial ventilation, and cleanroom environments. Unlike standardized equipment, each AHU configuration represents a unique combination of fan selection, coil geometry, filtration stages, casing construction, and control strategy. As a result, system performance is not fixed but dynamically influenced by interacting parameters that shift continuously during operation. Testing methodologies based on a single predetermined duty condition are therefore fundamentally inadequate to represent this variability.

From an engineering standpoint, fan performance is governed by the interaction between the fan curve and the system resistance curve, both of which vary with changes in airflow demand, duct configuration, and component pressure drops. A fan tested at a single operating point does not capture its behavior across the full pressure-flow envelope, particularly under part-load conditions or high static pressure scenarios such as filter fouling or system imbalance. This limitation can result in inaccurate prediction of airflow delivery and fan efficiency, directly impacting energy consumption and system stability.

Similarly, coil performance is highly sensitive to entering air conditions, humidity levels, face velocity, and fluid-side parameters. A single-point validation assumes constant psychrometric conditions, which rarely exist in practice. In real applications, coils operate across a wide range of dry-bulb and wet-bulb temperatures, with varying chilled water temperatures and flow rates driven by plant optimization strategies. This leads to significant variations in sensible capacity, latent performance, and bypass factor. Single duty-point testing fails to capture these thermodynamic variations, often resulting in underestimation of latent load requirements, improper coil selection, and compromised indoor environmental control.

Casing performance introduces another layer of complexity. Structural integrity and air leakage characteristics vary with pressure class and operating conditions. Testing at a fixed pressure does not account for deformation and leakage behavior under higher or fluctuating pressures encountered in applications such as hospitals, industrial systems, or cleanrooms. Consequently, systems designed based on limited casing validation may experience unintended air leakage, loss of pressurization control, and increased fan power requirements to compensate for inefficiencies.

Beyond individual components, the primary limitation of single duty-point testing lies in its inability to capture system-level interactions. In an assembled AHU, fans, coils, filters, and casing elements interact aerodynamically and thermally. Changes in one component—such as increased coil pressure drop due to condensation or fouling—directly influence fan operating point and airflow distribution. These coupled effects cannot be represented through isolated or single-condition testing, leading to a disconnect between laboratory performance data and actual field operation.

From a system design and operational perspective, reliance on such limited validation introduces multiple risks. Airflow imbalance across zones can occur due to inaccurate fan characterization, leading to occupant discomfort or process inefficiencies. Higher fan energy consumption may result from operating away from optimal efficiency points. Reduced cooling capacity and inadequate dehumidification can compromise thermal comfort and indoor air quality, particularly in high latent load environments. Additionally, compensatory measures such as increased airflow or lower chilled water temperatures can place additional burden on central plant systems, further increasing lifecycle operating costs.

In critical applications, these limitations are amplified. Data centers require precise thermal management to ensure equipment reliability, while healthcare and cleanroom environments demand strict control of temperature, humidity, and pressurization. Any deviation arising from inaccurate performance prediction can lead to operational disruptions, compliance risks, or increased maintenance requirements.

Ultimately, single duty-point testing represents a simplified and incomplete approach that does not align with the engineering reality of custom-built AHUs. It provides only a narrow snapshot of performance, ignoring the wide operating envelope over which these systems function. For accurate design, reliable operation, and optimized energy performance, validation methodologies must reflect the full range of operating conditions and system interactions inherent to real-world applications.

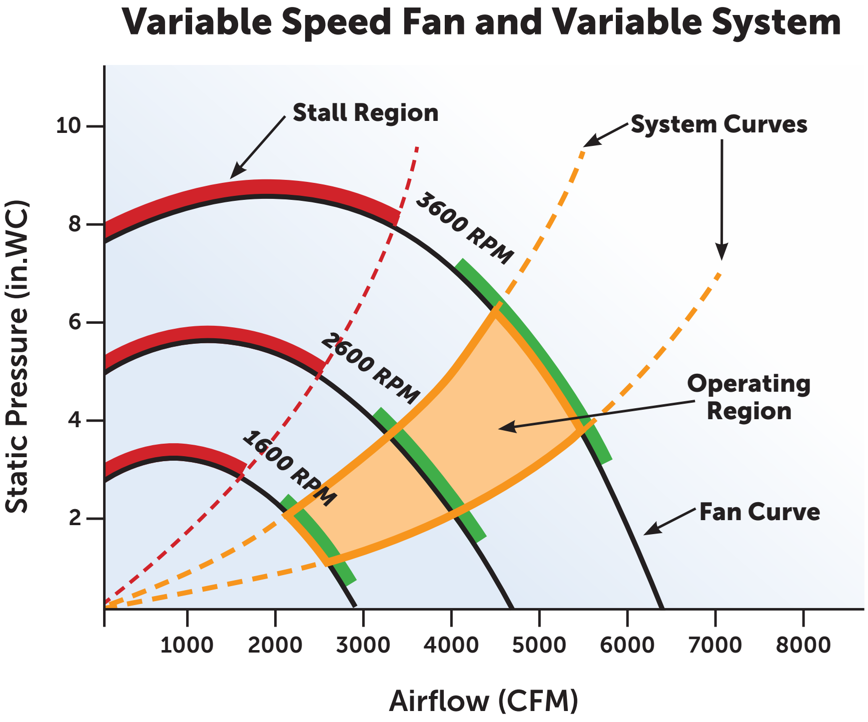
5. AHU Fan Performance Validation: System-Integrated Fan Performance Validation Across the Full Operating

Fan performance is one of the most critical determinants of overall Air Handling Unit efficiency, airflow delivery accuracy, and energy consumption. In real installations, fans do not operate at a fixed rating point; instead, their actual duty point is established through the interaction between the fan performance curve and the system resistance curve. Variations in duct layout, filter loading, coil pressure drop, damper positioning, and variable air volume control strategies continuously shift this operating point across the full pressure-flow envelope. Therefore, meaningful performance validation requires that fan characteristics be verified across the entire operating map, including peak airflow demand conditions as well as part-load and reduced airflow scenarios.

Under the AHRI's AHU Certification Program per AHRI Standard 430, fan performance is not validated in isolation or under simplified laboratory configurations. Instead, AHRI adopts a system-integrated testing methodology, wherein fans are evaluated as being installed within a complete, functional production air handling unit. Each certified AHU manufacturer is required to have a minimum of two representative random selected production units tested annually, incorporating the actual fan assemblies along with associated components such as filters, coils, and casing sections and testing the fans over their entire operating map and not just a single point. This approach ensures that the measured performance reflects realistic aerodynamic interactions, inlet and outlet flow conditions, and component pressure losses that influence fan behavior in practical applications.

By testing at least two complete functional AHU configurations every year per manufacturer, AHRI effectively enables validation of multiple fan brands, sizes, and performance ranges used within the manufacturer's product portfolio over a relatively short certification cycle. This systematic and statistically representative testing strategy provides confidence that the certified performance envelope accurately reflects real operational diversity. In contrast, simplified validation approaches that test a single fan model in isolation at infrequent intervals — for example, once every few years — offer only a limited snapshot of performance and fail to capture the wide variability inherent in customized AHU selections leading to big loopholes by allowing to certify non-tested fan units installed in the market. In practical terms, such fragmented testing philosophies could require several decades, or even more than a century, to meaningfully evaluate the full spectrum of fan configurations deployed across different AHU product ranges.

The AHRI methodology therefore emphasizes full pressure-flow envelope validation, ensuring that fan performance is characterized under conditions representative of both high static pressure operation (such as filter fouling or peak ventilation demand) and part-load energy-optimized modes. This integrated certification philosophy supports more accurate airflow prediction, improved life-cycle energy modelling, and enhanced system reliability across diverse application sectors including healthcare, data centers, industrial ventilation, and high-performance commercial buildings.



Backward-Inclined Fan Curve Example

6. Whole Operating Map Certification of Coil Thermal Performance

Cooling and heating coils are the primary heat transfer elements within an Air Handling Unit, directly governing its ability to deliver sensible cooling, latent dehumidification, or heating under varying operating conditions. Unlike simplified assumptions often used during equipment selection, coil performance is inherently multi-dimensional and strongly dependent on interacting variables including entering air dry-bulb temperature, wet-bulb temperature, humidity ratio, face velocity, chilled or hot water temperature, and fluid flow rate. In real-world applications, these parameters do not remain constant but vary continuously with climatic conditions, occupancy patterns, and plant-level control strategies. As a result, the thermal behavior of a coil cannot be accurately represented by validation at a single predetermined duty point.

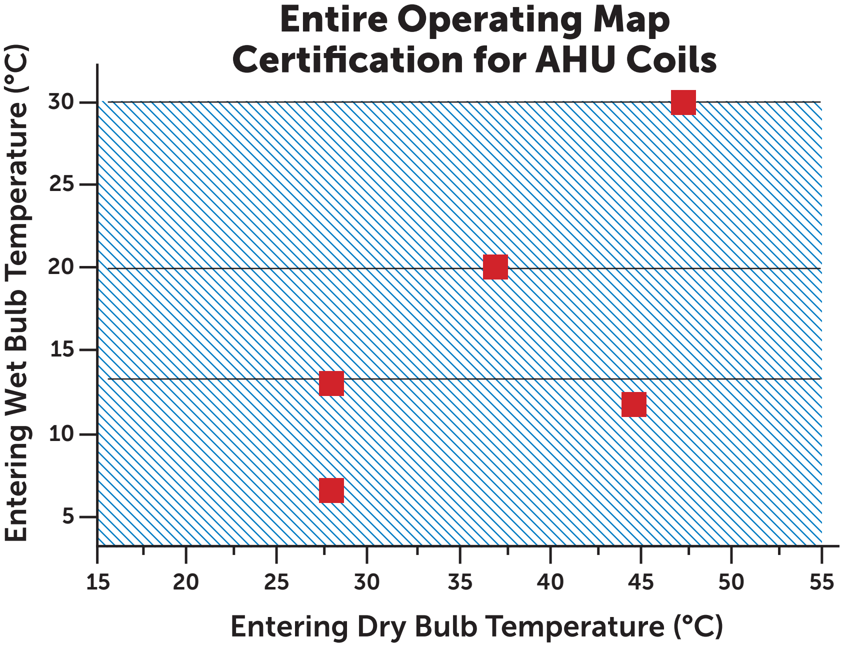
In practical operation, AHU coils are subjected to a wide spectrum of conditions. During peak summer operation, high entering dry-bulb and wet-bulb temperatures impose maximum sensible and latent loads, requiring the coil to operate near its upper capacity limits. Under part-load conditions, reduced airflow rates and modulated chilled water flow alter heat transfer coefficients and coil effectiveness. In winter or transitional seasons, coils may operate in sensible-only or heating modes with significantly different temperature differentials. High latent load applications such as hospitals, laboratories, and humid climates introduce additional complexity through elevated moisture removal requirements and condensate formation. Furthermore, modern chilled water plants often implement variable supply temperature strategies to optimize system efficiency, further shifting coil operating conditions across a broad thermodynamic range.

Each of these scenarios leads to variations in coil surface temperature distribution, apparatus dew point, bypass factor, sensible heat ratio, and total cooling capacity. Consequently, reliance on single-point testing introduces significant uncertainty in predicting actual performance, often resulting in misrepresentation of dehumidification capability, inaccurate airflow requirements, and suboptimal energy consumption. In extreme cases, this can lead to system-level inefficiencies such as over-sizing of fans to compensate for poor latent performance, increased pumping energy due to incorrect water-side assumptions, or inability to maintain required indoor environmental conditions.

To address this fundamental engineering challenge, whole operating map certification validates coil performance across a comprehensive matrix of operating conditions, encompassing variations in airflow rate, entering air psychometrics, and fluid-side parameters. This methodology generates a complete performance map that captures the true thermodynamic behavior of the coil over its entire usable envelope. Such mapping enables accurate derivation of performance curves for total capacity, sensible capacity, pressure drop, and moisture removal characteristics, thereby allowing engineers to make informed selections aligned with real operating scenarios rather than idealized conditions.

AHRI's Coil Certification Program ACHC, per AHRI Standard 410, operationalizes this philosophy through a rigorous and statistically robust testing framework. Unlike conventional approaches that validate a single coil at one rating condition over extended time intervals, the AHRI program requires 100% of Basic Model Groups (BMGs) to be tested during the qualification year. This ensures that all coil families, configurations, and performance ranges are validated comprehensively from the very beginning of certification. Furthermore, a minimum of two random selected production units are tested annually thereafter, maintaining continuous performance verification and ensuring sustained compliance across the manufacturer's portfolio.

This high-frequency, full-coverage testing approach eliminates the risk of performance deviation across different coil geometries, fin configurations, tube arrangements, and circuiting designs. Given the virtually infinite combinations in which coils can be selected—based on airside and waterside conditions—such extensive validation is essential to establish confidence in performance claims. In contrast, traditional methodologies that test a single coil periodically over several years provide only a narrow and fragmented view of performance, leaving substantial gaps in validation and creating potential pathways for non-compliant or underperforming products to enter the market.


Entire Operating Map Certification for AHU Coils

By ensuring that coil performance is characterized across the full operating map and continuously verified through annual testing, the AHRI 410 certification framework delivers a level of accuracy and reliability that directly benefits system design and operation. Engineers can rely on certified data for precise load calculations, optimized coil selection, and accurate prediction of sensible and latent performance under varying conditions. This, in turn, enhances the fidelity of building energy models, supports efficient plant operation, and minimizes lifecycle performance risks.

The importance of such comprehensive validation becomes particularly critical in high-performance and mission-critical applications including data centers, pharmaceutical manufacturing facilities, healthcare environments, and cleanrooms, where tight control of temperature and humidity is non-negotiable. In these contexts, even minor deviations in coil performance can lead to significant operational and energy penalties. Whole operating map certification therefore serves not only as a compliance mechanism but as a fundamental engineering requirement to ensure that AHU systems deliver consistent, reliable, and energy-efficient performance across their entire lifecycle.

7. Application-Specific Pressure Performance of AHU Casings

Air Handling Unit casings form the structural and containment envelope of the system, ensuring that conditioned air is delivered without unintended leakage while maintaining mechanical integrity under operating pressures. In real installations, AHU casings are subjected to a wide range of positive and negative pressures that vary continuously with fan operation, filter loading, damper positioning, duct resistance, and control strategies. These dynamic conditions mean that casing performance cannot be accurately represented through testing at a single fixed pressure value, as is commonly practiced in conventional methodologies.

Across applications, AHU casings are designed to withstand distinct pressure classes, such as: Comfort HVAC systems typically operate around ±800 Pa, while hospitals and institutional buildings require approximately ±1300 Pa to maintain controlled pressurization. Industrial ventilation systems may reach ±1800 Pa, and critical environments such as cleanrooms, containment facilities, and pharmaceutical spaces can demand ±2200 Pa or higher.

In addition to these steady-state conditions, transient events such as filter fouling, system imbalance, or start-up surges can further increase the pressure stress on AHU casing panels. Therefore, casing performance must be evaluated across a spectrum of pressures representative of actual operating conditions.

These varying pressures directly influence panel deflection, joint integrity, and air leakage characteristics. Excessive deflection can distort casing geometry, leading to misalignment of internal components and the creation of unintended bypass paths. Air leakage reduces effective airflow delivery and increases fan energy consumption, while also compromising pressurization control in sensitive environments. Validating casing performance at only one nominal pressure fails to capture these effects and can significantly underestimate real-world performance risks across different application categories.

To address this limitation, the AHRI's Air Handling unit casing (AHUC) certification program per AHRI Standard 1350, adopts a more comprehensive and application-representative approach. Rather than relying on fixed-point testing, AHRI evaluates casing performance across relevant pressure classes using complete functional production AHU assemblies. This application specific validation captures the combined behavior of panels, frames, seals, and joints under varying pressure conditions, providing a far more accurate representation of actual field performance.

The pressure values certified by AHRI's AHUC certification program suitable for different applications are:

- ±1000 Pa - Comfort HVAC applications
- ±1500 Pa - Hospitals and institutional buildings
- ±2000 Pa - Industrial ventilation systems
- ±2500 Pa - Cleanroom and containment facilities

By testing casings across multiple pressure levels corresponding to different application categories, the AHRI methodology ensures that performance is validated for the full range of expected operating conditions. This approach is inherently more robust than conventional testing practices that assess leakage and deflection at a single pressure point, irrespective of application. Fixed-pressure testing provides only a limited snapshot and will not reflect casing behavior under higher or lower pressure regimes encountered in real systems. In contrast, AHRI's multi-pressure validation framework delivers a comprehensive performance envelope, making it universally applicable across comfort, healthcare, industrial, and cleanroom applications.

Furthermore, AHRI certification requires testing of actual production units and not "golden sample model Box", ensuring that actual manufacturing practices and assembly quality are reflected in performance results. This reduces the risk of discrepancies between laboratory-tested samples and field-installed units. The outcome is statistically reliable as 30% of BMG's are tested during the qualification year and minimum 2 units annually thereafter as repeatable assessment of casing performance, providing engineers and specifiers with greater confidence in airflow containment, structural durability, and energy efficiency.

Application-specific pressure validation also directly supports improved system performance and lifecycle outcomes. Reduced leakage translates to lower fan energy consumption, while controlled deflection ensures long-term structural integrity and consistent operation. In critical applications such as hospitals, data centers, and cleanrooms, where precise airflow and pressure control are essential, this level of validation becomes indispensable.

Ultimately, the AHRI approach represents a shift from simplistic compliance testing toward true performance assurance. By validating AHU casings across the full range of application-specific pressures, it provides a more accurate, reliable, and universally applicable methodology compared to conventional fixed-pressure testing, ensuring that systems perform as intended under real operating conditions throughout their service life.

8. Component-Centric Performance Certification Philosophy

A robust and engineering-aligned AHU testing framework must adopt a component-centric certification philosophy, recognizing that Air Handling Units are not monolithic products, but configurable systems assembled from multiple performance-critical components. In practice, AHUs are designed on a ”pick-and-choose” basis, where fans, coils, filters, and casing modules are selected from a wide range of options to suit specific application requirements. This modularity is essential to address diverse operating conditions across comfort cooling, healthcare, industrial ventilation, data centers, and cleanroom environments. However, it also introduces significant variability in performance, making it imperative that each component be independently validated across its full operating map before being integrated into a system.

From a design perspective, the fan, coil, and casing each represent distinct physical domains—airflow generation, heat transfer, and structural containment—yet their combined performance defines the overall effectiveness of the AHU. A component-centric certification approach ensures that each of these elements is tested comprehensively, extensively and accurately, enabling predictable system-level behavior when assembled in different configurations. Without such independent validation, the variability introduced by different combinations of components cannot be reliably managed, leading to uncertainty in performance outcomes.

Fan certification, for instance, must establish aerodynamic performance across the full pressure-flow envelope, capturing efficiency, power input, and airflow delivery under varying system resistance conditions. Similarly, coil certification must map thermal performance across a matrix of airside and fluid side conditions, including variations in temperature, humidity, and flow rates. Casing certification must verify structural strength and air leakage characteristics across multiple pressure classes relevant to different applications. By validating each component independently over its entire operating range, the certification framework creates a reliable foundation upon which system-level performance can be built.

AHRI’s certification philosophy strongly aligns with this approach by establishing dedicated standards and programs for individual AHU components, such as AHRI Standard 430 for Fan performance, AHRI Standard 410 for coils, and AHRI Standard 1350 for casings. These programs emphasize full operating map validation and statistically representative testing, ensuring that each component’s performance data reflects real-world operating conditions rather than isolated or idealized scenarios.

This component-centric methodology is particularly critical given the combinatorial complexity of AHU design. A single manufacturer may offer multiple fan types (e.g., forward-curved, backward-curved, plug fans, EC fans), numerous coil configurations (varying in rows, fin spacing, tube diameter, and circuitry), and different casing constructions for various pressure classes. When combined, these options create thousands—or even millions—of possible AHU configurations. It is neither practical nor sufficient to validate performance at the system level alone without ensuring that each underlying component has been rigorously tested across its full performance envelope.

By establishing independently verified performance maps for each component, engineers gain the ability to predict system behavior with greater accuracy when assembling AHUs for specific applications. This enables more precise airflow balancing, optimized energy consumption, and reliable thermal performance under both design and off-design conditions. It also facilitates flexibility in design, allowing components to be interchanged or adapted without compromising overall system integrity, provided they are certified within their respective operating ranges.

In contrast, testing approaches that do not adopt a component-centric philosophy—such as validating only a limited number of fixed predetermined AHU configurations or relying on single-point data—fail to address the inherent variability of customized systems. Such methods will overlook performance deviations arising from different component combinations, leading to gaps in validation and increased risk of underperformance in the field.

Ultimately, extensive component testing across operating conditions shifts AHU design and operation from a reactive to a predictive paradigm and a component-centric performance certification framework bridges the gap between modular custom design flexibility and engineering reliability. By ensuring that each building block of the AHU is thoroughly validated across its full operating map, it provides a scalable and robust pathway to achieving consistent, predictable, and energy-efficient performance across the wide spectrum of applications that modern AHUs are required to serve.

9. AHRI vs Limited Duty-Point Testing – Engineering Comparison

The following table provides a comparative engineering assessment of AHRI's comprehensive operating-map-based certification methodology versus conventional single duty-point testing, highlighting their impact on performance accuracy, design reliability, and lifecycle energy outcomes:

Criteria	AHRI Extensive Operating Map, Application Specific Testing	Limited Single Duty-Point Testing
Testing Philosophy	Component-centric and system-integrated validation across full operating envelope	Simplified validation at one predetermined rating condition
Fan Performance	Full pressure–flow envelope validated within actual production AHU (system effect included)	Tested at single airflow and pressure point
Coil Thermal Performance	Validated across entire operating map	Verified at one rating point assuming constant conditions
Casing Strength & Leakage	Tested across application-specific pressure classes (±1000 to ±2500 Pa), on real production units	Tested at fixed pressures -400 & +700 Pa, not representative of real applications as tested on model boxes
Operating Condition Coverage	Covers peak, part-load, seasonal, and off-design conditions	Represents only a narrow snapshot of operation
Statistical Testing Coverage	High-frequency testing (multiple BMGs + annual production units)	Infrequent testing (single unit over at least 3 years intervals)
Energy Performance Prediction	High accuracy in fan power, coil capacity, and system energy use	Moderate to high uncertainty in energy prediction
Design Flexibility (Modular AHUs)	Supports "pick-and-choose" component combinations with validated performance maps for components	Does not account for variability across component combinations
System-Level Accuracy	Reflects real-world AHU behavior under dynamic operating conditions	Disconnect between lab data and field performance
Lifecycle Performance Reliability	Improved reliability, reduced commissioning issues, optimized operation	Higher risk of performance deviation and system inefficiencies
Risk to MEP Design	Low – predictable performance and better design confidence	High – risk of oversizing, underperformance, and energy penalties
Applicability Across Sectors	Suitable for comfort, healthcare, data centers, industrial, cleanrooms	Limited applicability, marginally suited for simplified comfort HVAC systems
Compliance Robustness	Strong conformity assessment aligned with real application conditions	Weak representation of actual compliance performance

10. Consultant Specification Guidance: Specification Requirement for AHRI-Certified Air Handling Units

MEP Consultants /Designers shall demand, all AHUs specified for their project shall comply with the relevant certification programs of AHRI ensuring component-level validation aligned with internationally recognized standards. The following minimum certification requirements shall be incorporated into project specifications:

10.1- AHU Fan Certification – AHRI 430 (AHU Program)

All Air Handling Units shall be certified under AHRI's AHU Certification program per AHRI Standard 430. The approved selection software and /or AHU models shall be listed in the AHRI Certified Product Directory.

10.2- Coil Performance Certification – AHRI 410 (ACHC Program)

All cooling and heating coils installed within the AHU shall be certified per AHRI Standard 410 through the AHRI ACHC (Air-Cooling and Heating Coil) Certification Program. The approved selection software version and /or coil models shall be listed in the AHRI Certified Product Directory.

10.3- AHU Casing Certification – AHRI 1350 (AHUC Program)

AHU casing models shall be AHRI-certified under the AHRI 1350 Certification Program and listed in the AHRI directory. Casing performance shall be tested across application-specific pressure classes suitable for different applications:

- ±1000 Pa - Comfort HVAC applications
- ±1500 Pa - Hospitals and institutional buildings
- ±2000 Pa - Industrial ventilation systems
- ±2500 Pa - Cleanroom and containment facilities

11. Technical Conclusion

In Summary, Air Handling Units are highly customized engineered assemblies, configured to meet specific airflow, thermal, and pressure requirements of individual projects rather than operating as standardized factory-rated products. Owing to this customized nature, it becomes imperative that each critical component — including cooling and heating coils, fans, and the unit casing — is independently tested across its full operational envelope, application categories and up to its extreme performance limits.

By selecting components whose performance has been thoroughly characterized under such extended test conditions and then integrating these validated performance maps into the project-specific AHU configuration, designers can achieve a far more realistic prediction of actual field performance. This engineering-driven approach reflects the true diversity of climatic conditions, load variations, filtration stages, and control strategies encountered in operation. In contrast, simplified methodologies that rate packaged air handling units at a limited set of standardized conditions will not fully capture the interaction effects between airflow dynamics, heat transfer processes, and structural behavior. Consequently, a component-map-based validation philosophy provides greater confidence in energy efficiency, capacity delivery, and operational reliability across the full lifecycle of customized AHU installations.

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The Air-Conditioning, Heating, and Refrigeration Institute
2311 Wilson Blvd, Suite 400, Arlington, VA 22201
https://www.ahrinet.org/