

For decades, architects and design engineers were forced to incorporate costly, square-footage-consuming physical vestibules at main building entrances to comply with commercial energy codes. The release of recent iterations of ASHRAE Standard 90.1 firmly establishes an engineered alternative: **properly certified air curtains are recognized as a direct compliance exception to physical vestibules.**

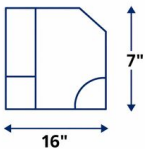


The Core Advantage: By choosing an air curtain over a physical vestibule, developers reclaim valuable front-of-house square footage, reduce structural construction costs, and optimize pedestrian traffic flow all while maintaining a superior thermal barrier at the building envelope.



THE ARCHITECTURAL & FINANCIAL BENEFITS

1 Maximum Spatial Efficiency



Standard vestibules require a minimum linear depth of 7 feet between interior and exterior doors extending to 16 feet for spaces exceeding 40,000 sq. ft. under Section 5.4.3.4.1). This layout consumes anywhere from 50 to hundreds square feet of prime commercial real estate. Air curtains mount compactly overhead, completely reclaiming this space for retail display, seating, or lobby areas.

2 Drastic First-Cost Reductions



Constructing a physical vestibule involves significant capital expense: secondary framing, additional storefront glass, localized drywall finishes, automated door operators, and dedicated HVAC terminal conditioning. An air curtain provides building envelope compliance at a fraction of the structural installation cost.

3 Unobstructed Traffic Flow



Physical vestibules create architectural bottlenecks, forcing two-stage door operations that impede heavily trafficked retail, hospitality, and healthcare entrances. Air curtains maintain an invisible, unbroken barrier that permits open, sightline-clear pedestrian movement without compromising indoor environmental quality.

4 Superior Infiltration Control



Real-world wind loads and building stack effects quickly compromise physical vestibules when both sets of doors are momentarily caught open. A high-efficiency air curtain provides continuous resistance against raw outdoor air infiltration, dust, insects, and exhaust fumes, actively stabilizing the interior HVAC zone.



Air Curtains vs. Vestibules: The Qualification Guide

- ✓ Climate Zones: Applicable in Climate Zones 4 through 8 (most common)
- ✓ Certification: The air curtain unit must be AMCA certified (tested in accordance with AMCA Standard 220)
- ✓ Floor Velocity: Must produce a minimum airstream velocity of 400 ft/min measured at the floor



USA CLIMATE ZONES





ASHRAE 90.1-2025 ENVELOPE CODE ALLOWANCES

Section 5.4.3.4 explicitly mandates building entrances separating conditioned space from the exterior to utilize an air barrier system. However, Exceptions 9 and 10 validate the use of self-closing doors paired with an air curtain unit in place of a physical vestibule across the majority of commercial building types and climate zones:

SECTION 5.4.3.4 EXCEPTIONS OVERVIEW:



Exception 9 (Climate Zones 0, 3, and 4): Permits self-closing doors in buildings of any height or footprint to utilize an air curtain unit complying with Sections 6.4.3.9 and 10.4.5 instead of a vestibule.



Exception 10 (Climate Zones 5 through 8): Extends the air curtain exception to buildings 15 stories or less within these colder geographical regions, validating high-velocity environmental separation.

To legally utilize the vestibule exception under ASHRAE 90.1-2025, the installed air curtain must not simply blow air; it must satisfy rigorous, verifiable performance metrics across **three** distinct engineering categories: testing certification, automatic controls, and thermal management.



TECHNICAL COMPLIANCE & SPECIFICATION GUIDE

Satisfying Mechanical, Performance, and Electrical Testing Mandates



1. AERODYNAMIC PERFORMANCE MANDATES (SECTION 10.4.5)

The air curtain unit must deliver a high-velocity air shield capable of reaching the floor level to seal the door threshold against ambient pressures due to stack effect and wind. The code enforces strict criteria:

- **Certified Testing:** Air curtain performance must be independently tested and rated in strict accordance with **ANSI/AMCA Standard 220** (Laboratory Methods of Testing Air Curtains for Aerodynamic Performance Ratings)
- **Minimum Jet Speed:** The unit must maintain a continuous discharge velocity of **not less than 400 FPM (2.0 m/s)** measured at 6.0 inches above the finished floor level. This ensures the air stream possesses sufficient air strength to minimize infiltration.



2. ELECTRICAL AUTOMATION & CONTROLS (SECTION 10.4.5)

Energy code compliance requires smart operation synchronized with building traffic. The air curtain cannot operate continuously if it is to conserve energy.

- **Interlocked Door Activation:** Automatic controls must be integrated to activate the air curtain unit immediately upon the opening of the door and cycle the unit off when the door closes.
- **Low-Voltage Control Packages:** Utilizing factory-mounted internal control options (such as the **INS-CTRL** system) paired with commercial magnetic door limit switches fully satisfies this automation requirement without requiring extensive external field wiring.



3. THERMAL CONTROL & HEATING LOCKOUTS (SECTION 6.4.3.9)

For units equipped with integral electric heating options designed to provide localized comfort, thermal restrictions apply to prevent energy waste:

- **Outdoor Ambient Lockout:** The heating system must feature automatic controls configured to completely shut off the heating mechanism when the outdoor air temperature rises above 45°F.
- **Space Thermostat Limits:** The local entryway thermostat must be configured and locked to limit supplemental space heating to a maximum of 60°F and space cooling to a minimum of 85°F.

TECHNICAL RESOURCES & COMPLIANCE SUPPORT

Please scan your designated companion team QR code or click the direct portal link to access the full text documentation of the ASHRAE 90.1 Energy Standard for Sites and Buildings Except Low-Rise Residential Buildings.

<https://www.ashrae.org/technical-resources/standards-and-guidelines/read-only-versions-of-ashrae-standards>

Standard 90.1-2025, Energy Standard, See page 50, exception 5.4.3.4

