MasterBuild Consulting — Free Technical Resource

HVAC Load Calculation

Review Checklist

ASHRAE Fundamentals load-calculation methodology · ACCA Manual J8/N/S · Florida hot-humid climate, IECC Zone 1A/2A · Self-audit or supervisory QA before permit submittal or equipment selection

COURTESY REFERENCE

This checklist compiles the load-calculation inputs and assumptions that most often drive an under- or oversized HVAC system, organized around ASHRAE Fundamentals load-calculation methodology and Florida's hot-humid climate. Built by a licensed Florida PE as a self-audit or supervisory QA tool — use it before a load calculation is finalized, submitted for permit, or handed off to equipment selection. This is a general reference, not a substitute for a project-specific engineering review.

HOW TO USE THIS CHECKLIST

Check off each line as your load calculation actually addresses it — not just as you read it. Any box left unchecked when the model is 'final' is a real risk of an under- or oversized system. Boxes marked FIELD INTEL flag the categories that generate the most callbacks and redlines in South Florida practice. Already occupied and something's off? Skip to the Field Diagnostic Quick-Reference near the end — match the symptom to the category and start there.

Climate & Site Basis

	Requirement	Code Ref.
☐	Weather station and design-day source confirmed appropriate for the project address and elevation	ASHRAE Fund. Ch.14
☐	Design percentile selected and justified — 0.4%/99.6% for conservative or critical-space loads; 1–2% cooling / 99% heating for standard commercial and residential work	ASHRAE Fund. Ch.14
☐	True-north building orientation verified against the site plan or survey, not assumed from the architectural north arrow	ASHRAE Fund. Ch.18

FIELD INTEL — MasterBuild PE review notes

Getting the orientation wrong doesn't just shift the block load — it shifts which spaces see the afternoon sun. A model built on assumed orientation can pass a total-building peak check and still undersize the west-facing corner offices. Confirm true north from the survey before spaces get their final peak assignment.

Envelope Inputs

	Requirement	Code Ref.
☐	Wall, roof, and slab-on-grade U-values/R-values cross-checked against the current architectural assembly detail, not carried forward from schematic-design code-minimum defaults	ASHRAE 90.1 Table 5.5
☐	Fenestration U-factor and SHGC verified against the actual window/door schedule and NFRC labels — including impact-rated assemblies, which often carry different values than standard glazing	ASHRAE 90.1 §5.5

	Requirement	Code Ref.
☐	Glazing area and exposure re-verified against final architectural elevations — glazing is the single largest swing factor in exterior load	ASHRAE Fund. Ch.18
☐	External shading (overhangs, fins, adjacent structures) modeled for south- and west-facing glazing; interior blinds and drapes excluded from the calculation, since occupant use of them can't be relied on	ASHRAE Fund. Ch.18

FIELD INTEL — MasterBuild PE review notes

Impact-rated glazing installed for wind-borne debris compliance frequently ships with a different U-factor and SHGC than the standard glass originally modeled at schematic design. Pull the actual NOA / product approval and cross-check the specified assembly against the load model before the equipment gets ordered — not after.

Internal Loads

	Requirement	Code Ref.
☐	Occupant density refined room-by-room for high-density space types (assembly, conference, classroom, dining, waiting areas) using actual seat counts or the fire/life-safety occupant load, not a blanket ASHRAE default	ASHRAE 62.1 Table 6-1
☐	People sensible/latent split adjusted for activity level — not left at the seated-quiet default for high-activity spaces such as fitness, dance, commercial kitchens, or light industrial	ASHRAE Fund. Ch.18 Table 1
☐	Lighting power density checked against the actual fixture schedule or photometric plan — LED retrofits routinely run well under the ASHRAE 90.1 allowances used as software defaults	ASHRAE 90.1 §9.5
☐	Miscellaneous, plug, and process loads reviewed space-by-space for kitchens, server/IT/electrical rooms, and lab or medical equipment — not carried as a flat blanket W/ft^2 across the floor plate	ASHRAE Fund. Ch.18

FIELD INTEL — MasterBuild PE review notes

Server rooms, electrical rooms, and commercial kitchens are where a generic plug-load density assumption does the most damage. Pull actual nameplate data (or the kitchen equipment schedule) for these spaces specifically — a single under-loaded server room can undersize an entire zone's cooling.

Space & System Boundary

	Requirement	Code Ref.
☐	Conditioned floor area reconciled against the architectural area plan; unconditioned spaces (garages, stairwells, shafts, attics) excluded from space loads and zone/system totals	ASHRAE Fund. Ch.18
☐	Infiltration rate justified by construction type or air-barrier testing target — not left at a generic software default — and excluded only where the space is demonstrably positively pressurized	ASHRAE Fund. Ch.16
☐	Ventilation rates confirmed per current occupancy category and floor area, with the correct zone air distribution effectiveness (Ez) applied — not a blanket 1.0	ASHRAE 62.1 §6.2
☐	System-level outdoor air intake calculated with the correct method for the system type — multiple-zone equation versus simple sum-of-spaces	ASHRAE 62.1 §6.2.5

FIELD INTEL — MasterBuild PE review notes

In Florida's hot-humid climate, outdoor air isn't just a sensible load — it's the dominant source of latent load on most systems. Undercounting ventilation air, or using Ez = 1.0 when the distribution system doesn't support it, is one of the most common root causes of a system that cools on paper but runs humid in the field.

System Design & Balancing

	Requirement	Code Ref.
☐	Space-to-zone and zone-to-system groupings follow standard zoning practice — spaces with disparate schedules, exposures, or internal gains kept on separate zones	ASHRAE Fund. Ch.18
☐	Design airflows reconciled against exhaust, makeup air, and building pressurization requirements — not sized from cooling load alone	FBC Mechanical Ch.4
☐	Occupant, lighting, and equipment diversity factors applied at the system level and documented with their basis (e.g., peak building occupancy ÷ sum-of-space occupants)	ASHRAE Fund. Ch.18

FIELD INTEL — MasterBuild PE review notes

Heavily exhausted spaces — commercial kitchens, restrooms, labs — can require more outdoor air intake than ventilation alone would demand, just to keep the building air-balanced. If that extra makeup air isn't accounted for in the load, the coil gets undersized and it shows up as a comfort complaint six months after occupancy, not as a design error anyone catches at review.

Florida Climate & Code Compliance

	Requirement	Code Ref.
☐	Latent load and part-load humidity performance reviewed separately from sensible load — oversized, sensible-only equipment selection is the leading cause of high-humidity callbacks in Florida's hot-humid climate	ASHRAE Fund. Ch.18; IECC Zone 1A/2A
☐	Equipment selected against Manual S (or equivalent) sizing limits — total capacity within roughly 115% of the calculated sensible/latent load, not upsized 'for margin'	ACCA Manual S
☐	Minimum equipment efficiency (SEER2/EER2/HSPF2, or IPLV for commercial) verified against the current ASHRAE 90.1 / Florida Energy Code tables in effect at permit submittal	ASHRAE 90.1 Table 6.8; FBC-EC
☐	Load calculation package assembled for permit submittal — inputs, assumptions, and results documented in a form a plan reviewer or peer can audit without reconstructing the model	FBC-EC Ch.4; ASHRAE 90.1 §6

FIELD INTEL — MasterBuild PE review notes

Oversizing is the single most common — and most preventable — load-calc mistake we see in the field. An oversized system short-cycles, strips humidity control, and drives up both first cost and utility bills, yet it's the ‘safe’ choice modelers default to under schedule pressure. Size to Manual S limits and let the diversity and safety factors already built into the ASHRAE methodology do their job.

Field Diagnostic Quick-Reference — When a Built System Isn't Performing as Modeled

Symptom	Likely Root Cause	Re-Check This Category
System runs, but spaces stay humid despite adequate cooling capacity	Oversized, sensible-only equipment selection stripping latent removal	Florida Climate & Code Compliance

Symptom	Likely Root Cause	Re-Check This Category
West- or south-facing rooms overheat in the afternoon even though the total building load checks out	Orientation, exposure, or glazing SHGC/shading input error	Climate & Site Basis / Envelope Inputs
Comfort complaints cluster in one zone while the rest of the building is fine	Disparate-use spaces grouped on one zone, or diversity factor misapplied	System Design & Balancing
A server room, kitchen, or equipment-heavy space consistently runs hot	Miscellaneous/plug load underestimated for that specific space	Internal Loads
Building feels stuffy, occupants report stale air, despite the AHU running	Ventilation rate, Ez, or outdoor-air-intake method miscalculated	Space & System Boundary
Equipment short-cycles or coils ice up	Equipment oversized relative to the actual calculated load	Florida Climate & Code Compliance
Doors are hard to open/close, or the building feels pressurized/depressurized	Exhaust and makeup air not reconciled against ventilation air	System Design & Balancing

Use this table after occupancy, not just before permit submittal — most comfort complaints trace back to one of the categories above, and re-checking that category's box is usually faster than re-running the whole model from scratch.

SELF-SCORE YOUR SUBMITTAL

Count your checked boxes against the total line items above, category by category. A fully-checked category means that scope is ready for permit submittal or equipment selection. Any category with unchecked boxes is your risk list — the exact inputs most likely to produce a system that doesn't perform the way the model says it will.

Developed by MasterBuild Consulting from ASHRAE Fundamentals load-calculation methodology (Nonresidential Cooling and Heating Load Calculations), ASHRAE Standard 62.1 (Ventilation), ASHRAE Standard 90.1 (Energy Standard), and ACCA Manual J8/N/S industry practice. General reference only — always verify against the ASHRAE 62.1, ASHRAE 90.1, and Florida Building Code Energy Conservation editions in effect for your jurisdiction and permit date.

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Found unchecked boxes? Want a second set of eyes on your load calc before equipment gets ordered? Request a Proposal.