

MCP SERVER

NO CODE

CLOUD HOSTED

HVAC Load Calculator MCP

Determine Precise Heating and Cooling Needs by Code.

HVAC Load Calculator (Manual J) uses simplified Manual J standards to determine precise heating and cooling requirements for any residential space. Calculate heat loss, solar gain from windows, and internal gains using tools like `calculate_cooling_demand` and `calculate_heating_demand`. It also lets you validate if your proposed HVAC unit is actually big enough for the job.

A+ Quality Score 100/100

hvac

thermal-load

manual-j

btu

cooling-load

heating-demand



The infrastructure that powers AI agents in the real world.



Vinkius connects AI to the world's software through secure, enterprise-grade infrastructure — enabling real-world execution at scale, built on the Model Context Protocol (MCP).

Your AI Connections Run Through Vinkius Cloud

The world's largest
managed MCP catalog

Vinkius is the cloud infrastructure where AI agents connect to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.

— Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256

Encryption at rest

Ed25519

PKI vault signatures

24h TTL

Ephemeral session keys

V8 Isolate

Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT

`https://edge.vinkius.com/{token}/mcp`

Claude



Cursor



VS Code



Windsurf



Grok



Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1)
Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

Get started at cloud.vinkius.com — connect your AI agent in under 60 seconds.

HVAC Load Calculator (Manual J) MCP

3 tools available

Cloud-hosted on Vinkius

This MCP gives HVAC professionals and building engineers a way to figure out exactly how much heating and cooling a space needs without getting lost in complex calculations. You input details about the structure, like window size and insulation level, and the tool handles the heavy lifting based on Manual J standards. It first calculates the necessary cooling load, then the required heating load. After you have those figures, you can run a final check to confirm if the HVAC unit being quoted actually has enough capacity for both demands. All of this happens directly through your AI client, making it simple to track and verify equipment sizing.

Core Capabilities

01 – Determine cooling load

The tool calculates the precise amount of cooling needed by a space in BTU/h and Tons.

02 – Estimate heating requirements

It figures out the minimum heat loss for a building to calculate the necessary heating capacity in BTU/h.

03 – Check equipment size

You can run a validation check that tells you if an existing HVAC unit meets the calculated cooling and heating demands.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/mcp/hvac-load-calculator-manual-j — connect your AI agent in three steps.

- 01 First, provide inputs like square footage, climate zone, window dimensions, and insulation levels.
- 02 Next, run specific calculations using your agent to get both the total cooling demand and the heating demand figures.
- 03 Finally, give the tool the capacity of the unit you want to use; it will report whether that equipment is sufficient for the calculated loads.

The bottom line is, you get a definitive, standards-based calculation showing exactly what size HVAC system your project needs.

Built For

This MCP is essential for mechanical engineers, building science consultants, and residential HVAC contractors. If you spend time calculating loads or second-guessing if a unit will actually keep the house comfortable through winter, this tool saves hours of manual spreadsheet work.

Mechanical Engineer

They use it to verify load calculations for complex residential builds, ensuring compliance with Manual J standards before signing off on blueprints.

HVAC Contractor

A contractor uses this tool quickly on site to confirm if the equipment models they are selling will meet the home's specific heating and cooling demands.

Building Scientist

They run preliminary load checks using it during the design phase, helping clients understand the true energy requirements of a space.

What Changes When You Connect

-
- 01** Stop guessing on unit size. Use `calculate_cooling_demand` to get the actual Tons and BTU/h needed, preventing costly over- or under-sizing of equipment.

 - 02** Avoid calculating heat loss twice. Run `calculate_heating_demand` first to establish a precise baseline for minimum required heating capacity in BTU/h.

 - 03** Save time verifying units. `validate_equipment_capacity` instantly tells you if the unit model you're considering is sufficient for the calculated loads, eliminating manual cross-referencing.

 - 04** Accurate solar gain modeling. The tool handles complex inputs like window orientation and size, which are critical components of both cooling and heating calculations.

 - 05** Industry standard results. Because it follows simplified Manual J standards, your final report is defensible and accurate for professional use.
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Real-World Applications

The homeowner needs a full system sizing estimate.

A contractor asks their agent to run the load calculation using `calculate_cooling_demand` first. Next, they ask it to run `calculate_heating_demand`. Finally, they input the brand's unit capacity and use `validate_equipment_capacity` to confirm if the proposed system is adequate for both loads.

Comparing different window types.

The building scientist uses `calculate_cooling_demand` multiple times, adjusting only the window areas and orientations each time. This allows them to quickly model how changing glass from north-facing to south-facing impacts the overall cooling load.

A new room addition needs load verification.

The engineer runs a preliminary check using `calculate_cooling_demand` based on the additions' specs. They then use `validate_equipment_capacity` to confirm if their existing central unit can handle the added thermal load without needing an entire system replacement.

Confirming unit suitability after insulation upgrade.

The contractor first runs `calculate_heating_demand` using updated insulation values. They then use `validate_equipment_capacity` with the same unit model to prove that the existing equipment still meets the new, reduced heat loss requirement.

Patterns to Avoid

Treating load calculation as a general spreadsheet task**X AVOID**

Manually inputting dozens of variables into Excel and then having to cross-reference that final number with the equipment spec sheet, which often uses different units.

✓ INSTEAD

Let your agent handle the process. Run `calculate_cooling_demand` and `calculate_heating_demand` sequentially. The results are standardized BTU/h figures you can immediately use in `validate_equipment_capacity`.

Forgetting to check unit capacity against both demands**X AVOID**

Only checking the cooling load requirement, assuming that if it passes the AC test, the heating will be fine. This overlooks potential mismatch issues.

✓ INSTEAD

Always run `calculate_cooling_demand` AND `calculate_heating_demand`. Then, use `validate_equipment_capacity` to check against both resulting loads simultaneously.

Using vague general capacity tools**X AVOID**

Relying on a generic 'energy requirement checker' that doesn't specify Manual J standards or differentiate between BTU/h and Tons.

✓ INSTEAD

Use this MCP. It is built specifically around the Manual J standard, ensuring your calculations are accurate for professional use.

The Right Fit

Use this MCP if you need to calculate precise thermal loads based on established engineering standards like Manual J. You must know the building envelope details (insulation, windows, climate zone) and need a definitive number of BTU/h or Tons for both heating AND cooling. Don't use it if your goal is just general energy efficiency advice; this tool gives specific sizing numbers, not vague recommendations. If you only have basic square footage and no other specs, this MCP won't help. You must provide the detailed building parameters for `calculate_cooling_demand` or `calculate_heating_demand` to get accurate results.

The guesswork involved in sizing HVAC equipment is brutal.

Right now, figuring out if an AC unit is big enough involves a painful cycle of calculating heat loss variables and then cross-referencing those figures against massive spec sheets. You juggle window angles, insulation R-values, climate zones, and internal gains—and the margin for error feels huge.

With this MCP, your agent handles the complexity. After you provide the building specs, it runs a comprehensive load calculation in one step. You get clean, definitive BTU/h numbers that tell you exactly what size unit is required.

Getting the right sizing confirmation with `validate_equipment_capacity`

Previously, confirming capacity meant running multiple spreadsheets and hoping the final number matched the manufacturer's rating. If you missed one input or used slightly different standards, your whole calculation was useless.

Now, run `calculate_cooling_demand` to get the required load, then feed that figure directly into `validate_equipment_capacity`. The tool gives an immediate pass/fail result, saving you trips and headaches on site.

HVAC Load Calculator (Manual J) with 3 Tools

Use these tools to calculate specific thermal loads for buildings, determining necessary heating and cooling capacities based on engineering standards.

#	TOOL	DESCRIPTION
01	<code>calculate_cooling_demand</code>	Calculates how much cooling is needed for a specific area in BTU/h and Tons.
02	<code>calculate_heating_demand</code>	Determines the minimum heat loss required, calculated in BTU/h, for a given space.
03	<code>validate_equipment_capacity</code>	Evaluates if an HVAC unit's rated capacity meets the necessary heating and cooling loads.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

U Calculate the heating demand for a 2000 sq ft space with medium insulation in climate zone 5.



The calculated heating load is 45,000 BTU/h.

U What is the cooling load for a 1500 sq ft room with north: 50, south: 20, east: 10, west: 10 window areas and 3 people?



The cooling load is 18,500 BTU/h (approximately 1.54 Tons).

U Is a 24,000 BTU unit enough for a load of 20,000 BTU heating and 26,000 BTU cooling?



No, the unit is Underpowered because it does not meet the required cooling load.

Frequently Asked Questions

01 Does HVAC Load Calculator (Manual J) account for solar gain?

Yes, it does. You provide the window dimensions and orientations, and the tool incorporates that solar gain into both `calculate_cooling_demand` and `calculate_heating_demand`.

02 What is the difference between using `calculate_heating_demand` and `calculate_cooling_demand`?

They measure different things. `calculate_heating_demand` finds the heat loss (BTU/h) required in cold weather, while `calculate_cooling_demand` finds the cooling capacity needed for summer months.

03 Can I use `validate_equipment_capacity` if my unit is already installed?

Yes. If you suspect your current unit might be undersized or oversized, you can run `calculate_cooling_demand` first and then use `validate_equipment_capacity` to check the discrepancy.

04 What inputs does HVAC Load Calculator (Manual J) need from me?







You generally need the building's dimensions, climate zone, insulation type, window sizes, and occupancy count. The tool guides you through these specific details.

Go Live in 60 Seconds

Get your connection token from cloud.vinkius.com, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

```
https://edge.vinkius.com/[TOKEN]/mcp
```

CLIENT	WHERE TO CONFIGURE
 Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
 Cursor	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
 VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add <code>"hvac-load-calculator-manual-j": { "url": "..." }</code>
 Windsurf	MCP Settings → <code>mcp_settings.json</code> → Add endpoint URL
 ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
 Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

-  **Ask ChatGPT** 
-  **Ask Claude** 
-  **Ask Perplexity** 
-  **Ask Gemini** 
-  **Ask Grok** 

READY TO CONNECT

HVAC Load Calculator (Manual J) is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and
start building. No SDK. No deployment. Just results.

[Start at cloud.vinkius.com](https://cloud.vinkius.com) →

vinkius.com · support@vinkius.com

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