

M C P S E R V E R

N O C O D E

C L O U D H O S T E D

Cooling Tower Sizing Utility

Get precise thermodynamic sizing and water balance data.

Cooling Tower Sizing Utility provides the engineering math needed to design and analyze industrial cooling systems. Your AI client uses this MCP to calculate physical tower dimensions, estimate necessary makeup water, and validate if specific temperature profiles are physically possible based on wet bulb temperatures and heat loads.

A+ Quality Score 100/100

cooling-tower

heat-transfer

water-treatment

thermal-engineering

industrial-cooling



The connectivity layer between AI and the world's software.

Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

Your AI Connections Run Through Vinkius Cloud

The world's largest
managed MCP catalog

Vinkius is the connectivity layer where AI connects 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.

Cooling Tower Sizing Utility MCP

4 tools available

Cloud-hosted on Vinkius

You can use this MCP to handle the heavy lifting for industrial cooling tower design. Instead of manual calculations, you give your AI client the heat load and wet bulb temperature, and it returns the physical dimensions and air flow requirements you need. It handles the thermodynamics so you can focus on the system layout.

If you are worried about system losses, the MCP calculates the water balance, including evaporation and blowdown. You can also run feasibility checks to see if a target temperature is actually achievable under current environmental conditions. It's a direct way to check thermal effectiveness and ensure your proposed cooling profiles don't violate physical constraints before you commit to a design.

Core Capabilities

01 — Physical Sizing

Your agent calculates tower diameter, height, and air flow requirements.

02 — Water Management

The AI determines makeup water needs and system losses.

03 — Feasibility Checking

Your client validates if temperature profiles meet physical constraints.

04 — Efficiency Analysis

The MCP provides metrics to evaluate thermal effectiveness.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/cooling-tower-sizing-utility — connect your AI agent in three steps.

- 01 Connect your preferred MCP-compatible client to Vinkius.
- 02 Provide your heat load, wet bulb temperature, and other parameters to your agent.
- 03 The agent invokes the specific tool needed for the calculation.
- 04 The MCP returns precise engineering data directly to your chat interface.

Connect your AI client to Vinkius to start running engineering calculations immediately.

Built For

This MCP is built for engineers working on industrial thermal systems and water treatment.

Thermal Engineers

They hand off heat load and wet bulb data to get tower dimensions.

Mechanical Designers

They use the tool to verify if cooling profiles fit hardware constraints.

Water Treatment Specialists

They use the water balance tools to plan makeup water requirements.

What Changes When You Connect

- 01 Calculates physical dimensions from heat load and wet bulb data.
- 02 Identifies impossible temperature profiles before design implementation.
- 03 Quantifies water makeup and system loss requirements.

04 Provides thermal efficiency metrics for design evaluation.

Real-World Applications

New System Design

Determine the required tower size and air flow for a specific heat load.

Feasibility Studies

Check if a target water temperature can be reached given the ambient wet bulb temperature.

Water Budgeting

Calculate the total makeup water needed based on evaporation and blowdown rates.

Performance Audits

Evaluate the thermal effectiveness of an existing or proposed tower design.

Patterns to Avoid

Guessing physical dimensions

❌ AVOID

You tell your agent to pick a standard tower size based on a rough heat load estimate.

✓ INSTEAD

Input the exact heat load and wet bulb temperature into calculate_tower_dimensions to get precise physical requirements.

Ignoring environmental limits

❌ AVOID

You design a system for a target temperature without checking if the local wet bulb allows it.

✓ INSTEAD

Run validate_cooling_constraints to confirm your temperature profile is physically achievable under current conditions.

Underestimating water needs

❌ AVOID

You plan your water supply based only on evaporation without accounting for blowdown.

✓ INSTEAD

Use estimate_water_balance to get a full picture of makeup water and total system losses.

The Right Fit

Thermal engineers and mechanical designers should connect this MCP to automate sizing and feasibility checks. If you are just looking for general cooling tips or non-industrial HVAC advice, this isn't for you. The decision depends on whether you need to validate specific thermal profiles against physical constraints.

Cooling Tower Sizing Utility: 4 Engineering Tools

These tools handle thermodynamics, physical sizing, and water balance calculations for industrial cooling systems.

#	TOOL	DESCRIPTION
01	estimate_water_balance	This tool calculates the water balance for your cooling tower system. It determines necessary makeup water and total system losses.
02	calculate_tower_dimensions	This tool determines the physical size and air flow requirements for a tower. It uses heat load and wet bulb temperature to find the right dimensions.
03	validate_cooling_constraints	This tool checks if a specific temperature profile is physically possible. It ensures your cooling targets meet hardware and environmental constraints.
04	get_tower_efficiency_metrics	This tool provides thermal effectiveness data. It calculates specific efficiency metrics for your cooling tower design.

See It in Action

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

U What size tower do I need for a 5000 kW heat load with a wet bulb of 25°C, an approach of 5°C, and a circulation rate of 100 kg/s?



The required cooling tower has a diameter of 4.5 meters, a height of 6.2 meters, a cooling range of 15°C, and requires an air flow of 120 m³/s.

U Is it possible to reach a water temperature of 28°C if the wet bulb is 26°C and my minimum approach is 2°C?



No, the proposed profile is not feasible because the calculated approach is only 2°C, which does not meet the minimum required approach of 2°C when considering precision limits.

U Calculate the water balance if evaporation is 0.5 kg/s and blowdown is 0.1 kg/s.



The total makeup water required is 0.6 kg/s, with total system losses of 0.6 kg/s.

Frequently Asked Questions

01 What can this MCP calculate for cooling towers?

It calculates physical dimensions, air flow requirements, water balance, and thermal efficiency metrics.

02 How does it handle water balance?

The MCP uses evaporation and blowdown rates to estimate the total makeup water and system losses.

03 Can I check if my cooling design is physically possible?

Yes, you can use the validation tool to see if your temperature profile meets hardware and environmental constraints.

04 Which AI clients can use this MCP?

You can use this with any MCP-compatible client like Claude, Cursor, or Windsurf.

05 Do I need to host the MCP myself?

No, Vinkius hosts and manages the MCP so it is ready to use as soon as you connect.

06 How do I determine the physical size of my tower?

You can use the `calculate\_tower\_dimensions` tool by providing the heat load, wet bulb temperature, approach temperature, and circulation rate.

07 Can I check if my cooling target is realistic?

Yes, the `validate\_cooling\_constraints` tool allows you to verify if a target water temperature is feasible given the ambient wet bulb temperature and hardware limits.

08 How much makeup water will I need?

Use the `estimate\_water\_balance` tool with your evaporation and blowdown rates to find the total required makeup water.

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>"cooling-tower-sizing-utility": { "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

Cooling Tower Sizing Utility 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 →

vinkius.com · support@vinkius.com

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DOCUMENT INFORMATION

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Platform	Vinkius Cloud for AI Agents
Endpoint	https://edge.vinkius.com/{token}/mcp

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