

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

Flare System Design MCP

Calculate compliant flare stack dimensions and radiation safety distances.

Flare System Design MCP provides specialized engineering calculations for flare stacks and relief systems. It follows API 520 and API 521 standards to help you determine stack height, tip diameter, and liquid separator sizing. Your AI client can use these tools to ensure thermal radiation limits are met and combustion remains smokeless.

A+ Quality Score 100/100

api-520

api-521

flare-design

thermal-radiation

relief-systems



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.

Flare System Design MCP

4 tools available

Cloud-hosted on Vinkius

You can now run complex flare system calculations directly within your AI client. This MCP handles the heavy lifting for relief system design by applying industry-standard API 520 and API 521 methodologies to your inputs. Instead of manual formula entry, you tell your agent the relief rates and gas properties, and it returns the necessary dimensions for your flare stack or knockout drum.

Safety is the core of this tool. You can quickly check if your proposed stack height keeps personnel at a safe distance from thermal radiation or if your gas composition will cause smoky combustion. It also handles the sizing for liquid separators, ensuring your knockout drum meets the required volume and dimensions for the specific flow rates you are managing. It turns your AI agent into a specialized engineering partner for relief system design.

Core Capabilities

01 — Stack Dimensioning

Your agent calculates height and tip diameter based on relief rates.

02 — Radiation Safety

The AI determines safe distances for personnel and equipment based on thermal limits.

03 — Separator Sizing

It calculates the volume and dimensions needed for knockout drums.

04 — Combustion Analysis

The tool checks if gas composition and tip design will cause smoke.

05 — Standard Compliance

All calculations follow API 520 and API 521 methodologies.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/flare-system-design — connect your AI agent in three steps.

- 01 Connect your MCP-compatible client to Vinkius.
- 02 Provide your relief rates, gas properties, or radiation limits to your AI agent.
- 03 The agent calls the specific tool needed for the calculation.
- 04 The MCP returns the calculated dimensions or safety distances.
- 05 Your agent presents the final engineering data to you.

Connect your AI client to the Vinkius hosted MCP to start running engineering calculations.

Built For

This MCP is built for engineers working on relief systems and flare design in the oil, gas, and chemical industries.

Process Engineer

You hand off relief rate data to the AI to get rapid sizing for stacks and drums.

Safety Engineer

You use the tool to verify radiation distances and smokeless combustion compliance.

Mechanical Engineer

You get specific dimensions for equipment sizing based on process requirements.

What Changes When You Connect

- 01 Calculations follow API 520 and 521 standards.
- 02 Reduces manual math for stack height and tip diameter.

-
- | | |
|----|--|
| 03 | Provides immediate safety distance checks for thermal radiation. |
|----|--|
-
- | | |
|----|--|
| 04 | Automates knockout drum sizing based on gas and liquid flow. |
|----|--|
-

Real-World Applications

Flare Stack Design

Determine the height and diameter of a new flare stack using specific relief rates.

Knockout Drum Sizing

Size liquid separators for specific gas and liquid flow combinations.

Personnel Safety Planning

Calculate how far equipment or workers must be from a flare to avoid radiation exposure.

Combustion Quality Checks

Verify that a flare design won't produce smoke given a specific gas composition.

4 Tools Available

#	TOOL	DESCRIPTION
01	calculate_radiation_distances	This tool calculates the required distance for personnel or equipment to stay within safe thermal radiation limits.
02	get_flare_stack_dimensions	Use this to determine the necessary height and tip diameter for a flare stack.
03	size_knockout_drum	This tool calculates the required volume and dimensions for a liquid separator.
04	validate_smokeless_condition	This tool checks if your flare tip design and gas composition will result in smoky combustion.

See It in Action

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

U What are the required flare stack dimensions for a relief rate of 500 kg/s with natural gas properties?



The required flare stack height is 45 meters with a tip diameter of 1.2 meters to maintain safe radiation levels.

U How far away should personnel be if the allowed radiation is 1.5 kW/m²?



The safe distance for personnel is 85 meters from the flame center.

U Calculate the size of a knockout drum for a gas flow of 200 kg/s and liquid flow of 5 kg/s.



The required knockout drum has a diameter of 3.5 meters and a height of 8 meters.

Frequently Asked Questions

01 What engineering standards does this MCP follow?

The calculations adhere to API 520 and API 521 methodologies.

02 Can I use this with Claude or Cursor?

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

03 What kind of flare calculations can the AI perform?

The AI can calculate flare stack dimensions, radiation distances, knockout drum sizing, and smokeless combustion conditions.

04 Do I need to host the MCP myself?

No, Vinkius hosts and manages the MCP for you. You just connect your client and start working.

05 Can it help with knockout drum sizing?

Yes, the `size_knockout_drum` tool determines the necessary volume and dimensions for liquid separators.

06 What standards does this tool follow?

The tool follows the industry-standard API 520 and API 521 methodologies for relief systems and flare design.

07 How do I calculate the required stack height?

You can use the `get_flare_stack_dimensions`` tool, providing the relief rate, gas properties, target radiation limit, and distance to personnel.

08 Can I check for smokeless combustion?

Yes, the `validate_smokeless_condition`` tool checks if the flare tip diameter and gas composition will result in smoky combustion.

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>"flare-system-design": { "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

Flare System Design 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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Server ID	01a0908d-7872-728b-aaac-c8cc91a0f17c
Platform	Vinkius Cloud for AI Agents
Endpoint	<code>https://edge.vinkius.com/{token}/mcp</code>

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