

MCP SERVER

NO CODE

CLOUD HOSTED

Ethylene Oxide Plant Designer MCP.

Run chemical engineering simulations directly within your AI client.

Ethylene Oxide Plant Designer MCP provides specialized engineering tools for designing Ethylene Oxide (EO) production plants. You can simulate reactor sizing, catalyst requirements, process efficiency, and safety constraints based on feedstock availability and catalyst selection. It works with any MCP-compatible client to handle complex chemical process calculations.

A+ Quality Score 100/100

ethylene-oxide

chemical-engineering

reactor-design

catalysis

process-safety



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.

Ethylene Oxide Plant Designer MCP

4 tools available

Cloud-hosted on Vinkius

This MCP gives you the mathematical foundation to design Ethylene Oxide production facilities. Instead of manually running separate simulation software, you can ask your AI client to handle the heavy lifting for reactor sizing and catalyst mass calculations. You can model both air and oxygen-based processes to see how different feedstocks impact your final yield. It handles the specific physics of silver catalyst requirements and helps you define the boundaries of safe operation. Whether you are sizing a new vessel or checking the selectivity of an existing process, this tool provides the specific engineering data you need to move from concept to design.

Core Capabilities

01 — Reactor Sizing

The AI calculates vessel volume, height, and diameter for specific production loads.

02 — Catalyst Estimation

Your agent determines the exact mass and volume of silver catalyst required.

03 — Efficiency Modeling

The tool predicts conversion rates and selectivity for different process types.

04 — Safety Boundary Definition

It generates operating limits to prevent thermal runaway in the reactor.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/ethylene-oxide-plant-designer — connect your AI agent in three steps.

- 01 Connect your AI client to the Vinkius-hosted MCP.
- 02 Provide production targets or feedstock details to your agent.
- 03 The agent calls the specific engineering tool needed for the calculation.
- 04 Receive precise dimensions, mass, or efficiency data in your chat interface.

You connect the MCP to your AI client and start asking engineering questions.

Built For

Chemical engineers and process designers use this MCP to automate repetitive sizing and safety calculations.

Process Engineer

Uses the tool to model selectivity and conversion rates for new plant designs.

Plant Designer

Relies on the MCP to determine physical reactor dimensions and vessel requirements.

Safety Engineer

Uses the safety envelope tool to establish operating limits for oxygen-based processes.

What Changes When You Connect

- 01 Reduces manual calculation time for reactor and catalyst sizing.
- 02 Provides consistent safety limits for both air and oxygen processes.

- 03** Connects engineering math directly to your AI-driven design workflow.
-

Real-World Applications

Initial Plant Design

Determine the necessary reactor size and catalyst mass for a new Ethylene Oxide facility.

Safety Compliance

Establish the safe operating envelope to prevent thermal runaway during production.

Process Optimization

Check how changing catalyst types affects selectivity and ethylene conversion.

Capacity Planning

Calculate the amount of silver catalyst needed to meet specific annual production targets.

4 Tools Available

#	TOOL	DESCRIPTION
01	analyze_process_efficiency	Predicts selectivity and conversion rates based on your specific input parameters.
02	calculate_reactor_dimensions	Determines the physical size and design parameters for the reactor vessel.
03	estimate_catalyst_requirements	Calculates the mass and volume of silver catalyst needed to hit your production targets.
04	generate_safety_envelope	Establishes safe operating limits to prevent thermal runaway or explosions.

See It in Action

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

- U** Calculate the reactor dimensions for 50 units of ethylene using the oxygen process and the standard silver catalyst.



The reactor requires a volume of 125.5 m³, a height of 12.0 m, a diameter of 3.6 m, and a heat exchange area of 45.2 m².

- U** How much silver catalyst is needed for an annual capacity of 10,000 tons using the high-activity catalyst?



The required catalyst mass is 4,500 kg with a total volume of 5,200 liters and a loading density of 0.86 kg/L.

- U** What is the expected selectivity for 30 units of ethylene using the air process?



The predicted selectivity is 78.5% with an ethylene conversion rate of 12.2% and a CO₂ yield of 21.5%.

Frequently Asked Questions

01 What kind of processes can this MCP model?

It supports both air-based and oxygen-based Ethylene Oxide production processes.

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 specific catalyst is used in the calculations?

The tool is designed to calculate requirements specifically for silver catalysts used in EO production.

04 Does this tool handle safety calculations?

Yes, it includes a tool to generate a safety envelope to prevent thermal runaway or explosions.

05 How do I get the results?

The results are returned directly to your AI client as text, providing specific numbers for volume, mass, or percentage.

06 How do I determine the reactor size?

You can use the `calculate\_reactor\_dimensions` tool by providing the ethylene availability, the oxygen source (air or oxygen), and the specific catalyst system.

07 What is the difference between the air and oxygen processes?

The air process uses atmospheric air, which is safer due to lower oxygen concentration but requires larger equipment. The oxygen process uses pure oxygen, allowing for higher throughput and smaller equipment but requires stricter safety controls.

08 Can I check the safety limits for my design?

Yes, use the `generate\_safety\_envelope` tool to define maximum temperature and oxygen concentration limits to prevent thermal runaway or explosions.

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>"ethylene-oxide-plant-designer": { "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

Ethylene Oxide Plant Designer 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	<code>https://edge.vinkius.com/{token}/mcp</code>

LICENSE & USAGE

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