MCP SERVER | NO CODE | CLOUD HOSTED

NMFC Freight Class Calculator MCP for AI Agents

Accurately Determining Shipping Costs and Classification based on Density

The NMFC Freight Class Calculator determines your National Motor Freight Classification (NMFC) and estimates shipping costs using density-based calculations. It takes weight and dimensions to calculate pounds per cubic foot, maps that number to the correct freight class, and finally adjusts the total cost estimate.

A+ Quality Score 100/100

nmfc | freight | density | shipping-calculator | logistics-tools

MAINTAINED BY VINKIUS CLOUD FOR AI AGENTS · JULY 2026
vinkius.com/mcp/nmfc-freight-class-calculator

SCAN TO VIEW

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.

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.

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.

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	Ed25519	24h TTL	V8 Isolate
Encryption at rest	PKI vault signatures	Ephemeral session keys	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.

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.

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.

06 — Honeytoken Trap System

Phantom credentials are injected into isolated environments. If a honeytoken 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.

Agent Activity

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

FinOps

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

Tool Health

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

Firewall & DLP

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

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.

NMFC Freight Class Calculator MCP

3 tools available
Cloud-hosted on Vinkius

Calculating freight classification used to be a tedious mess of manual measurements, density formulas, and complex rate books. You had to track down specific tables just to figure out if your shipment was Class 150 or Class 300, which fundamentally changes how much you pay. This MCP automates that entire process. Start by determining the precise density of any package using its weight and dimensions. Next, it assigns an official NMFC class rating based on that density. After getting the proper classification, the tool estimates your final shipping cost impact against a base rate per pound. Everything is handled in one place. If you're looking for reliable supply chain tools, Vinkius keeps this MCP right alongside thousands of others, making it easy to connect and use with any compatible AI client.

Core Capabilities

01 — Calculate shipping density

It takes a shipment's weight and dimensions and calculates its precise density in pounds per cubic foot (PCF).

02 — Determine NMFC freight class

This tool maps your calculated PCF value to the specific, official NMFC freight classification (ranging from Class 50 to Class 500).

03 — Estimate total cost impact

It calculates how a determined freight class affects your overall shipping costs using a provided base rate per pound.

One Click on Vinkius — From Prompt to Execution

Available at **vinkius.com/mcp/nmfc-freight-class-calculator** — connect your AI agent in three steps.

01 First, input the shipment's weight and physical dimensions (length, width, height) to calculate its density in pounds per cubic foot.

02 Second, feed that calculated density number into the system; it will then map this value directly to a specific NMFC class rating.

03 Finally, use the resulting freight class alongside your base rate to get an estimated total cost impact for shipping.

The bottom line is you go from raw physical data (weight/size) straight to a final financial estimate in three simple steps.

Built For

Anyone working with freight, logistics, or supply chain management needs this. It’s for the operations manager who can't afford shipping misclassifications, and the broker who has to process dozens of quotes a day. Stop relying on spreadsheets and manual lookups.

Logistics Coordinator

You use this MCP every time you quote a shipment, ensuring the calculated density matches the required NMFC class before submitting a rate.

Supply Chain Manager

You audit freight costs by running multiple scenarios to see how changing dimensions or weight affects the final classification and total expenditure.

Freight Broker

You process incoming rate requests, immediately calculating density and class to provide accurate initial cost estimates without needing external lookup tables.

What Changes When You Connect

01 Eliminate costly misclassification mistakes. By using the `get_class_from_density` tool, you ensure your shipment receives its accurate NMFC class rating.

02 Save hours of manual calculation time. Instead of cross-referencing rate tables and formulas, your agent handles density calculations instantly using `calculate_shipping_density`.

03 Get instant cost estimates. The `evaluate_cost_impact` tool provides immediate financial feedback, showing exactly how the freight class affects your final quote.

04 Maintain compliance across all quotes. You get a verifiable classification process that matches industry standards, protecting your business from unexpected surcharges.

05 Improve quoting accuracy on the fly. Because this MCP connects density measurement straight to cost evaluation, your bids are reliable and ready when you need them.

Real-World Applications

Determining rate feasibility for a new product line

A manager asks their agent: 'If we ship Product X (100 lbs, 2×2×2 ft), what's the cost?' The agent uses `calculate_shipping_density` to get PCF, then `get_class_from_density` to find Class 150. Finally, it runs `evaluate_cost_impact`, telling the manager the expected rate change.

Auditing a client's historical freight billing

A broker needs to check if a client was overcharged on an old invoice. They feed the original weight and dimensions into `calculate_shipping_density` and run it through `get_class_from_density`, instantly verifying if the billed class was correct.

Comparing multiple shipping carriers' quotes

Instead of manually running calculations for three different carriers, the agent uses this MCP to standardize the input. It calculates the density once and then feeds it into `evaluate_cost_impact` for each carrier's rate card.

Quickly assessing inventory shipping risk

A warehouse worker needs to know if a newly assembled unit (50 lbs, 12×12×12 inches) is going to be expensive. The agent runs the density calculation and immediately informs them of the resulting class and preliminary cost range.

Patterns to Avoid

Relying on generalized volume estimates

✗ AVOID

A user might just estimate that a large, light item is 'high volume' without knowing its specific weight. They assume the cost is high because of size alone.

✓ INSTEAD

Always start by calculating the density using `calculate_shipping_density`. This tool forces you to combine both weight and dimensions for an accurate reading, preventing inaccurate assumptions.

Skipping the NMFC class lookup

✗ AVOID

A user might only use a simple volume calculator that gives cubic feet but fails to translate that number into the official Class rating required by carriers.

✓ INSTEAD

After determining density, you must pass that value through `get_class_from_density`. This step is mandatory because it translates raw data into the industry-required classification code.

Ignoring variable base rates

✗ AVOID

A user calculates the class but forgets to tell their agent which carrier or rate card to use, leading to a useless cost projection.

✓ INSTEAD

Always finalize your query by using `evaluate_cost_impact`. You provide the calculated freight class and the specific base rate, ensuring the final number is financially relevant.

The Right Fit

Use this MCP if your job requires translating physical measurements (weight/size) into standardized financial shipping classes. This tool is essential for anyone needing to move beyond simple volume calculations and accurately determine density-based costs.

Don't use it if you only need a quick estimate based on weight alone, or if your pricing model doesn't rely on the official NMFC structure. If your process requires tracking inventory movements across multiple physical locations without calculating class changes, look for specialized WMS tools instead. But if accurate freight costing is key to your operation, this MCP handles it flawlessly by guiding you from density calculation through classification and final cost impact.

NMFC Freight Class Calculator: Solving Density-Based Shipping Quoting

Today, figuring out a precise shipping quote involves gathering weight logs, measuring dimensions with tape measures, consulting multiple rate books, and running density formulas by hand or in complex spreadsheets. It's slow, prone to rounding errors, and requires deep knowledge of the National Motor Freight Classification system.

With this MCP, you just provide the weight and dimensions. The agent first calculates the precise PCF, then maps it instantly to the correct NMFC Class (e.g., 250). You get a reliable class rating immediately, letting you move past manual calculation errors and jump straight into pricing.

NMFC Freight Class Calculator: Mastering Total Cost Impact Analysis

The biggest time suck isn't calculating the density; it's figuring out how that class affects the final price. You manually take the assigned class, find a

This MCP combines those steps. After getting the NMFC class, you feed it into the cost impact tool, which spits out the total estimated shipping

base rate per pound from a separate sheet, and multiply them—a process that has to be repeated for every quote.

expense directly. You get accurate financial projections without ever touching an external rate book.

NMFC Freight Class Calculator: 3 Tools for Logistics Density Calculations

Use these tools together to calculate the density of a package, assign its official NMFC freight class, and estimate the final shipping cost impact.

#	TOOL	DESCRIPTION
01	`get_class_from_density`	Takes a measured density value and returns the corresponding official NMFC freight class rating.
02	`evaluate_cost_impact`	Calculates the estimated total shipping cost by applying a base rate to the final determined freight class.
03	`calculate_shipping_density`	Calculates the density of a shipment using its weight and dimensions, resulting in pounds per cubic foot (PCF).

See It in Action

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

U What's the freight class and expected cost for a 150 lb crate that is 4×3×2 ft?

Analysis of Shipment:
- **Density Calculation:** Weight (150 lbs) / Volume (24 cubic feet) = **6.25 PCF**.
- **NMFC Class:** A density of 6.25 PCF falls into **Class 30**.
- **Estimated Cost Impact:** Using a base rate of $0.15/lb, the estimated cost for this shipment is **$45.00** (based on Class 30 multiplier).

This class rating helps you get the best quote from carriers.

U I have a small item weighing 25 lbs with dimensions of 12×12×12 inches. What should I expect?

Density Report:
- Weight: 25 lbs
- Dimensions: 12" x 12" x 12"
- Volume: 1728 cubic inches (or 0.012 cubic feet)
- Calculated Density: **~2.1 PCF**.

This density points to an NMFC Class of **Class 50**. This is usually a very cost-effective classification.

U If the freight class is 350 and my base rate is $2.50/lb, what's the total estimated shipping expense for 80 lbs?

Cost Projection:

- Base Weight: 80 lbs
- Assigned Class Multiplier: 1.4 (for Class 350)
- Rate Per Pound: $2.50
- **Estimated Total Cost: $280.00**.

Please confirm that the base rate of $2.50/lb is correct before finalizing this quote.

Frequently Asked Questions

01 **How do I calculate the density of my shipment?**

You can use the `calculate_shipping_density` tool. Simply provide the weight in pounds and the dimensions (length, width, and height) in inches.

02 **What is NMFC freight class?**

The National Motor Freight Classification (NMFC) system categorizes commodities based on density, ease of handling, and stability to determine shipping rates.

03 **How does freight class affect my costs?**

Higher freight classes (lower density) typically involve higher cost multipliers due to the increased space consumption in a trailer. You can use `evaluate_cost_impact` to see this effect.

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 `"nmfc-freight-class-calculator": { "url": "…" }`
Windsurf	MCP Settings → `mcp_settings.json` → 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

NMFC Freight Class Calculator 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

Generated	July 2026
MCP Server	NMFC Freight Class Calculator MCP
Server ID	`019f13f1-b44b-7029-a295-7546b600b243`
Platform	Vinkius Cloud for AI Agents
Endpoint	`https://edge.vinkius.com/{token}/mcp`

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