

## v3.4-DAT-004 – ZK-Indexed Search & Sovereign Query Layer

Document Title	ZK-Indexed Search & Sovereign Query Layer
Version	v3.4
Document ID	v3.4-DAT-004
Date	2025-03-22
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Document Type	Public / Certification / Internal

### 1. Purpose & Scope

This document defines the architecture and certification criteria for Zero-Knowledge indexed search capabilities and sovereign query mechanisms within MaxOneOpen. It ensures users can interact with structured data safely, without compromising confidentiality or relying on third-party indexing services.

### 2. ZK-Indexed Search Model

- Indexes are locally generated, user-owned, and encrypted
- ZK commitments are created for all searchable fields
- Search queries are verified against ZK proofs, not raw data
- Forks must implement local ZK index generators

### 3. Sovereign Query Protocol

Query Type	Execution Layer	Privacy Feature
Field Match	Local Vault Index	ZK commitment match only
Range Scan	Masked DAG traversal	No data exposure
Schema Audit	Control Layer pulse	Trigger-only logic
Multi-Vault	Federated ZK relay	Encrypted routing + merge

### 4. Runtime Execution & Isolation

- Query handlers execute in sandboxed twin environments
- Result aggregation is done client-side only
- Queries may not trigger any remote storage lookup
- Proofs must be traceable and verifiable post-query

### 5. Certification Requirements

- All forks must expose query interfaces with ZK enforcement
- No plaintext indexes or unmasked fields allowed
- Search logs must be unlinkable
- Proof-of-execution required for each certified query type

## 6. Certification Relevance

Certified MaxOneOpen deployments must include user-sovereign, ZK-compatible indexing and query mechanisms. Non-compliant search logic invalidates certification status.