

Software Requirements Specification

for the

Algorithmic Trading System

DEMO-2025-001

Revision: v1.1

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Reference Documents

- **MiFID-II** - Markets in Financial Instruments Directive II
- **SEC-Rule-15c3-5** - SEC Market Access Rule
- **FINRA-Rules** - FINRA Algorithmic Trading Rules
- **Regulation-NMS** - Regulation National Market System

Revision history

Version	Date	Description	Changes
1.1	2026-01-21	Non-functional SysML changes.	1 modified

Changes since last version

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Introduction

Purpose

This document serves as the Software Requirements Specification (SRS) for the Algorithmic Trading System. It outlines the comprehensive set of requirements that must be met by the system to ensure successful development, deployment, and operation in live trading environments.

This SRS contains requirements concerning the system's functionalities, performance, interfaces, and quality attributes from the stakeholder, trader, risk manager, compliance officer, and the development team's perspectives.

Scope

The requirements included in this document drive the development of the Algorithmic Trading System and ensure that the final deliverable aligns with regulatory compliance, risk management needs, and trading performance objectives. This document serves as a foundation for system design, development, testing, and validation.

Requirement Types

The following requirement type prefixes are used throughout this specification:

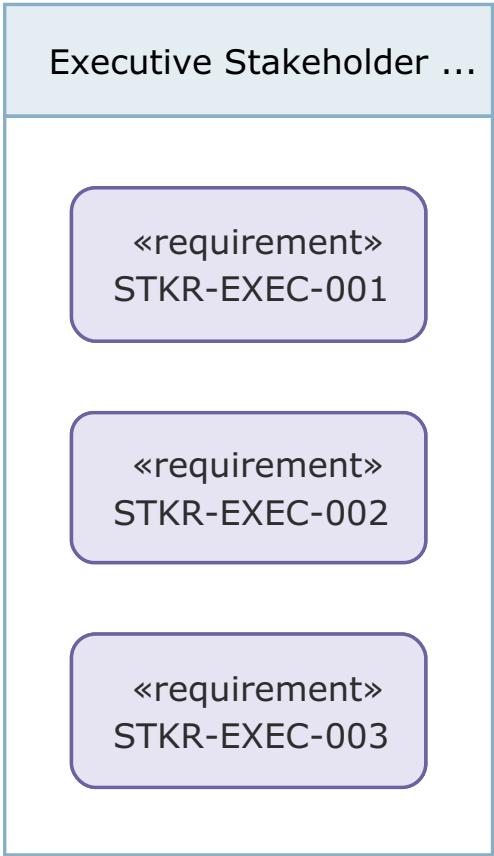
Prefix	Name	Description
STKR-EXEC	Trading Firm Requirement	Base requirement definition for stakeholder-level requirements.
STKR-USER	Trading Team Requirement	Requirement definition for quantitative trading team needs.
STKR-RISK	Risk Management Requirement	Requirement definition for risk management needs.
STKR-COMP	Compliance Requirement	Requirement definition for compliance officer needs.
SYS-PERF	Performance Requirement	Requirement definition for performance system requirements.
SYS-FUNC	Functional Requirement	Requirement definition for functional system requirements.
SYS-RISK	Risk Control Requirement	Requirement definition for risk control system requirements.
SYS-COMP	System Compliance Requirement	Requirement definition for compliance system requirements.

Summary

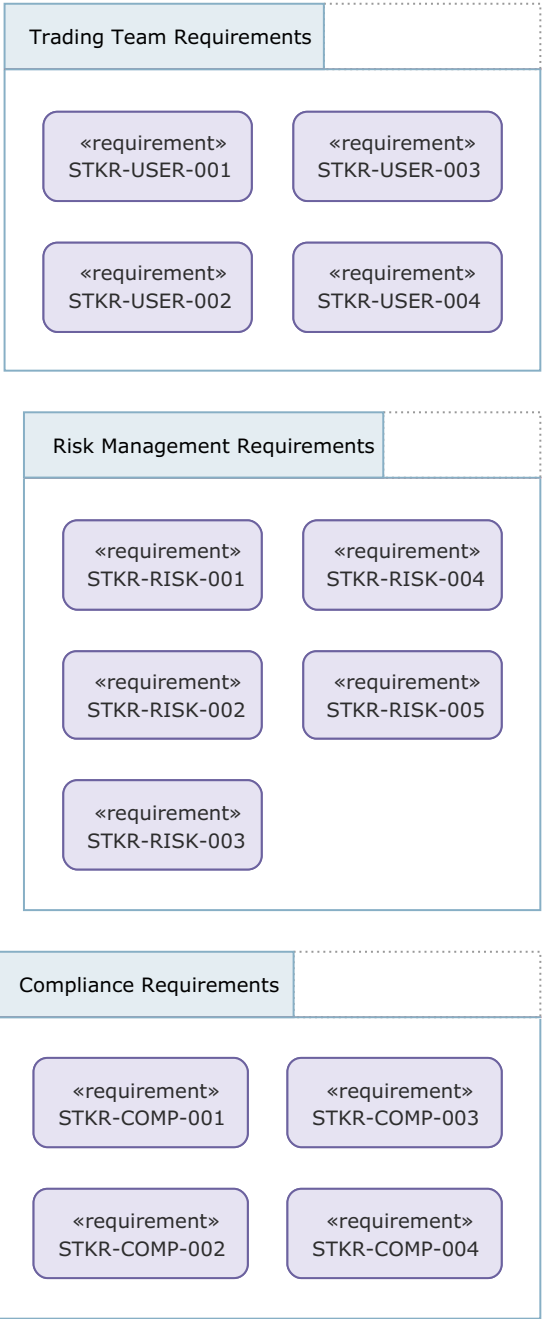
Category	Count
Executive Stakeholder Requirements	3
User Stakeholder Requirements	13
System Requirements	17
Total	33

The following diagrams provide a visual overview of the requirement structure defined in the SysML v2 model.

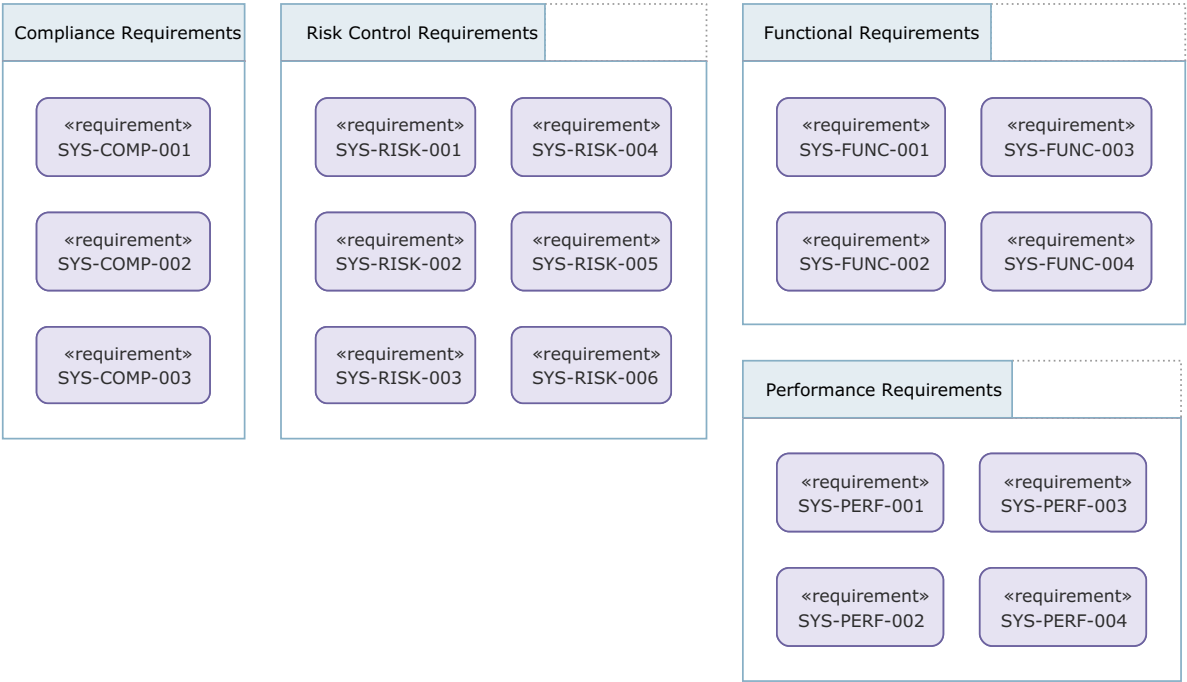
Executive Requirements



User Requirements



System Requirements



Requirements

Executive Stakeholder Requirements

STKR-EXEC-001

Requirement details

Status	Approved
Identifier	STKR-EXEC-001
Description	System shall generate consistent risk-adjusted returns while maintaining regulatory compliance.
Success criteria	Achieve minimum Sharpe ratio of 2.0 over rolling 12-month periods with zero regulatory violations.
Justification	Primary business objective to deliver value to investors while managing operational and regulatory risk.
Parent requirements	
Derived requirements	
Dependency graph	STKR-EXEC-001

Verification details

Implemented by	- Algorithmic Trading Platform
Validated by	- TEST-DEF-STKR-EXEC-001

STKR-EXEC-002

Requirement details

Status	Approved
Identifier	STKR-EXEC-002
Description	System shall comply with all applicable financial regulations including MiFID II and SEC requirements.
Success criteria	Pass all regulatory audits with no major findings and maintain trading authorization across all target markets.
Justification	Legal obligation to operate in regulated markets and avoid fines, sanctions, or license revocation.
Parent requirements	
Derived requirements	STKR-COMP-001 STKR-COMP-002
Dependency graph	<pre>graph LR; A[STKR-EXEC-002] -- derives to --> B[STKR-COMP-001]; A -- derives to --> C[STKR-COMP-002];</pre>

Verification details

Implemented by	- Algorithmic Trading Platform - Compliance Module - Market Data Handler
Validated by	- TEST-DEF-STKR-EXEC-002

STKR-EXEC-003

Requirement details

Status	Approved
Identifier	STKR-EXEC-003
Description	System shall prevent catastrophic losses through automated risk controls, position monitors, and circuit breakers.
Success criteria	Less than 0.1% trading incidents resulting in losses exceeding daily loss limits or requiring manual intervention.
Justification	Protect firm capital and prevent business-ending losses as seen in historical algorithmic trading failures.
Parent requirements	
Derived requirements	STKR-RISK-001 STKR-RISK-002 STKR-RISK-005
Dependency graph	<pre>graph LR; A[STKR-EXEC-003] -- derives to --> B[STKR-RISK-005]; A -- derives to --> C[STKR-RISK-001]; A -- derives to --> D[STKR-RISK-002];</pre>

Verification details

Implemented by	- Algorithmic Trading Platform
Validated by	- TEST-DEF-STKR-EXEC-003

Trading Team Requirements

STKR-USER-001

Requirement details

Status	Draft
Identifier	STKR-USER-001
Description	Trading team shall be able to backtest strategies on historical market data with realistic execution simulation.
Success criteria	Backtesting environment produces results within 5% of actual live trading performance over 3-month validation.
Justification	Validate strategy profitability and risk characteristics before deployment to avoid losses from untested algorithms.
Parent requirements	
Derived requirements	
Dependency graph	STKR-USER-001

Verification details

Implemented by	- Backtesting Engine - Strategy Engine
Validated by	- TEST-DEF-STKR-USER-001

STKR-USER-002

Requirement details

Status	Draft
Identifier	STKR-USER-002
Description	Trading team shall be able to deploy strategies to production with configurable risk parameters.
Success criteria	Strategies deploy to production within 10 minutes with all risk parameters correctly applied and verified.
Justification	Enable rapid strategy iteration and deployment while maintaining risk oversight and control.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Strategy Engine
Validated by	- TEST-DEF-STKR-USER-002

STKR-USER-003

Requirement details

Status	Draft
Identifier	STKR-USER-003
Description	Trading team shall be able to monitor strategy performance in real-time with P&L tracking.
Success criteria	P&L updates display with < 1 second latency and dashboards remain accessible during all market conditions.
Justification	Enables prompt response to performance degradation or changing market conditions to protect capital.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Monitoring & Alerting - Strategy Engine
Validated by	- TEST-DEF-STKR-USER-003

STKR-USER-004

Requirement details

Status	Draft
Identifier	STKR-USER-004
Description	Trading team shall be able to halt or modify strategies based on changing market conditions.
Success criteria	Strategy halt commands execute within 500 milliseconds with confirmation displayed to operator.
Justification	Market conditions change rapidly; manual override capability is essential for risk management.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Monitoring & Alerting
Validated by	- TEST-DEF-STKR-USER-004

Risk Management Requirements

STKR-RISK-001

Requirement details

Status	Draft
Identifier	STKR-RISK-001
Description	System shall enforce position limits per strategy, instrument, and aggregate portfolio.
Success criteria	100% of orders exceeding position limits are rejected before submission to market.
Justification	Prevent concentration risk and limit exposure to individual instruments or strategies.
Parent requirements	STKR-EXEC-003
Derived requirements	SYS-RISK-001 SYS-RISK-002
Dependency graph	<pre>graph LR; A[STKR-EXEC-003] -- derives to --> B[STKR-RISK-001]; B -- derives to --> C[SYS-RISK-001]; B -- derives to --> D[SYS-RISK-002]; style B fill:#f96</pre>

Verification details

Implemented by	- Risk Management System
Validated by	- TEST-DEF-STKR-RISK-001

STKR-RISK-002

Requirement details

Status	Draft
Identifier	STKR-RISK-002
Description	System shall monitor P&L in real-time and halt trading when daily loss limits are breached.
Success criteria	Loss limit breach detection and trading halt occurs within 100 milliseconds.
Justification	Cap maximum daily losses to prevent drawdowns that exceed risk tolerance or threaten firm viability.
Parent requirements	STKR-EXEC-003
Derived requirements	
Dependency graph	STKR-EXEC-003 derives to STKR-RISK-002

Verification details

Implemented by	- Risk Management System
Validated by	- TEST-DEF-STKR-RISK-002

STKR-RISK-003

Requirement details

Status	Draft
Identifier	STKR-RISK-003
Description	System shall perform pre-trade risk checks on all orders before submission to exchanges.
Success criteria	Pre-trade checks complete with < 50 microseconds latency and 100% of orders are validated before submission.
Justification	Regulatory requirement and best practice to prevent erroneous orders from reaching market.
Parent requirements	
Derived requirements	SYS-RISK-001 SYS-RISK-002 SYS-RISK-003 SYS-RISK-004
Dependency graph	<pre> graph LR A[STKR-RISK-003] -- derives to --> B(SYS-RISK-004) A -- derives to --> C(SYS-RISK-001) A -- derives to --> D(SYS-RISK-002) A -- derives to --> E(SYS-RISK-003) </pre>

Verification details

Implemented by	- Risk Management System
Validated by	- TEST-DEF-STKR-RISK-003

STKR-RISK-004

Requirement details

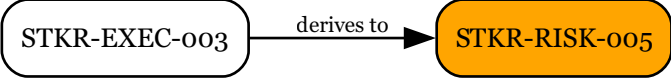
Status	Draft
Identifier	STKR-RISK-004
Description	System shall detect and prevent erroneous orders such as fat-finger errors and duplicate submissions.
Success criteria	Detect and reject 100% of orders with quantities >3 standard deviations from historical mean for that strategy.
Justification	Prevent costly trading errors that can result in significant losses and market disruption.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Risk Management System
Validated by	- TEST-DEF-STKR-RISK-004

STKR-RISK-005

Requirement details

Status	Draft
Identifier	STKR-RISK-005
Description	Risk managers shall have access to emergency kill switch to immediately halt all automated trading.
Success criteria	Kill switch activates within 100 milliseconds and cancels all pending orders.
Justification	Final safeguard for extreme situations requiring immediate cessation of all trading activity.
Parent requirements	STKR-EXEC-003
Derived requirements	
Dependency graph	 <pre>graph LR; A(STKR-EXEC-003) -- derives to --> B(STKR-RISK-005)</pre>

Verification details

Implemented by	- Risk Management System
Validated by	- TEST-DEF-STKR-RISK-005

Compliance Requirements

STKR-COMP-001

Requirement details

Status	Draft
Identifier	STKR-COMP-001
Description	System shall maintain complete, immutable audit trail of all trading activity with nanosecond timestamps.
Success criteria	Audit trail captures 100% of trading events with timestamp accuracy ± 100 nanoseconds and zero data loss.
Justification	Required for regulatory audits and post-trade analysis.
Parent requirements	STKR-EXEC-002
Derived requirements	
Dependency graph	STKR-EXEC-002 derives to STKR-COMP-001

Verification details

Implemented by	- Compliance Module
Validated by	- TEST-DEF-STKR-COMP-001

STKR-COMP-002

Requirement details

Status	Draft
Identifier	STKR-COMP-002
Description	System shall generate regulatory reports compliant with MiFID II transaction reporting and SEC audit trail requirements.
Success criteria	Reports generated daily by T+1 deadline with 100% accuracy and zero regulatory rejections.
Justification	Legal obligation for market participants to report trading activity to regulators within specified timeframes.
Parent requirements	STKR-EXEC-002
Derived requirements	
Dependency graph	STKR-EXEC-002 derives to STKR-COMP-002

Verification details

Implemented by	- Compliance Module
Validated by	- TEST-DEF-STKR-COMP-002

STKR-COMP-003

Requirement details

Status	Draft
Identifier	STKR-COMP-003
Description	System shall monitor trading activity for potential market abuse patterns including wash trades and layering.
Success criteria	Surveillance system flags 95% of known market abuse patterns with <1% false positive rate.
Justification	Prevent market manipulation and ensure compliance with market conduct regulations to avoid penalties.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Compliance Module
Validated by	- TEST-DEF-STKR-COMP-003

STKR-COMP-004

Requirement details

Status	Draft
Identifier	STKR-COMP-004
Description	System shall enforce best execution requirements by monitoring execution quality across venues.
Success criteria	Execution quality within top quartile of industry benchmarks with documented venue selection rationale.
Justification	Regulatory obligation to obtain best possible execution for client orders and demonstrate due diligence.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Execution Management System
Validated by	- TEST-DEF-STKR-COMP-004

Performance Requirements

SYS-PERF-001

Requirement details

Status	Draft
Identifier	SYS-PERF-001
Description	System shall process market data with end-to-end latency less than 1 millisecond from exchange feed to strategy.
Success criteria	99.9th percentile latency measured at <1ms during normal market conditions.
Justification	Low latency is critical for competitive advantage in high-frequency trading and market-making strategies.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Market Data Handler
Validated by	- TEST-DEF-SYS-PERF-001

SYS-PERF-002

Requirement details

Status	Draft
Identifier	SYS-PERF-002
Description	System shall submit orders with latency less than 1 millisecond from signal generation to exchange.
Success criteria	Mean order submission latency <500 microseconds with 99th percentile <1ms measured via hardware timestamps.
Justification	Minimize slippage and maximize probability of execution at desired prices in fast-moving markets.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Execution Management System - Order Management System
Validated by	- TEST-DEF-SYS-PERF-002

SYS-PERF-003

Requirement details

Status	Draft
Identifier	SYS-PERF-003
Description	System shall handle throughput exceeding 100,000 orders per second.
Success criteria	Sustained throughput of 100,000 orders/second with no message loss and latency degradation <10%.
Justification	Support high-frequency strategies and market-making across multiple instruments simultaneously.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	
Validated by	- TEST-DEF-SYS-PERF-003

SYS-PERF-004

Requirement details

Status	Draft
Identifier	SYS-PERF-004
Description	System shall maintain 99.99% uptime during market hours.
Success criteria	Maximum unplanned downtime of 5 minutes per month during trading hours.
Justification	Downtime results in missed trading opportunities and potential failure to meet market-making obligations.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Monitoring & Alerting
Validated by	- TEST-DEF-SYS-PERF-004

Functional Requirements

SYS-FUNC-001

Requirement details

Status	Draft
Identifier	SYS-FUNC-001
Description	System shall ingest real-time market data from multiple exchanges simultaneously.
Success criteria	Simultaneous connection to minimum 5 exchanges with no data gaps >100ms during market hours.
Justification	Access to multiple venues enables arbitrage opportunities and best execution across markets.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Market Data Handler
Validated by	- TEST-DEF-SYS-FUNC-001

SYS-FUNC-002

Requirement details

Status	Draft
Identifier	SYS-FUNC-002
Description	System shall normalize market data across different exchange formats into unified representation.
Success criteria	All supported exchanges mapped to common schema with 100% field accuracy validated against exchange specs.
Justification	Unified data format simplifies strategy development and enables cross-venue analysis and trading.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Market Data Handler
Validated by	- TEST-DEF-SYS-FUNC-002

SYS-FUNC-003

Requirement details

Status	Draft
Identifier	SYS-FUNC-003
Description	System shall track complete order lifecycle including submission, acknowledgment, fills, and cancellations.
Success criteria	Order state transitions tracked with 100% accuracy and reconciliation discrepancies <0.01% of total orders.
Justification	Accurate order state tracking is essential for position management, risk control, and regulatory compliance.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Order Management System
Validated by	- TEST-DEF-SYS-FUNC-003

SYS-FUNC-004

Requirement details

Status	Draft
Identifier	SYS-FUNC-004
Description	System shall calculate real-time P&L across all positions with mark-to-market pricing.
Success criteria	P&L calculations update within 100ms of price changes with accuracy $\pm 0.1\%$ vs end-of-day reconciliation.
Justification	Real-time P&L enables intraday risk management and supports loss limit monitoring requirements.
Parent requirements	
Derived requirements	
Dependency graph	

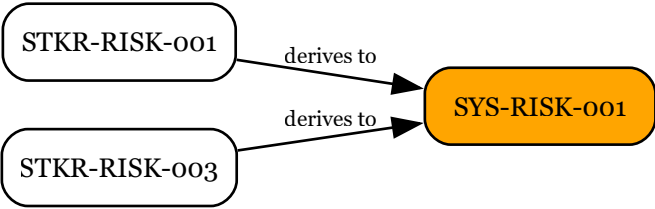
Verification details

Implemented by	- Monitoring & Alerting
Validated by	- TEST-DEF-SYS-FUNC-004

Risk Control Requirements

SYS-RISK-001

Requirement details

Status	Draft
Identifier	SYS-RISK-001
Description	System shall enforce maximum order size limits before order submission.
Success criteria	100% of orders exceeding configured size limits are rejected with detailed error message.
Justification	Prevent single large orders from causing excessive market impact or unintended exposure.
Parent requirements	STKR-RISK-001 STKR-RISK-003
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Risk Management System
Validated by	- TEST-DEF-SYS-RISK-001

SYS-RISK-002

Requirement details

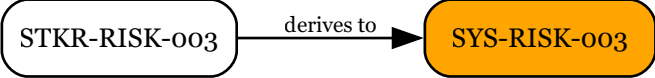
Status	Draft
Identifier	SYS-RISK-002
Description	System shall enforce maximum position limits per instrument before accepting new orders.
Success criteria	Position limits checked on every order with <10 microseconds latency and zero bypasses.
Justification	Technical implementation of position limit risk controls derived from stakeholder risk requirements.
Parent requirements	STKR-RISK-001 STKR-RISK-003
Derived requirements	
Dependency graph	<pre>graph LR; STKR-RISK-001 -- derives to --> SYS-RISK-002; STKR-RISK-003 -- derives to --> SYS-RISK-002;</pre> The dependency graph shows two parent requirements, STKR-RISK-001 and STKR-RISK-003, both of which derive to the system requirement SYS-RISK-002. The parent requirements are represented by white rounded rectangles, and the system requirement is represented by an orange rounded rectangle.

Verification details

Implemented by	- Risk Management System
Validated by	- TEST-DEF-SYS-RISK-002

SYS-RISK-003

Requirement details

Status	Draft
Identifier	SYS-RISK-003
Description	System shall reject orders with prices beyond configurable percentage from current market price.
Success criteria	
Justification	Prevents erroneous orders from impacting market.
Parent requirements	STKR-RISK-003
Derived requirements	
Dependency graph	 <pre>graph LR; STKR-RISK-003 -- derives to --> SYS-RISK-003</pre>

Verification details

Implemented by	- Risk Management System
Validated by	- TEST-DEF-SYS-RISK-003

SYS-RISK-004

Requirement details

Status	Draft
Identifier	SYS-RISK-004
Description	System shall detect and block duplicate order submissions within configurable time window.
Success criteria	Duplicate detection catches 100% of identical orders within 500ms window with no false positives.
Justification	Prevent accidental double-fills from software errors or network retransmissions that could double intended exposure.
Parent requirements	STKR-RISK-003
Derived requirements	
Dependency graph	STKR-RISK-003 derives to SYS-RISK-004

Verification details

Implemented by	- Risk Management System
Validated by	- TEST-DEF-SYS-RISK-004

SYS-RISK-005

Requirement details

Status	Draft
Identifier	SYS-RISK-005
Description	System shall halt all trading and cancel pending orders within 100 milliseconds when kill switch activated.
Success criteria	Complete trading halt within 100ms with confirmation of all order cancellations received from exchanges.
Justification	Technical implementation of emergency kill switch capability required by risk management stakeholders.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	- Risk Management System
Validated by	- TEST-DEF-SYS-RISK-005

SYS-RISK-006

Requirement details

Status	Draft
Identifier	SYS-RISK-006
Description	System shall alert risk managers when correlation between strategies exceeds configured thresholds.
Success criteria	Correlation alerts triggered within 30 seconds of threshold breach with affected strategy pairs identified.
Justification	Detect hidden concentration risk from strategies that appear independent but move together.
Parent requirements	
Derived requirements	
Dependency graph	

Verification details

Implemented by	
Validated by	

Compliance Requirements

SYS-COMP-001

Requirement details

Status	Draft
Identifier	SYS-COMP-001
Description	System shall log all order parameters including timestamps, prices, quantities for regulatory reporting.
Success criteria	All mandatory fields per MiFID II/SEC rules logged with zero data loss and tamper-evident storage.
Justification	Technical implementation of audit trail requirements for regulatory compliance and investigation support.
Parent requirements	
Derived requirements	
Dependency graph	SYS-COMP-001

Verification details

Implemented by	- Compliance Module
Validated by	- TEST-DEF-SYS-COMP-001

SYS-COMP-002

Requirement details

Status	Draft
Identifier	SYS-COMP-002
Description	System shall implement best execution monitoring by comparing execution prices against market benchmarks.
Success criteria	Execution quality metrics calculated for 100% of trades with benchmarks (VWAP, arrival price) within 1 minute.
Justification	Demonstrate compliance with best execution obligations through objective measurement and documentation.
Parent requirements	
Derived requirements	
Dependency graph	SYS-COMP-002

Verification details

Implemented by	- Execution Management System
Validated by	- TEST-DEF-SYS-COMP-002

SYS-COMP-003

Requirement details

Status	Draft
Identifier	SYS-COMP-003
Description	System shall prevent trading in securities on restricted lists maintained by compliance.
Success criteria	100% of orders in restricted securities blocked before submission with alerts to compliance team.
Justification	Enforce trading restrictions to prevent conflicts of interest, insider trading, and regulatory violations.
Parent requirements	
Derived requirements	
Dependency graph	SYS-COMP-003

Verification details

Implemented by	- Compliance Module
Validated by	- TEST-DEF-SYS-COMP-003

Traceability Matrix

The traceability matrix below shows which requirements are implemented by which system modules.

	marketDataHandler	strategyEngine	orderManagement	riskManagement	executionManagement	compliance	backtesting	monitoring	Algorithmic Trading Platform
STKR-EXEC-001									X
STKR-EXEC-002	X					X			X
STKR-EXEC-003									X
STKR-USER-001		X					X		X
STKR-USER-002		X							X
STKR-USER-003		X						X	X

	marketDataHandler	strategyEngine	orderManagement	riskManagement	executionManagement	compliance	backtesting	monitoring	Algorithmic Trading Platform
STKR-USER-004								X	X
STKR-RISK-001				X					X
STKR-RISK-002				X					X
STKR-RISK-003				X					X
STKR-RISK-004				X					X
STKR-RISK-005				X					X
STKR-COMP-001						X			X
STKR-COMP-002						X			X
STKR-COMP-003						X			X
STKR-COMP-004					X				X
SYS-PERF-001	X								X
SYS-PERF-002			X		X				X
SYS-PERF-003									
SYS-PERF-004								X	X
SYS-FUNC-001	X								X
SYS-FUNC-002	X								X
SYS-FUNC-003			X						X
SYS-FUNC-004								X	X
SYS-RISK-001				X					X
SYS-RISK-002				X					X
SYS-RISK-003				X					X
SYS-RISK-004				X					X
SYS-RISK-005				X					X
SYS-RISK-006									
SYS-COMP-001						X			X
SYS-COMP-002					X				X
SYS-COMP-003						X			X