

**TURQUOISE**

**Technical Specification  
EMAPI Certification Service Overview**

**Version 0.1b  
14 July 2008**

# TURQUOISE

## Contents

1. Overview.....	3
2. Testing Arrangements .....	3
3. Session Management .....	4
4. Information Certification .....	5
5. Trading Certification .....	6

## 1. Overview

This purpose of this document is to provide a summary of the activities required to undertake certification tests on the Turquoise Trading System. The Certification Tests are intended to cover a range of functional elements in order to demonstrate that a participant can successfully interact and perform as specified with the core Turquoise architecture. This mandatory testing is designed to ensure that a robust platform is in operation between participants and Turquoise to ensure a stable, productive and performant service.

A detailed breakdown of the messages and values are published in the EMAPI Certification Test Cycles specification.

Certification testing is categorised in three sections: Session Management, Information Certification and Trading Certification.

Session Management defines the initial interaction between a member firm's application and the Turquoise Trading System. The objectivity of this test is to establish that the connectivity and logon requirements have been implemented correctly.

On completion of the Session Management Test, testing can commence for Information Certification and Trading Certification.

The Information Certification and Trading Certification procedures consist of a set of test cycles designed to create a series of technical events oriented to assess the customer's ability to process specific trading and information messages defined by the EMAPI interface.

The Certification process allows for participants to be tested only for the functionality to be used in Live service. Therefore it is important to review the cycles thoroughly and agree the scope of the certification with Technical Account Management in advance of the date of the Certification Test.

## 2. Testing Arrangements

Prior to undertaking Certification, all participants are required to have completed a Connectivity Agreement and have confirmed connectivity to the Customer Test environment either via private network or VPN. Participants requiring exemptions from cycles of the test should have confirmed these with Technical Account Management at least one full working day prior to the day of the test. In certain circumstances additional test steps may be requested to due to the exemptions requested.

Certification Testing is arranged between a customer and Technical Account Management. Whilst participants should provide three working days notice for a test, short notice bookings may be available at the discretion of Technical Account Management.

Full Certification Testing is expected to take approximately 2 hours. The testing session may need to be extended where there is a requirement to re-run test cycles. Testing will be available between 8am and 6pm Monday to Friday.

## 3. Session Management

The Session Management Test assesses the ability to establish a connection, login, change security credentials and query permissions. The Session Management Test forms the initial phase of the Information and Trading Certification Tests. Connection to the system must be maintained throughout the full testing schedule. A failure to maintain a connection at any point during the Session Management or Information or Trading phases will constitute a failure of the Certification Test. Please note that if at any point an `EmapiHeartbeatReq` message is not received after three `heartbeatInterval` periods have elapsed, the Customer Test environment will logoff the user and disconnect the session. This will also constitute a failure of the Certification Test.

Section Number	Activity	Participant Input	Turquoise Output	Mandatory/Optional
1	A TCP/IP connection should be established to the Customer Test environment using the connect method of the EAPI			M
2	The application should send an <code>EmapiLoginReq</code> using the connection previously established connection.	<code>EmapiLoginReq</code> Username - The User ID allocated by Technical Account Management Member – The Trading Member the User belongs to Password – This will be provided prior to the start of the test	<code>EmapiLoginRsp</code>	M
3	Once a successful login has been established the <code>EmapiHeartbeatReq</code> messages should be sent at the intervals defined within the <code>EmapiLoginRsp</code> . These will be responded to with an <code>EmapiHeartbeatReq</code> message.	<code>EmapiHeartbeatReq</code>	<code>EmapiLoginRsp</code>	M
4	The user is required to change their password using the <code>EmapiChangePasswordReq</code> message.	<code>EmapiChangePasswordReq</code> memberId - The Trading Member the User belongs to userId - The User ID allocated by Technical Account Management oldPassword – This will be provided prior to the start of the test newPassword – This will be provided prior to the start of the test		M
5	The user can query their Subscription and Trading Access Profiles at this point.	<code>EmapiQryAccessInfoReq</code>	<code>EmapiQryAccessInfoRsp</code>	O
	<b>Information Certification</b>			
	<b>Trading Certification</b>			
6	The user must correctly logout of the system	<code>EmapiLogoutReq</code>		M

## 4. Information Certification

During the Information Certification Test the full range of messages that can be generated during a daily life cycle of the Turquoise Trading System are disseminated.

Section Number	Activity	Participant Input	Turquoise Output
1	The user requests a definition of the markets available on the system.	EmapiQryMarketReq	EmapiQryMarketRsp
2	The user requests a definition of the views available on the system.	EmapiQryViewReq	EmapiQryViewRsp
3	The user requests a definition of the views available on the system.	EmapiQryInstrumentsReq	EmapiQryInstrumentsRsp
4	Subscriptions should be made for the views or instruments required. This should include, but not necessarily be restricted to, the instruments used in the Certification Test.	EmapiAddViewSubscriptionReq or EmapiAddSubscriptionReq	EmapiAddViewSubscriptionReq or EmapiAddSubscriptionReq
5	The orderbooks enter an auction call.		EmapiOrderbookStateChangeEvent
6	Orders are entered into the orderbook.		EmapiPublicOrderbookEvent
7	Updates on the status of the auction are published. An auction will have an imbalance and there will be a zero value for the calculatedAuctionPrice.		EmapiAuctionEvent
8	Orders are entered into the orderbook which creates an indicative uncrossing price. The calculatedAuctionPrice will have a positive value.		EmapiAuctionEvent
9	The Auction uncrosses.		EmapiPublicTradeEvent
10	The orderbook enters continuous trading with orders carried over from the auction call.		EmapiPublicOrderbookEvent EmapiMblEvent
11	The user cancels their subscription to views/instruments provided to them.	EmapiRemoveSubscriptionReq	
12	The user re-subscribes to the previously cancelled subscriptions and requests a snapshot.	EmapiAddViewSubscriptionReq or EmapiAddSubscriptionReq	EmapiAddViewSubscriptionReq or EmapiAddSubscriptionReq EmapiCurrentValueStartEvent EmapiCurrentValueEndEvent
13	The orderbooks are closed.		EmapiOrderbookStateChangeEvent EmapiPublicOrderbookEvent EmapiMblEvent
14	A message is sent by Market Operations.		EmapiTextMessageEvent
15	An instrument is added.		EmapiInstrumentUpdateEvent
16	A tick size table is added.		EmapiTickSizeTableEvent
17	A replay of orderbook events is performed.	EmapiReplayReq	EmapiReplayRsp EmapiReplayStartEvent EmapiReplayEndEvent
18	A replay of trade events is performed.	EmapiReplayReq	EmapiReplayRsp EmapiReplayStartEvent EmapiReplayEndEvent

## 5. Trading Certification

Trading certification tests all of the order types available on Turquoise against price, time and size conditions, state changes and volatility checks. Where a customer does not support the functionality within a section these activities will be performed by Turquoise.

Section Number	Activity	Participant Input	Turquoise Output
	<b>CLOSED</b>		
1	The user enters a supported order.	EmapOrderInsertReq	EmapOrderInsertRsp
	<b>AUCTION PERIOD</b> - The orderbooks enter an auction call.		
2	An order is entered Pegged to the TBBO bid	EmapOrderInsertReq	EmapOrderInsertRsp
3	A Dark Limit order is entered with a valid Minimum Acceptable Quantity	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
4	A Limit order is entered with a valid Discretionary Price which includes a fractional tick	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
5	A Limit order is entered which is only valid for the auction	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
6	An Limit order is entered which is only valid for continuous trading	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
	<b>OPEN</b> - The Auction uncrosses.		EmapPrivateOrderbookEvent EmapPrivateTradeEvent
7	An order is entered Pegged to the TBBO bid without a TBBO being available.	EmapOrderInsertReq	EmapOrderInsertRsp
8	A Limit order is entered which is valid for the session	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
9	A Dark order is entered Pegged to the TBBO midpoint		EmapOrderInsertRsp EmapPrivateOrderbookEvent
10	The price for order 8 is modified		EmapPrivateOrderbookEvent
11	A Dark Limit order is entered	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent EmapPrivateTradeEvent
12	A Dark Limit order is entered by Turquoise	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent EmapPrivateTradeEvent
13	A Dark Limit order is entered with a valid Minimum Acceptable Quantity	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent EmapPrivateTradeEvent
14	A Limit order is entered with a valid Discretionary Price	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
15	A Dark Market order is entered with a valid Minimum Acceptable Quantity	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent EmapPrivateTradeEvent
16	A Dark Market order is entered with a valid Minimum Acceptable Quantity and set to Fill and Kill	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent EmapPrivateTradeEvent
17	An Iceberg Limit order is entered with a valid Discretionary Price	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
18	An Iceberg Limit order is entered with Valid From set to 2 minutes in the future	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
19	A Dark order is entered with Valid Till set to 1 minutes in the future	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
20	A Limit order is entered with Valid From set to 3 minutes in the future and Valid Till set to 4 minutes in the future	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
21	Orders expire & execute		EmapPrivateOrderbookEvent EmapPrivateTradeEvent

# TURQUOISE

22	Fill And Kill Limit order is entered	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent EmapPrivateTradeEvent
23	An Iceberg order is entered	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent EmapPrivateTradeEvent
24	Fill Or Kill Limit order is entered	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent EmapPrivateTradeEvent
25	Fill And Kill Market order is entered	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent EmapPrivateTradeEvent
26	Fill Or Kill Market order is entered	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent EmapPrivateTradeEvent
27	An order is entered Pegged to the TBBO bid	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
28	An order is entered Pegged to the TBBO offer	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
29	An order is entered Pegged to the TBBO bid with a 2 tick offset	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
30	An order is entered Pegged to the TBBO offer with offset	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
31	An order is entered Pegged to the EBBO bid	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
32	An order is entered Pegged to the EBBO offer	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
33	An Iceberg order is entered Pegged to the EBBO offer	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
34	A Dark order is entered Pegged to the TBBO midpoint	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
35	An Dark order is entered Pegged to the TBBO bid	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
36	An Dark order is entered Pegged to the TBBO offer	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
37	An Dark order is entered Pegged to the TBBO bid with offset	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
38	An Dark order is entered Pegged to the TBBO offer with offset	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
39	An Dark order is entered Pegged to the EBBO bid	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
40	An Dark order is entered Pegged to the EBBO offer	EmapOrderInsertReq	EmapOrderInsertRsp EmapPrivateOrderbookEvent
41	A Mass Update is entered to cancel all remaining orders	EmapOrderMassUpdateReq	EmapOrderMassUpdateRsp EmapPrivateOrderbookEvent