

Turquoise Equities

TQ601 - Guide to Application Certification

Issue 5.3

1 August 2018



London

Stock Exchange Group

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1.0 Introduction

1.1 Purpose

The purpose of this document is to provide customers with a detailed overview of the Certification service.

The London Stock Exchange Group restricts access to its Live Services to software applications that have not completed the software certification process. The Live Services are all Trading and Information Services on an eligible LSEG Venue. The eligible venues are currently London Stock Exchange, Borsa Italiana and Turquoise.

1.2 Readership

This document is particularly relevant to software developers, system testers and anyone else involved in developing a software application for use on any of the Live Services.

This document should be read in conjunction with London Stock Exchange Group Millennium Technical Specifications and the product specific 'Guide to Testing Services' documents. Together, these documents provide all of the relevant information that customers require to develop and certify to the services.

1.3 Document Series

This document is part of a series of Customer Testing documents that are available to customers. The other documents are:

- MIT501 Guide to Testing Services (London Stock Exchange and Turquoise)
- TQ602 Certification Test Report

1.4 Document History

This document has been through the following iterations:

Issue	Date	Description
1.0	20 July 2010	First issue of this document published.
1.1	9 August 2010	Second issue published with test MTF-000 (Initial Password Change) included
1.2	17 August 2010	MTF-000; removed requirement to change password for MITCH gateway
1.3	01 September 2010	Fourth issue of this document published.

Issue	Date	Description
1.4	21 September 2010	Inclusion of tam@tradeturquoise.com email address.
1.5	14 November 2011	Added trade cancel cycle.
1.6	13 April 2012	Separated MTF-037 (Order Cancel) and MTF-038 (Trade Cancel)
1.7	3 October 2012	Added CDS Test Environment Trading Hours
1.8	1 February 2013	Updated contact details and LCON policy
1.9	12 February 2013	Updated test cases and improved layout.
2.0	14 June 2013	Updated Annual Certification Policy
2.1	16 July 2013	Updated test case IDs
2.2	29 July 2013	Updated Certification Passport
3.0	20 October 2014	Added test cycles for Turquoise Block Discovery™ MIT-073, MIT-074, MIT-075.
3.1	24 October 2014	Changed reference of ITCH to MITCH
4.0	26 June 2015	Amended Annual Certification policy, Removed Application Passporting Removed non-Turquoise test cases
4.1	12 January 2016	Added test cycle for Continuous Trading / Order Management MIT-079 Added test cycle for Turquoise Block Discovery™ MIT-078
5.0	31 July 2017	Section 2.0 – updated wording Section 2.3 – updated to reflect changes to certification policy Reformatted document Added new test cycles for MiFID II MIT-106, MIT-107, MIT-108 Added test cycle for Turquoise Lit Auctions™ MIT-122
5.2	4 December 2017	Added test cycle for Turquoise Lit Auctions™ MIT-122
5.3	1 August 2018	Added test cycle for Turquoise Nylon™ MIT-123

Within this document, where amendments have been made to the previous version, these changes will be identified using a series of side bars as illustrated opposite.

1.5 Contacts

All customers who are developing software for use in the Live Service are allocated a Technical Account Manager (TAM). The TAM/Service Desk is available to provide support during the software development; testing and certification process. If you do not know who your TAM is and need assistance please contact the following team:

London Stock Exchange and Turquoise

Technical Account Management

Telephone: +44 (0)20 7797 3939

Email: londontam@lseg.com

All information requested by a tester during the certification process should be emailed to the following address:

marketaccess@lseg.com

2.0 Certification Programme

The Certification Programme is based on regulatory compliance supporting interoperability against the three eligible London Stock Exchange Group (LSEG) venues.

The following Certification Programme applies to anyone connecting a software application to an LSEG *Live Service*. A Live service is any production Trading or Information Services environment across LSEG.

Under EU and national regulatory requirements (including the ESMA Guidelines on Systems and Controls in a Highly Automated Trading Environment and MiFID II Regulatory Technical Standards) the eligible LSEG venues are required to have procedures and arrangements to ensure fair and orderly trading. This includes requirements for physical and electronic security to protect systems from misuse or unauthorised access and to ensure the integrity of the data that is part of or passes through the systems. The eligible venues are required to undertake standardised certification testing to ensure that members and participants systems used to access the venues have a minimum level of functionality that is compatible with fair and orderly trading on those venues.

Customer non-compliance with this certification programme may constitute a breach of the eligible venue terms and conditions or rules.

2.1 Access to the Live Service

Access to the LSEG Live Services is permitted only when a customer's software application has been certified as being fit for purpose.

2.2 Software Identification

All customer software must be identifiable by a software name and version number. Software applications that do not have both a name and version number will not be certified. Certification is limited to a single version of the named software.

2.3 Market Data Applications

All customers must confirm that their market data applications are fully conformant to all aspects of the GTP Technical Specifications and technically behaves as described in the GTP002 document. Customer also confirms that its application correctly receives and manages the market data messages

2.4 Certification Policy

Customers will be required to perform a certification test under the following conditions:

- Prior to use of a new application on the live environment
- The customer modifies the software in any way that directly impacts LSEG interfaces. This includes but is not limited to Gateways, Order Management, Execution Management and Quote Management software.
- The exchange venue upgrades its production environment to a later version of software
- The customer is requested to re-certify their application by the relevant venue.

If no certification has to be performed during a solar year because any of the previous conditions did not occur, the customer will be asked to self-certify by email that no changes have been made to their application since the last certification test.

2.5 Test Scenario Exception Policy

Customers only need to complete the test cases relating to the functionality that they will use on the Live Services. If a customer's application does not support the functionality described in a particular test scenario and they do not intend to complete the scenario during the test, this must be agreed before the start of the certification test.

2.6 Non-Conformant Behaviour on the Live Service

Any non-conformant behaviour by a customer's software application on the Live Services may lead to the software application being disconnected and not re-connected until it has been re-certified and the non-conformant behaviour corrected.

2.7 Test charges

The published venue specific Certification charges apply to all certification testing regardless of the test being assisted or not.

3.0 Certification Process

The Certification Process is an integral part of the Certification Programme

Mandatory testing will be required for all applications that wish to connect to the production environment and mandatory functions will need to be tested in order to confirm conformant behaviour.

Customers should consider their software application's 'production ready' before attempting the test. Customers should also read and familiarise themselves with this document and the Market and Product Specific Testing documents. These documents contain important guidance that must be read before completing the certification process. When ready to take the test, customers should complete the following steps:

- Customers should contact their TAM to provide the software name and version, a brief description of the application and the gateways that it will connect to.

3.1 Full Certification Test

Before Taking the Test

The Market Access team will be available to assist participants in completing part of their certification test by performing both mandatory and optional functions.

Gateway connections and User IDs should be checked at least 2 working days before planned execution date.

The report form must then be sent to: marketaccess@lseg.com.

This is a formal record of the software application that is being certified.

Customers should save a copy of the test report as they will be required to use it during the test to record their test results.

During the Test

Customers should complete the full set of uncoordinated test cycles described in Section 5 and inform the relevant venue of the LSEG when this has been completed. If required limited support can be provided during this phase.

Customers should record the test results on TQ602 Certification Test Report using the test procedure shown at the start of section 5. Customers are required to complete all test scenarios previously marked on the Certification Test Report. If a customer does not complete a pre-agreed test scenario, the test will fail.

When all of the uncoordinated test scenarios have been completed, the customer must then complete a set of coordinated test scenarios, assisted by a tester.

When documenting the test results, customers should include all information as requested in each of the steps, such as Order IDs, QuoteMsg IDs and Security IDs.

If the result does not match the expected result, the customer should still record it in the relevant section of the certification test report and in the comments section including the following:

- Order IDs/ QuoteMsg IDs (if any)
- Security ID
- Time of the order/quote/operation submission/execution
- Any information which may be helpful in troubleshooting the error

Unless a log off or disconnect request is specified in the test case the customer should complete all test cases without logging off or disconnecting. If there are any unexpected log offs or disconnects, these should be documented in the comments section of the certification test report.

Note: All test scenarios marked as mandatory must be completed unless an exception has been granted by the TAM.

When all of the uncoordinated test scenarios have been completed, the customer must then complete a set of coordinated test scenarios, assisted by a tester.

The customer can repeat this part as many times as necessary, however additional test sessions may have to be booked if the testing exceeds two hours.

When all test scenarios have been completed, the customer should email the completed Certification Test Report to the tester. The email sent to marketaccess@lseg.com.

After the Test

After the test the tester will check the details on the completed Certification Test Report and review the log files for the completed test scenarios. A report is generated detailing how the customer's application has performed during the test. If no re-testing is required, the report will be sent to the customer to sign off the application as fit for purpose and ready for access to the Live Services

The following items are checked:

- The functional behaviour and message sequencing in each scenario
- If the session was maintained for the entire period or if it dropped
- If any errors were produced over the time period

If multiple interfaces were included in the test, the results are concatenated into a single report.

The report will be run specifying a time ranged limited to a single day.

If the customer is required to repeat any of the testing they should do so within 24 hours of the original test.

By returning the signed copy of the Certification Test Report Certification Checklist, the customer is confirming that their application is fully conformant to all aspects of the Millennium Technical Specifications and technically behaves as described in the guidance given in both this document and the guide to testing.

4.0 Certification Test Scenarios

4.1 Market Data

4.1.1 MITCH Replay Request

Type:	ID #: MIT-002	Market: TQ	LSEG Assisted: N
MITCH Replay			
Description: Logon and send <u>Replay Request</u> to request the retransmission of a small range of messages already published on the multicast channel.			
Comments:			
The Replay Request must be sent within 5 seconds of establishing a connection.			
The retransmission request will be sent from the server's cache of the last 65,000 messages published on the multicast channel			
Prerequisites			
None.			
#	Test Steps	Expected Results	
1	Establish a connection and Logon to the Replay Service <i>(please choose any one channel to connect to and provide details in the comments section of the Certification report.)</i>	Successful Logon.	
2	Send a <u>Replay Request</u> message <i>Provide the "market data group", "First Message" and "count" field details in the Certification report.</i>	Receive a successful <u>Replay Response</u> to the request. Receive requested messages.	
3	Logout and Disconnect with in 5 seconds of the transmission of the last missed message.	Logout message sent by client and connection terminated. If this is not done within 5 seconds, the server will terminate the client session.	

4.1.2 MITCH Snapshot for Instrument

Type: MITCH Recovery		ID #: MIT-003	Market: TQ	LSEG Assisted: N
Description: Logon and request a Snapshot of the current order book for a particular instrument.				
Comments: If there is no activity for 5 seconds the server will send a Logout message and disconnect the client connection.				
Prerequisites None.				
#	Test Steps	Expected Results		
1	<p>Establish a connection and send a Login Request to the Recovery Service</p> <p><i>(please choose any one channel to connect to and provide details in the comments section of the Certification report.)</i></p>	Successful Login Response.		
2	<p>Send a <u>Snapshot Request</u> for the current order book for an instrument.</p> <p><i>Provide the "sequence number" and "instrument ID" field details in the Certification Report.</i></p>	<p>Receive:</p> <p>A <u>Snapshot Response</u> to indicate whether a Snapshot Request for an Instrument is accepted.</p> <p>A Snapshot of the current book for both the order and quote books (if any) for the requested instrument via a series of <u>Add Order</u> and <u>Add Attributed Order</u> messages (one book at a time).</p> <p>A <u>Snapshot Complete</u> message once the details for all active orders for the instrument's order book are disseminated (one message for the order book and one for the quote book (if applicable).)</p>		

4.1.3 MITCH Snapshot for Segment

Type: MITCH Recovery		ID #: MIT-004	Market: TQ	LSEG Assisted: N
Description: Request a snapshot of the current order book for all instruments in a specified segment.				
Comments: If there is no activity for 5 seconds or the client does not terminate the connection within 5 seconds of the transmission of the last application message, the server will send a <u>Logout</u> message.				
Prerequisites: Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	<p>Send a Snapshot Request for the current order book for a segment.</p> <p><i>Provide the "segment" and "instrument ID" field details in the Certification report.</i></p>	<p>Receive:</p> <p>A <u>Snapshot Response</u> to indicate whether a Snapshot Request for a segment is accepted.</p> <p>A Snapshot of the current book for both the order and quote books (if any) for all instruments in the requested segment via series of <u>Add Order</u> and <u>Add Attributed Order</u> messages. (one instrument at a time)</p> <p>A <u>Snapshot Complete</u> message:</p> <p>Once the details of all active orders for a particular instrument's order book are disseminated.</p> <p>A <u>Snapshot Complete</u> message once the details of all active orders for all instruments in the requested segment are disseminated.</p>		
2	Logout and Disconnect with in 5 seconds of the transmission of the last missed message.	<p>Logout message sent by client and connection terminated.</p> <p>If this is not done within 5 seconds, the server will terminate the client session.</p>		

4.1.4 GTP – Replay Request

Type: GTP Recovery		ID #: MIT-005	Market: TQ	LSEG Assisted: N
Description: Logon and send a <u>Replay Request</u>				
Comments:				
Prerequisites None.				
#	Test Steps	Expected Results		
1	Establish a connection and Logon to the Replay Service <i>(please choose any one channel to connect to and provide details in the comments section of the Certification report.)</i>	Successful Logon.		
2	Send an <u>Replay request</u> <i>Provide First Message, Count & Request ID in the Certification report.</i>	Receive a successful <u>Replay Response</u> . Receive requested messages. Receive <u>Replay & Recovery complete</u> message to indicate completion of retransmission. User will be disconnected after 5 seconds of inactivity		

4.1.5 GTP – Recovery Request

Type: GTP Recovery		ID #: MIT-006	Market: TQ	LSEG Assisted: N
Description: Logon and send a Recovery Request				
Comments:				
Prerequisites: None.				
#	Test Steps	Expected Results		
1	Establish a connection and Logon to the Recovery Service <i>(please choose any one channel to connect to and provide details in the comments section of the Certification report.)</i>	Successful Logon.		
2	Send an <u>Recovery request</u> <i>Provide Request level, instrument group/Segment(Group ID)/Multicast Channel, Recovery Type & request ID in the Certification report.</i>	Receive a successful <u>Recovery Response</u> . Receive requested messages. Receive <u>Replay & Recovery complete</u> message to indicate completion of request. User will be disconnected after 5 seconds of inactivity		

4.2 Continuous Trading and Order Management

4.2.1 Establish Logon for Test Cycle

Type: FIX/Native Gateways	ID #: MIT-100	Market: TQ	LSEG Assisted: N
Description: Establish a connection and Logon.E			
Comments:			
Prerequisites: None.			
#	Test Steps	Expected Results	
1	Establish a connection and Logon.	Successful Logon. This session must remain logged on for the duration of the certification test unless LSEG has instructed the customer to logout.	

4.2.2 Market Order

Type: FIX/Native Gateways		ID #: MIT-101	Market: TQ	LSEG Assisted: N
Description: Validate Market orders during Continuous Trading.				
Comments:				
Prerequisites: This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	<p>Enter a Market order (OrderType=1).</p> <p><i>(Assuming there are matching orders for this order on the order book. If there are no matching orders on the order book, please create these.)</i></p> <p><i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i></p>	<p>The order is executed.</p> <p>Receive Execution Report</p>		

4.2.3 Limit PassiveOnly Order

Type: FIX/Native Gateways		ID #: MIT-102	Market: TQ	LSEG Assisted: N
Description: Validate Limit "PassiveOnlyOrder" during Continuous Trading.				
Comments: This is an Order level parameter that allows clients to require that their order must rest prior to execution, with flexibility for visible orders to rest at a specified price level on the orderbook. NOTE: Setting PassiveOnlyOrder to values other than 0 or "null" may still result in the order aggressively matching against hidden orders resting on the order book.				
Prerequisites This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	Enter a Day Limit order with the "PassiveOnlyOrder" field populated with any of the defined values other than "0" or "Null". <i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i>	The order is accepted and goes on to the order book only if the field value conditions are met otherwise the order is rejected. Receive Execution Report with OrderStatus = 0 (New)		
2	Obtain the current sell price of a stock. <i>If there are no sell orders resting on the order book please enter a resting sell order</i>	Sell Price of test stock obtained		
3	Enter another order with the "PassiveOnlyOrder" field set to 1, and <u>set the bid price above the sell price</u> obtained in step 2 <i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i>	Receive Execution Report with OrderStatus = 6 (Expired) with error code "Order would execute with visible order on Aggression"		

4.2.4 Aggressive Limit Order

Type: FIX/Native Gateways		ID #: MIT-103	Market: TQ	LSEG Assisted: N
Description: Validate Aggressive Limit orders during Continuous Trading.				
Comments:				
Prerequisites This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	<p>Enter an Aggressive Limit order (TIF 3 or 4)</p> <p><i>(Assuming there are matching orders for this order in the order book. If there are no matching orders in the order book, please create them.)</i></p> <p><i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i></p>	<p>The order is immediately executed without resting.</p> <p>Receive Execution Report</p>		

4.2.5 Limit Passive Order

Type: FIX/Native Gateways		ID #: MIT-104	Market: TQ	LSEG Assisted: N
Description: Validate Passive Limit orders during Continuous Trading.				
Comments: Note: This test verifies entering a passive order <u>without</u> using the "PassiveOnlyOrder" field.				
Prerequisites This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	<p>Enter a day Passive Limit order.</p> <p>The PassiveOnlyOrder" field must be set to "0" or "Null"</p> <p><i>(Assuming there are matching orders for this order in the order book. If there are no matching orders in the order book, please create them.)</i></p> <p><i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i></p>	<p>The order goes on to the order book and rests</p> <p>Receive Execution Report</p>		

4.2.6 Dark Pegged Order

Type: FIX/Native Gateways		ID #: MIT-105	Market: TQ	LSEG Assisted: N
Description:				
Validate Dark Mid Price Pegged orders during Periodic Uncrossing (Dark Midpoint orderbook specified via RoutingInst/TargetBook)				
Validate Dark Mid Price Pegged orders during Continuous Trading (Dark Midpoint orderbook specified via RoutingInst/TargetBook)				
Comments:				
Prerequisites				
This test needs to be executed during Continuous Trading session.				
Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	Enter a Pegged order. <i>Please provide Order ID(s) and Client Order ID in the certification exception report.</i>	The order is successfully submitted and gets a valid order status. It is either parked or executed as a dark midpoint order pegged to the PBBO marketplace. Receive execution report		

4.2.7 Order Generated by Algorithm

Type: FIX/Native Gateways		ID #: MIT-106	Market: TQ	LSEG Assisted: N
Description: Validate Order generated by an Algorithm				
Comments:				
Prerequisites This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case.				
#	Test Steps	Expected Results		
1	<p>Enter an order with Tag 2594 OrderAttributeType = 4 (FIX) or Algo field set in Bit Field FXMiFIDFlags (Native) which indicates an order was generated via an algorithm.</p> <p><i>Please provide Order ID(s), Public OrderId and Client Order ID in the Certification report.</i></p>	<p>The order is successfully submitted and gets a valid order status.</p> <p>Receive Execution Report.</p>		

4.2.8 Order Generated as part of Liquidity Provision Activity

Type: FIX/Native Gateways		ID #: MIT-107	Market: TQ	LSEG Assisted: N
Description: Validate Order generated as part of Liquidity Provision				
Comments:				
Prerequisites This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case.				
#	Test Steps	Expected Results		
1	<p>Enter an order with Tag 2594 OrderAttributeType = 2 (FIX) or Liquidity Provision field set in Bit Field FXMiFIDFlags (Native) which indicates an order was generated as part of liquidity provision activity.</p> <p><i>Please provide Order ID(s), Public OrderId and Client Order ID in the Certification report.</i></p>	<p>The order is successfully submitted and gets a valid order status.</p> <p>Receive Execution Report.</p>		

4.2.9 Order Generated via Direct Electronic Access (DEA)

Type: FIX/Native Gateways		ID #: MIT-108	Market: TQ	LSEG Assisted: N
Description: Validate DEA Order				
Comments:				
Prerequisites This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case.				
#	Test Steps	Expected Results		
1	<p>Enter an order with Tag 1724 Order Origination = 2 (FIX) or which indicates an order was a DEA order and DEA Flag field set in Bit Field FXMiFIDFlags (Native)</p> <p><i>Please provide Order ID(s), Public OrderId and Client Order ID in the Certification report.</i></p>	<p>The order is successfully submitted and gets a valid order status.</p> <p>Receive Execution Report.</p>		

4.2.10 Iceberg Orders

Type: FIX/Native Gateways		ID #: MIT-109	Market: TQ	LSEG Assisted: N
Description: Validate Iceberg Orders.				
Comments:				
Prerequisites This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case.				
#	Test Steps	Expected Results		
1	Enter an Iceberg order. <i>Please provide Order ID(s), Public OrderId and Client Order ID in the Certification report.</i>	The order is successfully submitted and gets a valid order status. The order reside on the book (only for peak size) Receive Execution Report.		
2	Enter an order to trade the peak size (visible quantity). Please provide the <i>new</i> Public OrderID received in the Execution Report	The peak size are traded and refreshed in size back to the display quantity. Receive Execution Reports.		
3	Enter an order to trade the Visible and Hidden size Please provide the <i>new</i> Public OrderID received in the Execution Reports	Receive two Execution Reports.		

4.2.11 Randomized Iceberg Orders

Type: FIX/Native Gateways		ID #: MIT-110	Market: TQ	LSEG Assisted: N
Description: Validate Randomized Iceberg orders during Continuous Trading.				
Comments:				
Prerequisites This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	<p>Enter a Randomized Iceberg order.</p> <p><i>(Assuming there are matching orders for this order in the order book. If there are no matching orders in the order book, please create them.)</i></p> <p><i>Please provide Order ID(s) and Client Order ID in the Certification report.</i></p>	<p>The order is successfully submitted and gets a valid order status. This order may execute or reside on the order book, fully or partially.</p> <p>Receive Execution Report with partial fill or fully filled.</p>		

4.2.12 Order Modification

Type: FIX/Native Gateways		ID #: MIT-111	Market: TQ	LSEG Assisted: N
Description: Validate order Modification during Continuous Trading.				
Comments:				
Prerequisites This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	Enter a passive order that rests on the order book. <i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i>	The order is successfully submitted and resides on the order book. Receive Execution Report with ExecType = 0 (New)		
2	Amend order. <i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i>	The order is successfully modified. Receive Execution Report with ExecType = 5 (Replaced)		

4.2.13 Order Cancel

Type: FIX/Native Gateways		ID #: MIT-112	Market: TQ	LSEG Assisted: N
Description: Validate order deletion during Continuous Trading				
Comments:				
Prerequisites This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	Enter a passive order that rests on the order book. Please provide Order ID(s) and Client Order ID in the Certification Report.	The order is successfully submitted and resides on the order book. Receive Execution Report with ExecType = 0 (New)		
2	Cancel the order. Please provide Order ID(s) and Client Order ID in the Certification Report.	The order is successfully cancelled. Receive Execution Report with ExecType = 4 (Cancelled)		

4.2.14 Entry of Dark Lit Sweep Order Type

Type: FIX/Native Gateways	ID #: MIT-113	Market: TQ	LSEG Assisted: N
Description: Validate Dark Lit Sweep orders during Continuous Trading.			
Comments:			
Prerequisites This test needs to be executed during Continuous Trading session. Already logged on from previous Test Case			
#	Test Steps	Expected Results	
1	<p>FIX Gateway Enter an order with TIF Immediate Or Cancel (IOC) (TIF 3) and Routing Instruction (FIX Tag 9303) set to Dark Lit Sweep (S)</p> <p>Native Gateway Enter an order with TIF Immediate Or Cancel (IOC) (TIF 3) and Target Book set to Dark Lit Sweep (3)</p> <p><i>(Assuming there are matching orders for this order in the order book. If there are no matching orders in the order book, please create them.)</i></p> <p><i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i></p>	<p>The order is partially filled in the Turquoise Dark Midpoint Order Book, then partially/fully filled in the Integrated Order Book</p> <p>Receive Dark Midpoint Order Book Execution Report (Routing Instruction M)</p> <p>Receive Integrated Order Book Execution Report (Routing Instruction I)</p>	

4.2.15 Block Discovery – Enter BI and QBO

Type: FIX/Native Gateway		ID #: MIT-114	Market: TQ	LSEG Assisted: Y
Description: Enter Successful orders in to the Turquoise Block Discovery service.				
Comments:				
Prerequisites: This test needs to be entered ahead of the Turquoise Uncross™ Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	Participant submits a Block Indication (BI)	The BI is successfully accepted Turquoise Uncross™ occurs Receive Order Submission Request Receive order expire for BI		
2	Submit a firm Qualifying Block Order (QBO) in response to OSR (must be within 450ms of receiving the OSR)	Receive Trade		

4.2.16 Block Discovery – Enter Order with BDN

Type: FIX/Native Gateway	ID #: MIT-115	Market: TQ	LSEG Assisted: Y
Description: Enter Successful BDN orders in to the Turquoise Block Discovery service.			
Comments:			
Prerequisites: This test needs to be entered ahead of the Turquoise Uncross™ Already logged on from previous Test Case			
#	Test Steps	Expected Results	
1	Participant submits an Order with OrderSubType set to BDN	The order is successfully accepted	

4.2.17 Block Discovery – Breach of Reputational Score

Type: FIX/Native Gateway		ID #: MIT-116	Market: TQ	LSEG Assisted: N
Description: Perform actions to breach the reputational scoring threshold.				
Comments:				
Prerequisites: This test needs to be entered ahead of the Turquoise Uncross™ Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	Participant submits a Block Indication (BI)	The BI is successfully accepted Turquoise Uncross™ occurs Receive Order Submission Request Receive order expire for BI		
2	Submit a firm Qualifying Block Order (QBO) either: <ul style="list-style-type: none"> • At a less marketable price than original BI • At a lower quantity than original BI • Outside the time limit 	Receive Trade or Order Expire		
3	Participant submits a BI	BI is rejected.		

4.2.18 Block Discovery – Cancellation of Qualifying Block Orders (QBOs)

Type: FIX/Native Gateways	ID #: MIT-117	Market: TQ	LSEG Assisted: Y
Description: Validate Qualifying Block Order (QBO) deletion in the Turquoise Block Discovery™ Service.			
Comments:			
Prerequisites This test needs to be entered ahead of the Turquoise Uncross™ Already logged on from previous Test Case			
#	Test Steps	Expected Results	
1	Participant submits a Block Indication (BI)	The BI is successfully accepted Receive Order Submission Request	
2	Submit a firm Qualifying Block Order (QBO) in response to OSR (must be within 450ms of receiving the OSR)	Qualifying Block Order (QBO) is successfully accepted	
3	Cancel the Qualifying Block Order (QBO) before Turquoise Uncross™	Cancellation request accepted Receive Execution Report with ExecType = 4 (Cancelled) Event score of particular event made zero	

4.2.19 Cancel on Disconnect

Type: FIX/Native Gateways		ID #: MIT-118	Market: TQ	LSEG Assisted: N
Description: Validate Cancel-on-Disconnect and Logout				
Comments: If a different User ID/Comp ID has been specifically enabled for "Cancel on disconnect/Logout" for this test case please repeat test case MIT-007 first to Logon. Customers are highly encouraged to utilise the Cancel on Disconnect functionality				
Prerequisites Already logged on from previous Test Case				
#	Test Steps	Expected Results		
1	Enter 3 passive regular orders that rest on the orderbook. <i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i>	The orders are successfully submitted and have a Live order status.		
2	Terminate the client-server session by either TCP disconnect for Cancel on disconnect or Logout for cancel on logout.	Client-server session is terminated. (TCP connection dropped or Logout.)		
3	Establish a connection and Logon.	Successful Logon.		
4	Verify the status of orders submitted in step 1 above.	FIX Execution reports received for all cancelled orders automatically. Native: Session active with heartbeating		
5	For native trading, the customer must recover the missed messages via the recovery channel manually.	Execution reports received for all cancelled orders from the recovery channel.		

4.2.20 Cancel Client's Order

Type: On behalf of – Fix/Native Gateways		ID #: MIT-119	Market: TQ	LSEG Assisted: Y
Description: Exchange cancels an order on behalf of a customer.				
Comments:				
Prerequisites: Contact LSEG for executing this test in co-ordination with customer. Already logged on from previous Trading test case.				
#	Test Steps	Expected Results		
1	Customer to Enter a passive order that rests on the order book <i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i>	The order is successfully submitted and resides on the order book. Receive Execution Report		
2	Request LSEG to cancel the order, stating the OrderID LSEG cancel the orders as requested.	The order is successfully cancelled. Receive Execution reports with exec type (4).		
3	Customer to confirm receipt of unsolicited messages			

4.2.21 Cancel Client's Trade

Type: On behalf of – Fix/Native Gateways	ID #: MIT-120	Market: TQ	LSEG Assisted: Y
Description: Exchange cancels a trade.			
Comments:			
Prerequisites: Contact LSEG for executing this test in co-ordination with customer. Already logged on from previous Trading test case.			
#	Test Steps	Expected Results	
1	Customer to Enter an aggressive order that trades as <u>fully</u> filled. (OrderStatus = 2) <i>Please provide TradeMatchID, Order ID and Client Order ID in the Certification Report.</i>	The order is successfully submitted and resides on the order book. Receive Execution Report for fully filled	
2	Request LSEG to cancel the trade, providing the TradeMatchID that will be used for this test. LSEG cancel the trade	The trade is cancelled. Customer receives Execution Report for trade cancellation. Customer receives 2 nd Execution Report for the Order which is also cancelled.	
3	Customer to Enter an aggressive order that trades as partially filled. (OrderStatus = 1) <i>Please provide TradeMatchID, Order ID and Client Order ID in the Certification Report.</i>	The order is successfully submitted and resides on the order book. Receive Execution Report for partial fill	
4	Request LSEG to cancel the trade, providing the TradeMatchID that will be used for this test. LSEG cancel the trade	The trade is cancelled. Customer receives Execution Report for trade cancellation. Customer receives 2 nd Execution Report for the Order with the new quantity restated as follows: OrigQty – PartialTradedQty	

4.2.22 Requesting Missed Messages – Native Only

Type:		ID #: MIT-121	Market: TQ	LSEG Assisted: N
Native Recovery Gateway				
Description:				
This test case validates that native recovery works by sending a Missed Message Request for all AppIDs (LoadIDs)				
Comments:				
The same CompID and password must be used for both Native Trading and Native Recovery services.				
Prerequisites:				
Already logged on to the Native Trading Gateway from previous trading test case.				
Cancel-on-Disconnect needs to be enabled on the CompID used for testing. (Or send a request to LSEG to cancel your open orders on your behalf while the CompID is disconnected from the Exchange.)				
#	Test Steps	Expected Results		
1	Enter 4 passive orders that rest on the orderbook, one on each LoadID. <i>(Please contact the LSEG Market Access team to obtain the list of MTF Symbols with the four different LoadIDs).</i>	4 orders are now resting on the orderbook, one on each LoadID (also known as AppID and PartitionID).		
2	If cancel-on-disconnect is enabled: drop the connection Otherwise: Logout the CompID. Contact LSEG and request them to cancel the open orders on your behalf	While the CompID is disconnected, the open orders are cancelled		

3	<p>Wait 30 seconds, and then establish a connection to the Native Gateway real-time channel</p> <p><i>(This needs to happen before connecting to the recovery channel)</i></p>	<p>Successful logon to the Native Gateway real-time channel.</p>
4	<p>Establish a connection and Logon to the Native Recovery Channel</p>	<p>Successful logon to the Native Gateway recovery channel</p>
5	<p>Send a Missed Message Request for LoadID 1 (also known as AppID 1) specifying the LastMsgSeqNum that is known for that LoadID.</p>	<p>Missed Message Request Is Sent</p> <p>Missed Message Request Ack received with ResponseType=0 (Successful)</p> <p>Execution Report(s) received for each cancelled order</p> <p>Missed Message Report received with ResponseType=0 (Download Complete)</p>
6	<p>Repeat Step 5 for all other LoadIDs</p>	<p>Step 5 is repeated for LoadID 2 and LoadID 3.</p>
7	<p>Logout from the Native Recovery service within 3 heartbeat intervals</p> <p><i>(The server with disconnect customer connection if there is no activity for 3 heartbeat intervals)</i></p>	<p>Logout successful and Recovery session terminated</p> <p>Connection to the Realtime Channel should remain active and heartbeating.</p>

4.2.23 Enter order for Turquoise Lit Auctions

Type: Post Trading Gateway		ID #: MIT-122	Market: TQ	LSEG Assisted: N
Description: Enter an order for participation in the LIT Book Periodic Auction symbols with suffix _A				
Comments:				
Prerequisites None.				
#	Test Steps	Expected Results		
1	<p>Customer to enter order for participation in Turquoise Lit Auction (FIX tag 9303=A or NATIVE Target Book=4)</p> <p><i>Assuming there is a matching order for this order in the order book. If there are no matching order then please create them.)</i></p> <p><i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i></p>	<p>The order is successfully submitted and gets a valid order status and is subsequently filled at next periodic Lit auction</p> <p>Receive satisfactory Execution Report</p> <p>TradeLiquidityInd = C</p> <p>(Turquoise Lit Auctions™)</p>		

4.2.24 Enter order for Turquoise Nylon

Type: Post Trading Gateway	ID #: MIT-123	Market: TQ	LSEG Assisted: N
Description: Enter an order for participation in the Turquoise NYLON order book with suffix _B			
Comments:			
Prerequisites None.			
#	Test Steps	Expected Results	
1	<p>Customer to enter order for participation in Turquoise NYLON Auction (FIX tag 9303=B or NATIVE Target Book=5)</p> <p><i>Assuming there is a matching order for this order in the order book. If there are no matching order then please create them.)</i></p> <p><i>Please provide Order ID(s) and Client Order ID in the Certification Report.</i></p>	<p>The order is successfully submitted and gets a valid order status and is subsequently filled at next Turquoise NYLON Uncrossing.</p> <p>Receive satisfactory Execution Report</p> <p>TradeLiquidityInd = C</p> <p>(Turquoise Nylon™)</p>	

4.3 Post Trade Gateway Validation

4.3.1 Establish Logon for Test Cycle

Type: Post Trading Gateway	ID #: MIT-200	Market: TQ	LSEG Assisted: N
Description: Establish a connection and Logon.			
Comments:			
Prerequisites None.			
#	Test Steps	Expected Results	
1	Establish a connection and Logon to the Post Trade Gateway.	Successful Logon.	

4.3.2 Own Trade Book Download

Type: Post Trading Gateway		ID #: MIT-201	Market: TQ	LSEG Assisted: N
Description: Validate Own Trades Book Download.				
Comments:				
Prerequisites Already logged on from previous Test Case.				
#	Test Steps	Expected Results		
1	Send a Trade Capture Report Request. <i>Please provide TradeRequestID in the Certification Report.</i>	Receive a Trade Capture Report Request Ack Receive Trade Capture Report(s) as requested		

4.4 Drop Copy Validation

4.4.1 Establish Logon for Test Cycle

Type: Drop Copy Gateway	ID #: MIT-300	Market: TQ	LSEG Assisted: N
Description: Establish a connection and Logon.			
Comments:			
Prerequisites None.			
#	Test Steps	Expected Results	
1	Establish a connection and Logon to the Drop Copy Gateway.	Successful Logon.	

4.4.2 Own Order Book Download

Type:		ID #: MIT-301	Market: TQ	LSEG Assisted: N
Drop Copy Gateway				
Description:				
Validate Own Order Book Download				
Comments:				
Prerequisites:				
Already logged on from previous Test Case.				
#	Test Steps	Expected Results		
1	Send a Mass Order Status Request. <i>Please provide MassStatus ReqID and the Trader Group in the Certification Report</i>	Receive Execution Report for each active order for the specified Trader Group.		

4.5 Error Handling – All Gateways

4.5.1 Error Handling

Type:		ID #: MIT-400	Market: TQ	LSEG Assisted: Y
Error Handling – All Gateways				
Description:				
Verifying Logon after Suspension / Un-suspension of UserID.				
Comments: Mandatory Test				
<p>This test case needs to be repeated for every interface/service the customer subscribes to, i.e. a customer needs to repeat the steps below for each Gateway. This test needs to be completed (where applicable) for the services listed below:</p> <ul style="list-style-type: none"> • FIX Gateway • Native Gateway • Drop Copy Gateway • Post Trade Gateway • MITCH Replay Service (any one channel) • MITCH Recovery Service (any one channel) • Group Ticker Plant Replay Service (any one channel) • Group Ticker Plant Recovery Service (any one channel) <p>When executing this test case for Market Data Services, please choose any one channel to connect to and provide details in the comments section of the Certification Report.</p>				
Prerequisites:				
CompID / UserID is logged off				
#	Test Steps	Expected Results		
1	Request LSEG to suspend the CompID.	CompID is suspended.		
2	<p>Establish a connection and Logon to the applicable Gateway(s).</p> <p>Customer to verify the reject message.</p>	<p>Logon is rejected.</p> <p>Customer application should automatically stop trying to logon and display the reason the logon was unsuccessful.</p>		



4	Verify application behaviour conforms to the connectivity policy as outlined in the Technical Specification	Customer application attempts to connect a maximum of 3 times to the primary gateway with a minimum timeout value of 3 seconds between attempts before attempting to connect to the secondary gateway – and this should be retried a maximum of a further 3 times.
5	Request LSEG to un-suspend CompID	CompID un-suspended
6	Establish a connection and Logon Gateway	Successful Logon

4.6 Test for New Software Applications Only

4.6.1 Password Change

Type: FIX/Native Gateways	ID #: MIT-500	Market: TQ	LSEG Assisted: N
Description: Log on to the FIX / Native gateway(s) and change the logon password from the system default.			
Comments: This test must be performed using each of the protocols intended to be used by the customer (Native and/or FIX).			
Prerequisites: None.			
#	Test Steps	Expected Results	
1	Establish a connection and Logon to the relevant gateway(s). In your logon message, specify a new password of at least eight characters in length including one integer. <i>(please provide details of ComplID(s) and gateway(s) tested in the comments section of the Certification report.)</i>	Successful Logon, with current default password and a valid new password specified.	
2	Logout and Disconnect.	Logout message sent by client and connection terminated.	
3	Logon using the new password.	Successful Logon, using the new password specified in step 1.	

4.6.2 Heartbeat Exchange

Type: FIX Session Testing		ID #: MIT-501	Market: TQ	LSEG Assisted: Y
Description: The client and the server are exchanging Heartbeat messages during the period of client's inactivity.				
Comments: Mandatory Test				
Prerequisites: Customer application can suspend sending all messages except heartbeats. (Heartbeats are only sent during periods of inactivity).				
#	Test Steps	Expected Results		
1	<i>Document the time of test execution start in the Certification report.</i>			
2	Establish a connection and Logon to the Gateway.	Successful Logon.		
3	Stay inactive, i.e. make sure that there are no client initiated messages sent to the server. Make sure there are no unexpected disconnects within reasonable (a few minutes) timeframe.	There are no client initiated messages sent to the Gateway. Gateway is sending Heartbeat messages to the client. Client is sending Heartbeat messages to the Gateway.		
4	<i>Document the time of test execution end in the Certification Report and document whether or not disconnects happen during test execution.</i>			

4.6.3 Sequence Reset

Type: FIX Session Testing		ID #: MIT-502	Market: TQ	LSEG Assisted: Y
Description: FIX message Sequence Reset.				
Comments: Mandatory Test				
Prerequisites: None				
#	Test Steps	Expected Results		
1	<i>Document the time of test execution start in the Certification report.</i>			
2	Establish a connection and Logon to the Gateway.	Successful Logon.		
3	<p>Make sure that the client and Server are exchanging Heartbeat messages.</p> <p>Send a Sequence Reset message MsgType=4.</p> <p>Make sure that the value of the NewSeqNo tag is greater than the sequence number of the latest incoming Heartbeat message.</p>	<p>Gateway is sending Heartbeat messages to the client.</p> <p>Client is responding to Heartbeat messages sent by the server.</p> <p>Gateway resets messages sequence number to the value specified in NewSeqNo tag sent by the client.</p>		
4	<i>Document the time of test execution end in the Certification Report.</i>			

4.6.4 Sequence Reset at Logon

Type: FIX Session Testing		ID #: MIT-503	Market: TQ	LSEG Assisted: Y
Description: FIX messages Reset initiated by the client at Logon.				
Comments: Mandatory Test				
Prerequisites: None				
#	Test Steps	Expected Results		
1	<i>Document the time of test execution start in the Certification Report.</i>			
2	Establish a connection and Logon to the Gateway.	Successful Logon.		
3	Make sure that the client and Server are exchanging Heartbeat messages and inbound and outbound MsgSeqNum is > 10.	Server is sending Heartbeat messages to the client. Client is sending Heartbeat messages to the server.		
4	Disconnect from the server.	FIX session is terminated.		
5	Client to set the next expected inbound and outbound MsgSeqNumbers to 1. Send a Logon message with ResetSeqNumFlag tag set to "Y".	Server is responding with a Logon message with the ResetSeqNumFlag tag set to "Y". Messages sequence is reset to "1". Server and Client sending heartbeat messages		
6	<i>Document the time of test execution end in the Certification Report.</i>			

4.6.5 Resend Request

Type: FIX Session Testing		ID #: MIT-504	Market: TQ	LSEG Assisted: Y
Description: Client Resend Request.				
Comments: Mandatory Test				
Prerequisites: Customer application needs to support manually setting the next expected inbound MsgSeqNum (tag34).				
#	Test Steps	Expected Results		
1	<i>Document the time of test execution start in the Certification Report.</i>			
2	Establish a connection and Logon to the Gateway.	Successful Logon.		
3	Submit an order that results in a fully filled trade Note down the Message Sequence number received for this execution report.	The trade execution report received.		
4	Submit a Logout request	Logout acknowledged by gateway		
5	Customer to manually set their next expected inbound MsgSeqNum to the value obtained in step 3	Customer application's next expected inbound MsgSeqNum reconfigured.		
6	Reconnect and log on.	Logon successful.		
7	Customer application should detect a sequence number gap and send a Resend Request (MsgType=2) with tags BeginSeqNo and EndSeqNo set to the value obtained in step 3	Gateway will resend the Execution Report back to the client, with PossDup(43)=Y. Gateway will send a SeqReset with the next expected sequence number in tag 36. Session should remain active with heartbeats being exchanged.		
8	<i>Document the time of test execution end in the Certification Report.</i>			

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