

Application for

HKATS OAPI

Certification Test

(HKATS Upgrade 1.0.2)

# HKATS Upgrade Certification Test Environment – IP address: 10.161.5.119

# HKATS Upgrade Testing Environment – IP address: 10.161.5.117

**Derivatives Trading**

**Hong Kong Exchanges and Clearing Limited**

# Aug 2019

# Flowchart for OAPI Certification Test

Send an email to HKEX – Derivatives Trading (hkats[support@hkex.com.hk](mailto:clicksupport@hkex.com.hk)) (DT) to request for OAPI documentation and connection details for HKATS testing environment

*1. Request for OAPI*

*Information*

Make use of HKATS testing environment for program development, system test and user acceptance test.

*2. Program Development*

*and user acceptance test*

When ready, request for HKATS OAPI certification test by submitting the following two forms:

(a) Request for OAPI Certification Test **(Form OC)**;

(b) Application Form for HKATS OAPI Certification Test **(Appendix A)**

Perform certification test with the Exchange (test script provided in Appendix B)

*3. Arrange Certification test*

*with HKEX*

Perform certification test with HKEX (certification test script in Appendix B) and upon successful completion of the HKATS OAPI certification test, return Result of HKATS OAPI certification test (Appendix C) with authorized signatory to DT

Receive certification letter from DM

*4. Certified by HKEX*

*5. Connect the certified*

Connect the certified OAPI program to HKATS production environment

\*Certified OAPI Program for market making requires an additional two and a half hour market maker trial run test in the HKATS testing environment before the switching\*

*OAPI program to production*

When ready, submit forms to DT to request for OAPI certification test as any program change in the certified OAPI program should be subject to re-certification

*6. Program change of the*

*certified OAPI program*

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##### Appendix A

|  |  |  |
| --- | --- | --- |
| Application Form *for HKATS OAPI Certification Test*(HKATS Upgrade 1.0.1) | | |
|  | | |  | | |
| **Exchange Participant:**  **The OAPI program is developed from the following Exchange-provided library: (Please put a “**X**” in the appropriate box)**  **Windows (32-bit)**  **Red Hat Enterprise Linux 6 (32-bit)\***  **Red Hat Enterprise Linux 7 (32-bit)**  **Windows (64-bit)**  **Red Hat Enterprise Linux 6 (64-bit)\***  **Red Hat Enterprise Linux 7 (64-bit)**  **\* Please note that the maintenance support for Red Hat 6 will be ended on 30 November 2020.**  **Version number of Operating System used by the OAPI program:**  **Our OAPI program will perform the following function(s): (Please put a “**X**” in the appropriate box)**  **Market Making function (Existing Market Making Program? :  Yes  No)**  (must support item 1, 2 and 3 in the following functionality list)  **Trading function (Existing Trading Program? :  Yes  No)**  (must support item 1, 2 and 4 in the following functionality list) The OAPI program’s market data source is from: Orion Market Data Platform – Derivatives Market (OMD-D)  Not Applicable Information Service Vendor:  **Number of OAPI Connection(s) required to run the OAPI Program :** **for market making and     for trading**  Indicate the supported functions of your OAPI program in the following function list by putting a “X” in the appropriate box under the first column together with answer for the corresponding questions under the “Test successful/information” column, if applicable.  Please note that most EPs and OAPI Vendors who failed HKATS OAPI certification test mainly because they were unfamiliar with the certification test requirement and their OAPI programs. To ensure that the certification test will be run smoothly, the column “Test successful/information” of Appendix A should be filled in by the tester who participates in the HKATS OAPI certification test. The tester should also read the HKATS OAPI Certification Test Script provided in Appendix B before the certification test.  **\*\* No exemption requests will be accepted after the certification test started. The OAPI program will be considered as failed in the certification test if it cannot complete all mandatory functions.**   |  |  | | --- | --- | | **General Checklist:** | Yes No | | 1. Supported functions were checked? |  | | 1. Information or tested result provided? |  | | 1. The tester has read the HKATS OAPI Certification Test Script in Appendix B |  | | | | | | |
| **\*Checklist for HKATS Upgrade : [Respective test cases in this test script]** | | | Yes No/Not Applicable | | |
| 1. **Your OAPI program can support trading beyond mid-night?** | | |  | | |
| 1. **Are you an existing Exchange Info field user?**   →If Yes, verify that the structure of Exchange Info Field has been extended from 32 to 40 bytes. Your OAPI should only use the first 15 bytes as per current practice. | | |  | | |
| 1. **Are you an existing MO96 Mass Quote user**?   →If Yes, verify that all series in one MO96 transaction must belong to the same partition under the new allocation of partitions. [Section 3] | | |  | | |
| 1. **Are you an existing TMC user**?   →If Yes, verify that the new field “pricing\_method\_c” is added in the structure of DC3 and the field must be specified in every TMC creation. [Section 6] | | |  | | |
| 1. **Are you an existing T2 Trade Report user**?   →If Yes, verify that all series in one MO77 transaction must belong to the same partition under the new allocation of partitions. [Section 8.2] | | |  | | |
| 1. **Are you an existing Quote Request user**?   →If Yes, verify that MO51 is replacing MC4. [Section 10] | | |  | | |

\*Please note that **new/updated items** for HKATS Upgrade are highlighted in yellow in the following script.

|  | ***Functionality*** | **Test successful / information**  **Yes No** |
| --- | --- | --- |
|  | **1. Mandatory Functions for all types of program** |  |
|  | **1.1.1 Program Identification**  The program name and version defined in appl\_ident\_s in omni\_login\_t structure) is equal to or less than 18 characters? (please fill in the identification below) |  |
|  | **1.1.2 Library Verification**  The program is using the Exchange-provided Library? (please fill in the library version number\* below)    **\*version number** can be obtained from the provided library file, i.e. goapi\_**x.x.xx**… |  |
|  | **1.2 Change of expired Login Password**  The program can identify the expired logon and change the password successfully. |  |
|  | **1.3 Connection Status** |  |
|  | The program:  1.3.1 can still connect to the system after 15 minutes of no action (i.e. no order or query activities) |  |
|  | 1.3.2 has subscribed BI9 broadcast and polls it in regular manner |  |
|  | 1.3.3 will prevent re-login into HKATS for 10 consecutive login failure attempts |  |
|  | 1.3.4 will make re-login attempt only after 1 minute |  |
|  | 1.3.5 will wait for at least 1 second after login before initiating the first transaction or query |  |
|  | 1.3.6 Load test on series update – Exchange suspends or resumes 10 stocks underlying and the login account must not be disconnected / heartbeat automatically within 5 minutes. |  |
|  | 1.3.7 When Exchange suspends or resumes 10 stocks underlying in item 1.3.6, the login account without Stock Options trading rights must not be disconnected / heartbeat automatically within 5 minutes. |  |
|  | **1.4. The program has polling interval at most 250 milliseconds for any transactions which involve Read Events (Broadcast Messages)** |  |
|  | **1.5 The program can get the message code and text description for any transactions which provide completion and/or transaction status** | Change the login password or execute an order and get the following status in words:  Completion status  Message Code:  Text Description:    Transaction Status  Message Code:  Text Description: |
|  | **1.6 The program will use omniapi\_logout\_ex to logout the testing account** |  |
|  | **1.7 Receive Market Message (BI81) and identify the following information:**  1.7.1 message priority (message\_priority\_c) in text description:  1.7.2 message subject (message\_header\_s):  1.7.3 message content (text\_line\_s):  1.7.4 the market that receives the message (market code in series\_t) (optional): |  |
|  | **1.8 Confirmation on real-time addition of instrument series and Tailor Made Combo (TMC) series:**  (Tester needs to perform the following without re-login the program) |  |
|  | 1.8.1 Confirmation on newly added instrument and TMC series by BU124 and BU126. Please write down the newly added TMC series names. (e.g.TMC\_HSI/001)    1.8.2a Tester needs to confirm whether buy/sell for each series when buying and selling for the newly added series by BU126: (i.e. the definition of the combo series. For example: buying HSIM8 at ratio 1; selling HSI30000G8 at ratio 2).  1.8.2b Tester needs to confirm the definition of an existing series by using DQ126: | Please provide below information :  Date:  TMC series name:    The definition of the newly added TMC:          The TMC series selected:    The definition of the TMC / combo series: |
|  | 1.8.3 Handling the delist of TMC series  1.8.3.1 Program can identify which TMC series had been delisted.  1.8.3.2 Handling of a new TMC series with the same combo definition as a delist TMC series. (After step 1.8.3.1, the Exchange will add a new TMC series with the same combo definition. Tester can identify the newly added TMC series and the combo definition.) |  |
|  | **1.9 Market Status (BI41 & DQ29) (e.g. PREOPEN, PREOPENALLOC, OPENALLOC, PAUSE, PRE\_MKT\_ACT, OPEN\_DPL, OPEN & CLOSE)** |  |
|  | **1.9.1 Use DQ29 to retrieve all the market status defined in the system.** | List out all available market status: |
|  | **1.9.2 After login HKATS, check the market status of MHI market (e.g. PREOPEN, PREOPENALLOC) and write it down:** | Time:  Market Status: |
|  | **1.9.3 Identify the change of “Instrument session state” on an instrument series and underlying which is not same as trading session state.** |  |
|  | **1.10 Get first trading date, expiration date and last trading time of a series** |  |
|  | 1.10.1 Check the first trading date of a series and/ or combo series | Series name:    The first trading date is: |
|  | 1.10.2 Tester inputs order before the first trading date of a series will be rejected. |  |
|  | 1.10.3 Check the last trading date and time of a series and/ or combo series | Series name:    The last trading date and time are: |
|  | 1.10.4 Check a series with different last trading date and time, expiration date and effective expiration date. (e.g. HSI128000X5) | Series name:    The last trading date and time are:    The expiration date:    The effective expiration date: |
|  | **1.11 Resumption and suspension of Trading (BI1 & BU124)**  Exchange will resume and suspend a contract. Tester needs to confirm which contracts have been resumed/suspended |  |
|  | 1.11.1 Tester inputs orders/quotes on two contracts which one is going to be suspended (for program that will input orders/quotes) |  |
|  | 1.11.2 Exchange will suspend one of the contracts and tester should be able to identify which contract is suspended. |  |
|  | 1.11.3 Exchange will resume the suspended contract and tester should be able to identify which contract is resumed |  |
|  | 1.11.4 Exchange will suspend the product by underlying and all contracts based on this underlying will be suspended. |  |
|  | 1.11.5 Exchange will resume the product suspended in previous steps and tester should be able to identify the resumed contracts. |  |
|  | 1.11.6 Exchange will suspend and lock the product by underlying and all contracts based on this underlying will be suspended. Tester should be able to identify the locked Underlying. |  |
|  | 1.11.7 All orders/quotes input on the contract that belongs to the suspended and locked Underlying will be rejected. |  |
|  | **1.12 Handling of products with different features** |  |
|  | 1.12.1 The program can handle different products with different trading currencies. |  |
|  | 1.12.1.1 Tester can identify the trading currency of the product (via the field “base\_cur\_s” field in DQ122) | And it can identify the trading currency for CUS market as: |
|  | 1.12.1.2 Tester can place and execute orders in products other than HKD, e.g. GLD and CNY futures. |  |
|  | 1.12.2 The program will use the tick size and strike price information from instrument class via DQ122. |  |
|  | Classes with different tick sizes in stock options market are set up (e.g. XAB, XBC, XCC & XIC)  1.12.2.1 Tester can identify the tick size of an instrument class (via the field “dec\_in\_premium\_n” field in DQ122) | The field “dec\_in\_premium\_n” in transaction DQ122 [Instrument Class QUERY] for XAB Call is |
|  | 1.12.2.2 Tester can identify the decimal place in the strike price of an instrument class (via the field “dec\_in\_strike\_price\_n” field in DQ122) | And the field “dec\_in\_strike\_price\_n” for XAB Call is |
|  | 1.12.2.3 Tester can place orders into the instrument class with different tick size and decimal place and confirm the order details which include the series strike price and order price. |  |
|  | 1.12.3 The setting for Compression between OAPI Client and OMNet Gateway should be “ANY”:  - omniapi\_set\_option\_ex(…, OMNIAPI\_OPT\_COMPRESS, OMNIAPI\_OPVAL\_ANY ) ; |  |
|  | 1.12.4 “Omex Version” |  |
|  | The OAPI program doesn’t interpreted the “omex version”, an internal reference used by HKEX, which will be returned by the following queries/transactions.   * omniapi\_get\_info\_ex (OMNI\_INFTYP\_OMEXVERSION) * UQ12 (omex\_version\_s) * CQ68 (omex\_version\_s) |  |
|  | **1.12.5 “Handling product with 5 Underlying Code”** |  |
|  | 1.12.5.1 Tester can identify the Underlying with 5 Underlying Code via DQ120. (e.g. HK388, Commodity Code: 6102) |  |
|  | 1.12.5.2 Tester can place, alter and cancel MO31 orders of instrument and combo classes with 5 Underlying Code. Confirm BO5 and BD6 after order execution. |  |
|  | 1.12.5.3 Tester can place, alter and cancel MO37/MO96 orders of instrument and combo classes with 5 Underlying Code. (only if system support MO37/MO96) |  |
|  | 1.12.5.4 Tester can handle Trade Reports of instrument classes with 5 Underlying Code. (only if system support MO75/MO76/MO77) |  |
|  | 1.12.5.5 Tester can handle Quote Request of instrument and combo classes with 5 Underlying Code. (only if system support MO51) |  |
|  | 1.12.5.6 Tester uses DC3 with net\_price pricing method to create a TMC series with 5 Underlying Code and input order in that new TMC in same time (via MO31/MO37). (only if system support DC3) |  |
|  | 1.13 Volatility Control Mechanism (VCM)(\*Only applicable to existing OAPI programs).(\*\*For new programs, please apply for the full VCM verification test where the test script will be provided separately by the Exchange in the confirmation email of the certification test.) *\* Screenshots for return messages (txstat, test description, BO5 broadcast and BI81 broadcast) are required for this session (Please submit in PDF/WORD Format with clear indication to which step the screenshot belongs to)* |  |
|  | 1.13.1 The OAPI program performs MO31 order placement actions and trade executions on any VCM-applicable contracts.Upon triggering of the VCM Cooling-Off Period, identify the details of BI81 Broadcast |  |
|  | 1.13.2 The OAPI program performs MO37 quote placement actions and trade executions on any VCM-applicable contracts. (only if the system supports MO37)Upon triggering of the VCM Cooling-Off Period, identify the details of BI81 Broadcast |  |
|  | 1.13.3 The OAPI program performs MO96 quote placement actions and trade executions on any VCM-applicable contracts. (only if the system supports MO96)Upon triggering of the VCM Cooling-Off Period, identify the details of BI81 Broadcast |  |
|  | 1.13.4 The OAPI program performs MO33 order modification actions and trade executions on any VCM-applicable contracts. (only if the system supports MO33)Upon triggering of the VCM Cooling-Off Period, identify the details of BI81 Broadcast |  |

|  | ***Functionality*** | **Test successful / information**  **Yes No** |
| --- | --- | --- |
|  | **2. Mandatory Functions for Market Making and/or Trading program(s)** |  |
|  | **2.1 Confirmation on own executed trades with the following information by both BO5 & BD6**  Execute a trades and use BO5 and BD6 to check the trade number  (on BD6 only), instrument series, price, quantity, order number and match ID for their executed trades under username level (preferable under customer level) | BO5:   |  |  | | --- | --- | | Series Name:  *(e.g. HSIM6,*  *HSI20000F6)* |  | | Price: |  | | Quantity: |  | | Order no.:  *(In 16-digit hexadecimal)* |  | | Match ID:  *(In 16-digit hexadecimal)* |  |   BD6:   |  |  | | --- | --- | | Series Name:  *(e.g. HSIM6,*  *HSI20000F6)* |  | | Price: |  | | Quantity: |  | | Order no.:  *(In 16-digit hexadecimal)* |  | | Match ID:  *(In 16-digit hexadecimal)* |  | | Trade no: |  | |
|  | **2.2 Price and Quantity Deviation** |  |
|  | 2.2.1 Price Deviation  Tester sets a limit on Price (e.g. compare to last traded price or the bid /ask price) in any instrument series. Then the tester places 2 orders which are higher and lower than the limit in the instrument series respectively. The tester cannot input any order with price outside the price limit | And the warning message for price outside the price limit: |
|  | 2.2.2 Quantity Deviation  Tester sets a limit on Quantity for any instrument series. Then the tester places 2 orders which are higher and lower than the limit in the instrument series respectively. The tester cannot input any order with quantity greater than the limit | And the warning message for quantity greater than the limit is: |
|  | **2.3** **Cross Modification** |  |
|  | **2.4 The program can confirm outstanding orders after order deletion by others (e.g. exchange) via (BO5/MQ8) (Maximum of 1 MQ8 per second)** |  |
|  | **2.5 Pre-Trade Risk Management (PTRM) rejection message code verification**  *\* Screenshots for return messages (csts, txstat and text description) are required for this session. (Please submit in PDF/WORD Format with clear indication to which step the screenshot belongs to)* |  |
|  | 2.5.1 Handle the message code and text description after place Order (MO31), Quote (MO37) and/or Trade Report (MO75, MO76, MO77) are rejected by PTRM system   |  |  |  | | --- | --- | --- | |  | Completion Status (i.e. csts) | Transaction Status (i.e. txstat) | | i) | -12 | -850002 | | ii) | -12 | -850004 | | iii) | -12 | -850006 | | iv) | -12 | -850008 | |  |
|  | 2.5.2 Handle BO5 broadcast after Mass Order Cancellation Function in PTRM system |  |
|  | 2.5.3 Handle the message code and text description after Price Alteration (MO33 and/or MO4+MO31) are rejected by PTRM system |  |
|  | **2.6 The program can identify post trade transactions (clearing transactions) from Trade Confirmation Message (BD6)** |  |
|  | \*Filter #Identify N/A  2.6.1 Pre-Opening Session  (not applicable if the OAPI program can't input Give Up order)  2.6.1.1 Give Up (to CCCC) and take up Auction Order  2.6.1.2 Give Up (to CCCC) and take up Limit Order  2.6.2 Normal Trading Session  2.6.2.1 Split Trade  2.6.2.2 Change Free text  2.6.2.3 Change account  2.6.2.4 Solely trade rectification  2.6.2.5 Give Up to CCCC  2.6.2.6 Take Up  2.6.2.7 Average Price Trade  2.6.2.8 Transfer trade from DA(Default)Account  2.6.2.9 Cancellation of trade  2.6.2.10 Position netting  2.6.2.11 Position transfer  **\* Filter:** The OAPI program does not display the back office trade confirmation message (BD6) to the user  **# Identify:** The OAPI program displays the back office trade confirmation message (BD6) to the user and indicate to user that the above messages are back office messages, not trading messages | |
|  | 2.7 Market Making and/or Trading Program Participating in After-Hours Trading (AHT) |  |
|  | **2.7.1 Confirmation of Orders, Trades and Price Information (BO5, CQ10, CQ68, MO31, MQ8 & BD6) in T day** (Tester could refer to App B for the details of the test script) |  |
|  | 2.7.1.1 Enter orders in T session |  |
|  | 2.7.1.2 Execute the orders in T session and use BD6 to confirm the clearing date of the trades |  |
|  | 2.7.1.3 Trading State changes to AHT\_INACT\_T\_ORDER, tester should be able to identify which orders are active and which orders have been inactivated by system. |  |
|  | 2.7.1.4 Trading State changes to AHT\_OPEN\_PL, tester executes orders and use CQ68 to retrieve the clearing date (Clearing date is next business day) and locate the trade number, instrument series, price, quantity and order number in BD6. |  |
|  | 2.7.1.5 Trading State changes to AHT\_OPEN\_PL State, tester has to enter specific orders, execute orders and confirm the trade details. |  |
|  | 2.7.1.6 Query trades which will be cleared today and the next clearing date:  Tester logouts the application and then Exchange will execute some trades. Tester logins again and queries for trades cleared on today and the next clearing date via CQ10 using the current clearing date and next clearing date information in CQ68 |  |
|  | 2.7.1.7 After mid-night, the program can enter orders, execute orders and confirm the trade details. |  |
|  | **2.7.2 Orders and Trades Confirmation (CQ68, MQ8, CQ10) in next business day (T+1 day)** |  |
|  | 2.7.2.1 On the next business day, tester logins and can identify the outstanding orders. |  |
|  | 2.7.2.2 Program can confirm the details of those trades which are executed in AHT session of the previous business day. |  |
|  | 2.8 Handling last trading time (LTT) during in After-Hours Trading (AHT) |  |
|  | 2.8.1 Trade execution in the expiring spot series with last trading time (LTT) during AHT session, e.g., LME mini futures |  |
|  | 2.8.2 Order actions in the expiring spot series with last trading time (LTT) during AHT session, e.g., LME mini futures  (\* order change only applicable for system support MO33) |  |
|  | 2.8.3 Verification of ‘End of Trading’ flag (optional) |  |
|  | ***2.9 Trading Halt Mechanism (THM) in After-Hours Trading (AHT)*** |  |
|  | 2.9.1 Enter orders in T session on THM option contracts of two different option classes. |  |
|  | 2.9.2 Trading State changes to AHT\_OPEN\_PL State, Exchange triggers “HALT” ISS on all option series from one of the THM option classes. All orders of the halted THM option contracts will remain but will not be matched.  Tester can identify the halted option class and contracts via BI41. The login account(s) should not be disconnected/having missing Heartbeat. |  |
|  | 2.9.3 Tester can delete the orders during trading halt; also, tester can modify information in Cust and/or Info field, change the duration of validity and decrease the quantity of the orders during trading halt. |  |

|  | ***Functionality*** | **Test successful / information**  **Yes No** |
| --- | --- | --- |
|  | ***3.* Mandatory Functions for Market Making Program**  (\* MO96 only applicable to Exchange Participant granted with it; Maximum 10 legs - under same partition only)  *– Please refer to Section 4.3 and 4.4 in the “Highlight of Changes of OAPI Client application Development in 2018 HKATS Upgrade” for more info on Partition Dependence of MO96.*  (All quotes for market making are calculated by the program itself) |  |
|  | 3.1 Send quotes with bid and ask orders with valid account type (e.g. ‘M1’ for stock options or ‘R1234’ for HKFE products) for an instrument series and combo series and can confirm the 16-digit hexadecimal order number after sending the quotes By MO37  By MO96 \* |  |
|  | 3.2 Replace the quotes for instrument series and combo series with valid account type By MO37  By MO96 \* |  |
|  | 3.3 Bulk and individual cancellation of quote(s) By MO37 (Individual Cancellation)  By MO96 \* (Individual Cancellation)  By MO4 (Bulk and Individual Cancellation) |  |
|  | 3.4 Identify the details of quote request for instrument series and TMC series |  |
|  | 3.5 Can send out zero-bid quote for out-of-money series by providing “0” as the bid quantity By MO37  By MO96 \* |  |
|  | 3.6 Handling real-time addition of instrument series (for MO37 and MO96) and TMC series (for MO37 only) 3.6.1 Placement of MO37 and MO96\* orders  3.6.2 Receive quote requests (MI4)  3.6.3 Detailed retrieval of executed orders by BO5 and BD6 |  |
|  | 3.7 Market Making Program Participating in After-Hours Trading (T+1 session) |  |
|  | 3.7.1 During “Open” State, tester enters quotes with MO37 and/or MO96. |  |
|  | 3.7.2 After the Trading State changed to AHT\_INACT\_T\_ORDER, the program can identify the quotes are removed by HKATS |  |
|  | 3.7.3 During AHT\_OPEN State (AHT session), the program can enter quotes  By MO37  By MO96 \* |  |
|  | 3.7.4 During AHT\_OPEN\_PL State (AHT session), the program can enter quotes  By MO37  By MO96 \* |  |
|  | 3.7.5 After mid-night, the program can enter quotes  By MO37  By MO96 \* |  |
|  | **4. Mandatory Functions for Trading Program** |  |
|  | 4.1 Tester uses MO31 transaction to input rest of day order with valid account type for existing instrument series and TMC series in different partitions (e.g. HSI Futures and Stock Options) and confirm the 16-digit hexadecimal order number after placing the orders. For TMC series, tester needs to input three orders with positive, zero and negative price respectively |  |
|  | 4.2 Tester uses MO4 to cancel the inputted orders on instrument series & TMC series |  |
|  | 4.3 Handling real-time addition of instrument series and TMC series  4.3.1 Placement of MO31 rest of day limit order  4.3.2 Detailed retrieval of executed order by BO5 and BD6 |  |

|  |  |  |
| --- | --- | --- |
| **Optional Functions:** | | |
|  | **5. Change order (MO33)**  After inputting MO31 limit order, the program can use MO33 to  5.1 decrease quantity (will retain order priority)  5.2 increase quantity (may lose order priority)  5.3 decrease limit price (may lose order priority)  5.4 increase limit price (may lose order priority) |  |
|  | **6. Create Tailor-Made Combination (TMC) series for trading** |  |
|  | 6.1 Tester uses DC3 with net\_price pricing method to create TMC series with 2 legs and input order in that new TMC in the same time (via MO31/MO37) 6.1.1 Orders/quotes sent  6.1.2 Tester is able to identify the TMC and leg details (e.g. buy 1 lot of HSI25000L4 and buy 2 lot of HSI25000X4) |  |
|  | 6.2 Tester uses DC3 with net\_price pricing method to create TMC series with 4 legs and input order in that new TMC in the same time (via MO31/MO37) 6.2.1 Order/quotes sent  6.2.2 Tester is able to identify the TMC and leg details |  |
|  | 6.3 Tester uses DC3 to add TMC series without order or quote will be rejected by the OAPI program |  |
|  | 6.4 Tester uses DC3 without pricing method specified should be rejected. |  |
|  | **7. Special Order Placement** |  |
|  | 7.1 Input and alteration of Auction Order |  |
|  | 7.2 Good Till Date Order |  |
|  | 7.3 Good Till Cancel Order |  |
|  | 7.4 Execution with FAK order |  |
|  | 7.5 Execution with FOK order |  |
|  | **7.6 Give-up Order** |  |
|  | **7.7 Order Position (open/close)** |  |

|  | ***Functionality*** | **Test successful / information**  **Yes No** |
| --- | --- | --- |
|  | **8. Trade Report** |  |
|  | 8.1 T1 – Internal Trade Report (MO76) |  |
|  | 8.2 T2 – Combo Trade Report (MO77)  *– Please refer to Section 4.3 and 4.4 in the “Highlight of Changes of OAPI Client application Development in 2018 HKATS Upgrade” for more info on Partition Dependence of MO77.* |  |
|  | 8.3 T4 – Interbank Trade Report (MO75) |  |
|  | 8.3.1 MO74 – Unmatched Own T4 Trade Report Deletion |  |
|  | 8.3.2 MQ78-Query Unmatched Own T4 Trade Report |  |
|  | 8.3.3 MQ80 – Query T4 Trade Report waiting for matching from counterpart |  |
|  | **9. Get other user order book changes under the same customer (BO5)** |  |
|  | **10. Issuing Quote Request (MO51) (Maximum of 1 Quote Request per second)** |  |
|  | **11. Receiving Quote Request (MI4)** |  |
|  | **12. Market Maker Protection (MMP) for Market Makers Providing Continuous Quotes**  (\*Market Maker Protection only applicable to Exchange Participant granted with it) |  |
|  | 12.1 Tester can retrieve the parameters setting via query (DQ87) |  |
|  | 12.2 The Exchange changes one of the MMP setting and the tester can identify the changes via broadcast (BU87) |  |
|  | 12.3 Tester can use transaction to change the “Quantity Protection quantity”, “Delta Protection quantity”, “Exposure Limit Time Interval” and “Quotation Frozen time” (DC87) |  |
|  | 12.4 The program able to identify which underlying has MMP triggered and keeps normal (BO5 and BO38). |  |
|  | 12.5 Quotes will be rejected during the “Quotation Frozen time” period |  |
|  | 12.6 Order can be successfully issued during the “Quotation Frozen Time” period (optional for MM program that will use MO31 only) |  |
|  | 12.7 Reset the MMP setting (without changes the parameter) and issue quotes during the “Quotation Frozen Time” period. |  |
|  | 12.8 After MMP is triggered in three classes, the program should be able to identify which underlying has MMP triggered and staying normal (handling of more than one MMP triggering). |  |
|  | **13. Holiday Trading (DQ18 & DA18)** |  |
|  | 13.1 Tester can retrieve a list of non-trading days of DHT futures (Market Code:129 ; Commodity Code:6101) via DQ18 and DA18. |  |
|  | 13.2 Tester can identify the respective dates of non-trading days via date\_non\_trading\_s field. |  |
|  | 13.3 Tester can identify whether the respective dates are close for trading, settlement or clearing respectively. |  |
|  | 13.4 Tester place orders in products from both holiday market and non-holiday market. Orders for products in holiday market should be rejected. |  |

|  |  |  |
| --- | --- | --- |
|  | ***Functionality*** | **Test successful / information**  **Yes No** |
|  | **14. Weekly Options** |  |
|  | 14.1 Tester can place, alter and cancel MO31 orders of Weekly Options. (e.g. HSI Weekly Options, HSI30000D8W27; Market Code:39) Confirm BO5 and BD6 after order execution. |  |
|  | 14.2 Tester can place, alter and cancel MO37/MO96 orders of Weekly Options. (only if system support MO37/MO96) |  |
|  | 14.3 Tester can handle Trade Reports of Weekly Options. (only if system support MO75/MO76/MO77) |  |
|  | 14.4 Tester can handle Quote Request of Weekly Options. (only if system support MO51) |  |
|  | 14.5 Tester uses DC3 with net\_price pricing method to create a TMC series with Weekly Options and input order in that new TMC in same time (via MO31/MO37) (only if system support DC3) |  |

|  |  |  |
| --- | --- | --- |
|  | The Program will support the following Market(s): |  |
|  | **A. Index Products (Index Futures and Options)** |  |
|  | **B. Index Products (Flexible Index Options)** |  |
|  | **C. Equity Products (Stock Futures)** |  |
|  | **D. Equity Products (Stock Options)** |  |
|  | **E. Currency Products** |  |
|  | **F. Interest Rate and Fixed Income Products** |  |
|  | **G. Commodities Products** |  |
|  |  |  |
|  |  |  |
|  |  |  |

##### Appendix B

**HKATS OAPI Certification Test Script (HKATS Upgrade 1.0.1)**

**EP: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Tester Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Login ID(s): \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Program Name & version: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Library Used: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Developed by: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Test Date: \_\_\_\_\_\_\_\_\_\_ Test Time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Type of program:** □ **Market Making** □ **Trading**

**Version number of Operating System used by the OAPI program: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

**Document Version Control**

|  |  |  |
| --- | --- | --- |
| **Version** | **Date** | **Remark** |
| 1.0 | 20 July 2018 | HKATS Upgrade |
| 1.0.1 | 11 Sep 2018 | Update of Terminologies and Layout Enhancements |

Please note that this test script may be changed from time to time. During the certification test, Exchange staff will certify the mandatory items and all functions which the OAPI program supports. The mandatory items must be passed in order to pass the certification test. Please note that only certified items can be used in HKATS production environment. Tester must go through the test script in details before the certification test. Since the certification test takes quite a significant time to finish, the tester must familiar with the functionality and the operation of the OAPI program.

| ***Functionality*** | ***Successful***  Yes No |
| --- | --- |
| ***1. Mandatory Functions for All Types of Program*** 1.1.1 Program Name and version defined in the Program |  |
| The program must define the program name and version (appl\_ident\_s in omni\_login\_t structure) for starting a session. Exchange will verify the program name and version after the tester login the testing account. The program name and version must not contain more than 18 characters | □ □ |
| ***1.1.2 Library Verification***  The program is using the Exchange-provided Library? | □ □ |
| 1.2 Change of expired Login Password |  |
| Exchange sets the password expired for testing account. When the tester logins the testing account, tester needs to change password | □ □ |
| 1.3 Connection Status |  |
| 1.3.1 Tester needs to logout the account and then login the account with 15 minutes’ idle time. During the idle time, the login account must not be disconnected automatically | □ □ |
| 1.3.2 In order to maintain heartbeat of connection with the host (i.e. login status on/off), the program must subscribe BI9 broadcast and poll it in regular manner. Exchange perform some actions for the login account and check the login status (i.e. on/off) with the tester | □ □ |
| 1.3.3 Program / tester must have some controls to prevent 10 consecutive failed login attempts. Otherwise, the account will be locked (controlled by program/manual) | □ □ |
| 1.3.4 Login request time interval of 1 minute. Program / tester cannot re-logon within one minute after previous logout. (controlled by program/manual) | □ □ |
| 1.3.5 Wait for at least 1 second after login before initiating the first transaction or query | □ □ |
| 1.3.6 Load test on series update – Exchange suspends or resumes 10 stocks underlying and the login account must not be disconnected / heartbeat automatically within 5 minutes. | □ □ |
| 1.3.7 When Exchange suspends or resumes 10 stocks underlying in item 1.3.6, the login account without Stock Options trading rights must not be disconnected / heartbeat automatically within 5 minutes. | □ □ |
| 1.4 Polling interval for any transactions which involve Read Events (Broadcast Messages) |  |
| For any transactions (e.g.BD70/71, BD6) which involve Read Events (i.e.omniapi\_read\_event\_ext\_ex), the recommendation is to poll with time interval 250 milliseconds. The polling interval for the OAPI program is milliseconds | □ □ |
| 1.5 Get the message code and text description for any transactions which provide completion status (i.e. cstatus) and / or transaction status (i.e. txstat) |  |
| The OAPI program needs to get the message code for any transactions which provide the completion status (i.e. cstatus) and/or transaction status (i.e. txstat) and call the function omniapi\_get\_message\_ex() during login state to obtain the text description for the above status. Exchange staff requests the tester to perform some transaction(s) and then check the message code and description with the tester | □ □ |
| 1.6 Normal Logout (use omniapi\_logout\_ex to logout the testing account) |  |
| After the tester logs out the testing account, it must not have heartbeat disconnect after 3 minutes | □ □ |
| 1.7 Receive Market Message (BI81) (must complete items 1.7.1 to 1.7.3) |  |
| The Exchange sends the market message and confirms the following with the tester:  1.7.1 message priority (message\_priority\_c) in text description  1.7.2 message subject (message\_header\_s)  1.7.3 message content (text\_line\_s)  1.7.4 the market that receives the message (market code in series\_t) (optional) | □ □ |
| 1.8 Confirmation on real-time addition of instrument series and combo series |  |
| After the Exchange adds the instrument series and combo series with immediate effect, tester needs to perform the following with the Exchange without re-login the program: | □ □ |
| 1.8.1 Confirmation on newly added instrument series by BU124 and TMC series by BU124 and BU126 *(Tester needs to confirm which instrument series (e.g. HSI25000L4) and combo series (e.g. HSIK8/M8) have been added)* | □ □ |
| 1.8.2 Get the TMC definition of newly added series by BU126 and existing series by DQ126  - TMC with two legs  - TMC with three legs  - TMC with four legs  (Tester needs to confirm whether buy/sell for each series when buying and selling for the added (by BU126) and existing combo series (by DQ126) (e.g. buying HSIM8 at ratio 1; selling HSI30000G8 at ratio 2). | □ □ |
| 1.8.3 Handling the delist of TMC series  1.8.3.1 The Exchange will delist a TMC series and the tester can identify which TMC series is delisted.  1.8.3.2 Handling of a new TMC series with the same combo definition as a delist TMC series. (After step 1.8.3, the Exchange will add a new TMC series with the same combo definition. Tester can identify the newly added TMC series and the combo definition.) | □ □  □ □ |
| 1.9. Market Status (BI41 and DQ29) |  |
| 1.9.1 After login HKATS, check the market status (e.g PREOPEN, PREOPENALLOC, OPENALLOC, PAUSE, PRE\_MKT\_ACT, OPEN\_DPL, OPEN & CLOSE) in some markets (e.g. MHI) which retrieved from DQ29 with the tester | □ □ |
| 1.9.2 Exchange will change the market status in some market(s) (e.g. MHI). Check the market status (e.g PREOPEN, PREOPENALLOC, OPENALLOC, PAUSE, PRE\_MKT\_ACT, OPEN\_DPL, OPEN & CLOSE) which received from BI41 with the tester | □ □ |
| 1.9.3 Tester can confirm the “Instrument session state” after the Exchange change it in instrument series level and underlying level | □ □ |
| 1.10 Get first trading date, expiration date and last trading time of a series |  |
| 1.10.1 Check with tester the first trading date and time of a series and a combo series | □ □ |
| 1.10.2 Tester inputs order before the first trading date of a series will be rejected. | □ □ |
| 1.10.3 Check with tester the last trading date and time of a series and a combo series | □ □ |
| 1.10.4 After the Exchange change the last trading date and the effective expiration date of an instrument series, tester needs to confirm which instruments have been changed and the updated last trading date and time and the new expiration date | □ □ |
| 1.11 Resumption and Suspension of Trading (BI1 & BU124) Exchange will suspend contracts for trading and OAPI program should be able to handle it properly. |  |
| 1.11.1 Tester inputs orders/quotes on two contracts that is going to be suspended (for program that will input orders/quotes) | □ □ |
| 1.11.2 Exchange will suspend one of the contracts and tester should be able to identify which contract is suspended. | □ □ |
| 1.11.3 Exchange will resume the suspended contract and tester should be able to identify which contract is resumed | □ □ |
| 1.11.4 Exchange will suspend the product by underlying and all contracts based on this underlying will be suspended. | □ □ |
| 1.11.5 Exchange will resume the product suspended in previous steps and tester should be able to identify the resumed contracts. | □ □ |
| 1.11.6 Exchange will suspend and lock the product by underlying and all contracts based on this underlying will be suspended. Tester should be able to identify the locked Underlying via locked\_underlying\_c field | □ □ |
| 1.11.7 Tester inputs orders/quotes on the contracts of the locked Underlying should be rejected. | □ □ |
| 1.12 Handling of products with different features |  |
| 1.12.1 The program will utilize the currency information defined in Instrument Class level. |  |
| 1.12.1.1 Tester can identify the trading currency of the product (via the field “base\_cur\_s” field in DQ122) | □ □ |
| 1.12.1.2 Tester can place and execute orders in products other than HKD, e.g. GLD and CNY futures | □ □ |
| 1.12.2 The program will utilize the tick sizes information defined in Instrument Class Level |  |
| Product with different tick size in stock options market had been set up (e.g. XAB, XBC & XCC)  1.12.2.1 Tester can identify the tick size of an instrument class (via the field “dec\_in\_premium\_n” field in DQ122) | □ □ |
| 1.12.2.2 Tester can identify the decimal place in the strike price of an instrument class (via the field “dec\_in\_strike\_price\_n” field in DQ122) | □ □ |
| 1.12.2.3 Tester can place orders into the instrument class with different tick size and decimal place and confirm the order details which include the series strike price and order price | □ □ |
| 1.12.3 The setting for Compression between OAPI Client and OMNet Gateway should be “ANY”:  - omniapi\_set\_option\_ex(…, OMNIAPI\_OPT\_COMPRESS, OMNIAPI\_OPVAL\_ANY ) | □ □ |
| 1.12.4 “Omex Version” |  |
| The OAPI program doesn’t interpret the “omex version”, an internal reference used by HKEX that will be returned by the following queries/transactions.   * omniapi\_get\_info\_ex (OMNI\_INFTYP\_OMEXVERSION) * UQ12 (omex\_version\_s) * CQ68 (omex\_version\_s) | □ □ |
| **1.12.5 “Handling product with 5 Underlying Code”** |  |
| 1.12.5.1 Exchange suspends one Underlying with 5 Underlying Code (e.g. HK388; Commodity Code: 6102) and tester identifies the suspended underlying via BU120. | □ □ |
| 1.12.5.2 Input MO31 orders to Instrument and Combo Classes with 5 Underlying Code:   1. Buy HK388 Futures (Price 200.30, Quantity 1) with “validity” set to day and “exch\_order\_type\_n” set to 0 2. Sell HK388 Call Options (Price 10.50, Quantity 2) with “validity” set to Good-Till-Cancel and “exch\_order\_type\_n” set to 2048 (only if system support GTC orders) 3. Buy HK388 Put Options (Price 8.38, Quantity 3) with “validity” set to Good-Till-Cancel and “exch\_order\_type\_n” set to 0 (only if system support GTC orders) 4. Buy HK388 calendar spread Combo (Price -10, Quantity 4) with “validity” set to day and “exch\_order\_type\_n” set to 0 5. Delete order i) and Alter order ii) via MO4 and MO33 (only if system support MO33) respectively. 6. Exchange executes one of the orders, tester confirms outstanding orders and trade details via BO5 and BD6 respectively. | □ □ |
| 1.12.5.3 Input MO37/MO96 Quotes to Instrument and Combo Classes with 5 Underlying Code: (only if system support MO37/MO96)   1. HK388 Futures (Bid Price 200.30 Quantity 1 Ask Price 20031, Quantity 1) 2. HK388 Call Options (Zero Bid, Ask Price 10.50, Quantity 2) 3. HK388 calendar spread Combo (Bid Price -2.00 Quantity 1 Ask Price 0.00 Quantity 1) 4. Delete Quote i) and Alter Quote ii) via MO4/MO37/MO96 and MO37/MO96 respectively. | □ □ |
| 1.12.5.4 Input Trade Reports to Instrument Class with 5 Underlying Code: (only if system support MO75/MO76/MO77)   1. Enter T1 (MO76) on HK388 Futures 2. Enter T2 (MO77) on HK388 Call Options 3. Enter T4 (MO75) on HK388 Put Options | □ □ |
| 1.12.5.5 Handle Quote Request of Instrument and Combo Classes with 5 Underlying Code: (only if system support MO51/MI4)   1. Issue Quote Request (MO51) on HK388 Futures 2. Exchange Sends a Quote Request on any HK388 Futures, Options or calendar spread Combo series of HK388. Tester should identify the series that is requested via MI4. | □ □ |
| 1.12.5.6 Tester uses DC3 with net\_price pricing method to create a TMC series with 5 Underlying Code and input order in that new TMC in same time (via MO31/MO37). (only if system support DC3) | □ □ |

| ***Functionality*** | ***Successful***  Yes No |
| --- | --- |
| ***1.13 Volatility Control Mechanism (VCM)***  (\*Only applicable to **existing** OAPI programs)  (\*\*For new programs, please apply for the full VCM verification test where the test script will be provided separately by the Exchange in the confirmation email of the certification test.)  *\* Screenshots for return messages (txstat, test description, BO5 broadcast and BI81 broadcast) are required for this session (Please submit in PDF/WORD Format with clear indication to which step the screenshot belongs to)* |  |
| 1.13.1 The OAPI program performs MO31 order placement actions and trade executions on any VCM-applicable contracts.   1. Perform trade execution with traded price at 20,000 2. 3 minutes after step a, perform trade execution with traded price at 20,500 3. 2 minutes after step b, place a bid order with price at 21,001 for 1 lot 4. 1 minute after step c, place an ask order with price at 21,001 for 1 lot 5. For the ask order, identify the Transaction Status (i.e. txstat) = 17; Text Description = “Circuit breaker started, no part of the order placed in the Order book and no part closed” 6. For the ask order, identify the BO5 Broadcast’s “change\_reason\_c” = 1; Text Description = “Order deleted”. The ask order is deleted. 7. For the bid order, identify the BO5 Broadcast’s “change\_reason\_c” = 15; Text Description = “Order deleted due to changed price limits; Order deleted due to new price limits and the order premium is outside the new limits”. The bid order is deleted. 8. Upon triggering of the VCM Cooling-Off Period, identify the details of BI81 Broadcast: series, triggering time, reference price, upper price limit, lower price limit and end time | □ □ |
| 1.13.2 The OAPI program performs MO37 order placement actions and trade executions on any VCM-applicable contracts. (only if system support MO37)   1. Perform trade execution with traded price at 20,000 2. 3 minutes after step a, perform trade execution with traded price at 20,500 3. 2 minutes after step b, place a pair of quote at 21,001-21,002 for 1 lot 4. 1 minute after step c, place a pair of quote at 21,003-21,004 for 1 lot 5. Identify the Transaction Status (i.e. txstat) = 516; Text Description = “Circuit Breaker has started for the Bid order”; while txstat = 4 and txstat = 512 are ask side quote and bid side quote respectively. 6. For the bid side quote with price at 21,003, identify the BO5 Broadcast’s “change\_reason\_c” = 1; Text Description = “Order deleted”. The bid quote is deleted while the ask quote at 21,004 is still a valid quote. 7. For the bid side quote with price at 21,001, identify the BO5 Broadcast’s “change\_reason\_c” = 15; Text Description = “Order deleted due to changed price limits; Order deleted due to new price limits and the order premium is outside the new limits”. The bid quote deleted while the ask quote at 21,002 is still a valid quote. 8. Upon triggering of the VCM Cooling-Off Period, identify the details of BI81 Broadcast: series, triggering time, reference price, upper price limit, lower price limit and end time | □ □ |
| 1.13.3 The OAPI program performs MO96 order placement actions and trade executions on any VCM-applicable contracts. (only if system support MO96)   1. perform trade execution with traded price at 20,000 2. 3 minutes after step a, perform trade execution with traded price at 20,500 3. 2 minutes after step b, place a bid order at 21,001 for 1 lot 4. 1 minute after step c, place a pair of quote at 21,000-21,001 for 1 lot 5. Identify the Transaction Status (i.e. txstat) = 1. For the ask side quote with price at 21,001, identify the BO5 Broadcast’s “change\_reason\_c” = 1; Text Description = “Order deleted”. The ask quote is deleted while the bid quote at 21,000 is still a valid quote. 6. For the bid order with price at 21,001, identify the BO5 Broadcast’s “change\_reason\_c” = 15; Text Description = “Order deleted due to changed price limits; Order deleted due to new price limits and the order premium is outside the new limits”. The bid order is deleted. 7. Upon triggering of the VCM Cooling-Off Period, identify the details of BI81 Broadcast: series, triggering time, reference price, upper price limit, lower price limit and end time | □ □ |
| 1.13.4 The OAPI program performs MO33 order modification actions and trade executions on any VCM-applicable contracts. (only if system support MO33)   1. Perform trade execution with traded price at 20,000 2. 3 minutes after step a, perform trade execution with traded price at 20,500 3. 2 minutes after step b, place a bid order with price at 21,001 for 1 lot 4. 1 minute after step c, place an ask order with price at 21,002 for 1 lot 5. Right after step d, perform MO33 to modify the price to 21,001 6. For the ask order, identify the Transaction Status (i.e. txstat) = 1 7. For the ask order, identify the BO5 Broadcast’s “change\_reason\_c” = 1; Text Description = “Order deleted”. The ask order is deleted. 8. For the bid order, identify the BO5 Broadcast’s “change\_reason\_c” = 15; Text Description = “Order deleted due to changed price limits; Order deleted due to new price limits and the order premium is outside the new limits”. The bid order is deleted. 9. Upon triggering of the VCM Cooling-Off Period, identify the details of BI81 Broadcast: series, triggering time, reference price, upper price limit, lower price limit and end time | □ □ |

| ***Functionality*** | ***Successful***  Yes No |
| --- | --- |
| ***2. Mandatory Functions for Market Making and/or Trading Program(s)*** 2.1 Confirm own executed trades by both BO5 & BD6 |  |
| Tester inputs the following orders with \*valid account type (i.e. ex\_client\_s). Then the Exchange executes some orders. Tester needs to use BO5 and BD6 to check the trade number (BD6 only), instrument series, price, quantity, order number and Match ID for their executed trades under username level (preferable under customer level) | □ □ |
| 2.1.1 input 10 non-executed orders in the same instrument series |  |
| 2.1.2 input 1 order to execute 10 orders which are input by other users |  |
| 2.1.3 input several non-executed orders in different instrument series |  |
| \*valid account type : Non stock options - C/H/RXXX where XXX is the market maker trading account number, stock options – A1/P1/M1 |  |
| 2.2 Price and Quantity Deviation |  |
| **2.2.1 Price Deviation** |  |
| Request tester to set a limit on Price (e.g. compare to last traded price or the bid /ask price) in any instrument series. Then the tester places 2 orders with valid account type which are higher and lower than the limit in the instrument series respectively. The tester cannot input any order with price outside the price limit | □ □ |
| **2.2.2 Quantity Deviation** |  |
| Request the tester to set a limit on Quantity for any instrument series. Then the tester places 2 orders with valid account type which are higher and lower than the limit in the instrument series respectively. The tester cannot input any order with quantity greater than the limit | □ □ |
| 2.3 Cross Modification **2.3.1 Order Executed during Alteration in Quantity** |  |
| 2.3.1.1 Change in Quantity (lost time priority scenario)  - Tester inputs a buy order with valid account type, quantity 10 and price 20,000 in any futures series  - Tester changes the quantity from 10 to 8 and the Exchange execute 9 lots (a) within the same second and (b) more than 1 seconds  (a) 9 lots executed, 1 lot remaining and the tester intends to change the order from 1 lot to 8 lots  (b) 8 lots executed | □ □ |
| *Results:*  (same second) (>1 second)  Alert message is being generated (preferable) □ □  Remaining order, 1 lot is still in the market □ or □ or  No remaining order □ or □ or  Extra order has been placed after the modification ( lots) □ □ |  |
| 2.3.1.2 Change in Quantity (time priority remains unchanged)  Tester inputs a buy order with valid account type, quantity 10 and price 20000 in any futures series  Tester changes the quantity from 10 to 7 and the Exchange execute 2 lots (a) within same second and (b) more than 1 second.  (a) 2 lots executed, 8 lots remaining and the tester intends to change the order from 8 lots to 7 lots  (b) 2 lots executed, 5 lots remaining  *Results (same second)*  *(>1 second)*  *Alert message is being generated (preferable)* □ □  *8 lots have been placed after modification* □ or □ or  *7 lots have been placed after modification* □ or □ or  *5 lots have been placed after modification*  □ or □ or  *Did not place new order after execution* □ □ | □ □ |
| **2.3.2 Order Executed during Cancellation** |  |
| - Tester inputs 2 buy orders with valid account type, quantity 10 and price 20,000 in any futures series  - Tester cancels the above orders and the Exchange executes whole or part of the order for each order within same second  *Results:* *Whole order* *Part of order*  *Orders updated accordingly* □ □  *Alert message is being generated (preferred)* □ □ | □ □ |
| 2.4 Confirm outstanding orders after the Exchange deletes some order(s) (BO5/MQ8) |  |
| After tester inputs several orders, the Exchange deletes some order(s). Tester need to confirm the outstanding order(s) with the Exchange | □ □ |
| 2.5 Pre-Trade Risk Management (PTRM) rejection message code verification *\* Screenshots for return messages (csts, txstat and text description) are required for this session. (Please submit in PDF/WORD Format with clear indication to which step the screenshot belongs to)* |  |
| **2.5.1 Handle the message code and text description after place Order (MO31), Quote (MO37) and/or Trade Report (MO75, MO76, MO77) are rejected by PTRM system**  Exchange staff performs certain actions in PTRM system and requests the tester to perform Order (MO31), Quote (MO37) and/or Trade Report (MO75, MO76, MO77) and then check the message code and description with the tester.  By MO31  By MO37 and/or MO96 (optional)  By MO75, MO76 and/or MO77 (optional)  The OAPI program must be able to handle the 4 new return codes described below after the quotes are rejected by PTRM system and call the function omniapi\_get\_message\_ex() during login state to obtain the text description for the new return codes  a) Completion Status (i.e. csts) = -12 and Transaction Status (i.e. txstat) = -850002  Text Description = “User is in a blocked pre trade risk state”  b) Completion Status (i.e. csts) = -12 and Transaction Status (i.e. txstat) = -850004  Text Description = “User has breached order rate limit”  c) Completion Status (i.e. csts) = -12 and Transaction Status (i.e. txstat) = -850006  Text Description = “User has breached an intraday exposure limit”  d) Completion Status (i.e. csts) = -12 and Transaction Status (i.e. txstat) = -850008  Text Description = “User has exceeded max. order size limit” | □ □  □ □  □ □  □ □  □ □  □ □  □ □ |
| **2.5.2 Handle BO5 broadcast after Mass Order Cancellation Function in PTRM system**  After tester inputs several quotes, Exchange staff deletes some quotes by using Mass Order Cancellation Function and the OAPI should receive the corresponding BO5. | □ □ |
| **2.5.3 Handle the message code and text description after Price Alteration (MO33 and/or MO4+MO31) are rejected by PTRM system**  **Exchange staff performs certain actions in PTRM system and requests the tester to perform** MO33/ MO4+MO31 transaction(s) and then check the message code and description with the tester  By MO33 (optional)  By MO4+MO31 (optional)  a) Completion Status (i.e. csts) = -12 and Transaction Status (i.e. txstat) = -850002  Text Description = “User is in a blocked pre trade risk state”  b) Completion Status (i.e. csts) = -12 and Transaction Status (i.e. txstat) = -850004  Text Description = “User has breached order rate limit”  c) Completion Status (i.e. csts) = -12 and Transaction Status (i.e. txstat) = -850006  Text Description = “User has breached an intraday exposure limit”  d) Completion Status (i.e. csts) = -12 and Transaction Status (i.e. txstat) = -850008  Text Description = “User has exceeded max. order size limit”  Note: Original order is kept in orderbook for price alteration with MO33 while the order is  cancelled for price alteration with MO4 + MO31 | □ □  □ □  □ □  □ □  □ □  □ □ |
| 2.6 Handling Additional Trade Confirmation Message (BD6) for clearing transactions |  |
| Tester executes some trades on bid and ask sides in different instrument series. Tester needs to confirm whether their OAPI program receives the back office trade confirmation message (BD6) after the Exchange performs the following clearing transactions: |  |
| \*Filter #Identify N/A  2.6.1 Pre-Opening Session  (not applicable if the OAPI program can't input Give Up order)  2.6.1.1 Give Up (to CCCC) and take up Auction Order □ □ □  2.6.1.2 Give Up (to CCCC) and take up Limit Order □ □ □  2.6.2 Normal Trading Session  2.6.2.1 Split Trade □ □  2.6.2.2 Change Free text □ □  2.6.2.3 Change account □ □  2.5.2.4 Solely trade rectification □ □  2.6.2.5 Give Up to CCCC □ □  2.6.2.6 Take Up □ □  2.6.2.7 Average Price Trade □ □  2.6.2.8 Transfer trade from DA(Default)Account □ □  2.6.2.9 Cancellation of trade □ □  2.6.2.10 Position netting □ □  2.6.2.11 Position transfer □ □  **\* Filter:** The OAPI program does not display the back office trade confirmation message (BD6) to the user  **# Identify:** The OAPI program displays the back office trade confirmation message (BD6) to the user and indicate to user that the above messages are back office messages, not trading messages |  |
| ***2.7 Market Making and/or Trading Program Participating in After-Hours Trading (AHT)*** |  |
| **2.7.1 Orders, Trades and Price Information Confirmation (BO5, CQ10, CQ68, MO31, MQ8 & BD6) in T day** |  |
| 2.7.1.1 During Open State, tester enters the following orders:  i. Buy LRA Futures (Price 10040, Quantity 1) with “exch\_order\_type\_n” set to 0  ii. Buy LRA Futures (Price 10035, Quantity 1) with “exch\_order\_type\_n” set to 2048  iii. Buy LRA Futures (Price 10030, Quantity 1) with “validity” set to day and “exch\_order\_type\_n” set to 0  iv. Buy LRA Futures (Price 10025, Quantity 1) with “validity” set to good-till-cancel and “exch\_order\_type\_n” set to 0 (only if system support GTC orders)  v. Buy LRA Futures (Price 10010, Quantity 1) with “validity” set to day and “exch\_order\_type\_n” set to 2048  vi. Buy LRA Futures (Price 10020, Quantity 1) with “validity” set to day and “exch\_order\_type\_n” set to 2048  vii. Buy LRA Futures (Price 10005, Quantity 1) with “validity” set to good-till-cancel and “exch\_order\_type\_n” set to 2048 (only if system support GTC orders)  viii. Buy LRA Futures (Price 10015, Quantity 1) with “validity” set to good-till-cancel and “exch\_order\_type\_n” set to 2048 (only if system support GTC orders) | □ □ |
| 2.7.1.2 The Exchange executes the orders in i and ii. Then, tester uses BD6 to confirm the clearing date of the trades. | □ □ |
| 2.7.1.3 The Exchange changes the Trading State to AHT\_INACT\_T\_ORDER, tester must be able to identify orders in v, vi, vii, and viii are active while orders in iii and iv are inactivated. | □ □ |
| 2.7.1.4 The Exchange changes the Trading State of LRA market to AHT\_OPEN\_PL, and then, executes orders in vi and viii . Tester uses BD6 to confirm the clearing date of the trades. | □ □ |
| 2.7.1.5 During AHT\_OPEN\_PL State (AHT), tester enters the following orders:  ix. Buy LRA Futures (Price 10155, Quantity 1) with “validity” set to day and “exch\_order\_type\_n” set to 2048  x. Buy LRA Futures (Price 10165, Quantity 1) with “validity” set to day and “exch\_order\_type\_n” set to 2048  xi. Buy LRA Futures (Price 10160, Quantity 1) with “validity” set to good-till-cancel and “exch\_order\_type\_n” set to 2048 (only if system support GTC orders)  xii. Buy LRA Futures (Price 10170, Quantity 1) with “validity” set to good-till-cancel and “exch\_order\_type\_n” set to 2048 (only if system support GTC orders)  The Exchange executes the orders in x and xii. Then, tester uses BD6 to confirm the trade details. | □ □ |
| 2.7.1.6 Query trades that will be cleared today and next clearing date:  Tester logouts the application and then Exchange will execution some trades. Tester logins again and query for trades cleared on today and next clearing date via CQ10 by using the current clearing date and next clearing date information in CQ68 | □ □ |
| 2.7.1.7 After mid-night, tester has to enter specific orders, execute orders and confirm the trade details.  xiii. Buy LRA Futures (Price 10175, Quantity 1) with “validity” set to day and “exch\_order\_type\_n” set to 2048  xiv. Buy LRA Futures (Price 10185, Quantity 1) with “validity” set to day and “exch\_order\_type\_n” set to 2048  xv. Buy LRA Futures (Price 10180, Quantity 1) with “validity” set to good-till-cancel and “exch\_order\_type\_n” set to 2048 (only if system support GTC orders)  The Exchange executes the orders in xiv. Then, tester uses BD6 to confirm the trade details. | □ □ |
| **2.7.2 Orders and Trades Confirmation (CQ68, MQ8 & CQ10) in next business day (T+1 day)** |  |
| 2.7.2.1 Tester logins to the testing environment and confirm the outstanding orders’ details (orders in iv, vii, xi and xv). | □ □ |
| 2.7.2.2 Tester confirms the trade details of the trades from orders in vi, viii, x, xii, and xiv (trades from AHT session of previous business day) | □ □ |
| ***2.8.Handling last trading time (LTT) during in After-Hours Trading (AHT) session*** |  |
| **2.8.1 Trade execution in the expiring spot series with last trading time (LTT) during AHT session, e.g., LME mini futures** |  |
| 2.8.1.1 Tester executes trades **in the expiring spot** **series** in T session. Trades on 2 classes with different LTT are required, i.e., 1 trade in each class. | □ □ |
| 2.8.1.2 Tester executes trades **in the expiring spot series** in AHT session but before the LTT. Trades on 2 classes with different LTT are required, i.e., 1 trade in each class. | □ □ |
| 2.8.1.3 Tester executes trades **in the spot-next series** in AHT session after the LTT of spot series. Trades on 2 classes with different LTT are required, i.e., 1 trade in each class. | □ □ |
| 2.8.2 Order actions in the expiring spot series with last trading time (LTT) during AHT session, e.g., LME mini futures (\* order change only applicable for system support MO33) |  |
| 2.8.2.1 In T session, Tester places at least 6 buy/ sell orders with T+1 flag in the expiring spot series (including relevant combo series), and cancel 1 of those orders subsequently. 2.8.2.2 Change 1 of those orders (only applicable for system support MO33). | □ □ |
| 2.8.2.3 In AHT session (before LTT), Tester cancels 1 of those orders placed in item 2.8.2.1  2.8.2.4 In AHT session (before LTT), Tester places 1 new order and cancels it immediately.  2.8.2.5 In AHT session (before LTT), Tester changes 1 of those orders placed in item 2.8.2.1 (MO33\*).  2.8.2.6 In AHT session (before LTT), Tester places 1 new order and changes it immediately (MO33\*). | □ □ |
| 2.8.2.7 In AHT session (after LTT), Tester cancels 1 of those orders placed in item 2.8.2.1 and got rejected.  2.8.2.8 In AHT session (after LTT), Tester places 1 new order and got rejected.  2.8.2.9 In AHT session (after LTT), Tester places 1 new order in the spot-next series and cancels it immediately.  2.8.2.10 In AHT session (after LTT), Tester changes 1 of those orders placed in item 2.8.2.1 and got rejected (MO33\*).  2.8.2.11 In AHT session (after LTT), Tester places 1 new order in the spot-next series and changes it immediately (MO33\*). | □ □ |
| **2.8.3 Verification of ‘End of Trading’ flag (optional)** |  |
| 2.8.3.1 Verify the ‘End of Trading’ flag is not with T session close (i.e. CLOSE\_TODAY\_E) and have no impact.  2.8.3.2 Verify the ‘End of Trading’ flag is with the AHT close (i.e. AHT\_CLOSE\_E) and can serve as the signal of day close as required by the OAPI Program. | □ □ |
| 2.9 Trading Halt Mechanism (THM) in After-Hours Trading (AHT) |  |
| 2.9.1 In T session, tester enters 6 orders on HHI and MHI options with “exch\_order\_type\_n” set to 2048. | □ □ |
| 2.9.2 In AHT session, Exchange triggers “Halt” ISS on either HHI or MHI options. Tester can identify the halted option class and contracts via BI41 and confirms all orders of the halted THM option contracts remain but are not matched. The login account(s) should not be disconnected/having missing Heartbeat. | □ □ |
| 2.9.3 Tester can delete the orders during trading halt; also, tester can modify information in Cust and/or Info field, change the duration of validity and decrease the quantity of the orders during trading halt. | □ □ |

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| ***Functionality*** | ***Successful***  Yes No |
| ***3. Mandatory Functions for Market Making Program***  (\* MO96 only applicable to Exchange Participant granted with it; Maximum 10 legs - under same partition only)  *– Please refer to Section 4.3 and 4.4 in the “Highlight of Changes of OAPI Client application Development in 2018 HKATS Upgrade” for more info on Partition Dependence of MO96.*  (All quotes for market making are calculated by the program itself) |  |
| ***3.1 Send quotes with* bid and ask orders** with valid account type (e.g. ‘M1’ or ‘R123’) for a newly created instrument series and combo series and confirms the 16-digit hexadecimal order number after sending the quotes  By MO37  By MO96\* | □ □  □ □ |
| 3.2 Replace the quotes for instrument series and combo series with valid account type By MO37  By MO96\* | □ □  □ □ |
| 3.3 Bulk and individual cancellation of quote(s) By MO37 (Individual Cancellation)  By MO96 \* (Individual Cancellation)  By MO4 (Bulk and Individual Cancellation) | □ □  □ □  □ □ |
| ***3.4 Identify the details of quote request for instrument series and TMC series***  After the Exchange sends the quote request for one of the instrument series and TMC series, tester needs to confirm which series have the quote request | □ □ |
| 3.5 Send out zero-bid quote for out-of-money series by providing “0” as the bid quantity By MO37  By MO96\* | □ □  □ □ |
| 3.6 Handling real-time addition of instrument series and TMC series After the Exchange adds the instrument series and TMC series with immediate effect, tester needs to perform the following for the newly added instrument series and TMC series without re-login the program:  3.6.1 Tester input “rest of day” order with valid account type  By MO37  By MO96\* (instrument series only)  3.6.2 After the Exchange sends the quote request. Tester needs to confirm which instrument series and TMC series have the quote request  3.6.3 After the tester executes a trade, tester needs to confirm the executed trade with the instrument series, price, quantity and 16-digit hexadecimal order number from BO5 and BD6 (also confirms the trade number) | □ □  □ □  □ □  □ □ |
| ***3.7. Mandatory Functions for Market Making Program Participating in After-Hours Trading (AHT)*** |  |
| 3.7.1 During Open State, tester enters quotes with MO37 and/or MO96 | □ □ |
| 3.7.2 The Exchange changes the Trading State to AHT\_INACT\_T\_ORDER, tester should be able to identify quotes are removed by HKATS | □ □ |
| 3.7.3 During AHT\_OPEN State (AHT session), tester enters quotes with MO37 and/or MO96 | □ □ |
| 3.7.4 During AHT\_OPEN\_PL State (AHT session), tester enters quotes with MO37 and/or MO96 | □ □ |
| 3.7.5 After mid-night, tester enters quotes with MO37 and/or MO96 | □ □ |

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| ***Functionality*** | ***Successful***  Yes No |
| ***4. Mandatory Functions for Trading Program*** |  |
| 4.1 Tester uses MO31 transaction to input rest of day order with valid account type for existing instrument series and TMC series in different partitions (e.g. HSI Futures and Stock Options) and confirm the 16-digit hexadecimal order number after placing the orders. For TMC series, tester needs to input three orders with positive, zero and negative price respectively | □ □ |
| 4.2 Tester uses MO4 to cancel the inputted orders on instrument series & TMC series | □ □ |
| 4.3 Handling real-time addition of instrument series and TMC series  After the Exchange adds the instrument series and TMC series with immediate effect, tester needs to perform the following for the newly added instrument series and TMC series without re-login the program:  4.3.1 Tester uses MO31 transaction to input rest of day order with valid account type. For TMC series, tester needs to input three orders with positive, zero and negative price respectively  4.3.2 After the tester execute a trade, tester needs to confirm the executed trade with the instrument series, price, quantity and 16-digit hexadecimal order number from BO5 and BD6 (also confirms the trade number) | □ □  □ □ |

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| ***5. Change order (MO33)***  After tester inputs MO31 limit order, tester needs to use MO33 to  5.1 decrease quantity (will retain order priority)  5.2 increase quantity (may lose order priority)  5.3 decrease limit price (may lose order priority)  5.4 increase limit price (may lose order priority) | □ □  □ □  □ □  □ □ |

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| ***6. Create Tailor-Made Combination (TMC) series for trading*** |  |
| 6.1 Tester uses DC3 with ‘net\_price’ pricing method to add TMC series with 2 legs together with order input via MO31/MO37 (via pricing\_method\_c field.) 6.1.1 Order/quotes sent  6.1.2 Tester is able to identify the TMC and its combo leg details (e.g. buy 1 lot of HSI25000L4 and buy 1 lot of HSI25000X4) | □ □  □ □ |
| 6.2 Tester uses DC3 with ‘net\_price’ pricing method to add TMC series with 4 legs together with order input via MO31/MO37 6.2.1 Order/quotes sent  6.2.2 Tester is able to identify the TMC and its combo leg details | □ □  □ □ |
| 6.3 Tester uses DC3 to add TMC series without order or quote will be rejected by the OAPI program. | □ □ |
| 6.4 Tester uses DC3 without pricing method specified should be rejected.  “Pricing method given in DC3 does not match the pricing method for the TMC” rejection message is observed. | □ □ |

| ***Functionality*** | ***Successful***  Yes No |
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| ***7. Special Order Placement*** |  |
| **7.1 Input and alteration of Auction Order** |  |
| **7.1.1 Pre-Market Activities**  Tester inputs the following MO31 orders during Pre-Opening with any valid account type (e.g. ‘C’), valid order position (optional) (i.e. open\_close\_req\_c = 1 for open position, open\_close\_req\_c = 2 for close position) on spot futures) |  |
| 7.1.1.1 Buy 7 lots of Auction order (AO) with close position (Give Up to HKCGA1 (i.e. give\_up\_member) if applicable)  7.1.1.2 Change the quantity of above AO order from 7 to 3  7.1.1.3 Change the quantity of above AO order from 3 to 5  7.1.1.4 Sell 7 lots of AO with open position  7.1.1.5 Cancel the above AO order with 7 lots  7.1.1.6 Sell 10 lots of AO with open position  7.1.1.7 Sell 10 lots of Limit order (LO) @ 23200 with open position (Good Till Date order if applicable, otherwise rest of day order, tester needs to confirm the 16-digit hexadecimal order number for good till date order) (Give Up to HKCGA1 (i.e. give\_up\_member) if applicable)  7.1.1.8 Change the price to 23300 and quantity to 5 lots for the above order  7.1.1.9 Buy 3 lots of LO @ 23200 with close position (Good Till Cancel order if applicable, otherwise rest of day order, tester needs to confirm the 16-digit hexadecimal order number for good till cancel order)  7.1.1.10 Change the price to 23300 and quantity to 1 lot for the above order  *Check with outstanding order details* | □ □ |
| **Exchange change the market status to Pre-Opening Allocation (POA):**  Please note that tester can input auction order only during this market status  **Exchange change the market status to Open-Allocation (OPA):**  Please note that tester cannot perform any order actions during this market status  **Exchange change the market status to Pause (PAU):**  During this period, orders will be matched. Confirm traded details in BD6 with the tester   1. Executed Instrument 2. Trade number 3. 16-digital hexadecimal order number 4. Traded Price and quantity 5. Give up account (if applicable)   f. Order position (if applicable)  Check with executed details and outstanding order details  **Change the market to Open session** | □ □ |
| **7.1.2 BO5 (AO conversion) during Pre-market**  7.1.2.1 Tester places AO with any valid account type on both Bid and Ask sides in any MHI Futures during Pre-Opening and confirms the 16-digit hexadecimal order number after placing the orders  7.1.2.2 Place LO on Bid side by the Exchange during Pre-Opening  7.1.2.3 Change market session to POA, OPA, PAU by the Exchange  7.1.2.4 Verify details of outstanding orders  (Ask AO removed and Bid AO converted to LO) | □ □ |
| **7.2 Good Till Date (Need to be tested if 7.1.1.7 does not test good till date order)**  Tester inputs a good till date order with valid account type for any instrument series and confirms the 16-digit hexadecimal order number after placing the order | □ □ |
| **7.3 Good Till Cancel (Need to be tested if 7.1.1.9 does not test good till cancel order)**  Tester inputs a good till cancel order with valid account type for any instrument series and confirms the 16-digit hexadecimal order number after placing the order | □ □ |
| **7.4 Execution with FAK**  Tester inputs a fill and kill order (FAK) with valid account type to execute one existing order and confirms the 16-digit hexadecimal order number after the execution | □ □ |
| **7.5 Execution with FOK**  Tester inputs a fill or kill order (FOK) with valid account type to execute one existing order with FOK order quantity greater than the existing order. (No order should be executed ) | □ □ |
| **7.6 Give-Up Order (Need to be tested if 7.1.1.7 does not test Give-up order)**  Tester inputs a Give-Up Order to HKCGA1 with valid account type for any instrument series and confirms the 16-digit hexadecimal order number after placing the order. | □ □ |
| **7.7 Order Position (open/ close) (Need to be tested if 7.1.1.7 & 7.1.1.9 do not test order position)**  Tester inputs two orders (one is open position and the other is close position) with valid account type for any instrument series | □ □ |

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| ***8. Trade Report*** |  |
| **8.1 T1 – Internal Trade Report (MO76)**  Tester sends several trade report series with valid account type in any Options series with non-blank information in the information field and Give Up to HKCGA1 if applicable. Tester needs to confirm the 16-digit hexadecimal order number after sending the above order | □ □ |
| **8.2 T2 – Combo Trade Report (MO77) (Maximum 6 legs - under same partition only)**  *– Please refer to Section 4.3 and 4.4 in the “Highlight of Changes of OAPI Client application Development in 2018 HKATS Upgrade” for more info on Partition Dependence of MO77.*  Tester sends a combo series trade report with valid account type with 2 legs in any Options series with non-blank information in the information field and Give Up to HKCGA1 if applicable. Tester needs to confirm the 16-digit hexadecimal order number after sending the above order and the resulting trade details from BO5 and BO6 | □ □ |
| **8.3 T4 – Interbank Trade Report (MO75)**  Tester sends a Buy interbank trade report with valid account type to company HKCCC in any Options series with non-blank information in the information field and Give Up to HKCGA1 if applicable. Tester needs to confirm the 16-digit hexadecimal order number after sending the above order | □ □ |
| **8.3.1 MO74-Unmatched Own T4 Trade Report Deletion (Optional)**  After tester sends a T4 trade report, tester needs to delete the above order | □ □ |
| **8.3.2 MQ78-Query Unmatched Own T4 Trade Report (Optional)**  After tester sends several T4 trade reports, some T4 trade reports are executed by the Exchange. Tester needs to tell the Exchange for unmatched own T4 trade report | □ □ |
| **8.3.3 MQ80-Query T4 Trade Report waiting for matching from counterpart (Optional)**  Exchange will issue a T4 trade reports to tester for matching. Tester need to confirm the details of the trade report and match the trade report by sending out MO75 | □ □ |

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| ***Functionality*** | ***Successful***  Yes No |
| ***9. Get other user order book changes under the same customer (BO5)*** |  |
| Exchange logins with an account of the same customer. Then Exchange performs some order actions (e.g. place, change, delete order etc). Confirm which order actions the Exchange have performed | □ □ |

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| ***10. Issuing Quote Request (MO51)*** |  |
| Tester needs to send quote requests with any volume (Maximum of 1 Quote Request per second) for the newly added instrument series and TMC series without re-login the program | □ □ |

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| ***11. Receiving Quote Request (MI4)*** |  |
| After the Exchange sends the quote request for an newly added instrument series and TMC series, tester needs to confirm which series have the quote request | □ □ |

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| ***12. Market Maker Protection for Market Makers Providing Continuous Quotes***  (\*Market Maker Protection only applicable to Exchange Participant granted with it) |  |
| 12.1 Tester can retrieve the parameters setting via query (DQ87) | □ □ |
| 12.2 The Exchange changes one of the MMP setting and the tester can identify the changes via broadcast (BU87) | □ □ |
| 12.3 Tester can use transaction to change the “Quantity Protection quantity”, “Delta Protection quantity”, “Exposure Limit Time Interval” and “Quotation Frozen time” (DC87) | □ □ |
| 12.4 Tester places quotes with MO37/MO96 for 120 series each with 30 lots on both sizes. When Exchange executes the quotes with equal or exceed the protection amount, the remaining quotes will be removed automatically. The tested OAPI program will not be logout automatically and able to identify which underlying has MMP triggered (handling of BO5 and BO38). | □ □ |
| 12.5 During the “Quotation Frozen time” period, tester tries to issue quotes and the quotes will be rejected by HKATS | □ □ |
| 12.6 During the “Quotation Frozen Time” period, tester tries to issue limit order via MO31 and the order can be successfully issued (optional for MM program that will use MO31 only) | □ □ |
| 12.7 During the “Quotation Frozen Time” period, tester reset the MMP setting again (without changes the parameter) and then issue quotes (MO37/MO96). | □ □ |
| 12.8 Tester place quotes with MO37/MO96 for 120 series each with 30 lots on both sizes on the three classes. The Exchange executes the quotes with equal or exceeds the protection amount for all the three classes. The tested OAPI program will not be logout automatically and able to identify which underlying has MMP triggered (handling of more than one MMP triggering). | □ □ |

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| ***13. Holiday Trading (DQ18 & DA18)*** |  |
| 13.1 Tester can retrieve a list of non-trading days of DHT futures (Market Code:129; Commodity Code: 6101) via DA18 after issuing a DQ18. | □ □ |
| 13.2 Tester can identify the respective dates of non-trading days via date\_non\_trading\_s field. | □ □ |
| 13.3 Tester can identify whether the respective dates are close for trading, settlement or clearing respectively via closed\_for\_trading\_c, closed\_for\_settlement\_c or closed\_for\_clearing\_c fields. | □ □ |
| 13.4 Tester place MO31 orders in products from both holiday market and non-holiday market. Orders for products in holiday market should be rejected. | □ □ |

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| ***Functionality*** | ***Successful***  Yes No |
| ***14. Weekly Options*** |  |
| * 1. Input MO31 orders to Weekly Options (e.g. HSI Weekly Options; Market Code:39):  1. Buy HSI Weekly Call Options (e.g. HSI30000D8W27) (Price 100, Quantity 1) with “validity” set to day and “exch\_order\_type\_n” set to 0 2. Sell HSI Weekly Call Options (Price 101, Quantity 2) with “validity” set to Good-Till-Cancel and “exch\_order\_type\_n” set to 2048 (only if system support GTC orders) 3. Buy HSI Weekly Put Options (e.g. HSI30000P8W27) (Price 80, Quantity 3) with “validity” set to Good-Till-Cancel and “exch\_order\_type\_n” set to 0 (only if system support GTC orders) 4. Delete order i) and Alter order ii) via MO4 and MO33 (only if system support MO33) respectively. 5. Exchange executes one of the orders, tester confirms outstanding orders and trade details via BO5 and BD6 respectively. | □ □ |
| * 1. Input MO37/MO96 Quotes to Weekly Options: (only if system support MO37/MO96)  1. HSI Weekly Call Options (Bid Price 200 Quantity 1 Ask Price 205, Quantity 1) 2. HSI Weekly Put Options (Zero Bid, Ask Price 300, Quantity 2) 3. Delete Quote i) and Alter Quote ii) via MO4/MO37/MO96 and MO37/MO96 respectively. | □ □ |
| * 1. Input Trade Reports to Weekly Options: (only if system support MO75/MO76/MO77)  1. Enter T1 (MO76) on HSI Weekly Call Options 2. Enter T2 (MO77) on HSI Weekly Call Options 3. Enter T4 (MO75) on HSI Weekly Put Options | □ □ |
| * 1. Handle Quote Request of Weekly Options: (only if system support MO51/MI4)  1. Issue Quote Request (MO51) on HSI Weekly Call Options 2. Exchange Sends a Quote Request on any HSI Weekly Put Options. Tester should identify the series that is requested via MI4. | □ □ |
| * 1. Tester uses DC3 with net\_price pricing method to create a TMC series with Weekly Options and input order in that new TMC in same time (via MO31/MO37) (only if system support DC3) | □ □ |

Fax : (852)25090724 / (852)28770017(To be issued by the Exchange)

##### Appendix C

Email : [hkatssupport@hkex.com.hk](mailto:hkatssupport@hkex.com.hk)

**Results of HKATS OAPI Certification Test**

**(HKATS Upgrade 1.0.1)**

Exchange Participant : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Contact Person : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Phone : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

E-Mail : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Test Date : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Program Name & Version : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

By signing below, we consent to the processing of personal data in accordance with the Privacy Policy Statement.

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Signature of Tester Authorized Signature

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Name of Signatory Name of Signatory

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Date

Ref: 180911

Program Name & Version : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Developed by :\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Exchange Library Used : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Test Date : \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Type of program: Market Making (Existing / New )

Trading (Existing / New )

### Market Data Source: Orion Market Data Platform – Derivatives Market (OMD-D)

### Information Service Vendor: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

### Not Applicable

Version number of Operating System used by the OAPI program:  ***\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_***

Please indicate the results of the OAPI certification test by putting a “X” in the appropriate boxes.

| **Functionality** | **Completed** | **Not Applicable** | **Remark** |
| --- | --- | --- | --- |
| **1. Basic Functions for all types of program** |  |  |  |
| 1.1.1 Program and version defined in the Program |  |  |  |
| 1.1.2 Library verification |  |  |  |
| 1.2 Change of expired Login Password |  |  |  |
| 1.3 Connection Status |  |  |  |
| 1.3.1 Connection is not disconnected after 15 minutes’ idle time |  |  |  |
| 1.3.2 Login status (on/off) - subscribe Price Information Heartbeat Broadcast and poll it in regular interval |  |  |  |
| 1.3.3 Restriction on re-login for 10 or more consecutive login failure attempts |  |  |  |
| 1.3.4 Login request time interval for 1 minute |  |  |  |
| 1.3.5 Wait for at least 1 second after login, before initiating the first transaction or query |  |  |  |
| 1.3.6 Load test on series update |  |  |  |
| 1.3.7 Connection is not disconnected when Exchange suspends or resumes 10 stocks underlying |  |  |  |
| 1.4 Polling interval for any transactions which involve Read Events (Broadcast Messages) - polling interval is \_\_\_\_\_\_\_\_\_\_\_\_\_ milliseconds |  |  |  |
| 1.5 Get the message code and text description for any transactions which provide completion and /or transaction status |  |  |  |
| 1.6 Normal Logout |  |  |  |
| 1.7 Receive Market Message (BI81) |  |  |  |
| 1.7.1 Message priority |  |  |  |
| 1.7.2 Message subject |  |  |  |
| 1.7.3 Message content |  |  |  |
| 1.7.4 Market / Market code (optional) |  |  |  |
| 1.8 Confirmation on real-time addition of instrument series and TMC series |  |  |  |
| 1.8.1 Confirmation on newly added instrument series by BU124 and TMC series by BU124 and BU126 |  |  |  |
| 1.8.2 Get the TMC definition of newly added series by BU126 and existing series by DQ126 |  |  |  |
| 1.8.3 Handling of delist of TMC series |  |  |  |
| 1.9 Market Status (BI41 & DQ29) |  |  |  |
| 1.10 Get expiration date and last trading time of a series |  |  |  |
| 1.11 Resumption and suspension of Trading |  |  |  |
| 1.12 Other best programming practices: utilize instrument class level information , handling extended 5 Underlying Code, set correct compression value, and not to interpret the OMex version |  |  |  |
| 1.13 Volatility Control Mechanism (VCM) |  |  |  |
|  |  |  |  |
| **2. Core Functions for Market Making and Trading program(s)** |  |  |  |
| 2.1 Confirm own executed trades with the following information by BO5 & BD6 |  |  |  |
| 2.1.1 Trade number (BD6 only) |  |  |  |
| 2.1.2 Instrument Series |  |  |  |
| 2.1.3 Premium & Quantity |  |  |  |
| 2.1.4 Order number |  |  |  |
| 2.1.5 Match ID |  |  |  |
| 2.2 Price and Quantity Deviation |  |  |  |
| 2.3 Cross Modification |  |  |  |
| 2.3.1 Order Execution during Alternation in Quantity |  |  |  |
| 2.3.1.1 Alert message |  |  |  |
| 2.3.1.2 Orders updated accordingly |  |  |  |
| 2.3.2 Order Execution during Cancellation |  |  |  |
| 2.3.2.1 Alert message |  |  |  |
| 2.3.2.2 Orders updated accordingly |  |  |  |
| 2.4 Confirm outstanding orders after the Exchange deletes some order(s) (BO5/MQ8) |  |  |  |
| 2.5 Pre-Trade Risk Management (PTRM) rejection message code verification |  |  |  |
| 2.6 Handling Additional Trade Confirmation Message (BD6) for clearing transactions |  |  |  |
| 2.6.1 Pre-Opening Session (For program with Give Up order functionality only) |  |  |  |
| 2.6.1.1 Give Up(to CCCC) and take up Auction Order |  |  |  |
| 2.6.1.2 Give Up (to CCCC) and take up Limit Order |  |  |  |
| 2.6.2 Normal Trading Session |  |  |  |
| 2.6.2.1 Split trade |  |  |  |
| 2.6.2.2 Change free text |  |  |  |
| 2.6.2.3 Change account |  |  |  |
| 2.6.2.4 Solely trade rectification |  |  |  |
| 2.6.2.5 Give Up to CCCC |  |  |  |
| 2.6.2.6 Take Up |  |  |  |
| 2.6.2.7 Average Price Trade |  |  |  |
| 2.6.2.8 Transfer trade from DA a/c |  |  |  |
| 2.6.2.9 Cancellation of trade |  |  |  |
| 2.6.2.10 Position Netting |  |  |  |
| 2.6.2.11 Position Transfer |  |  |  |
| 2.7 Market Making and/or Trading Program Participating in After-Hours Trading (AHT) |  |  |  |
| 2.7.1 Orders, Trades and Price Information Confirmation (BO5, CQ10, CQ68, MO31, MQ8 & BD6) in T day |  |  |  |
| 2.7.2 Orders and Trades Confirmation (CQ68, MQ8 & CQ10) in T +1 Day |  |  |  |
| 2.8 Handling last trading time (LTT) during in After-Hours Trading (AHT) |  |  |  |
| 2.8.1 Trade execution in expiring spot series with last trading time during AHT session |  |  |  |
| 2.8.2 Order actions in expiring spot series with last trading time during AHT session |  |  |  |
| 2.8.3 Verification of ‘End of Trading’ flag |  |  |  |
| 2.9 Trading Halt Mechanism (THM) in After-Hours Trading (AHT) |  |  |  |
|  |  |  |  |
| **3. Core Functions for Market Making Program (All quotes for market making are calculated by the program itself)** |  |  |  |
| 3.1 Send quotes for instrument series and TMC series by MO37 and / or MO96 (with account type field specified) |  |  |  |
| 3.2 Replace quotes (with account type field specified) by:  MO37 (for instrument series and TMC series)  MO96 (for instrument series only) |    |    |  |
| 3.3 Bulk and individual cancellation of quote(s) by  MO37 (Individual cancellation)  MO96 (Individual cancellation)  MO4 (Bulk and Individual cancellation) |      |      |  |
| 3.4 Receive Quote Request for existing instrument series and TMC series by MI4 |  |  |  |
| 3.5 Send out zero-bid quote for out-of-money series  MO37  MO96 |    |    |  |
| 3.6 Handling real-time addition of instrument series and TMC series  3.6.1 Placement of quotes by MO37 / MO96  3.6.2 Receive quote request (MI4)  3.6.3 Detailed retrieval of executed order by BO5 and BD6 |      |      |  |
| 3.7 Core Functions for Market Making Program Participating in After-Hours Trading (AHT) |  |  |  |
| 3.7.1 Enter quotes with MO37/MO96 in OPEN State |  |  |  |
| 3.7.2 Handle quotes removed by HKATS before AHT session |  |  |  |
| 3.7.3 Enter quotes with MO37/MO96 in AHT\_OPEN State |  |  |  |
| 3.7.4 Enter quotes with MO37/MO96 in AHT\_OPEN\_PL State |  |  |  |
| 3.7.5 After mid-night, tester enters quotes with MO37 / MO96 |  |  |  |
|  |  |  |  |
| **4. Core Functions for Trading Program** |  |  |  |
| 4.1 Input rest of day for existing instrument series and TMC series by MO31 (with account type field specified) |  |  |  |
| 4.2 Cancellation of orders on existing instrument series and TMC series |  |  |  |
| 4.3 Handling real-time addition of instrument series and TMC series  4.3.1 Placement of MO31 rest of day order  4.3.2 Detailed retrieval of executed order by BO5 and BD6 |    |    |  |
|  |  |  |  |
| **5. Change order (MO33)** |  |  |  |
|  |  |  |  |
| **6. Create and trade Tailor-Made Combination(DC3)** |  |  |  |
| 6.1 & 6.2 Create net price TMC together with order/quote input |  |  |  |
| 6.3 Reject TMC creation if no order/quote input |  |  |  |
| 6.4 DC3 without pricing method specified should be rejected. |  |  |  |
|  |  |  |  |
| **7. Special Order Placement (with account type field specified)** |  |  |  |
| 7.1 Input and alteration of Auction Order |  |  |  |
| 7.2 Good Till Date |  |  |  |
| 7.3 Good Till Cancel |  |  |  |
| 7.4 Execution with FAK |  |  |  |
| 7.5 Execution with FOK |  |  |  |
| 7.6 Give-Up Order |  |  |  |
| 7.7 Order Position (open / close) |  |  |  |
|  |  |  |  |
| **8. Trade Report** |  |  |  |
| 8.1 T1 - Internal Trade Report (MO76) |  |  |  |
| 8.2 T2 - Combo Trade Report (MO77) |  |  |  |
| 8.3 T4 - Interbank Trade Report (MO75) |  |  |  |
| 8.3.1 Unmatched Own T4 Trade Report Deletion (MO74) |  |  |  |
| 8.3.2 Query Unmatched Own T4 Trade Report (MQ78) |  |  |  |
| 8.3.3 Query Unmatched T4 Trade Report as counterparty (MQ80) |  |  |  |
|  |  |  |  |
| **9. Get other user order book changes under the same customer (BO5)** |  |  |  |
|  |  |  |  |
| **10. Issuing Quote Request (MO51) (Maximum of 1 Quote Request per second)** |  |  |  |
|  |  |  |  |
| **11. Receiving Quote Request (MI4)** |  |  |  |
|  |  |  |  |
| **12. Market Maker Protection (MMP) for Market Makers Providing Continuous Quotes** |  |  |  |
| 12.1 Tester can retrieve the parameters setting via query (DQ87) |  |  |  |
| 12.2 The Exchange changes one of the MMP setting and the tester can identify the changes via broadcast (BU87) |  |  |  |
| 12.3 Tester can use transaction to change the “Quantity Protection quantity”, “Delta Protection quantity”, “Exposure Limit Time Interval” and “Quotation Frozen time” (DC87) |  |  |  |
| 12.4 The program able to identify which underlying has MMP triggered and keeps normal (BO5 and BO38). |  |  |  |
| 12.5 Quotes will be rejected during the “Quotation Frozen time” period |  |  |  |
| 12.6 Order can be successfully issued during the “Quotation Frozen Time” period (optional for MM program that will use MO31 only) |  |  |  |
| 12.7 Reset the MMP setting (without changes the parameter) and issue quotes during the “Quotation Frozen Time” period. |  |  |  |
| 12.8 MMP has been triggered in three classes, the program is able to identify which underlying has MMP triggered and remains normal (handling of more than one MMP triggering). |  |  |  |
|  |  |  |  |
| **13. Holiday Trading (DQ18 and DA18)** |  |  |  |
| 13.1 Retrieve a list of non-trading days of HSI futures and options via DA18 after issuing a DQ18. |  |  |  |
| 13.2 Tester can identify the respective dates of non-trading days via date\_non\_trading\_s field. |  |  |  |
| 13.3 Tester can identify whether the respective dates are close for trading, settlement or clearing respectively. |  |  |  |
| 13.4 Tester place MO31 orders in products from both holiday market and non-holiday market. Orders for products in holiday market should be rejected. |  |  |  |
|  |  |  |  |
| **14. Weekly Options** |  |  |  |
| 14.1 Place orders on HSI weekly options. |  |  |  |
| 14.2 Place MO37/MO96 quotes on HSI weekly options. |  |  |  |
| 14.3 Place Trade Reports on HSI weekly options. |  |  |  |
| 14.4 Handle QR for HSI weekly options. |  |  |  |
| 14.5 Create TMC for HSI weekly options. |  |  |  |
|  |  |  |  |
| A. Index Products (Index Futures and Options) |  |  |  |
| B. Index Products (Flexible Index Options) |  |  |  |
| C. Equity Products (Stock Futures) |  |  |  |
| D. Equity Products (Stock Options) |  |  |  |
| E. Currency Products |  |  |  |
| F. Interest Rate and Fixed Income Products |  |  |  |
| G. Commodities Products |  |  |  |
|  |  |  |  |
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