

January 2020

**NGRM
BRIEFING & WORKSHOP**

HKEX
香港交易所



1. PREPARATION & READINESS

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AGENDA

- 1 What is NGRM ?
- 2 Tentative Schedule
- 3 Key Activities
- 4 Tentative Daily Flow & Operational Highlights
- 5 Margin Simulation
- 6 Technical Setup
- 7 Upcoming Activities & Important Information



What is NGRM ?

New Infrastructure

CCASS

Decommission risk functions to NGRM

NGRM

- Single risk engine for risk monitoring & calculation for **ALL** markets, *i.e. Hong Kong, Shanghai & Shenzhen markets*
- Initial Margin, *applicable to Hong Kong market only* :
flat margin rate → portfolio margining
- Stress Testing for Default Fund (DF), *applicable to Hong Kong market only* :
same scenarios for ALL → multiple product-specific scenarios per security

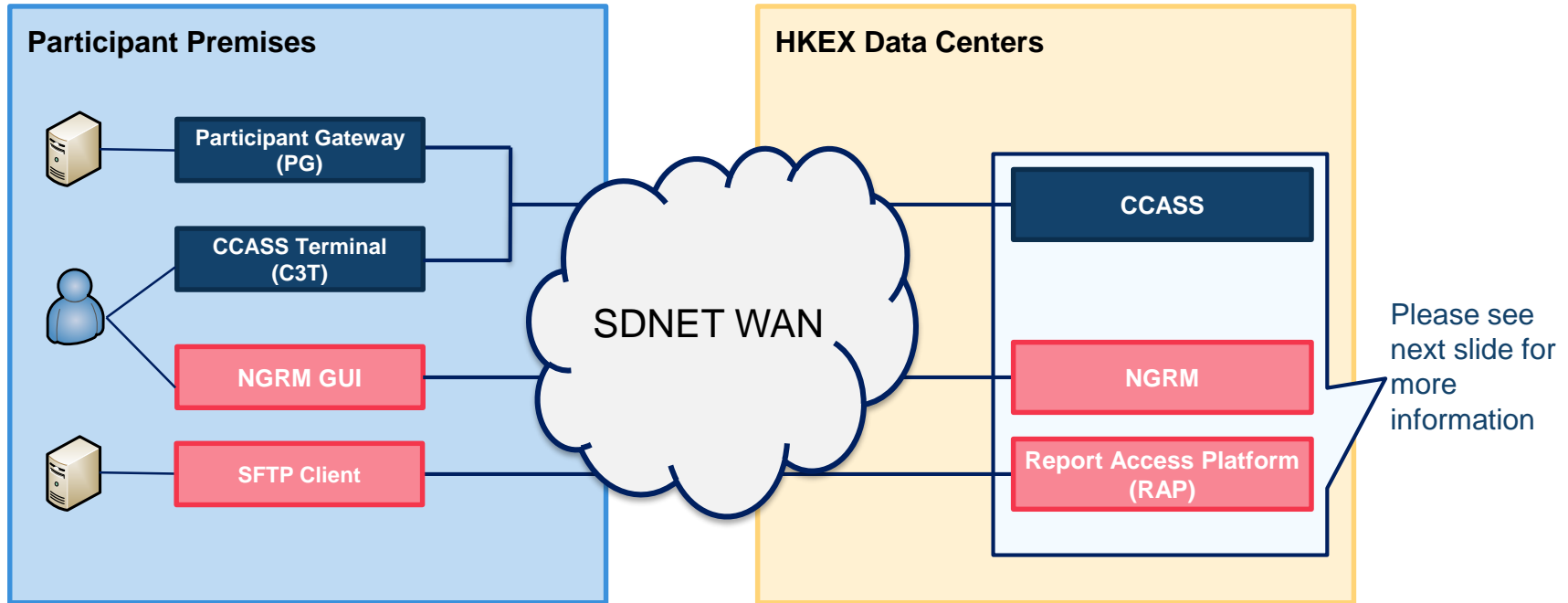
Report Access Platform (RAP)

Centralised report platform for retrieval of NGRM reports & data files



What is NGRM ?

- Infrastructure

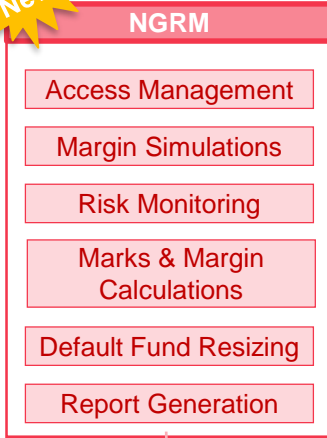


Existing Setup

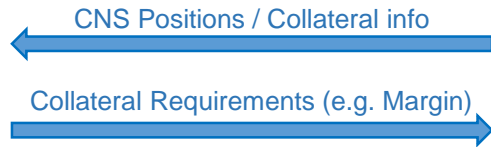
NGRM Setup

What is NGRM ?

- Overview



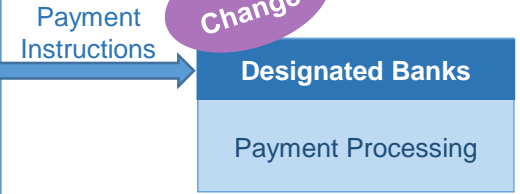
new single risk engine for risk monitoring & risk exposure calculation



Report Access Platform
new secure file transfer protocol (sftp) facility for retrieving NGRM reports & data files



- Shift risk functions to NGRM
- Conduct collateralization based on risk calculation result from NGRM and then proceed to payment collection



What is NGRM ?

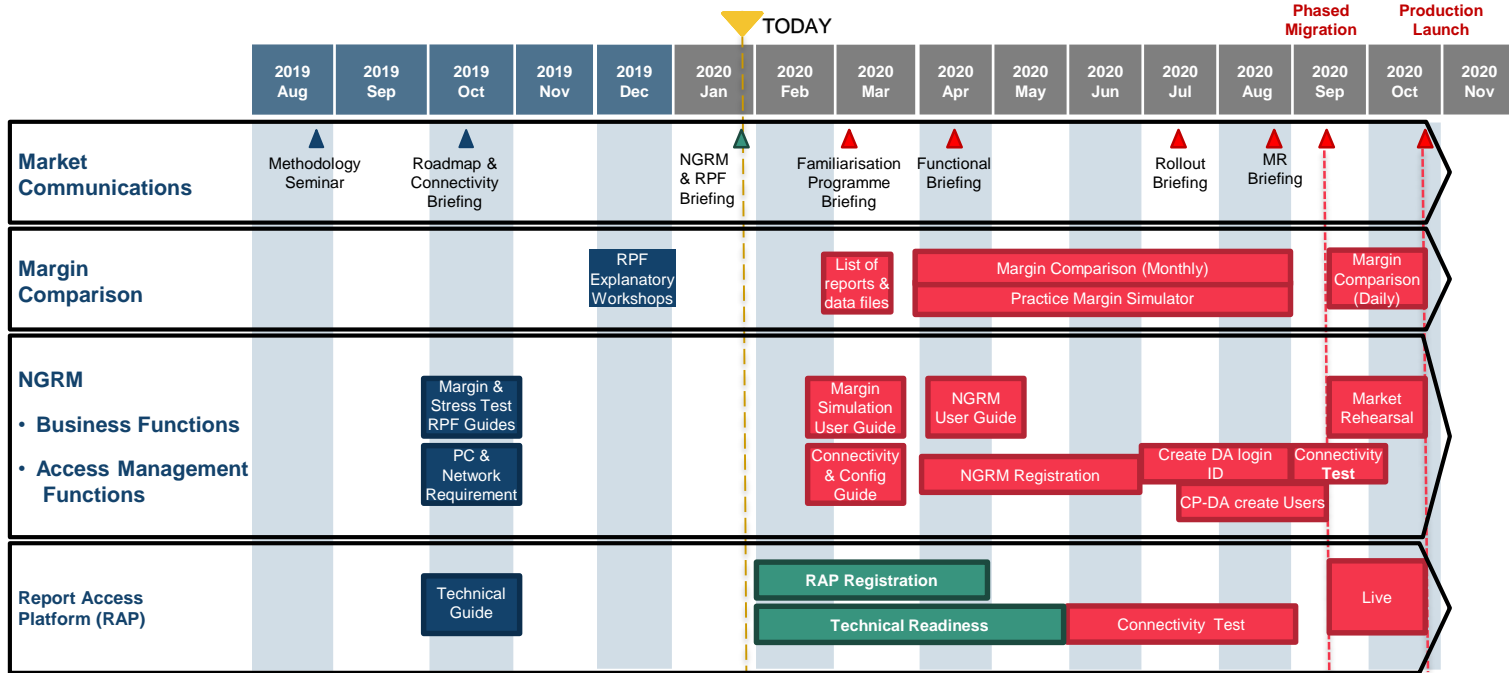
- Changes

Major Changes	<ul style="list-style-type: none"> - new Risk Model for HKSCC, <i>applicable to Hong Kong Securities only</i> - change the existing flat rate margining to portfolio margining: <ul style="list-style-type: none"> - based on individual stock volatility - allow risk offset among selected stocks 	
Functional Changes	CCASS	<ul style="list-style-type: none"> - shift risk collateral requirement calculation¹ (e.g. margin) to NGRM - continue to generate payment obligations reports
	NGRM	<ul style="list-style-type: none"> - new online views/functions : margin simulation, enquiry of position data & margin data - new reports : risk collateral requirements and risk data files (e.g. RPFs)
	RAP	<ul style="list-style-type: none"> - new facility : for retrieval of new NGRM reports & data files via secured file transfer protocol (sftp)

1. Key risk collaterals are Marks, Margin, Guarantee Fund, Mainland Settlement Deposit and Mainland Security Deposit.



Tentative Schedule



Dec 2019
Risk Parameter File (RPF) Workshops

Mar 2020
Impact Analysis Reports

Mar - Aug 2020
Margin Comparison Reports

Mar - Aug 2020 (3-6 months)
Practice Margin Simulator

Sep - Oct 2020 (1 month)
Phased Migration Approach

Completed In Progress Planned



Key Activities for the launch

More details on the Familiarisation Programme in March 2020

Clearing, settlement and operations

Target group:
Operations

Key activities:

- Thorough understanding on new and modified risk and payment reports for updating operational workflow
- Get familiarized with functionalities of NGRM (e.g. margin simulator)
- Understand margin impact of new model (e.g. via margin comparison reports)

Technology

Target group:
IT, vendors, system service providers

Key activities:

- Reconfigure & setup Report Access Platform (RAP) & NGRM
- Modify/develop BOS, if required

Risk model simulation

Target group:
CPs using RPF to estimate margin

Key activities :

- In-depth study on Initial Margin Calculation Guide
- Attend RPF Workshop
- Develop own margin simulation & risk management tools

Funding preparation

Target group:
Treasury, payment operations

Key activities:

- Thorough understanding on new and modified payment reports for updating internal funding workflow
- Understand margin impact of new model (e.g. via margin comparison reports)



Tool:
Online video

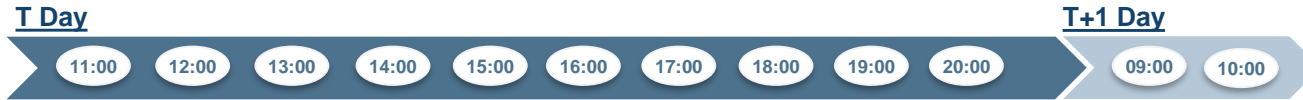
Support: Dedicated hotline and email

Information: Latest materials on HKEX website

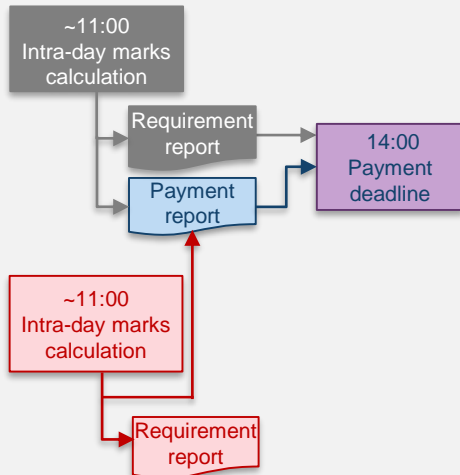
Phased Migration Approach: Initial phase with technical ready only, business launch upon full migration



Tentative Daily Flow – Marks & Margin in Hong Kong Market

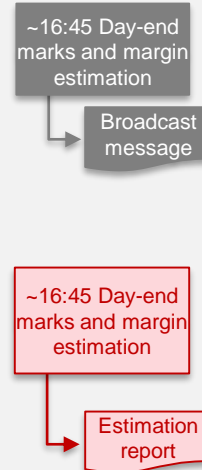


Intra-day Marks Calculation & Collection

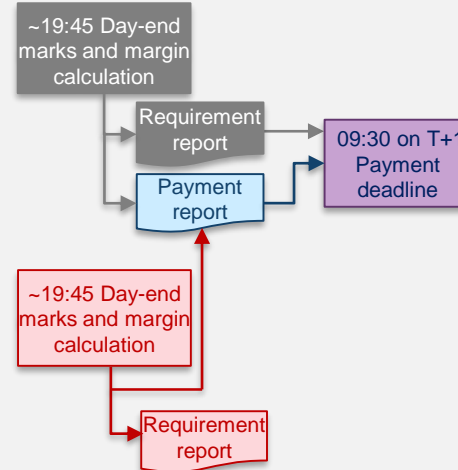


Day-end Marks and Margin

Estimation



Calculation & Collection



Note: The estimation is calculated based on margin scenarios generated on T-1 which will be refreshed at around 19:00 for day-end calculation. CPs are advised to add a buffer for funding preparation.

To be obsolete
To be newly introduced
To be enhanced
No change

Modified

CCASS

New

NGRM

New

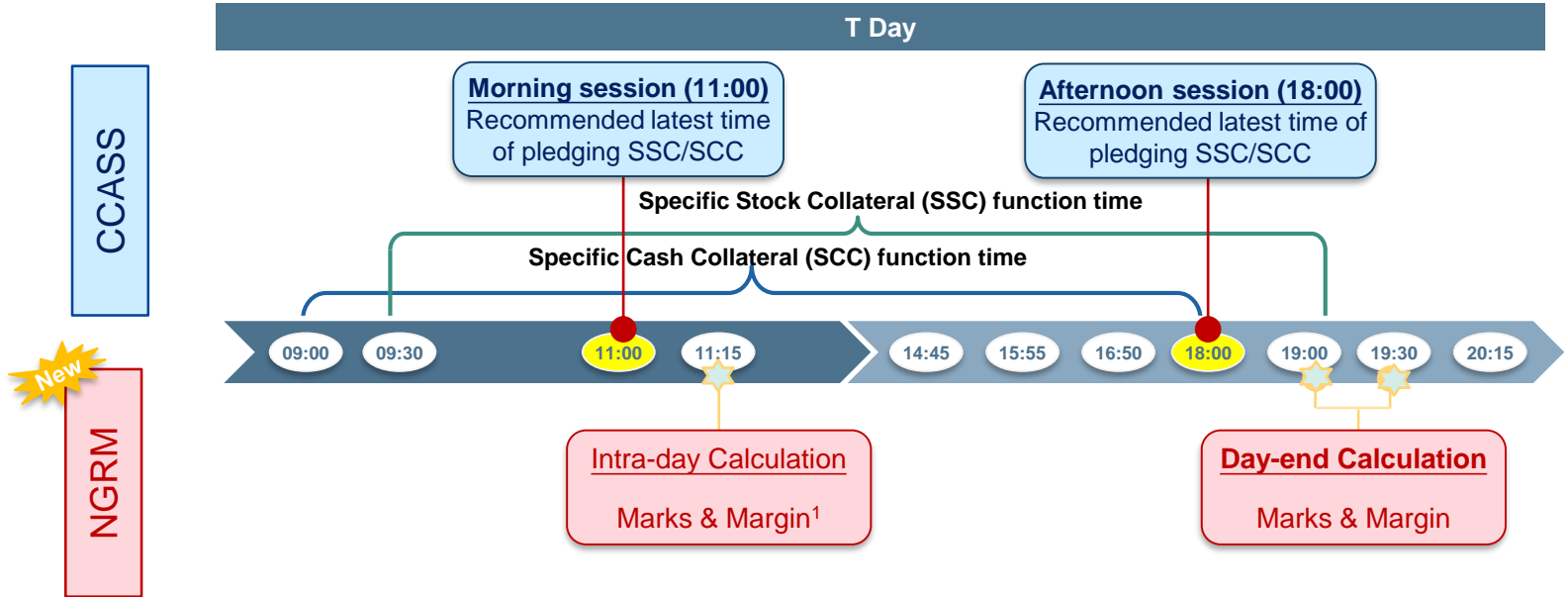
RAP

Risk calculation and risk specific reports migrate to NGRM and RAP respectively but payment reports and processing remain unchanged in CCASS



Tentative Daily Flow

- Specific Stock Collateral (SSC) & Specific Cash Collateral (SCC)



SSC/SCC reduces margining positions and the covered CNS position will be exempted from the Marks & Margin calculation if posted before the cut-off time

1. Intra-day Margin for Holiday will only be collected on the day before long holiday

Operational Highlights under NGRM

Funding Projection

CPs' IM and DF requirements can fluctuate as they are calculated based on the risk of CPs' portfolios

Mitigating measures provided by HKSCC

- 1 Margin simulation tools (see later slides)**
 - Facilitate CPs' internal processes related to risk control and margin estimation
 - Allow CPs to replicate and simulate margin requirement for existing portfolios and hypothetical trades
 - Practice Session will be provided for CPs before official launch
- 2 Specific Stock Collateral (SSC) and Specific Cash Collateral (SCC)**
 - CNS stock positions covered by SSC or SCC are exempted from margin calculation
- 3 Margin and DF credit will continue**
 - No change in current HK\$5 million margin credit and HK\$1 million DF credit

Other operational processes remain the same

- Relevant settlement reports (based on new margin requirement) will still be available via existing CCASS
- Timing of most existing operations remain unchanged
- Excess margin is refunded at day-end when exposure is reduced (i.e. upon settlement)



Margin Simulation

Basic	Advance
<p>NGRM</p> <p>To <i>enquire</i></p> <ul style="list-style-type: none">(1) estimated margin requirement based on price & positions <p>To <i>simulate</i> margin requirements based on</p> <ul style="list-style-type: none">(1) own portfolio(2) hypothetical trades	<p>Risk Parameter File (RPF)</p> <p>To replicate the margin calculation and estimate margin requirements based on</p> <ul style="list-style-type: none">(1) own portfolio(2) hypothetical trades(3) client portfolios

Subject to own business needs, to facilitate CP to conduct margin simulation & replicate the margin calculation with (1) NGRM Only or (2) Risk Parameter File (RPF)




Technical Set Up – 3 options

	<u>Option 1</u> Minimum Setup use existing C3T for RAP ¹	<u>Option 2</u> Basic Setup use existing C3T for RAP ¹ & NGRM	<u>Option 3</u> Advance Setup acquire new PC for RAP ¹ & NGRM
Feature	Existing CCASS access + (NEW) RAP	Existing CCASS access + (NEW) RAP & NGRM	
Hardware	Existing C3T		Existing C3T + NEW PC
Software	<ul style="list-style-type: none"> • Upgrade existing C3T to Win10 & associated JRE version • Update PC Domain Name Server (DNS) Setting • Install SFTP client for RAP¹ & Chrome for NGRM 		
Network	Reconfigure existing SDNet to access new DNS, RAP & NGRM		

CP should start planning for the technical setup for your preferred Option accordingly



Upcoming Activities – tentative schedules

Event	Tentative Schedule
<ul style="list-style-type: none"> ✓ Technical setup for RAP & NGRM ✓ Submit registration form for Report Access Platform (RAP) 	 Feb 2020 onward
<ul style="list-style-type: none"> ✓ Study new & modified CCASS / NGRM reports & data files ✓ Study NGRM User Guide ✓ Attend Familiarisation Programme Briefing ✓ Register & participate in NGRM practice sessions 	Mar to Aug 2020
<ul style="list-style-type: none"> ✓ Attend Functional Briefing ✓ Submit registration form for NGRM 	Apr 2020
<ul style="list-style-type: none"> ✓ Verify RAP technical setup & connectivity ✓ Register & attend Rollout Preparation Briefing ✓ Study Rollout Package 	Jun / Jul 2020
<ul style="list-style-type: none"> ✓ Register & attend Market Rehearsal Briefing 	Aug 2020
<ul style="list-style-type: none"> ✓ Initial Phase Launch ✓ Register & participate in Market Rehearsal ✓ Official Business Launch 	Sep / Oct 2020



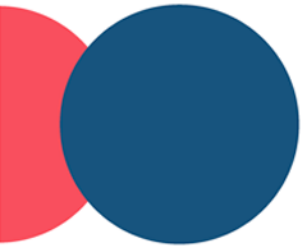
Important Information

NGRM related information & documents are available via designated NGRM web corner :

https://www.hkex.com.hk/Services/Next-Generation-Post-Trade-Programme/NextGen-Risk-Management?sc_lang=en

NGRM Related Documentations	
❖	Initial Margin Calculation Guide
❖	Stress Test Value Calculation Guide
❖	PC and Network Requirement
❖	HKSCC Report Access Platform (RAP) Registration Form
❖	HKSCC Report Access Platform (RAP) Technical Guide





APPENDIX

Appendix 1. PC Requirement for C3T, RAP & NGRM

	<u>Option 1</u> Use Existing C3T ¹ for RAP	<u>Option 2</u> Use Existing C3T ¹ for RAP & NGRM	<u>Option 3</u> Acquire new PC for RAP & NGRM
CPU	1GHz	2.4GHz or faster	
Memory	2GB	8GB	
HardDisk	20GB	22GB	
Operating System	Windows 10 Pro (64 bit)		
Browser	IE11	IE11 (for C3T) & Chrome (for NGRM)	
JRE	Java 8 update 211		N/A
Layered Software	Anti-virus software		
Bandwidth	1M	1M ²	



1. Clearing Participants (CP) should review their existing C3T setting to ensure it meets the minimum PC requirement
2. Minimum requirement, CP should assess and evaluate its own bandwidth requirement based on their business needs

Appendix 2. Key Set Up Requirements & Timeline

#	REF	Key Set Up Requirements	<u>Option 1</u> Use Existing C3T	<u>Option 2</u> Use Existing C3T for ALL	<u>Option 3</u> Acquire new PC for NGRM	Action by
1	N	Reconfigure SDNet routing to access NGRM functions & reports	Required & by Apr 2020*			Network Vendors
2	SW	Update PC Domain Name Server (DNS) Setting to access NGRM functions & reports	Required & by Apr 2020*		New PC <i>(follow latest DNS setting)</i>	PC Vendors/ Participants
3	SW	Install SFTP client for NGRM report download <i>(follow Report Access Platform Technical Guide)</i>	Required & by May 2020*			Participants
4	SW/HW	Upgrade existing C3T to Win10 & associated JRE version <ul style="list-style-type: none"> Win7 end of support in mid Jan 2020 NGRM supports Win 10 only 	Required & by Dec 2019		New PC <i>(running on Win10)</i>	PC Vendors/ Participants
5	SW	Install Chrome to access NGRM functions	N/A	Required & by Aug 2020		Participants

Report Access Platform Connectivity Test will available from June 2020



N: Network related; **SW:** PC Software related; **HW:** PC Hardware related

*Dates are indicative only

Appendix 3. To be Obsolete CCASS Reports – Marks & Margin

To be Obsolete CCASS Reports	
Report ID	Report Name
CFIPM01	Marks and Collateral Collection Report
CRMIM01	Intra-day Marks and Collateral Collection Report
CRMMG01	Intra-day Margin Payable Report
CRMMG02	Margin Payable Report
CRMAC01	Additional Cash Collateral Payable Report
CRMNP01	NCP Marks Projection Report (intra-day)
CRMNP02	NCP Marks Projection Report (day-end)
CRMNP03	NCP Margin Projection Report (intra-day)
CRMNP04	NCP Margin Projection Report (day-end)



New NGRM Reports available via Report Access Platform (RAP)	
Report ID	Report Name
RMAMP01	Marginable Position Report
RMAMR01	MTM and Margin Requirement Report
RMAMR03	MTM and Margin Requirement Report _Summary Version
RMASP01	Series Prices Report
RPF01	Initial Margin Risk Parameter File
DWH0081C	Daily Participant Margin Multiplier Report

Appendix 4. To be Obsolete CCASS Reports – Guarantee Fund

To be Obsolete CCASS Reports	
Report ID	Report Name
GFR608	Statement of Guarantee Fund Contributions
GFR616	NCP(s) Guarantee Fund Contribution Projection By Position
GFR806	Guarantee Fund Risk Collateral Requirement Report



New CCASS Reports available via CCASS	
Report ID	Report Name
CCMDF02	Statement of Default Fund Contributions

New NGRM Reports available via Report Access Platform (RAP)	
Report ID	Report Name
RMADF01	Default Fund Requirement Report
RMAMR01	MTM and Margin Requirement Report*
RMAMR03	MTM and Margin Requirement Report_Summary Version*
RMAST01	Stress Testing Report
RPF02, RPF03 & RPF04	Stress Testing Risk Parameter Files

*Refer to "Default Fund Add-on" of the last report generated at around 20:30.



Appendix 5. To be modified CCASS Reports

To be modified CCASS Reports		
Report ID	Report Name	Description of Modification
CSEMA08 (intra-day)	Statement of Money Ledger	<ul style="list-style-type: none"> • Rename 'MARGIN & PENDING MARKS' account to 'MARKS & MARGIN' account • Remove 'OVERDUE POSITION MARKS' account • Modify the following money ledger descriptions <ul style="list-style-type: none"> - CL CCMS Marks & Margin SH for intra-day - CM CCMS Marks & Margin SH - XI Marks & Mgn Collection for Chinaclear SB - XJ Marks & Mgn Refund for Chinaclear SB - 81 Collection of Default Fund Contribution - 82 Refund of Default Fund Contribution - 92 Transfer from/to Marks & Margin A/C
CSEMS08 (day-end)		
CCMPY01 (intra-day)	Posting / Collateralisation Result Report	<ul style="list-style-type: none"> • Lists the ledger / obligations request, postings result and payment generation for each ledger / obligations activity • New section 'Preferred Single Settlement Currency Conversion Result' for conversion of contract currency to preferred single currency for payment collection, if applicable
CCMPY02 (day-end)		

No impact to data file format



Appendix 6. To be modified CCASS Reports (Cont'd)

To be modified CCASS Reports

Report ID	Report Name	Description of Modification
CRMSD01	Mainland Settlement Deposit Payable Report (Shanghai)	<ul style="list-style-type: none"> Removed the following info: <ul style="list-style-type: none"> - Buy Turnover in SH/SZ Securities - Overdue Short Position in SH/SZ Securities - SPSA Sell Turnover in SH/SZ Securities - Settlement Deposit Rate (SH/SZ) (%) - Minimum Amount - Monthly MSTD Requirement per last Monthly Review
CRMSD04	Mainland Settlement Deposit Payable Report (Shenzhen)	
CRMSD07	Intra-day Mainland Settlement Deposit Payable Report (Shanghai)	
CRMSD09	Intra-day Mainland Settlement Deposit Payable Report (Shenzhen)	
CRMGF01	Mainland Security Deposit Payable Report (Shanghai)	
CRMGF03	Mainland Security Deposit Payable Report (Shenzhen)	

New NGRM Reports available via Report Access Platform (RAP)



Report ID	Report Name
RMCNM01	Northbound MSTD Requirement Report



Report ID	Report Name
RMCNM03	Northbound MSCD Requirement Report





2. INTRODUCTION OF MARGIN SIMULATION BY USING RISK PARAMETER FILES

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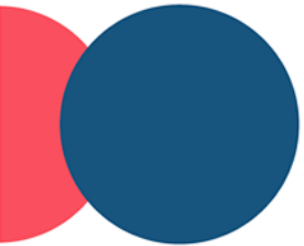
AGENDA

1 Major Math Operations

2 Overview of the Calculation Process

3 Calculation Example (3 Days)





MAJOR MATH OPERATIONS

Sample RPF(1)

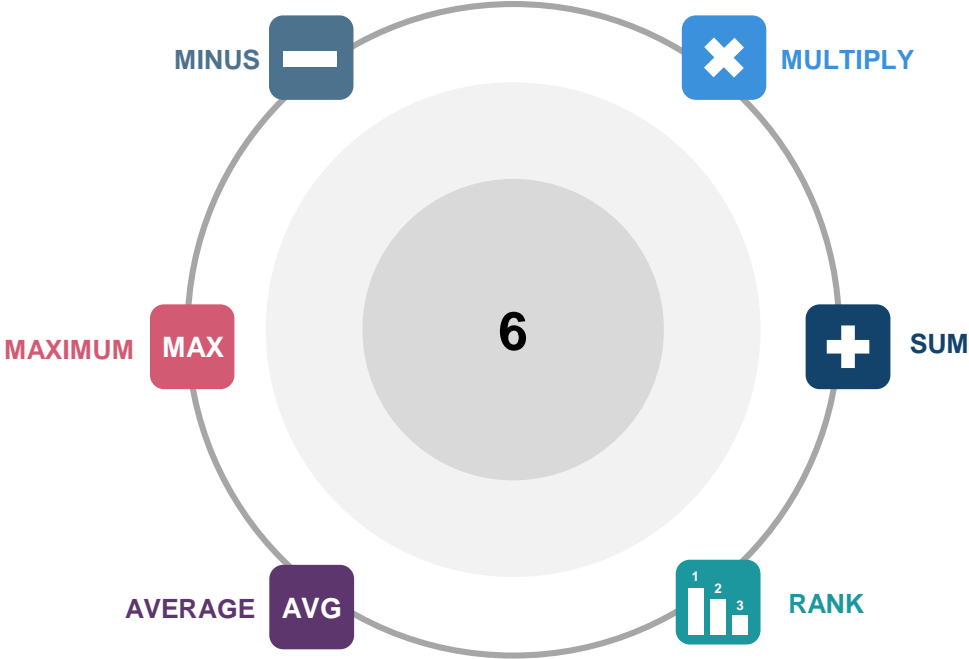
Valuation_DT	1/4/2019													
HVaR_WGT	0.75													
SVaR_WGT	0.25													
HVaR_Scen_Count	1000													
SVaR_Scen_Count	1018													
STV_Count	200													
HVaR_CL	0.994													
SVaR_CL	0.98													
HVaR_Measure	4													
SVaR_Measure	4													
Rounding	10000													
Holiday_Factor	0.7320508075													
InstrumentId	FieldType	1	2	3	4	5	6	7	8	9	10			
	700	1	0.01391	-0.01422	0.006132	0.006687	0.013556	0.01391	0.006132	0.006687	0.013556	0.013556	0.013556	0.013556
	1299	1	0.01125	0.008827	-0.00875	-0.003115	0.006901	0.01125	-0.00875	-0.003115	0.006901	0.006901	0.006901	0.006901
	1876	1	0.011128	-0.014789	0.006009	0.007356	0.015725	0.012936	0.005825	0.008292	0.00976	0.010167	0.010167	0.010167
	2823	1	0.011628	-0.003311	0.001658	-0.009852	-0.001639	0.011628	0.001658	-0.009852	-0.001639	-0.001639	-0.001639	-0.001639
	3690	1	0.012241	-0.016268	0.00661	0.008092	0.017298	0.01423	0.006408	0.009121	0.010736	0.011184	0.011184	0.011184
	26883	1	0.136461	-0.129264	0.034216	0.046343	0.134202	0.136462	0.034217	0.046342	0.134203	0.134203	0.134203	0.134203
	60954	1	-0.104288	-0.083417	0.0819	0.029439	-0.060245	-0.104288	0.0819	0.029439	-0.060245	-0.060245	-0.060245	-0.060245
	700	2	0.041026	0.092873	-0.067737	-0.030462	-0.000031	0.0406915	0.0406918	0.0406778	0.0406596	0.0406699	0.0406699	0.0406699
	1299	2	0.037588	0.048124	-0.042722	-0.042776	-0.000008	0.0372818	0.037268	0.0372632	0.0372858	0.0372862	0.0372862	0.0372862
	1876	2	0.040616	0.076156	-0.069769	-0.038382	-0.000035	0.028877	0.034181	0.034576	0.034561	0.04067	0.04067	0.04067
	2823	2	0.026217	0.043137	-0.036832	-0.031046	0.000021	0.0259822	0.0259914	0.0259828	0.025985	0.0259961	0.0259961	0.0259961
	3690	2	0.044678	0.083772	-0.076746	-0.04222	-0.000039	0.031765	0.037599	0.038034	0.038017	0.044737	0.044737	0.044737
	26883	2	0.254769	0.660324	-0.53648	-0.139819	-0.000034	0.2526511	0.2527275	0.2527227	0.2525469	0.2526738	0.2526738	0.2526738
	60954	2	-0.321378	-0.437447	0.399873	0.404237	0.000022	-0.318807	-0.318531	-0.318547	-0.318514	-0.318721	-0.318721	-0.318721
	658	3	0.12											
	3606	3	0.12											
	700	4	0.0022	0.9	30000000	500								
	1299	4	0.0025	1.1	10000000	80								
	1876	4	0.002	1.2	20000000	30								
	2823	4	0.002	1	25000000	30								
	2800	4	0.002	1	25000000	30								
	3690	4	0.0022	1.3	30000000	70								
	26883	5	700	0.0446	100	0.1784								
	60954	5	1299	-0.789588	100	-0.63167								
	26883	6	0.02	5										
DSP700		7	0.5	0.5										
DIV1299		7	1	0										
SRI3606		7	0	0.5										

Only simple calculations are needed using the parameters specified in the RPF



(1) In reality, RPF is released on each business day at around 20:00. However, it is assumed that the same sample RPF is applied throughout the illustration for simplicity. 27

Margin Calculation – Major Math Operations



Margin computation is using a combination of basic math operations only



Major Math Operations



MULTIPLY (Find the product of values)

- E.g. Market value of position \times Rate of return for each scenario⁽¹⁾ – *Portfolio Margin (Scenario Returns)*

Stock Code	Market Value	FieldType	Scenario 1	Scenario 2	...	Scenario 1,000
700	-250,000,000	1	0.01391	-0.01422	...	-0.000004

Stock Code	Market Value	FieldType	Scenario 1	Scenario 2	...	Scenario 1,000
26883	200,000	1	0.136461	-0.129264	...	0.000044



Stock Code	Market Value	FieldType	Scenario 1	Scenario 2	...	Scenario 1,000
700	-250,000,000	1	(3,477,500)	3,555,000	...	1,000

Stock Code	Market Value	FieldType	Scenario 1	Scenario 2	...	Scenario 1,000
26883	200,000	1	27,292	(25,853)	...	9



SUM (Add up the values)

- E.g. **Sum** the dollar scenario return per scenario – *Portfolio Margin (Scenario P/L for 2 positions)*

Stock Code	Market Value	FieldType	Scenario Return 1	Scenario Return 2	...	Scenario Return 1,000
700	-250,000,000	1	(3,477,500)	3,555,000	...	1,000
26883	200,000	1	27,292	(25,853)	...	9



Stock Code	Market Value	FieldType	Scenario P/L 1	Scenario P/L 2	...	Scenario P/L 1,000
700+26883	-249,800,000	1	(3,450,208)	3,529,147	...	1,009



RANK (Arrange the values in ascending order)

- E.g. **Rank** scenario P/L – *Portfolio Margin (Identification of Worst Scenarios)*

Scenario P/L 1	Scenario P/L 6	Scenario P/L 5	Scenario P/L 9	Scenario P/L 10	Scenario P/L 8	...	Scenario P/L 15
(3,450,208)	(3,450,208)	(3,362,160)	(3,362,159)	(3,362,159)	(1,662,482)	...	7,500,008

Worst
Best

(1) There are 1,000 scenarios for HVaR and 1,018 scenarios for SVaR.



Major Math Operations (Con't)

AVG

AVERAGE (Find the mean of the worst scenarios / weighted average as the case may be)

- E.g. **Average** the worst 6 scenarios – *Portfolio Margin (Expected Shortfall for HVaR)*

Scenario P/L	Scenario P/L	Scenario P/L	Scenario P/L	Scenario P/L	Scenario P/L	...	Scenario P/L
1	6	5	9	10	8	...	15
(3,450,208)	(3,450,208)	(3,362,160)	(3,362,159)	(3,362,159)	(1,662,482)	...	7,500,008

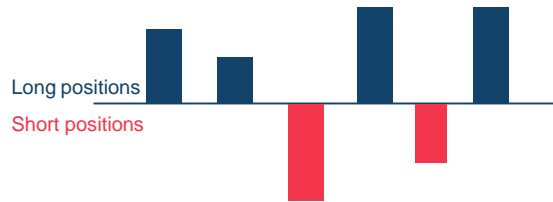


➔ Average = -3,108,229

MAX

MAXIMUM (Choose the higher value)

- E.g. **Max** (Market value of aggregated long positions, Market value of aggregated short positions) – *Flat Rate Margin (Market Value of Higher of Aggregated Long / Short Position)*



➔ Sum all positions by long or short

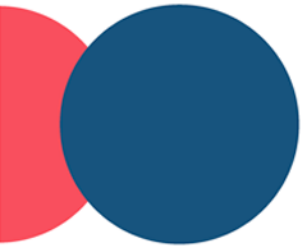
➔ Choose the higher of aggregated long / short positions

MINUS

MINUS (Find the difference between values)

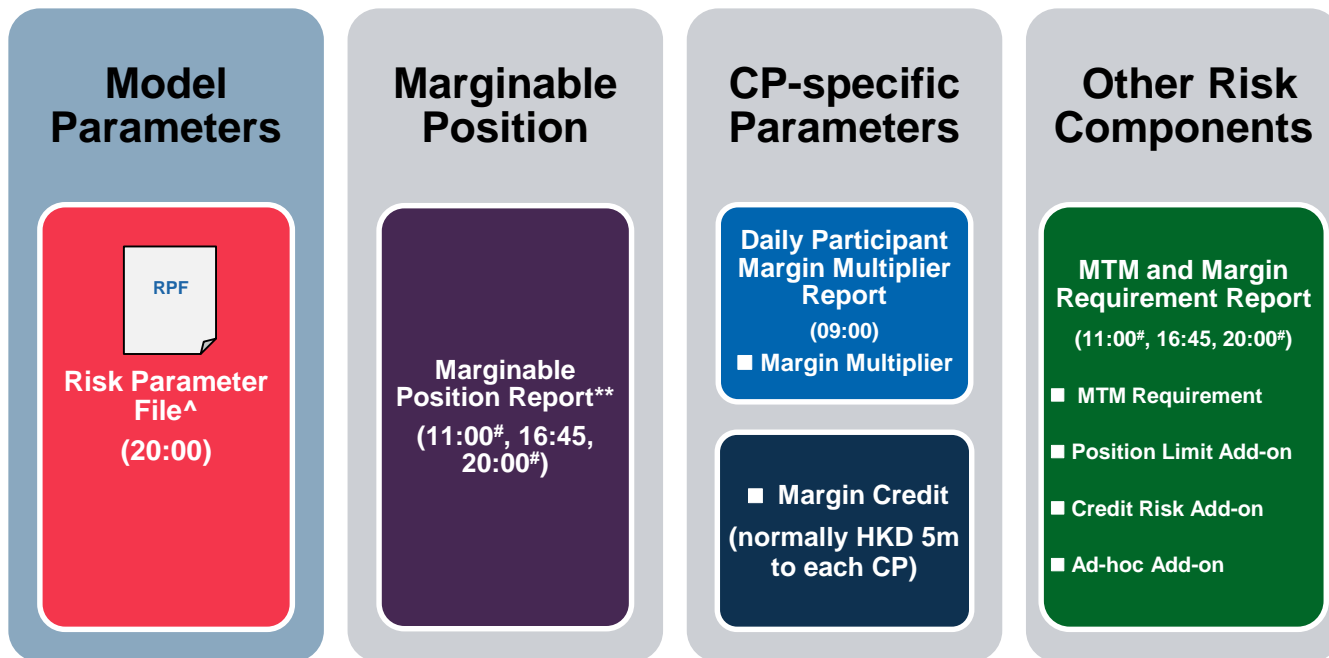
- E.g. Compare the **difference** between position and threshold – *Instrument-level LRA and Portfolio-level LRA*





OVERVIEW OF THE CALCULATION PROCESS

Advanced Method – Overview of the Calculation Process



All report available time is subject to NG system finalization.

Note (^): Model parameters will be based on previous-day RPFs for intra-day estimation.

Note (**): Position adjustments are needed if in-house settlement position is used for IM estimation.

Note (#): NCPs' information is only updated at 11:00 and 20:00.

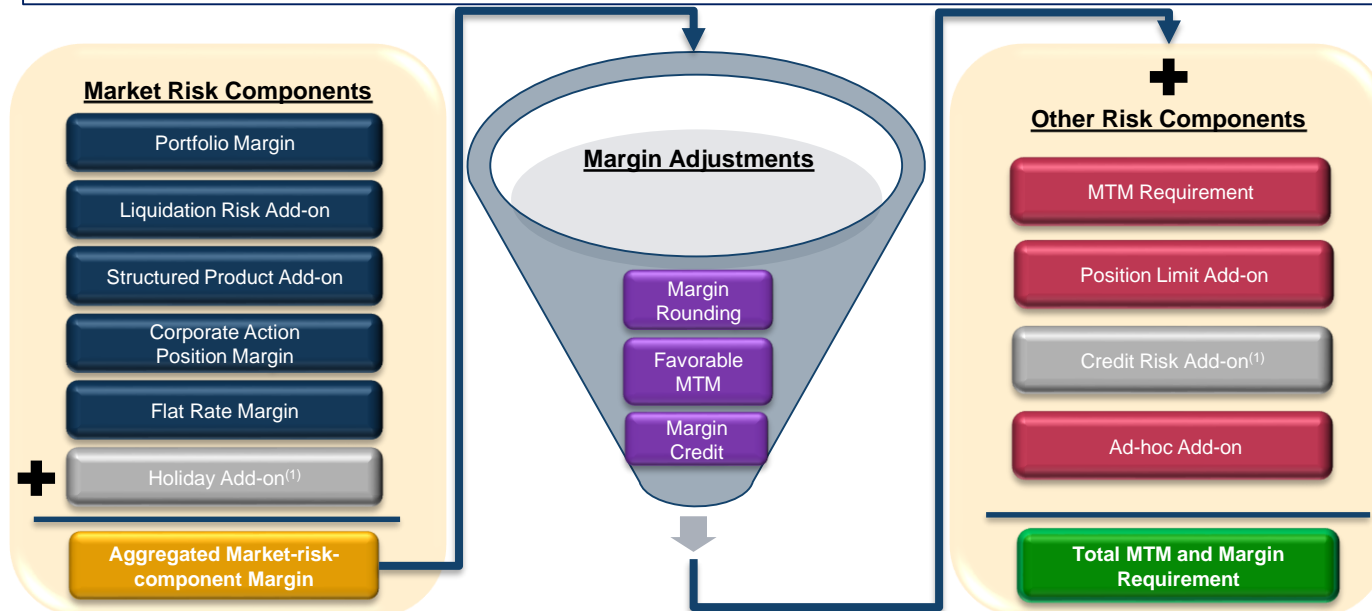
CPs need to gather all required information for the margin estimation



Advanced Method – Overview of the Calculation Process (Con't)

Steps to calculate Total MTM and Margin Requirement

1. Identify applicable Market Risk Components for each instrument in the portfolio
2. Identify Margin Adjustments and Other Risk Components
3. Calculate Market Risk Components
4. Aggregate Market Risk Components and perform Margin Adjustments
5. Calculate or retrieve Other Risk Components from report
6. Derive Total MTM and Margin Requirement by adding results from steps 4 and 5



(1) Holiday Add-on and Credit Add-on will not be applicable at launch of NGRM. HKSCC will notify CPs before the implementation.



Advanced Method – Sample RPF(1)

FieldType

To identify the list of instruments subject to relevant market risk components

Instrument to be included in each market risk components

- 1 – Portfolio Margin (HVaR)
- 2 – Portfolio Margin (SVaR)
- 3 – Flat Rate Margin
- 4 – Liquidation Risk Add-on (for stocks)
- 5 – Liquidation Risk Add-on (for structured products)
- 6 – Structured Product Add-on
- 7 – Corporate Action Position Margin

Valuation_DT	1/4/2019																			
HVaR_WGT	0.75																			
SVaR_WGT	0.25																			
HVaR_Scen_Count	1000																			
SVaR_Scen_Count	1018																			
STV_Count	200																			
HVaR_CL	0.994																			
SVaR_CL	0.98																			
HVaR_Measure	4																			
SVaR_Measure	4																			
Rounding	10000																			
Holiday_Factor	0.7320508075																			
InstrumentId	FieldType	1	2	3	4	5	6	7	8	9	10									
700	1	0.01391	-0.01422	0.006132	-0.006687	0.013556	0.01391	0.006132	0.006687	0.013556	0.013556									
1299	1	0.01125	0.008827	-0.00875	-0.003115	0.006901	0.01125	-0.00875	-0.003115	0.006901	0.006901									
1876	1	0.011128	-0.014789	0.006009	0.007356	0.015725	0.012936	0.005825	0.008292	0.00976	0.010167									
2823	1	0.011628	-0.003311	0.001658	-0.009852	-0.001639	0.011628	0.001658	-0.009852	-0.001639	-0.001639									
3690	1	0.012241	-0.016268	0.00661	0.008092	0.017298	0.01423	0.006408	0.009121	0.010736	0.011184									
26883	1	0.136461	-0.129264	0.034216	0.046343	0.134202	0.136462	0.034217	0.046342	0.134203	0.134203									
60954	1	-0.104288	-0.083417	0.0819	0.029439	-0.060245	-0.104288	0.0819	0.029439	-0.060245	-0.060244									
700	2	0.041026	0.092873	-0.067737	-0.030462	-0.000031	0.0406715	0.0406918	0.0406778	0.0406596	0.0406699									
1299	2	0.037588	0.048124	-0.042722	-0.042776	-0.000008	0.0372818	0.037268	0.0372632	0.0372858	0.0372862									
1876	2	0.040616	0.076156	-0.069769	-0.038382	-0.000035	0.028877	0.034181	0.034576	0.034561	0.04067									
2823	2	0.026217	0.043137	-0.036832	-0.031046	0.000021	0.0259822	0.0259914	0.0259828	0.025985	0.0259961									
3690	2	0.044678	0.083772	-0.076746	-0.04222	-0.000039	0.031765	0.037599	0.038034	0.038017	0.044737									
26883	2	0.254769	0.660324	-0.53648	-0.139819	-0.000034	0.2526511	0.2527275	0.2527227	0.2525469	0.2526738									
60954	2	-0.321378	-0.437447	0.399873	0.404237	0.000022	-0.318807	-0.318531	-0.318547	-0.318514	-0.318721									
658	3	0.12																		
3606	3	0.12																		
700	4	0.0022	0.9	300000000	500															
1299	4	0.0025	1.1	100000000	80															
1876	4	0.002	1.2	200000000	30															
2823	4	0.002	1	250000000	30															
2800	4	0.002	1	250000000	30															
3690	4	0.0022	1.3	300000000	70															
26883	5	700	0.0446	100	0.1784															
60954	5	1299	-0.789588	100	-0.63167															
26883	6	0.02	5																	
DSP700	7	0.5	0.5																	
DIV1299	7	1	0																	
SRI3606	7	0	0.5																	

Parameters for Portfolio Margin

(1) In reality, RPFs are released on each business day at around 20:00. However, it is assumed that the same sample RPF is applied throughout the illustration for simplicity.

Calculation of Aggregated Market Risk Components

Tier P

1. Portfolio Margin
(FieldType 1,2)

2. Liquidation Risk
Add-on (LRA)
(FieldType 4,5)

3. Structured
Product Add-on
(FieldType 6)

Tier CA

4. Corporate Action
Position Margin
(FieldType 7)

Tier N

5. Flat Rate Margin
(FieldType 3)

Summary Steps

- Calculate the HVaR and SVaR scenario returns respectively for the portfolio
- Rank and identify the worst scenarios for HVaR at 99.4% confidence level⁽¹⁾ & SVaR at 98% confidence level⁽²⁾
- Calculate Portfolio Margin for the scenarios identified above, subject to portfolio margin floor

- Instrument-level LRA:
 - Calculate delta equivalent position for each underlying group
 - Compare delta equivalent position with instrument-level threshold
- Portfolio-level LRA:
 - Calculate beta hedge position for each underlying group
 - Compare beta hedge position with portfolio-level threshold (hedging instrument threshold)

- Identify instruments applicable to Structured Product Add-on (i.e., listed under FieldType 6 and in long positions)
- Calculate the add-on with the instrument-specific tick size multiplier and minimum tick size stated in the RPF

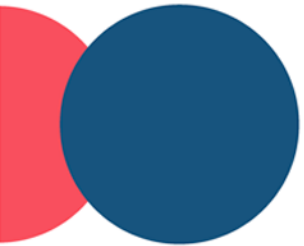
- Identify relevant instruments with unsettled position (i.e., traded before ex-date)
- Calculate Corporate Action Position Margin with the corresponding add-on scenario stated under FieldType 7

- Aggregate absolute market values of long and short positions separately
- Choose the higher of aggregated long / aggregated short positions
- Multiply the higher aggregated positions by the flat margin rate and flat rate margin multiplier

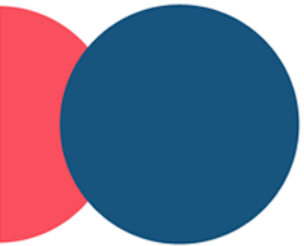
(1) According to the sample RPF, the confidence level for HVaR (HVaR_CL) is determined as 99.4%. As there are 1,000 scenarios for HVaR in the example, $(1-99.4\%) \times 1,000 = 6$ scenarios

(2) According to the sample RPF, the confidence level for SVaR (SVaR_CL) is determined as 98%. As there are 1,018 scenarios for SVaR in the example, $(1-98\%) \times 1,018 = 21$ scenarios (rounding up to the nearest integer)





CALCULATION EXAMPLE (3 DAYS)



DAY 1

Illustration:

1. Portfolio Margin
2. Liquidation Risk Add-on
3. Flat Rate Margin
4. Structured Product Add-on

Day 1 Portfolio: 700.HK

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
1	1	Short	700	-500,000	-240,000,000	-250,000,000	P	

1. Portfolio Margin
(FieldType 1,2)

2. Liquidation Risk
Add-on
(FieldType 4,5)

3. Structured
Product Add-on
(FieldType 6)

4. Corporate Action
Position Margin
(FieldType 7)

5. Flat Rate Margin
(FieldType 3)



Day 1 Portfolio: 700.HK (Portfolio Margin)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
1	1	Short	700	-500,000	-240,000,000	-250,000,000	P

i. Calculate the scenario returns for HVaR and SVaR

HVaR Scenario Returns				
1	2	...	1,000	
700	(3,477,500)	3,555,000	...	1,000

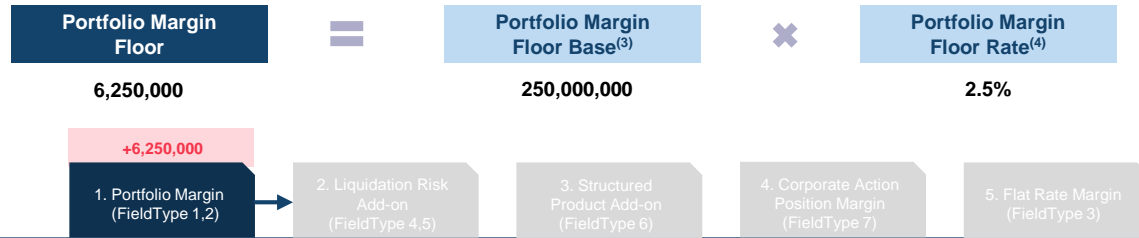
SVaR Scenario Returns				
1	2	...	1,018	
700	(10,256,500)	(23,218,250)	...	17,573,750

ii. Rank the scenarios and identify the **worst 6 scenarios⁽¹⁾** for HVaR and **21 scenarios⁽²⁾** for SVaR

iii. Calculate Portfolio Margin for the scenarios identified above and take absolute value

HVaR (75%) + SVaR (25%)
Average of the worst 6 HVaR scenarios * 75% + Average of the worst 21 SVaR scenarios * 25% = 4,892,225

iv. Check the portfolio margin floor:



(1) $(1 - 99.4\% \text{ (HVaR_CL)}) \times 1,000 \text{ (HVaR_Scen_Count)}$ scenarios = 6 scenarios, rounding up to the nearest integer

(2) $(1 - 98\% \text{ (SVaR_CL)}) \times 1,018 \text{ (SVaR_Scen_Count)}$ scenarios = 21 scenarios, rounding up to the nearest integer

(3) Set as the higher of gross long/ short market values of all instruments subject to portfolio margin

(4) Portfolio Margin Floor Rate is currently set as 2.5%, but it is subject to change from time to time. HKSCC will issue circulars to notify the market before any change is made.



Day 1 Portfolio: 700.HK (Liquidation Risk Add-on)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
1	1	Short	700	-500,000	-240,000,000	-250,000,000	P

Instrument-level LRA

- i. Calculate the market value of delta equivalent position for each underlying group

InstrumentID	Quantity	Cash Delta per Quantity	Market Value of Delta Equivalent Position
700	-500,000	500	-250,000,000
Total for the underlying group 700			-250,000,000

- ii. Compare delta equivalent position with **instrument-level threshold** found in RPF

Underlying Group	Market Value of Delta Equivalent Position (in Absolute Value)	Instrument-level Threshold	Bucket Rate	Instrument-level LRA
700	250,000,000	300,000,000	0.0022	0
Total for the portfolio				0

Portfolio-level LRA

- i. Calculate the market value of beta hedge position for each underlying group

Underlying Group	Market Value of Delta Equivalent Position	Beta	Market Value of Beta Hedge Position
700	-250,000,000	0.9	-225,000,000
Total for the portfolio			-225,000,000

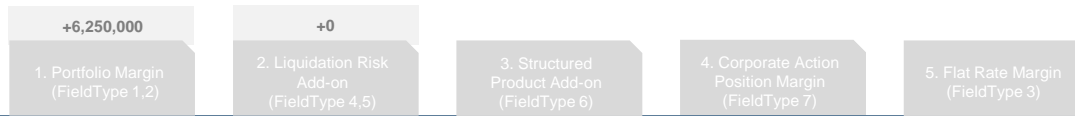
- ii. Compare beta hedge position with **portfolio-level threshold** (hedging instrument threshold) found in RPF

	Market Value of Beta Hedge Position (in Absolute Value)	Portfolio-level Threshold	Bucket Rate	Portfolio-level LRA
Total	225,000,000	250,000,000	0.002	0



Day 1 Portfolio: Adding 658.HK and 3606.HK

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
1	1	Short	700	-500,000	-240,000,000	-250,000,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on
▶ 1	2	Short	658	-10,000,000	-62,000,000	-60,000,000	N	
▶ 1	3	Long	3606	1,000,000	28,000,000	30,000,000	N	



Day 1 Portfolio: Adding 658.HK and 3606.HK (Flat Rate Margin)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
1	2	Short	658	-10,000,000	-62,000,000	-60,000,000	N
1	3	Long	3606	1,000,000	28,000,000	30,000,000	N

- i. Aggregate absolute market value of long and short positions separately
- ii. Choose the higher of aggregated long / aggregated short positions

InstrumentID	Quantity	Absolute Market Value of Long Positions in HKD equivalent	Absolute Market Value of Short Positions in HKD equivalent
658	< 0	0	60,000,000
3606	≥ 0	30,000,000	0
Total		30,000,000	60,000,000

- iii. Multiply the higher aggregated positions by the flat margin rate and flat rate margin multiplier



(1) Flat rate margin multiplier is a CP-specific parameter. Please refer to the Daily Participant Margin Multiplier Report.



Day 1 Portfolio: Adding 26883.HK

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
1	1	Short	700	-500,000	-240,000,000	-250,000,000	P	<ul style="list-style-type: none"> > Portfolio Margin > Liquidation Risk Add-on
1	2	Short	658	-10,000,000	-62,000,000	-60,000,000	N	> Flat Rate Margin
1	3	Long	3606	1,000,000	28,000,000	30,000,000	N	> Flat Rate Margin
1	4	Long	26883	11,000,000	300,000	200,000	P	



Underlying stock = 700.HK



Day 1 Portfolio: Adding 26883.HK (Portfolio Margin)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
1	1	Short	700	-500,000	-240,000,000	-250,000,000	P
1	4	Long	26883	11,000,000	300,000	200,000	P

i. Calculate the returns for each HVaR and SVaR scenario

HVaR Scenario Returns				
	1	2	...	1,000
700	(3,477,500)	3,555,000	...	1,000
26883	27,292	(25,853)	...	9

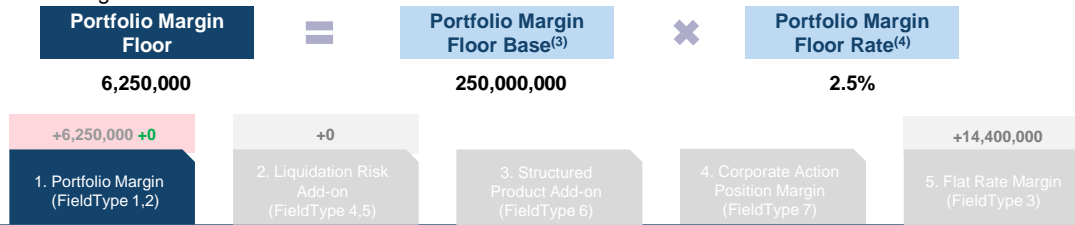
SVaR Scenario Returns				
	1	2	...	1,018
700	(10,256,500)	(23,218,250)	...	17,573,750
26883	50,954	132,065	...	(130,327)

ii. Rank the scenarios and identify the **worst 6 scenarios⁽¹⁾** for HVaR and **21 scenarios⁽²⁾** for SVaR

iii. Calculate Portfolio Margin for the scenarios identified above and take absolute value

HVaR (75%) + SVaR (25%)
Average of the worst 6 scenarios * 75% + Average of the worst 21 scenarios * 25% = 5,017,059

iv. Check the portfolio margin floor:



(1) $(1 - 99.4\% \text{ (HVaR_CL)}) \times 1,000 \text{ (HVaR_Scen_Count)}$ scenarios = 6 scenarios, rounding up to the nearest integer

(2) $(1 - 98\% \text{ (SVaR_CL)}) \times 1,018 \text{ (SVaR_Scen_Count)}$ scenarios = 21 scenarios, rounding up to the nearest integer

(3) Set as the higher of gross long / short market values of all instruments subject to portfolio margin

(4) Portfolio Margin Floor Rate is currently set as 2.5%, but it is subject to change from time to time. HKSCC will issue circulars to notify the market before any change is made.



Day 1 Portfolio: Adding 26883.HK (Liquidation Risk Add-on)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
1	1	Short	700	-500,000	-240,000,000	-250,000,000	P
1	4	Long	26883	11,000,000	300,000	200,000	P

Instrument-level LRA

- i. Calculate the market value of delta equivalent position for each underlying group

InstrumentID	Quantity	Cash Delta per Quantity	Market Value of Delta Equivalent Position
700	-500,000	500	-250,000,000
26883	11,000,000	0.1784	1,962,400
Total for the underlying group 700			-248,037,600

- ii. Compare delta equivalent position with **instrument-level threshold** found in RPF

Underlying Group	Market Value of Delta Equivalent Position (in Absolute Value)	Instrument-level Threshold	Bucket Rate	Instrument-level LRA
700	248,037,600	300,000,000	0.0022	0
Total for the portfolio				0

Portfolio-level LRA

- i. Calculate the market value of beta hedge position for each underlying group

Underlying Group	Market Value of Delta Equivalent Position	Beta	Market Value of Beta Hedge Position
700	-248,037,600	0.9	-223,233,840
Total for the portfolio			-223,233,840

- ii. Compare beta hedge position with **portfolio-level threshold** (hedging instrument threshold) found in RPF

	Market Value of Beta Hedge Position (in Absolute Value)	Portfolio-level Threshold	Bucket Rate	Portfolio-level LRA
Total	223,233,840	250,000,000	0.002	0

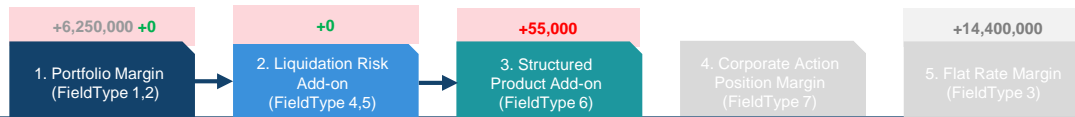


Day 1 Portfolio: Adding 26883.HK (Structured Product Add-on)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
1	4	Long	26883	11,000,000	300,000	200,000	P

- i. Identify instrument which is subject to Structured Product Add-on as per the criteria below
 - Whether the instrument is listed under FieldType 6 in the RPF
 - Whether the instrument is under long position
- ii. For instrument identified, calculate the add-on as below:

$$\begin{array}{ccccccc}
 \text{Structured Product Add-on} & = & \text{Quantity} & \times & \text{Tick size multiplier}^{(1)} & \times & \text{Minimum tick size}^{(2)} \\
 55,000 & & 11,000,000 & & 5 & & 0.001
 \end{array}$$



- (1) Tick size multiplier is instrument-specific. Users can refer to the figures stated under column 2 of FieldType 6 for each relevant instrument.
- (2) The current minimum tick size is set as 0.001. HKSCC will notify the market before any change is made.

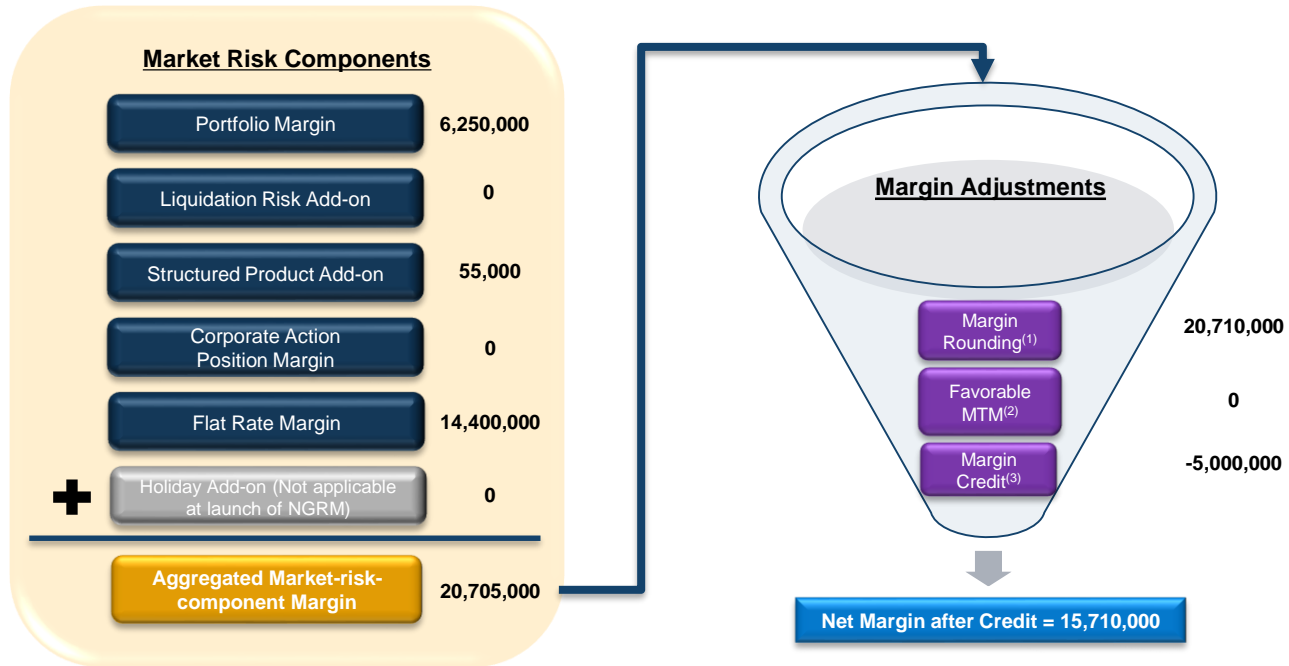


Day 1 Portfolio: Summary

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
1	1	Short	700	-500,000	-240,000,000	-250,000,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on
1	2	Short	658	-10,000,000	-62,000,000	-60,000,000	N	<ul style="list-style-type: none"> ➤ Flat Rate Margin
1	3	Long	3606	1,000,000	28,000,000	30,000,000	N	<ul style="list-style-type: none"> ➤ Flat Rate Margin
1	4	Long	26883	11,000,000	300,000	200,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on ➤ Structured Product Add-on



Day 1 Portfolio: Margin Adjustments

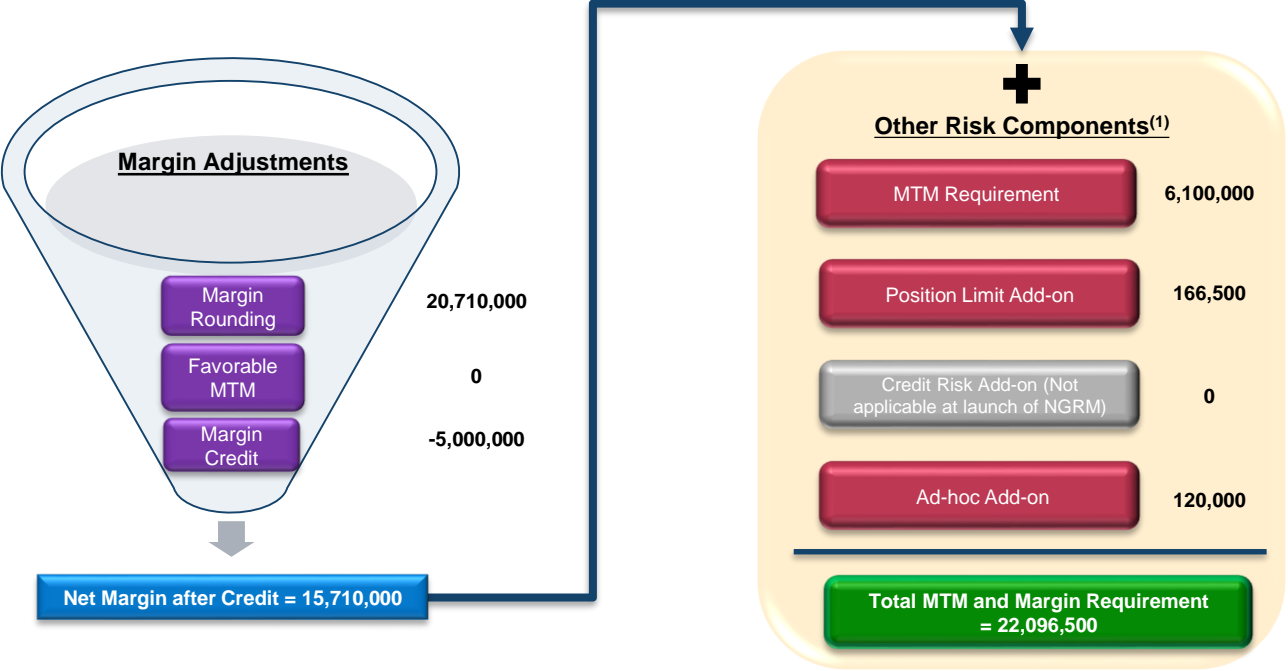


(1) Derive Aggregated Market-risk-component Margin and round up to the nearest 10,000 (with reference to the rounding parameter stated in the RPF)

(2) Obtain favorable MTM from "MTM and Margin Requirement Report"

(3) Margin Credit (normally 5,000,000) is granted to each CP and can be used to offset Net Margin

Day 1 Portfolio: Other Risk Components



(1) All of the other risk components can be obtained from the "MTM and Margin Requirement Report". The figures shown are hypothetical for illustration purpose.





DAY 2

Illustration:

1. Corporate Action Position Margin
2. Portfolio Margin (Cross-day Netting)
3. Liquidation Risk Add-on (Cross-day Netting)
4. Specific Stock Collateral and Specific Cash Collateral

Day 2 Portfolio: Corporate Action (Distribution in Specie) on 700.HK

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
1	1	Short	700	-500,000	-240,000,000	-250,000,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on
1	2	Short	658	-10,000,000	-62,000,000	-60,000,000	N	➤ Flat Rate Margin
1	3	Long	3606	1,000,000	28,000,000	30,000,000	N	➤ Flat Rate Margin
1	4	Long	26883	11,000,000	300,000	200,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on ➤ Structured Product Add-on

Distribution in Specie
 Stock: 700.HK
 Ex-date: Day 2
 Entitlement ratio: 0.2

Price adjustment on 700.HK on ex-date (\$500 -> \$400)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
1	1 (Adj.)	Short	700	-500,000	-240,000,000	-200,000,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on
2	1	Short	DSP700	-100,000	0	-50,000,000	CA	

+6,250,000

1. Portfolio Margin
(FieldType 1,2)

+0

2. Liquidation Risk
Add-on
(FieldType 4,5)

+55,000

3. Structured
Product Add-on
(FieldType 6)

4. Corporate Action
Position Margin
(FieldType 7)

+14,400,000

5. Flat Rate Margin
(FieldType 3)



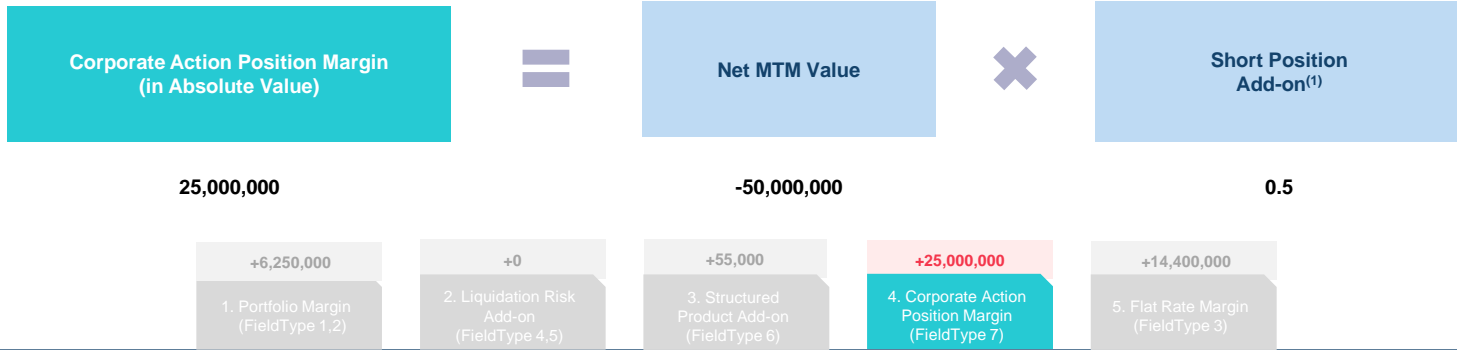
Day 2 Portfolio: Corporate Action Position Margin on 700.HK

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
2	1	Short	DSP700	-100,000	0	-50,000,000	CA

- i. Calculate the net mark-to-market ("MTM") value of positions

InstrumentID	Quantity	Contract Value	Market Value	Net MTM Value
DSP700	< 0	0	-50,000,000	-50,000,000

- ii. Apply net MTM value under to corresponding add-on scenario



(1) Users can refer to FieldType 7 for the Short Position Add-on.



Day 2 Portfolio: Adding 700.HK (Cross-day Netting)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
1	1 (Adj.)	Short	700	-500,000	-240,000,000	-200,000,000	P	<ul style="list-style-type: none"> > Portfolio Margin > Liquidation Risk Add-on
1	2	Short	658	-10,000,000	-62,000,000	-60,000,000	N	> Flat Rate Margin
1	3	Long	3606	1,000,000	28,000,000	30,000,000	N	> Flat Rate Margin
1	4	Long	26883	11,000,000	300,000	200,000	P	<ul style="list-style-type: none"> > Portfolio Margin > Liquidation Risk Add-on > Structured Product Add-on
2	1	Short	DSP700	-100,000	0	-50,000,000	CA	> Corporate Action Position Margin
2	2	Long	700	1,500,000	576,000,000	600,000,000	P	



Day 2 Portfolio: Adding 700.HK (Cross-day Netting)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
1	1 (Adj.)	Short	700	-500,000	-240,000,000	-200,000,000	P	> Portfolio Margin > Liquidation Risk Add-on
1	2	Short	658	-10,000,000	-62,000,000	-60,000,000	N	> Flat Rate Margin
1	3	Long	3606	1,000,000	28,000,000	30,000,000	N	> Flat Rate Margin
1	4	Long	26883	11,000,000	300,000	200,000	P	> Portfolio Margin > Liquidation Risk Add-on > Structured Product Add-on
2	1	Short	DSP700	-100,000	0	-50,000,000	CA	> Corporate Action Position Margin
2	2	Long	700	1,500,000	576,000,000	600,000,000	P	



Cross-day Netting is applied on 700.HK positions (Day 1 and Day 2)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
2	2 (Net)	Long	700	1,000,000	336,000,000	400,000,000	P	> Portfolio Margin > Liquidation Risk Add-on

+6,250,000	+0	+55,000	+25,000,000	+14,400,000
1. Portfolio Margin (FieldType 1,2)	2. Liquidation Risk Add-on (FieldType 4,5)	3. Structured Product Add-on (FieldType 6)	4. Corporate Action Position Margin (FieldType 7)	5. Flat Rate Margin (FieldType 3)



Day 2 Portfolio: Adding 700.HK (Portfolio Margin – Cross-day Netting)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
1	4	Long	26883	11,000,000	300,000	200,000	P
2	2 (Net)	Long	700	1,000,000	336,000,000	400,000,000	P

- i. Calculate the returns for each HVaR and SVaR scenario

HVaR Scenario Returns				
	1	2	...	1,000
700	5,564,000	(5,688,000)	...	(1,600)
26883	27,292	(25,853)	...	9

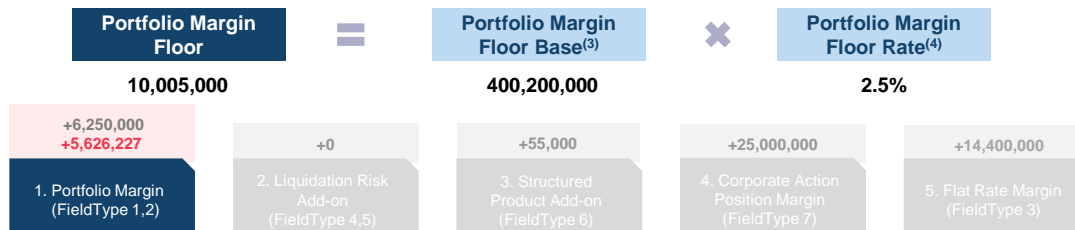
SVaR Scenario Returns				
	1	2	...	1,018
700	16,410,400	37,149,200	...	(28,118,000)
26883	50,954	132,065	...	(130,327)

- ii. Rank the scenarios and identify the **worst 6 scenarios⁽¹⁾** for HVaR and **21 scenarios⁽²⁾** for SVaR

- iii. Calculate Portfolio Margin for the scenarios identified above and take absolute value

HVaR (75%) + SVaR (25%)
Average of the worst 6 scenarios * 75% + Average of the worst 21 scenarios * 25% = 11,876,227

- iv. Check the portfolio margin floor:



(1) $(1 - 99.4\% (\text{HVaR_CL})) \times 1,000 (\text{HVaR_Scen_Count})$ scenarios = 6 scenarios, rounding up to the nearest integer.

(2) $(1 - 98\% (\text{SVaR_CL})) \times 1,018 (\text{SVaR_Scen_Count})$ scenarios = 21 scenarios, rounding up to the nearest integer.

(3) Set as the higher of gross long / short market values of all instruments subject to portfolio margin

(4) Portfolio Margin Floor Rate is currently set as 2.5%, but it is subject to change from time to time. HKSCC will issue circulars to notify the market before any change is made.



Day 2 Portfolio: Adding 700.HK (Liquidation Risk Add-on – Cross-day Netting)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
1	4	Long	26883	11,000,000	300,000	200,000	P
2	2 (Net)	Long	700	1,000,000	336,000,000	400,000,000	P

Instrument-level LRA

- i. Calculate the market value of delta equivalent position for each underlying group

InstrumentID	Quantity	Cash Delta per Quantity	Market Value of Delta Equivalent Position
700	1,000,000	400*	400,000,000
26883	11,000,000	0.1784	1,962,400
Total for the underlying group 700			401,962,400

Note (*): Cash Delta per Quantity is adjusted on ex-date

- ii. Compare delta equivalent position with **instrument-level threshold** found in RPF

Underlying Group	Market Value of Delta Equivalent Position (in Absolute Value)	Instrument-level Threshold	Bucket Rate	Instrument-level LRA
700	401,962,400	300,000,000	0.0022	224,317
Total for the portfolio				224,317

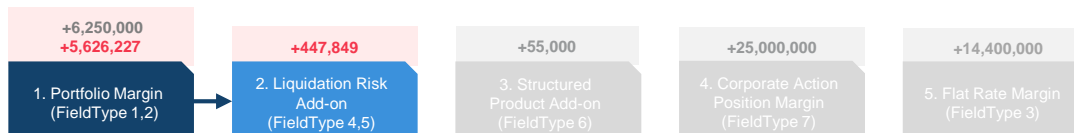
Portfolio-level LRA

- i. Calculate the market value of beta hedge position for each underlying group

Underlying Group	Market Value of Delta Equivalent Position	Beta	Market Value of Beta Hedge Position
700	401,962,400	0.9	361,766,160
Total for the portfolio			361,766,160

- ii. Compare beta hedge position with **portfolio-level threshold** (hedging instrument threshold) found in RPF

Underlying Group	Market Value of Beta Hedge Position (in Absolute Value)	Portfolio-level Threshold	Bucket Rate	Portfolio-level LRA
700	361,766,160	250,000,000	0.002	223,532
Total				223,532



Day 2 Portfolio: Pledging Specific Stock Collateral (“SSC”) to 658.HK Pledging Specific Cash Collateral (“SCC”) to 3606.HK

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
1	1 (Adj.)	Short	700	-500,000	-240,000,000	-200,000,000	P	<ul style="list-style-type: none"> > Portfolio Margin > Liquidation Risk Add-on (With Cross-day Netting)
1	2	Short	658	-10,000,000	-62,000,000	-60,000,000	N	> Flat Rate Margin
1	3	Long	3606	1,000,000	28,000,000	30,000,000	N	> Flat Rate Margin
1	4	Long	26883	11,000,000	300,000	200,000	P	<ul style="list-style-type: none"> > Portfolio Margin > Liquidation Risk Add-on > Structured Product Add-on
2	1	Short	DSP700	-100,000	0	-50,000,000	CA	> Corporate Action Position Margin
2	2	Long	700	1,500,000	576,000,000	600,000,000	P	<ul style="list-style-type: none"> > Portfolio Margin > Liquidation Risk Add-on (With Cross-day Netting)

To pledge

- (i) 8,000,000 shares as SSC to 658.HK
- (ii) \$5,000,000 cash as SCC to 3606.HK



Day 2 Portfolio: Pledging SSC to 658.HK & SCC to 3606.HK

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
1	2	Short	658	-10,000,000	-62,000,000	-60,000,000	N
1	3	Long	3606	1,000,000	28,000,000	30,000,000	N

- i. Calculate the resulting uncovered positions after pledging SSC / SCC (i.e., positions covered by SSC / SCC are excluded from margin calculation)

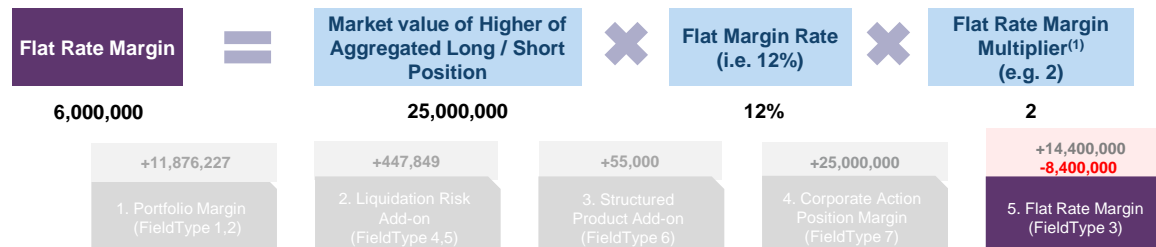
Day	Transaction No.	Position	InstrumentID	Adjusted Quantity	Adjusted Contract Value	Adjusted Market Value	Remarks
1	2 (Adj.)	Short	658	-2,000,000	-12,400,000	-12,000,000	SSC of 8,000,000 shares pledged
1	3 (Adj.)	Long	3606	833,333	23,333,333	25,000,000	SCC of \$5,000,000 pledged

- ii. Aggregate absolute market value of long and short positions separately

- iii. Choose the higher of aggregated long/ aggregated short positions

InstrumentID	Quantity	Absolute Market Value of Long Positions in HKD equivalent	Absolute Market Value of Short Positions in HKD equivalent
658	< 0	0	12,000,000
3606	≥ 0	25,000,000	0
Total		25,000,000	12,000,000

- iv. Multiply the higher aggregated positions by the flat margin rate and flat rate margin multiplier



(1) Flat rate margin multiplier is a CP-specific parameter. Please refer to the Daily Participant Margin Multiplier Report.

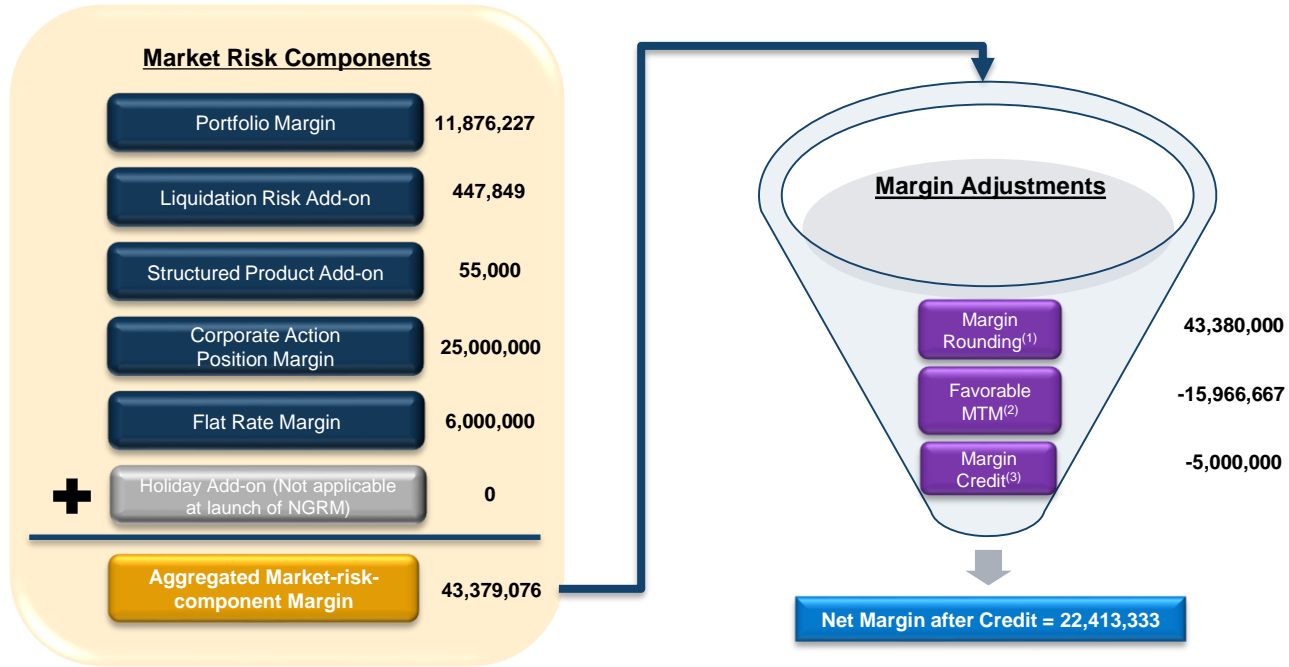


Day 2 Portfolio: Summary

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
1	1 (Adj.)	Short	700	-500,000	-240,000,000	-200,000,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on (With Cross-day Netting)
1	2 (Adj.)	Short	658	-2,000,000	-12,400,000	-12,000,000	N	<ul style="list-style-type: none"> ➤ Flat Rate Margin (With SSC pledged)
1	3 (Adj.)	Long	3606	833,333	23,333,333	25,000,000	N	<ul style="list-style-type: none"> ➤ Flat Rate Margin (With SCC pledged)
1	4	Long	26883	11,000,000	300,000	200,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on ➤ Structured Product Add-on
2	1	Short	DSP700	-100,000	0	-50,000,000	CA	<ul style="list-style-type: none"> ➤ Corporate Action Position Margin
2	2	Long	700	1,500,000	576,000,000	600,000,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on (With Cross-day Netting)

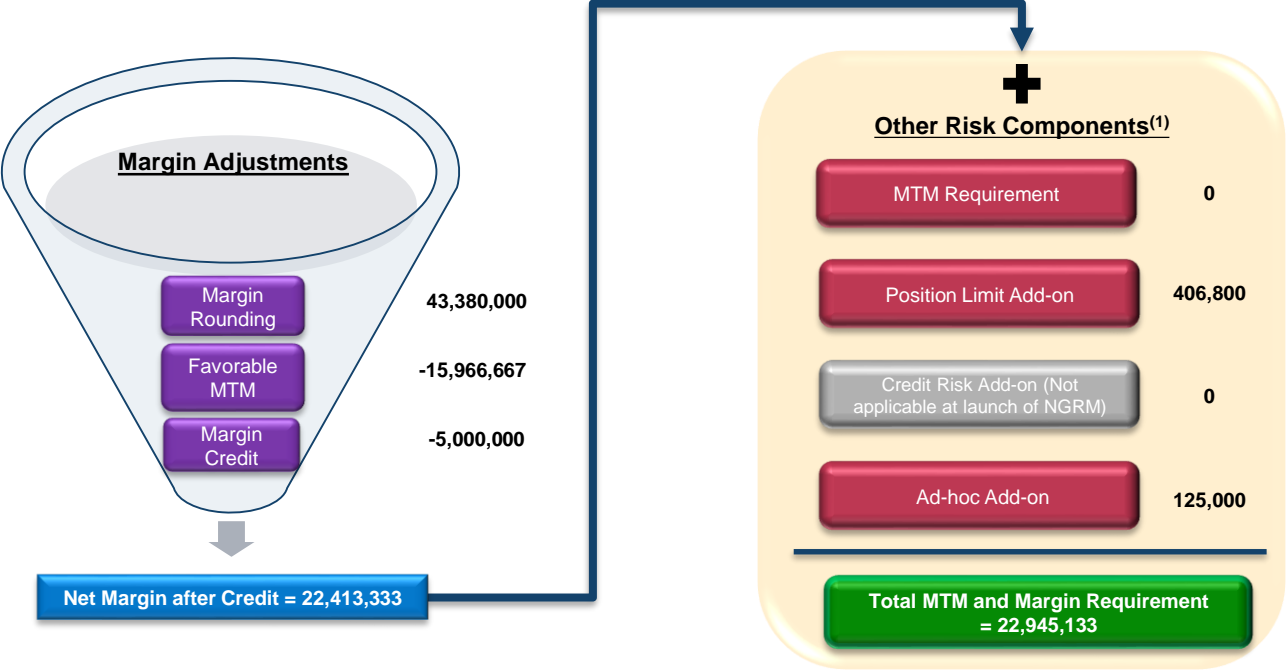


Day 2 Portfolio: Margin Adjustments



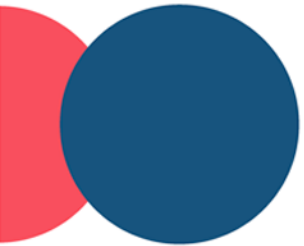
(1) Derive Aggregated Market-risk-component Margin and round up to the nearest 10,000 (with reference to the rounding parameter stated in the RPF)
(2) Obtain favorable MTM from "MTM and Margin Requirement Report"
(3) Margin Credit (normally 5,000,000) is granted to each CP and can be used to offset Net Margin

Day 2 Portfolio: Other Risk Components



(1) All of the other risk components can be obtained from the "MTM and Margin Requirement Report". The figures shown are hypothetical for illustration purpose.





DAY 3

Illustration:

1. Treatment on Position Brought Down
2. Portfolio Margin (IPO segregation)

Day 3 Portfolio: Day 1 Position Settled

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
1	1 (Adj.)	Short	700	-500,000	-240,000,000	-200,000,000	P	<ul style="list-style-type: none"> > Portfolio Margin > Liquidation Risk Add-on (With Cross-day Netting)
1	2 (Adj.)	Short	658	-2,000,000	-12,400,000	-12,000,000	N	<ul style="list-style-type: none"> > Flat Rate Margin (With SSC pledged)
1	3 (Adj.)	Long	3606	833,333	23,333,333	25,000,000	N	<ul style="list-style-type: none"> > Flat Rate Margin (With SCC pledged)
1	4	Long	26883	11,000,000	300,000	200,000	P	<ul style="list-style-type: none"> > Portfolio Margin > Liquidation Risk Add-on > Structured Product Add-on
2	1	Short	DSP700	-100,000	0	-50,000,000	CA	<ul style="list-style-type: none"> > Corporate Action Position Margin
2	2	Long	700	1,500,000	576,000,000	600,000,000	P	<ul style="list-style-type: none"> > Portfolio Margin > Liquidation Risk Add-on (With Cross-day Netting)

Position yet to be settled

+11,876,227

1. Portfolio Margin
(FieldType 1,2)

+447,849

2. Liquidation Risk
Add-on
(FieldType 4,5)

+55,000

3. Structured
Product Add-on
(FieldType 6)

+25,000,000

4. Corporate Action
Position Margin
(FieldType 7)

+6,000,000

5. Flat Rate Margin
(FieldType 3)



Day 3 Portfolio: Position Brought Down (700.HK)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
2	2	Long	700	1,500,000	576,000,000	600,000,000	P



Day 3 Portfolio: Position Brought Down (700.HK) (Portfolio Margin)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
2	2	Long	700	1,500,000	576,000,000	600,000,000	P

- i. Calculate the returns for each HVaR and SVaR scenario

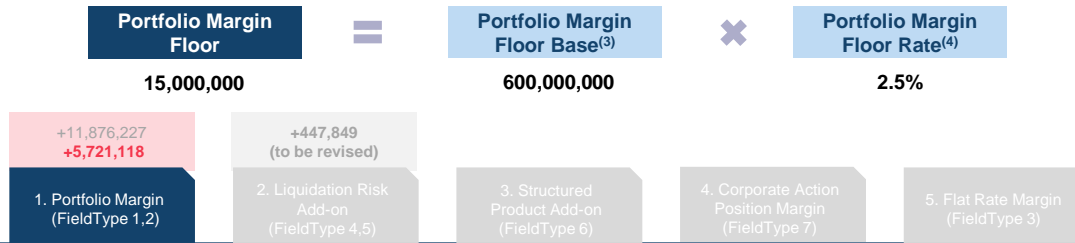
HVaR Scenario Returns				
	1	2	...	1,000
700	8,346,000	(8,532,000)	...	(2,400)

SVaR Scenarios Returns				
	1	2	...	1,018
700	24,615,600	55,723,800	...	(42,177,000)

- ii. Rank the scenarios and identify the **worst 6 scenarios⁽¹⁾** for HVaR and **21 scenarios⁽²⁾** for SVaR
- iii. Calculate Portfolio Margin for the scenarios identified above and take absolute value

HVaR (75%) + SVaR (25%)
Average of the worst HVaR 6 scenarios * 75% + Average of the worst SVaR 21 scenarios * 25% = 17,597,345

- iv. Check the portfolio margin floor:



(1) (1-99.4% (HVaR_CL)) x 1,000 (HVaR_Scen_Count) scenarios = 6 scenarios, rounding up to the nearest integer
 (2) (1-98% (SVaR_CL)) x 1,018 (SVaR_Scen_Count) scenarios = 21 scenarios, rounding up to the nearest integer
 (3) Set as the higher of gross long/ short market values of all instruments subject to portfolio margin
 (4) Portfolio Margin Floor Rate is currently set as 2.5%, but it is subject to change from time to time. HKSCC will issue circulars to notify the market before any change is made.



Day 3 Portfolio: Position Brought Down (700.HK) (Liquidation Risk Add-on)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier
2	2	Long	700	1,500,000	576,000,000	600,000,000	P

Instrument-level LRA

- i. Calculate the market value of delta equivalent position for each underlying group

InstrumentID	Quantity	Cash Delta per Quantity	Market Value of Delta Equivalent Position
700	1,500,000	400	600,000,000
Total for the underlying group 700			600,000,000

- ii. Compare delta equivalent position with **instrument-level threshold** found in RPF

Underlying Group	Market Value of Delta Equivalent Position (in Absolute Value)	Instrument-level Threshold	Bucket Rate	Instrument-level LRA
700	600,000,000	300,000,000	0.0022	660,000
Total for the portfolio				660,000

Portfolio-level LRA

- i. Calculate the market value of beta hedge position for each underlying group

Underlying Group	Market Value of Delta Equivalent Position	Beta	Market Value of Beta Hedge Position
700	600,000,000	0.9	540,000,000
Total for the portfolio			540,000,000

- ii. Compare beta hedge position with **portfolio-level threshold** (hedging instrument threshold) found in RPF

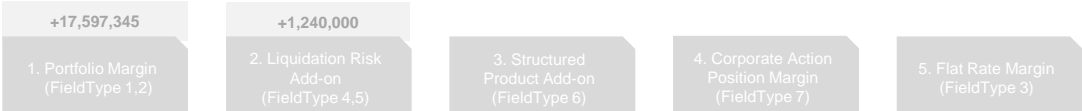
	Market Value of Beta Hedge Position (in Absolute Value)	Portfolio-level Threshold	Bucket Rate	Portfolio-level LRA
Total	540,000,000	250,000,000	0.002	580,000



Day 3 Portfolio: Adding 1876.HK (IPO Stock)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
2	2	Long	700	1,500,000	576,000,000	600,000,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on
3	1	Long	1876	100,000	2,700,000	3,000,000	P	

IPO Stock
 >> Separate group in portfolio margin calculation



Day 3 Portfolio: Adding 1876.HK (Portfolio Margin)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
2	2	Long	700	1,500,000	576,000,000	600,000,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on
3	1	Long	1876	100,000	2,700,000	3,000,000	P	

i. Calculate the returns for each HVaR and SVaR scenario

HVaR Scenario Returns (Non-IPO Instrument)					SVaR Scenario Returns (Non-IPO Instrument)				
	1	2	...	1,000		1	2	...	1,018
700	8,346,000	(8,532,000)	...	(2,400)	700	24,615,600	55,723,800	...	(42,177,000)

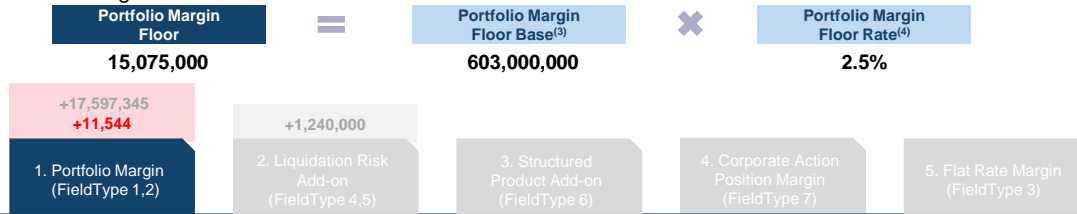
HVaR Scenario Returns (IPO Instrument)					SVaR Scenario Returns (IPO Instrument)				
	1	2	...	1,000		1	2	...	1,018
1876	33,384	(44,367)	...	(9)	1876	121,848	228,468	...	(166,599)

ii. Rank the scenarios and identify the **worst 6 scenarios⁽¹⁾** for HVaR and **21 scenarios⁽²⁾** for SVaR

iii. Calculate Portfolio Margin for the scenarios identified above and take absolute value

HVaR (75%) + SVaR (25%)	
Non-IPO:	Average of the worst 6 scenarios * 75% + Average of the worst 21 scenarios * 25% = 17,597,345
IPO:	Average of the worst 6 scenarios * 75% + Average of the worst 21 scenarios * 25% = 11,544

iv. Check the portfolio margin floor:



(1) $(1-99.4\% \text{ (HVaR_CL)}) \times 1,000 \text{ (HVaR_Scen_Count)}$ scenarios = 6 scenarios, rounding up to the nearest integer.
 (2) $(1-98\% \text{ (SVaR_CL)}) \times 1,018 \text{ (SVaR_Scen_Count)}$ scenarios = 21 scenarios, rounding up to the nearest integer.
 (3) Set as the higher of gross long / short market values of all instruments subject to portfolio margin
 (4) Portfolio Margin Floor Rate is currently set as 2.5%, but it is subject to change from time to time. HKSCC will issue circulars to notify the market before any change is made.



Day 3 Portfolio: Adding 1876.HK (Liquidation Risk Add-on)

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
2	2	Long	700	1,500,000	576,000,000	600,000,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on
3	1	Long	1876	100,000	2,700,000	3,000,000	P	

Instrument-level LRA

- i. Calculate the market value of delta equivalent position for each underlying group

InstrumentID	Quantity	Cash Delta per Quantity	Market Value of Delta Equivalent Position
700	1,500,000	400	600,000,000
Total for the underlying group 700			600,000,000
1876	100,000	30	3,000,000
Total for the underlying group 1876			3,000,000

- ii. Compare delta equivalent position with **instrument-level threshold** found in RPF

InstrumentID	Market Value of Delta Equivalent Position	Instrument-level Threshold	Bucket Rate	Instrument-level LRA
700	600,000,000	300,000,000	0.0022	660,000
1876	3,000,000	200,000,000	0.002	0
Total for the portfolio				660,000

Portfolio-level LRA

- i. Calculate the market value of beta hedge position for each underlying group

InstrumentID	Market Value of Delta Equivalent Position	Beta	Market Value of Beta Hedge Position
700	600,000,000	0.9	540,000,000
1876	3,000,000	1.2	3,600,000
Total for the portfolio			543,600,000

- ii. Compare beta hedge position with **portfolio-level threshold** (hedging instrument threshold) found in RPF

	Market Value of Beta Hedge Position (in Absolute Value)	Portfolio-level Threshold	Bucket Rate	Portfolio-level LRA
Total	543,600,000	250,000,000	0.002	587,200

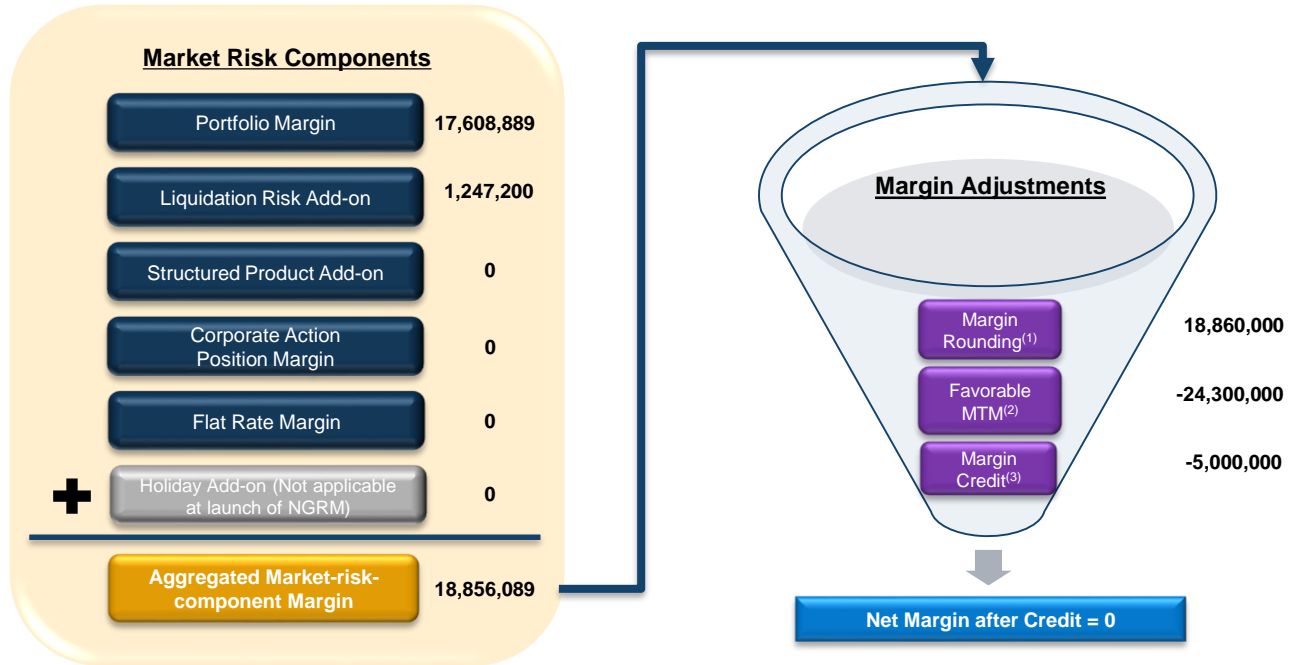


Day 3 Portfolio: Summary

Day	Transaction No.	Position	InstrumentID	Quantity	Contract Value	Market Value	Tier	Adjustment on Market Risk Components
2	2	Long	700	1,500,000	576,000,000	600,000,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin ➤ Liquidation Risk Add-on
3	1	Long	1876	100,000	2,700,000	3,000,000	P	<ul style="list-style-type: none"> ➤ Portfolio Margin (IPO Segregation) ➤ Liquidation Risk Add-on



Day 3 Portfolio: Margin Adjustments



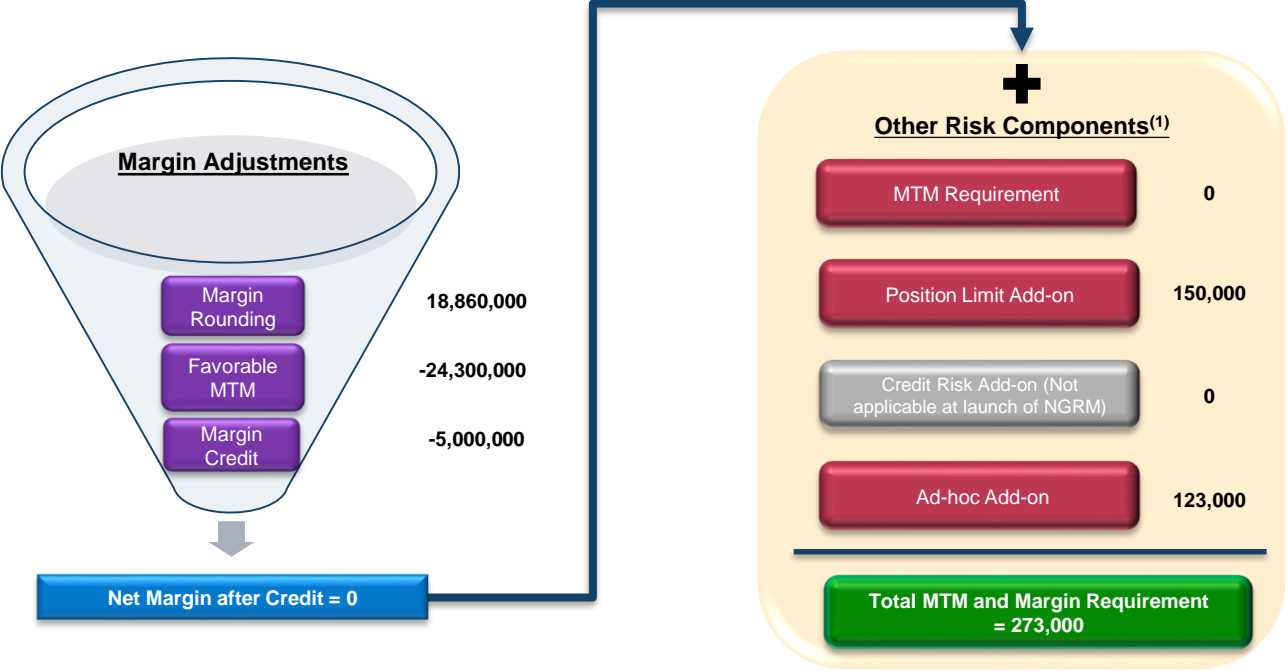
(1) Derive Aggregated Market-risk-component Margin and round up to the nearest 10,000 (with reference to the rounding parameter stated in the RPF)

(2) Obtain favorable MTM from "MTM and Margin Requirement Report"

(3) Margin Credit (normally 5,000,000) is granted to each CP and can be used to offset Net Margin.

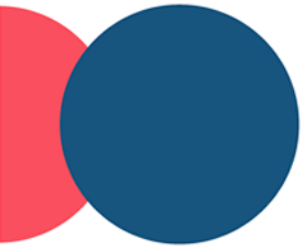


Day 3 Portfolio: Other Risk Components



(1) All of the other risk components can be obtained from the "MTM and Margin Requirement Report". The figures shown are hypothetical for illustration purpose.





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