

INITIAL MARGIN CALCULATION GUIDE

Hong Kong Exchanges and Clearing Limited
VaR Platform

Version 1.21

June 2022

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1. INTRODUCTION

Hong Kong Securities Clearing Company Limited (“HKSCC”) adopts Next Generation initial margin model to determine the initial margin (“IM”) requirement of Clearing Participants’ (“CPs”) portfolios. The model contains portfolio margin component for Primary Tier (“Tier P”) instruments, flat rate margin component for Non-constituent Tier (“Tier N”) instruments, corporate action position margin component and other margin add-on components.

The Next Generation initial margin model is developed in accordance with the regulatory requirements and international best practices (e.g., CPMI-IOSCO Principles for Financial Market Infrastructures). To promote transparency of the model, a file containing the key risk parameters required for calculating IM (a.k.a., “Initial Margin Risk Parameter File”, or “IMRPF”) will be disseminated to all HKSCC’s CPs on a daily basis upon the launch of Next Generation initial margin model.

This document outlines how to use the Initial Margin Risk Parameter File to calculate the total MTM and margin requirement of a portfolio for HKSCC clearable instruments in Hong Kong market.

2. INITIAL MARGIN RISK PARAMETER FILE

2.1 Layout of Initial Margin Risk Parameter File

An Initial Margin Risk Parameter File¹ (i.e., RPF01) will be generated in csv format and could be downloaded by CPs on each business day². The layout of the file is shown below:

RPF01:

This file includes instrument price returns for historical Value-at-Risk (“HVaR”) scenarios, stress Value-at-Risk (“SVaR”) scenarios, flat rate margin scenarios, beta hedge information for liquidation risk add-on, instrument delta information for liquidation risk add-on, price threshold and add-on% for structured product add-on and corporate action position margin scenarios.

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	400							
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	0.5									
700	7	1	4	-0.5	0.5							
1299	7	3	0	-1	0							
3606	7	2	0.5	0	0.5							

¹ The number of scenario types is subject to change from time to time and will be reflected in the IMRPF. HKSCC will notify CPs before any change is made in accordance with applicable General Rules of CCASS/CCASS Operational Procedures.

² The dissemination time is around 9:00 p.m. HKT subject to system finalization.

2.2 Specifications of Initial Margin Risk Parameter File

Field Name	Description	Format
Valuation_DT	Valuation date	DD/MM/YYYY
HVaR_WGT	Weighting of the historical Value-at-Risk (“HVaR”) component in the initial margin model	DECIMALS (X,10) ³ ;
SVaR_WGT	Weighting of the stress Value-at-Risk (“SVaR”) component in the initial margin model	DECIMALS (X,10);
HVaR_Scen_Count	Number of scenarios used for calculating HVaR component	INTEGER (X,0) ³ ; e.g., a value of 1000 means 1000 risk scenarios for HVaR calculation.
SVaR_Scen_Count	Number of scenarios used for calculating SVaR component	INTEGER (X,0); e.g., a value of 1018 means 1018 risk scenarios for Stress VaR calculation.
STV_Count ⁴	Number of stress test scenarios	INTEGER (X,0); e.g., a value of 200 means 200 stress test scenarios for STV.
HVaR_CL	Confidence level applied to HVaR	DECIMALS (X,10); e.g., a value of 0.994 means 99.4% confidence level.
SVaR_CL	Confidence level applied to SVaR	DECIMALS (X,10); e.g., a value of 0.98 means 98% confidence level.
HVaR_Measure	Risk measure type for HVaR component	4 – FHS ES (Discrete) ⁵
SVaR_Measure	Risk measure type for SVaR component	4 – FHS ES (Discrete)
Rounding	Rounding parameter for margin calculation	INTEGER (X,0); e.g., a value of 10,000 means to round up the figure to 10,000.
Holiday_Factor	Scaling factor for calculating holiday add-on. It is calculated as square root(H) – 1, where H is the number of consecutive Hong Kong holidays excluding Saturdays and Sundays	DECIMALS (X,10)
InstrumentID	Instrument identifier e.g. Stock code, or underlying stock code for corporate action position margin instruments like distribution in specie (“DSP”), cash dividend (“DIV”), rights issue (“SRI”), etc.	TEXT

³ The second number in INTEGER() and DECIMALS() refers to the maximum decimal places supported by IMRPF.

⁴ For potential future use only.

⁵ FHS ES stands for Filtered Historical Simulation Expected Shortfall, also known as Conditional Value-at-Risk (“CVaR”) or Expected Tail Loss (“ETL”) or average tail loss. It is the risk measure calculated based on Exponential Weighted Moving Average (“EWMA”) rescaled historical returns in the look back period. “Discrete” meaning only discrete data points on the distribution tail will be selected for calculation. There is no interpolation required between discrete data points.

Field Name	Description	Format
FieldType	Label to indicate the record type: 1 – HVaR Scenarios 2 – SVaR Scenarios 3 – Flat Rate Scenarios 4 – Beta hedge information for liquidation risk add-on 5 – Instrument delta information for liquidation risk add-on 6 – Price threshold and add-on% for structured product add-on 7 – Corporate action position margin scenarios	INTEGER (X,0)
FieldType 1 Columns	Scenario returns for each instrument in HVaR component On the right of “FieldType 1”: - total number of scenarios should be same as “HVaR_Scen_Count”	DECIMALS (X,10)
FieldType 2 Columns	Scenario returns for each instrument in SVaR component On the right of “FieldType 2”: - total number of scenarios should be same as “SVaR_Scen_Count”	DECIMALS (X,10)
FieldType 3 Columns	Return for each instrument in flat rate margin component	DECIMALS (X,10)
FieldType 4 Columns	On the right of “FieldType 4”:	
	- 1st column: Bucket rate	DECIMALS (X,10)
	- 2nd column: Instrument beta	DECIMALS (X,10)
	- 3rd column: Delta equivalent position market value threshold	INTEGER (X,0)
FieldType 5 Columns	On the right of “FieldType 5”:	
	- 1st column: Underlying group	TEXT
	- 2nd column: Delta	DECIMALS (X,10)
	- 3rd column: Conversion ratio	DECIMALS (X,10)
FieldType 6 Columns	On the right of “FieldType 6”:	
	- 1st column: Price threshold	DECIMALS (X,10)
	- 2nd column: One-tenth of tick size multiplier	DECIMALS (X,10)
FieldType 7 Columns	On the right of “FieldType 7”:	
	- 1st column: Benefit entitlement type	INTEGER (X,0) 1 – Distribution in specie 2 – Rights issue 3 – Cash dividend
	- 2nd column: Price of the benefit entitlement (Shows 1 for cash dividend)	DECIMALS (X,10)
	- 3rd column: Short position add-on%	DECIMALS (X,10)
Numbers next to “FieldType”	Scenario numbers	INTEGER (X,0)

3. CALCULATION OF TOTAL MTM AND MARGIN REQUIREMENT

3.1 Required Inputs

3.1.1 Risk Parameters and Margin Adjustments

To derive total MTM and margin requirement, the risk parameters (including market risk and other risk components) and margin adjustments below are required. The sources are stated as follows:

		Source	
		IMRPF	MTM ⁶ and Margin Requirement Report ⁷
Market risk component	Portfolio margin	Y	-
	Flat rate margin	Y	-
	Liquidation risk add-on	Y	-
	Structured product add-on	Y	-
	Corporate action position margin ⁸	Y	-
	Holiday add-on	Y	-
Margin adjustment	Rounding on aggregated market-risk-component margin	Y	-
	Consideration on favorable MTM	-	Y
	Application of margin credit	-	Y
Other risk component	MTM requirement	-	Y
	Position limit add-on	-	Y
	Credit risk add-on	-	Y
	Ad-hoc add-on	-	Y

3.1.2 Positions

The following position details of portfolios are required to calculate total MTM and margin requirement:

- InstrumentID (e.g., 700 for Tencent Holdings)
- Quantity⁹ (e.g. -1,000,000 means to deliver 1,000,000 shares)
- Contract value¹⁰ in HKD equivalent (e.g., In VaR Platform, -384,000,000 means the CP has a receivable of \$384,000,000)
- Market value¹¹ in HKD equivalent

The above information for CPs' entire portfolios could be retrieved from "Marginable Position Report" ("RMAMP01"), which will be disseminated to CPs after each margin call and day-end margin estimation process¹². When using the information in the "Marginable Position Report", please note that:

⁶ MTM refers to "Mark-to-Market" a.k.a. the Marks.

⁷ The report will be generated on each business day for CPs to download via Report Access Platform ("RAP").

⁸ Please note that corporate action position margin will be determined on a case-by-case basis. HKSCC will notify CPs in advance, if applicable.

⁹ Positive value means it is a long position. Negative value means it is a short position.

¹⁰ Negative value means it is a receivable for CP in VaR Platform.

¹¹ Market value = Position quantity x Instrument market price. The sign is determined by the position quantity. (i.e., Negative quantity means a short position and that market value is also negative.)

¹² The dissemination time is around 11:45 a.m., 5:00 p.m. and 9:00 p.m. HKT subject to system finalization.

- For non-HKD denominated instruments, contract values and market values are converted to HKD equivalent using the latest available FX rates without haircut when the position snapshot is captured;
- Positions covered by specific stock / cash collateral are excluded¹³; and
- All positions are adjusted for corporate actions¹⁴; and
- All positions are cross-day netted¹⁵.

In addition, users could opt to generate the marginable positions by their own if they would like to calculate margin and marks more frequently during the day. The generation of marginable position will include three main steps: (i) adjustment of specific stock / cash collateral cover, (ii) Corporate Action positions adjustment and (iii) cross-day positions netting. Appendix 4.3 to 4.5 demonstrate the detailed steps for reference.

A sample portfolio is shown below for illustration of calculation in the subsequent section:

InstrumentID	Quantity	Contract value in HKD Equivalent	Market value in HKD Equivalent
658	-10,000,000	-62,000,000	-60,000,000
700	-1,000,000	-384,000,000	-400,000,000
1299	1,000,000	80,000,000	80,000,000
1876	100,000	2,700,000	3,000,000
2823	1,000,000	30,000,000	30,000,000
3606	1,000,000	28,000,000	30,000,000
3690	100,000	6,900,000	7,000,000
26883	110,000,000	3,000,000	2,000,000
DSP700	-1,000,000	0	-4,000,000
DIV1299	1,000,000	-1,000,000	0
SRI3606	2,000,000	0	1,000,000
60954	120,000,000	8,000,000	10,000,000

3.2 Calculation Process

3.2.1 Overview of the Calculation Process for Total MTM and Margin Requirement

Total MTM and margin requirement is calculated according to the steps as follows:

- Identify applicable market risk components for each instrument in the portfolio (See §3.2.2);
- Identify margin adjustments and other risk components (See §3.2.3);
- Calculate market risk components (See §3.2.4);
- Aggregate market risk components and perform margin adjustments (See §3.2.5);
- Calculate or retrieve other risk components from report (See §3.2.6); and
- Derive total MTM and margin requirement by adding results from §3.2.5 & §3.2.6 (See §3.2.8).

3.2.2 Identify Applicable Market Risk Components for Each Instrument in Portfolio

Users shall identify applicable margin components by using the CP-specific “Marginable Position Report” and “Initial Margin Risk Parameter File” according to the steps as follows:

¹³ Please refer to Appendix 4.3 for Specific Stock Collateral / Specific Cash Collateral covered position exclusion logic

¹⁴ Please refer to Appendix 4.4 for the corporate action position adjustment logic

¹⁵ Please refer to Appendix 4.5 for the cross-day position netting logic

Step 1: Identify all corresponding FieldType(s) in the “Initial Margin Risk Parameter File” for each instrument shown in the “Marginable Position Report”.

Please note that **Instrument Code** in the “Marginable Position Report” is the same as **InstrumentID** in the “Initial Margin Risk Parameter File” for each tradeable instrument. For corporate action entitled instruments, the instrument code would be decomposed into two fields in FieldType 7 (See §2.2).

For example, Instrument Code 658 is found in the “Marginable Position Report”. Users shall find out “658” under the column InstrumentID and identify the corresponding FieldType(s) associated with the instrument in the “Initial Margin Risk Parameter File”. In this case, FieldType 3 is identified for the instrument.

For example, a corporate action entitled instrument “DSP700” is found in the “Marginable Position Report”, users shall find out “700” under the column InstrumentID and “1” under the next column in FieldType 7.

After repeating the aforementioned step for each instrument, user should identify the instruments subject to holiday add-on¹⁶. The holiday add-on will apply to all instruments except for those having FieldType 7 (i.e. instruments subject to corporate action position margin). Finally, the identification result of the sample portfolio is shown as follows:

Instrument Code / InstrumentID	Market risk component							Holiday add-on
	Portfolio margin		Flat rate margin	Liquidation risk add-on	Structured product add-on	Corporate action position margin	Holiday add-on	
	HVaR	SVaR						
	FieldType							
1	2	3	4	5	6	7		
658	-	-	Y	-	-	-	-	Y
700	Y	Y	-	Y	-	-	-	
1299	Y	Y	-	Y	-	-	-	
1876	Y	Y	-	Y	-	-	-	
2823	Y	Y	-	Y	-	-	-	
3606	-	-	Y	-	-	-	-	
3690	Y	Y	-	Y	-	-	-	
26883	Y	Y	-	-	Y	Y	-	
DSP700	-	-	-	-	-	-	Y	
DIV1299	-	-	-	-	-	-	Y	-
SRI3606	-	-	-	-	-	-	Y	
60954	Y	Y	-	-	Y	-	-	Y

Step 2: Identify applicable margin components for each instrument by referring to the FieldType definitions stated in §2.2.

¹⁶ Please note that the holiday add-on will not be applicable upon the launch of VaR Platform. HKSCC will notify CPs before the implementation.

For example, users should only include the InstrumentID 658 and 3606 for flat rate margin calculation according to the identification results shown in the above table (see §3.2.4.2 for calculation process on flat rate margin in details).

3.2.3 Identify Margin Adjustments and Other Risk Components

Users shall follow the rules below to determine which instrument should be included in the calculation of other risk components:

- Positions limit add-on applies to all Hong Kong market instruments; and
- Credit risk add-on and ad-hoc add-on are not applicable to any instruments from the Initial Margin Risk Parameter File. Instead, users shall refer to the add-on amounts directly from the “MTM and Margin Requirement Report”.

The margin adjustments below are applied on a portfolio basis (See §3.2.8 for details):

- Rounding on aggregated market-risk-component margin;
- Consideration on favorable MTM; and
- Application of margin credit.

3.2.4 Calculate Market Risk Components

3.2.4.1 Portfolio Margin

The portfolio margin is the weighted average of the following two components, subject to the portfolio margin floor:

- Historical Value-at-Risk (“HVaR”) component; and
- Stress Value-at-Risk (“SVaR”) component.

For the calculation of (i) and (ii), it is required to treat each IPO¹⁷ stock and its relevant structured product(s)¹⁸ as an individual portfolio and group other non-IPO related instruments together as another separate portfolio.

3.2.4.1.1 Historical Value-at-Risk Component (“HVaR”)

HVaR is calculated according to the steps as follows:

Step 1: Calculate the portfolio returns of positions in each scenario under FieldType 1 identified as per instructions in §3.2.2.

For example:

$$\begin{aligned} &\text{Portfolio return}^{19} \text{ in scenario 1 for IPO instrument group 1876} \\ &= (\text{Market value}_{1876} \times \text{Return}_{1876}) \\ &= (3,000,000 \times 0.011128) \\ &= 33,384 \end{aligned}$$

Portfolio return²⁰ in scenario 1 for IPO instrument group 3690

¹⁷ CPs could refer to the IPO Indicator Report (“DWH0303”) on Report Access Platform (“RAP”) daily to identify the stocks that are subject to IPO segregation and its relevant structured product(s) required to be grouped as an individual portfolio when calculating HVaR and SVaR (i.e., stocks which are newly listed within the recent 180 calendar days, subject to SFC approval).

¹⁸ If the underlying (as shown under Column 1 of FieldType 5 in the IMRPF) of an instrument in FieldType 5 is an IPO stock, this instrument is a relevant structured product.

¹⁹ Round off any (Market value_i x Return_i) term to the nearest integer if the result is a decimal number.

²⁰ Round off any (Market value_i x Return_i) term to the nearest integer if the result is a decimal number.

$$= (\text{Market value}_{3690} \times \text{Return}_{3690})$$

$$= (7,000,000 \times 0.012241)$$

$$= 85,687$$

Portfolio return²¹ in scenario 1 for non-IPO instruments

$$= (\text{Market value}_{700} \times \text{Return}_{700}) + (\text{Market value}_{1299} \times \text{Return}_{1299}) + (\text{Market value}_{2823} \times \text{Return}_{2823}) + (\text{Market value}_{26883} \times \text{Return}_{26883}) + (\text{Market value}_{60954} \times \text{Return}_{60954})$$

$$= (-400,000,000 \times 0.01391) + (80,000,000 \times 0.01125) + (30,000,000 \times 0.011628) + (2,000,000 \times 0.136461) + (10,000,000 \times -0.104288)$$

$$= -5,085,118$$

Step 2: Repeat step 1 for all HVaR scenarios under FieldType 1 (i.e., 1,000 referring to HVaR_Scen_Count in the Initial Margin Risk Parameter File).

A set of scenario returns under FieldType 1 will be obtained as follows:

FieldType 1	Scenario 1	Scenario 2	...	Scenario 1,000
Portfolio return for IPO stock 1876	33,384	-44,367	...	-9
Portfolio return for IPO stock 3690	85,687	-113,876	...	-21
Portfolio return for non-IPO instruments	-5,805,118	5,202,132	...	6,738

Step 3: Calculate HVaR component of the portfolios by averaging the worst 6 scenarios²², where HVaR_Measure parameter indicates an ES (Discrete) risk measure, and HVaR_CL parameter indicates a confidence level of 99.4%.

$$\text{HVaR for IPO instrument group 1876} = -7,546.5$$

$$\text{HVaR for IPO instrument group 3690} = -19,369$$

$$\text{HVaR for non-IPO instruments} = -4,793,885.67$$

3.2.4.1.2 Stress Value-at-Risk Component (“SVaR”)

SVaR is calculated according to the steps as follows:

Step 1: Calculate the portfolio return of positions for each scenario under FieldType 2 identified as per instructions in §3.2.2.

For example:

Portfolio return²³ in scenario 1 for IPO instrument group 1876

$$= (\text{Market value}_{1876} \times \text{Return}_{1876})$$

²¹ Round off any (Market value_i x Return_i) term to the nearest integer if the result is a decimal number.

²² (1-99.4% (HVaR_CL)) x 1,000 (HVaR_Scen_Count) scenarios = 6 scenarios, rounding up to the nearest integer.

²³ Round off any (Market value_i x Return_i) term to the nearest integer if the result is a decimal number.

$$= (3,000,000 \times 0.040616)$$

$$= 121,848$$

Portfolio return²⁴ in scenario 1 for IPO instrument group 3690

$$= (\text{Market value}_{3690} \times \text{Return}_{3690})$$

$$= (7,000,000 \times 0.044678)$$

$$= 312,746$$

Portfolio return²⁵ in scenario 1 for non-IPO instruments

$$= (\text{Market value}_{700} \times \text{Return}_{700}) + (\text{Market value}_{1299} \times \text{Return}_{1299}) + (\text{Market value}_{2823} \times \text{Return}_{2823}) + (\text{Market value}_{26883} \times \text{Return}_{26883}) + (\text{Market value}_{60954} \times \text{Return}_{60954})$$

$$= (-400,000,000 \times 0.041026) + (80,000,000 \times 0.037588) + (30,000,000 \times 0.026217) + (2,000,000 \times 0.254769) + (10,000,000 \times -0.321378)$$

$$= -15,321,092$$

Step 2: Repeat step 1 for all SVaR scenarios under FieldType 2 (i.e., 1,018 referring to SVaR_Scen_Count in the Initial Margin Risk Parameter File).

A set of scenario returns under FieldType 2 will be obtained as follows:

FieldType 2	Scenario 1	Scenario 2	...	Scenario 1,018
Portfolio return for IPO stock 1876	121,848	228,468	...	-166,599
Portfolio return for IPO stock 3690	312,746	586,404	...	-427,602
Portfolio return for non-IPO instruments	-15,321,092	-35,058,992	...	25,818,414

Step 3: Calculate SVaR component of the portfolio is the average of the worst 21 scenarios²⁶, where SVaR_Measure parameter indicates an ES (Discrete) risk measure, and SVaR_CL parameter indicates a confidence level of 98%.

$$\text{SVaR for IPO instrument group 1876} = -23,535.29$$

$$\text{SVaR for IPO instrument group 3690} = -60,407.67$$

$$\text{SVaR for non-IPO instruments} = -16,147,985.33$$

3.2.4.1.3 Portfolio Margin Floor

Portfolio margin floor is the product of:

- (i) Portfolio margin floor base; and
- (ii) Portfolio margin floor rate.

²⁴ Round off any (Market value_i x Return_i) term to the nearest integer if the result is a decimal number.

²⁵ Round off any (Market value_i x Return_i) term to the nearest integer if the result is a decimal number.

²⁶ (1-98% (SVaR_CL)) x 1,018 (SVaR_Scen_Count) scenarios = 21 scenarios, rounding up to the nearest integer.

Where the portfolio margin floor base is the higher of gross long and short market value of positions under FieldType 1 or 2, and portfolio margin floor rate is currently set as 2.5%²⁷.

The portfolio margin floor is calculated according to the steps as follows:

Step 1: Calculate the portfolio margin floor base.

Portfolio margin floor base

$$= \text{Maximum [Absolute value of (Market value}_{1299}) + \text{Absolute value of (Market value}_{1876}) + \text{Absolute value of (Market value}_{2823}) + \text{Absolute value of (Market value}_{3690}) + \text{Absolute value of (Market value}_{26883}) + \text{Absolute value of (Market value}_{60954}) , \text{Absolute value of (Market value}_{700})]}$$

$$= \text{Maximum [(80,000,000 + 3,000,000 + 30,000,000 + 7,000,000 + 2,000,000 + 10,000,000) , 400,000,000]}$$

$$= \text{Maximum [132,000,000 , 400,000,000]}$$

$$= 400,000,000$$

Step 2: Calculate portfolio margin floor by applying the 2.5% margin floor rate to the base.

Portfolio margin floor

$$= \text{Portfolio margin floor base} \times \text{Portfolio margin floor rate}$$

$$= 400,000,000 \times 2.5\%$$

$$= 10,000,000$$

As a result, the portfolio margin will be:

Portfolio margin²⁸

$$= \text{Maximum [Sum of (HVaR} \times \text{HVaR_WGT} + \text{SVaR} \times \text{SVaR_WGT}) , \text{Portfolio margin floor}]}$$

$$= \text{Maximum [Absolute value of ((-7,546.5} \times 75\%) + (-23,535.29 \times 25\%) + (-19,369 \times 75\%) + (-60,407.67 \times 25\%) + (-4,793,885.67 \times 75\%) + (-16,147,985.33 \times 25\%)) , 10,000,000]}$$

$$= \text{Maximum [Absolute value of ((-11,543.70) + (-29,628.67) + (-7,632,410.59)) , 10,000,000]}$$

$$= \underline{\underline{10,000,000}}$$

3.2.4.2 Flat Rate Margin

Flat rate margin is calculated according to the steps as follows:

Step 1: Aggregate absolute market value of long positions and absolute market value of short positions separately for each position identified as per instructions in §3.2.2.

²⁷ The portfolio margin floor is subject to change from time to time. HKSCC will issue circulars to notify the market before any change is made.

²⁸ Round off to the nearest integer if the result is a decimal number.

For example:

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

As above, the total absolute short market value is higher than the total absolute long market value. Therefore, all short positions will be included in the flat rate margin calculation while all long positions will be excluded.

InstrumentID	Quantity	Contract value in HKD Equivalent	Market value in HKD Equivalent
658	-10,000,000	-62,000,000	-60,000,000

Step 2: Sum the product of absolute position market value and the flat margin rate under FieldType 3.

Step 3: Apply flat rate margin multiplier²⁹ by referring to the “Daily Participant Margin Multiplier Report” (“DWH0081C”) to obtain the flat rate margin after margin multiplier.

For example, assume a flat rate margin multiplier of 2 is assigned,

$$\begin{aligned} &\text{Flat rate margin after applying margin multiplier} \\ &= (60,000,000 \times 12\%) \times 2 \\ &= \underline{\underline{14,400,000}} \end{aligned}$$

3.2.4.3 Liquidation Risk Add-on (“LRA”)

LRA is consisted of two components identified as per instructions in §3.2.2:

- Instrument-level LRA; and
- Portfolio-level LRA.

3.2.4.3.1 Instrument-level LRA

Instrument-level LRA is calculated according to the steps as follows:

Step 1: Calculate the delta-equivalent position market values for each underlying group. Users could find out the underlying group of a particular structured product by referring to the first column on the right of “FieldType = 5” in the Initial Margin Risk Parameter File.

Taking Instrument 26883 as an example, users could refer to the Initial Margin Risk Parameter File and locate Instrument 700 is its corresponding underlying group.

Similarly, the underlying stock for Instrument 60954 is Instrument 1299.

²⁹ Flat rate margin multiplier varies among CPs. Please refer to Daily Participant Margin Multiplier Report (DWH0081C).

In case the users only hold the stock without the corresponding structured product (i.e., no information of that particular instrument under FieldType 5), the users shall calculate the market value of delta-equivalent position by using the information under FieldType 4.

See the treatment of instruments 1876, 2823, 3690 in the example as follows:

InstrumentID	Quantity (A)	Cash delta per quantity (B)	Market value of delta equivalent position in HKD equivalent (C) = (A) x (B)
700	-1,000,000	400	-400,000,000
26883	110,000,000	0.1784	19,624,000
Total for the underlying group 700			-380,376,000
1299	1,000,000	80	80,000,000
60954	120,000,000	-0.63167	-75,800,400
Total for the underlying group 1299			4,199,600
1876	100,000	30	3,000,000
Not applicable			0
Total for the underlying group 1876			3,000,000
2823	1,000,000	30	30,000,000
Not applicable			0
Total for the underlying group 2823			30,000,000
3690	100,000	70	7,000,000
Not applicable			0
Total for the underlying group 3690			7,000,000

Step 2: Calculate the instrument-level LRA based on the respective bucket rates and the portion of delta-equivalent position market value which exceeds the thresholds for each underlying group and subsequently aggregate the LRAs for all underlying groups shown as follows:

Underlying Group	Market value of delta equivalent position in HKD equivalent (A)	Threshold In HKD equivalent (B)	Bucket rate (C)	Liquidation risk add-on (D) = Maximum [Absolute value of ((A)-(B) , 0] x (C)
700	-380,376,000	300,000,000	0.0022	176,827.2
1299	4,199,600	100,000,000	0.0025	0
1876	3,000,000	200,000,000	0.002	0
2823	30,000,000	250,000,000	0.002	0
3690	7,000,000	300,000,000	0.0022	0
Total				176,827.2

Instrument-level LRA = **176,827** (rounded off to the nearest integer)

3.2.4.3.2 Portfolio-level LRA

Portfolio-level LRA is calculated according to the steps as follows:

Step 1: Calculate market values of beta hedge positions for each of the underlying groups and subsequently aggregate the results.

Underlying group	Market value of delta equivalent position in HKD Equivalent (A)	Beta (B)	Market value of beta hedge position (C) = (A) x (B)
700	-380,376,000	0.9	-342,338,400
1299	4,199,600	1.1	4,619,560
1876	3,000,000	1.2	3,600,000
2823	30,000,000	1	30,000,000
3690	7,000,000	1.3	9,100,000
Total			-295,018,840

Step 2: Calculate portfolio-level LRA with the aid of a portfolio hedging instrument.

The sample portfolio's hedging instrument is currently set as the Tracker Fund of Hong Kong (2800.HK)³⁰.

Hedging market value threshold = 250,000,000

Hedging instrument bucket rate = 0.002

Portfolio-level liquidation risk add-on

= Maximum [0 , Absolute value of (Total market value of beta hedge position) – Hedging market value threshold] x Hedging instrument bucket rate

= Maximum [0 , (295,018,840 – 250,000,000)] x 0.002

= **90,038** (rounded off to the nearest integer)

As a result, the liquidation risk add-on will be:

LRA

= Instrument-level LRA + Portfolio-level LRA

= 176,827 + 90,038

= **266,865**

3.2.4.4 Structured Product Add-on

Structured product add-on includes structured products which

- The instrument market prices are smaller than their corresponding price thresholds (i.e., all instruments listed under FieldType 6 as per instruction in §3.2.2); and
- The instruments are under long positions.

Structured product add-on is calculated according to the steps as follows:

Step 1: Identify the position of all instruments under FieldType 6.

In the sample portfolio, InstrumentID 26883 is identified under FieldType 6 as per the table shown in §3.2.2.

³⁰ The Tracker Fund of Hong Kong (2800.HK) is set as the default portfolio hedging instrument and subject to change from time to time. HKSCC will issue circulars to notify the market before any change is made.

As there is a positive quantity of InstrumentID 26883 (i.e., 110,000,000), the instrument is under long position and should be included in the subsequent calculation for structured product add-on³¹.

Step 2: Calculate the structured product add-on by using the formula as follows:

$$= \text{Quantity} \times \text{Tick size multiplier}^{32} \times \text{Minimum tick size}^{33}$$

The calculation process is shown as follows:

InstrumentID	Quantity (A)	Tick size multiplier (B)	Minimum tick size (C)	Structured product add-on (D) = (A) x (B) x (C)
26883	110,000,000	5	0.001	550,000
Total				<u>550,000</u>

3.2.4.5 Corporate Action Position Margin

Corporate action position margin is calculated according to the steps as follows:

Step 1: Calculate the net market value of positions for each scenario under FieldType 7 identified as per instructions in §3.2.2.

The result of sample portfolio is shown as follows:

InstrumentID	Quantity	Contract value in HKD equivalent (A)	Market value in HKD equivalent (B)	Net market value (C) = (B) - (A)
DSP700	< 0	0	-4,000,000	-4,000,000
DIV1299	≥ 0	-1,000,000	0	1,000,000
SRI3606	≥ 0	0	1,000,000	1,000,000

Step 2: Apply positive net market value positions to scenario 4 under FieldType 7.

Step 3: Apply negative net market value positions to scenario 3 under FieldType 7.

Step 4: Add the results obtained from steps 2 and 3.

Corporate Action Position Margin³⁴

= Absolute value of (net market value_{DSP700}) x scenario 3 + Absolute value of (net market value_{DIV1299}) x scenario 4 + Absolute value of (net market value_{SRI3606}) x scenario 4

= Absolute value of (-4,000,000 x -0.5) + Absolute value of (1,000,000 x 0) + Absolute value of (1,000,000 x 0.5)

= **2,500,000**

³¹ If the quantity of InstrumentID 26883 is negative e.g., -100 it will be excluded from the calculation of structured product add-on.

³² Tick size multiplier of the respective instrument is calculated by 10 times the value as shown under Column 2 of FieldType 6 in the IMRPF of that instrument (i.e., 10 x 0.5 = 5 in this illustration).

³³ The current minimum tick size is set as 0.001. HKSCC will notify the market before any change is made.

³⁴ Round off any (net market value_i x scenario_i) term to the nearest integer if the result is a decimal number.

3.2.4.6 Holiday Add-on³⁵

Holiday add-on only includes positions subject to portfolio margin or flat rate margin identified as per instructions in §3.2.2.

Holiday add-on is calculated according to the steps as follows:

Step 1: Calculate the base of holiday add-on by adding portfolio margin to flat rate margin.

$$\begin{aligned} &\text{Base of holiday add-on} \\ &= \text{Portfolio margin} + \text{Flat rate margin} \\ &= 10,000,000 + 14,400,000 \\ &= 24,400,000 \end{aligned}$$

Step 2: Calculate holiday add-on by multiplying the base of holiday add-on by Holiday_Factor parameter³⁶.

$$\begin{aligned} &\text{Holiday add-on} \\ &= \text{Base of holiday add-on} \times 0.7320508075 \\ &= 24,400,000 \times 0.7320508075 \\ &= \underline{\underline{17,862,040}} \text{ (rounded off to the nearest integer)} \end{aligned}$$

3.2.5 Aggregate Market Risk Components and Perform Margin Adjustments

The market risk components are aggregated with margin adjustments as follows:

- Rounding on aggregated market-risk-component margin
- Consideration on favourable MTM³⁷
- Application of margin credit

3.2.5.1 Rounding on Aggregated Market-risk-component Margin

Margin rounding is performed on all market risk components according to the steps as follows:

Step 1: Calculate aggregated margin derived from market risk components.

$$\begin{aligned} &\text{Aggregated market-risk-component margin} \\ &= \text{Portfolio margin} + \text{Flat rate margin} + \text{Liquidation risk add-on} + \text{Structured product add-on} \\ &\quad + \text{Corporate action position margin} + \text{Holiday add-on} \\ &= 10,000,000 + 14,400,000 + 266,865 + 550,000 + 2,500,000 + 17,862,040 \\ &= 45,578,905 \end{aligned}$$

³⁵ Please note that the holiday add-on will not be applicable upon the launch of VaR Platform. HKSCC will notify CPs before the implementation.

³⁶ The Holiday_Factor parameter is 0.7320508075 which implies the number of consecutive holidays is 3. Please refer to §2.2 for the conversion methodology.

³⁷ Favorable MTM and MTM requirement are mutually exclusive. See §3.2.5.2 for details.

Step 2: Round up the aggregated margin with reference to the rounding parameter stated in the Initial Margin Risk Parameter File (e.g., 10,000 in the sample Initial Margin Risk Parameter File).

In our example, 45,578,905 is to be rounded up to the nearest 10,000.

Rounded aggregated market-risk-component margin = **45,580,000**

3.2.5.2 Consideration on Favorable MTM

Favorable MTM (or MTM requirement)³⁸ could be determined by the steps as follows:

Step 1: Calculate favorable MTM (or MTM requirement) by using the formula as follows:

$$\begin{aligned} \text{Favorable MTM (or MTM requirement)}^{39} &= \text{Market value}_{\text{Portfolio}} - \text{Contract value}_{\text{Portfolio}} \\ &= (-301,000,000) - (-288,400,000) \\ &= \mathbf{-12,600,000} \end{aligned}$$

The negative number refers to a MTM requirement, which its absolute value will be added after applying margin credit (See §3.2.6.1). In such case, favorable MTM is zero.

Step 2: Deduct favorable MTM from rounded aggregated market-risk-component margin to derive net margin.

$$\begin{aligned} \text{Net margin} &= \text{Maximum} (0, \text{Rounded aggregated market-risk-component margin} - \text{Favorable MTM}) \\ &= \text{Maximum} [0, (45,580,000 - 0)] \\ &= \mathbf{45,580,000} \end{aligned}$$

3.2.5.3 Application of Margin Credit

A margin credit (normally 5,000,000)⁴⁰ is granted to each CP and applied for margin calculation⁴¹.

Net margin after credit is calculated as follows:

$$\begin{aligned} \text{Net margin after credit} &= \text{Maximum} [0, (\text{Net margin} - \text{Margin credit})] \\ &= \text{Maximum} [0, (45,580,000 - 5,000,000)] \end{aligned}$$

³⁸ Favorable MTM and MTM requirement are mutually exclusive. In the MTM and Margin Requirement Report, absolute value of favorable MTM (or MTM requirement) will be shown.

³⁹ The aggregated value of HKD equivalent contract value and HKD equivalent market value. Numbers are rounded off on position level. Please refer to Appendix 4.6 for calculation logic that involve multiple currencies in the portfolio.

⁴⁰ Such amount may be reduced for risk management purpose. HKSCC will notify CPs in advance.

⁴¹ Please refer to the session "Risk Management of CNS Trades in Hong Kong Market" in HKEX website. (https://www.hkex.com.hk/Services/Clearing/Securities/Risk-Management-of-CNS-Trades-in-Hong-Kong-Market?sc_lang=en)

= **40,580,000**

3.2.6 Calculate or Retrieve Other Risk Components from Report

3.2.6.1 MTM Requirement⁴²

In our example, a MTM requirement of **12,600,000** is figured out as per §3.2.5.2.

3.2.6.2 Position Limit Add-on

Position limit add-on is applicable to all non-custodian CPs (See §4.1 for detailed calculation). CPs could refer to the “MTM and Margin Requirement Report” for the amount of positions limit add-on to be charged.

For illustration purpose, position limit add-on for the sample portfolio is assumed to be **483,488**.

3.2.6.3 Credit Risk Add-on⁴³

Credit risk add-on is only applicable to specific CPs who will be notified by HKSCC individually. Those CPs could refer to the “MTM and Margin Requirement Report” for the amount to be charged.

For illustration purpose, credit risk add-on for the sample portfolio is assumed to be **12,000,000**.

3.2.6.4 Ad-hoc Add-on

Ad-hoc add-on is only applicable to specific CPs who will be notified by HKSCC individually. Those CPs could refer to the “MTM and Margin Requirement Report” for the amount to be charged.

For illustration purpose, ad-hoc add-on for the sample portfolio is assumed to be **600,000**.

3.2.7 Summary of Market Risk Components with Margin Adjustments and Other Risk Components

		Results in HKD equivalent
Market risk components	Portfolio margin	10,000,000
	Flat rate margin	14,400,000
	Liquidation risk add-on	266,865
	Structured product add-on	550,000
	Corporate action position margin	2,500,000
	Holiday add-on	17,862,040
	Aggregated market-risk-component margin	45,578,905
Margin adjustments	Net margin after credit	40,580,000
Other risk components	MTM requirement	12,600,000
	Position limit add-on	483,488
	Credit risk add-on	12,000,000
	Ad-hoc add-on	600,000

⁴² Please refer to Appendix 4.7 for intra-day calculation logic.

⁴³ Please note that the credit risk add-on will not be applicable upon the launch of VaR Platform. HKSCC will notify CPs before the implementation.

3.2.8 Derive Total MTM and Margin Requirement from Results under §3.2.5 & §3.2.6

Eventually, total MTM and margin requirement could be derived by adding the net margin after credit to other risk components.

Total MTM and margin requirement

= Net margin after credit + Other risk components

= Net margin after credit + MTM requirement + Position limit add-on + Credit risk add-on + Ad-hoc add-on

= 40,580,000 + 12,600,000 + 483,488 + 12,000,000 + 600,000

= **66,263,488**

4. APPENDIX

4.1 Detailed Calculation on Position Limit Add-on

Position limit add-on assumes hypothetical conditions as follows:

- Apportioned liquid capital of CP = 75,000,000
- Apportioned liquid capital multiplier⁴⁴ = 4
- Apportioned liquid capital cap⁴⁵ = 280,000,000
- Rounded aggregated market-risk-component margin = 45,580,000
- Net margin after credit = 40,580,000
- Add-on%⁴⁶ = 25%

Position limit add-on is calculated according to the steps as follows:

Step 1: Sum the market values in HKD equivalent of all positions in the portfolio as follows:

InstrumentID	Market value in HKD equivalent
658	-60,000,000
700	-400,000,000
1299	80,000,000
1876	3,000,000
2823	30,000,000
3606	30,000,000
3690	7,000,000
26883	2,000,000
DSP700	-4,000,000
DIV1299	0
SRI3606	1,000,000
60954	10,000,000
Total	-301,000,000

Step 2: Calculate net market value (“NMV”) of the portfolio by taking absolute value in case of net short position.

NMV = Absolute value of (-301,000,000) = 301,000,000

Step 3: Calculate position limit add-on by using the formula as follows:

Position limit add-on

= If (NMV = 0, 0, Maximum {NMV – Minimum [(Apportioned liquid capital x Apportioned liquid capital multiplier) , Apportioned liquid capital cap] , 0} / NMV x Round up(Portfolio margin + Flat rate margin + Corporate action position margin + Liquidation risk add-on + Structured product add-on, Rounding parameter in the IMRPF) x If (Net margin after credit > 0, Add-on%, 1+ Add-on%))

⁴⁴ Apportioned liquid capital multiplier is CP-specific. HKSCC will notify CPs before any change is made in accordance with applicable CCASS rules/operational procedures.

⁴⁵ Apportioned liquid capital cap is currently not applicable. HKSCC will issue circulars to notify the market before any change is made.

⁴⁶ The add-on% is subject to change from time to time. HKSCC will issue circulars to notify the market before any change is made.

= Maximum {301,000,000 – Minimum [(75,000,000 x 4) , 280,000,000] , 0} / 301,000,000 x Round up(27,716,865,10,000) x 25%

= Maximum [(301,000,000 – 280,000,000) , 0] / 301,000,000 x 27,720,000 x 25%

= Maximum (21,000,000 , 0) / 301,000,000 x 27,720,000 x 25%

= **483,488** (rounded off to the nearest integer for decimal numbers)

4.2 Guarantee Fund Risk Collateral

Guarantee Fund risk collateral, a.k.a. default fund add-on, in the amount of net projected loss of the CP in excess of 50% of the Guarantee Fund threshold will be collected from the concerned CPs should the Guarantee Fund threshold be reached. Please note that it will not be aggregated to total MTM and margin requirement.

Definition refer to CCASS Operational Procedures §10.11 is as follows:

Guarantee Fund risk collateral

= Guarantee Fund expected uncollateralised loss⁴⁷ - Guarantee Fund risk predefined limit⁴⁸

The calculation result could be found under the field “Default Fund Add-on” in the “MTM and Margin Requirement Report”.

4.3 Specific Stock / Cash Collateral Position Cover

Positions covered by Specific Stock Collateral (“SSC”) or Specific Cash Collateral (“SCC”) shall be excluded from the MTM and margin requirement calculation. Please note that SSC and SCC could only be arranged to cover positions prior to the settlement date (i.e., Current business date < Settlement date) and capped by the position quantity / position amount. Any excess collateral⁴⁹ will be ignored.

4.3.1 Specific Stock Collateral for Short Position

SSC are pledged in CCMS according to corresponding stock code and settlement date. Position cover follows the same manner.

Supposing a CP holds short positions with Quantity < 0 on 5 Nov 2019:

Current business date: 05-Nov-2019

Trade date	Settlement date	Stock code	Quantity	Amount
04-Nov-2019	06-Nov-2019	5	-4,000	-240,000
01-Nov-2019	05-Nov-2019	388	-1,500	-360,000
04-Nov-2019	06-Nov-2019	700	-1,000	30,000
05-Nov-2019	07-Nov-2019	5	-2,000	-120,000

Supposing the CP tries to pledge a quantity of **1,500** for each of the stocks as per the same settlement date as SSC, the resulting uncovered positions are shown as follows:

⁴⁷ CP can refer to the field “Daily EUL” in Default Fund Requirement Report (“RMADF01”).

⁴⁸ The current Guarantee Fund risk pre-defined limit is HKD3,300,000,000. HKSCC will issue circulars to notify the market before any change is made.

⁴⁹ Any excess SSC pledged will not be on-hold by CCMS. SCC will be collected in full amount by CCMS according to the CP’s input even the input amount is in excess to the position amount. Excess SCC will be refunded to the CP in next business day.

Current business date: 05-Nov-2019

Trade date	Settlement date	Stock code	Quantity	Amount	Remarks
04-Nov-2019	06-Nov-2019	5	-2,500	-150,000	Pro-rata reduction on amount based on covered quantity
01-Nov-2019	05-Nov-2019	388	-1,500	-360,000	Not allowed to be covered as SSC is arranged on Settlement Date
04-Nov-2019	06-Nov-2019	700	0	0	The position is fully covered. Excess collateral is ignored.
05-Nov-2019	07-Nov-2019	5	-500	-30,000	Pro-rata reduction on amount based on covered quantity

In case of a half trading day (e.g. 24 Dec 2019), for each stock, there could be 2 positions with different trade dates but having the same settlement date.

If both the positions have quantity < 0, then the position with higher position average price will be covered first (i.e., Position average price = Absolute value of (Amount / Quantity))

Nevertheless, if there are two positions, one with quantity > 0 while the other one with quantity < 0, only the one with quantity < 0 will undergo the position cover before cross-day position netting.

An example of a CP holds some positions traded on different dates but with the same settlement date:

Current business date: 24-Dec-2019

Trade date	Settlement date	Stock code	Quantity (A)	Amount (B)	Average price (C)=Abs((B)/(A))
23-Dec-2019	30-Dec-2019	5	-4,000	-240,000	60
24-Dec-2019	30-Dec-2019	5	2,000	126,000	63
23-Dec-2019	30-Dec-2019	700	-1,000	-330,000	330
24-Dec-2019	30-Dec-2019	700	-2,000	-720,000	360

Supposing the CP tries to pledge a quantity of **2,500** for each of the stocks as per the same settlement date as SSC, the resulting uncovered positions are shown as follows:

Current business date: 24-Dec-2019

Trade date	Settlement date	Stock code	Quantity	Amount	Remarks
23-Dec-2019	30-Dec-2019	5	-1,500	-90,000	Pro-rata reduction on amount based on covered quantity
24-Dec-2019	30-Dec-2019	5	2,000	126,000	SSC is not accepted as quantity > 0
23-Dec-2019	30-Dec-2019	700	-500	-165,000	Because of the lower position average price, this position is covered by the remaining SSC in the quantity of 500. Pro-rata reduction on amount based on covered quantity.
24-Dec-2019	30-Dec-2019	700	0	0	Because of the higher position average price, this position is firstly covered by the SSC in the quantity of 2,500. The position is fully covered. Excess collateral (i.e., 500) is ignored.

The resulting positions after SSC position cover will be used for deriving the marginable position for MTM and margin requirement calculation.

4.3.2 Specific Cash Collateral Position Cover

SCC are arranged in CCMS according to corresponding stock code and trade date. Position cover follows the same manner.

Supposing a CP holds some long positions with Quantity > 0 and Amount > 0 on 5 Nov 2019:

Current business date: 05-Nov-2019

Trade date	Settlement date	Stock code	Quantity	Amount
04-Nov-2019	06-Nov-2019	5	4,000	240,000
01-Nov-2019	05-Nov-2019	388	1,500	360,000
04-Nov-2019	06-Nov-2019	700	100	30,000
05-Nov-2019	07-Nov-2019	5	2,000	180,000

Supposing the CP tries to arrange **\$60,000** for each of the stocks as per the same trade date as SCC, the resulting uncovered positions are shown as follows:

Current business date: 05-Nov-2019

Trade ate	Settlement date	Stock code	Quantity	Amount	Remarks
04-Nov-2019	06-Nov-2019	5	3,000	180,000	Pro-rata reduction on Quantity based on covered Amount
01-Nov-2019	05-Nov-2019	388	1,500	360,000	Not allowed to be covered as SCC is arranged on Settlement Date
04-Nov-2019	06-Nov-2019	700	0	0	The position is fully covered. Excess collateral is ignored.
05-Nov-2019	07-Nov-2019	5	1,334	120,000	Pro-rata reduction on Quantity based on covered Amount

The resulting positions after SCC position cover will be used for deriving the marginable position for MTM and margin requirement calculation.

4.4 Corporate Action Position Adjustment

When an instrument (a stock) undergoes corporate action(s), it is possible that some benefit entitlements would be distributed to the CPs (shareholders) or would cause a change in number of shares. The market price of the instrument would react to such kind of corporate actions since the ex-date and therefore the original traded positions should be adjusted to capture the changes. It is also possible that more than one corporate action will appear for the same instrument on the different ex-dates. In this case, each corporate action shall be adjusted separately according the trade date of the position.

There are five types of corporate actions that require position adjustment⁵⁰:

- Bonus share / Stock split / Stock consolidation
- Cash dividend
- Stock dividend
- Rights issue / Open offer
- Stock conversion

A “Corporate Action Position Adjustment Report” will be generated in csv format and could be downloaded by CPs on each business day⁵¹. The layout of the file is shown below:

Business Date	Ex-Date	Market	Instrument Code	Converted Instrument Code	Quantity Conversion Ratio	Instrument Code for Cash Dividend	Cash Dividend Amount	Instrument Code for Stock Dividend	Entitled Stock Quantity	Instrument Code for Rights	Rights Quantity
05/11/2019	05/11/2019	HKMK	5	5	2	DIV5	-0.78	DSP5	0.13	SRI5	1.5
05/11/2019	05/11/2019	HKMK	8359	150	1						

Corporate Action Position Adjustment Report specification:

Field Name	Description	Format
Business Date	Report generation date	DD/MM/YYYY
Ex-Date	Market ex-date of the corporate action. Only the positions traded before ex-date will be subject to corporate action adjustment	YYYYMMDD
Market	Market of the instrument	TEXT (30)
Instrument Code	Instrument identifier for the corporate action announcement stock	TEXT (20)
Converted Instrument Code	Instrument identifier for the corporate action announcement stock after the corporate action that would change Instrument Code or position quantity	TEXT (10)
Quantity Conversion Ratio	Position quantity conversion ratio used for Bonus share / Stock split / Stock consolidation / Stock conversion.	DECIMALS (X,10); e.g., a value of 2 means every 1 position quantity held before the corporate action will be adjusted to 2 after the corporate action
Instrument Code for Cash Dividend	Instrument identifier for cash dividend	TEXT (23); e.g. a label of DIV5 means a cash dividend distributed by the stock of instrument code 5
Cash Dividend Amount	Cash dividend amount in HKD equivalent	DECIMALS (X,10); e.g., a value of -0.78 means every 1 position quantity held before the corporate action will be entitled to HKD 0.78 cash dividend
Instrument Code for Stock Dividend	Instrument identifier for stock dividend	TEXT (23); e.g. a label of DSP5 means a stock dividend distributed by the stock of instrument code 5
Entitled Stock Quantity	Entitled stock quantity	DECIMALS (X,10); e.g., a value of 0.13 means every 1 position quantity held before the corporate action will be entitled to 0.13 quantity of the stock dividend

⁵⁰ Round down to integer for positive position quantity. Round up to integer for negative position quantity.

⁵¹ The dissemination time is around 10:00 a.m. HKT subject to system finalization.

Instrument Code for Rights	Instrument identifier for Rights issue / Open offer	TEXT (23); e.g. a label of SRI5 means a rights issue distributed by the stock of instrument code 5
Rights Quantity	Rights quantity	DECIMALS (X,10); e.g., a value of 1.5 means every 1 position quantity held before the corporate action will be entitled to 1.5 quantity of the rights issue

4.4.1 Position Quantity Adjustment for Bonus Share / Stock Split / Stock Consolidation

Supposing there is a bonus share / stock split / stock consolidation shown in the Corporate Action Position Adjustment Report:

Business Date	Ex-Date	Market	Instrument Code (A)	Converted Instrument Code (B)	Quantity Conversion Ratio (C)	Instrument Code for Cash Dividend (D)	Cash Dividend Amount (E)	Instrument Code for Stock Dividend (F)	Entitled Stock Quantity (G)	Instrument Code for Rights (H)	Rights Quantity (I)
05/11/2019	05/11/2019	HKMK	5	5	2						

Note: Please repeat the position adjustment if more than one corporate actions with different ex-dates for the same instrument are required.

Supposing a CP trades instrument (stock) with corporate action announcement, the original traded positions **before** corporate action adjustment is shown below:

Trade date	Instrument code (X)	Quantity (Y)	Contract value (Z)
04/11/2019	5	400	24,000
05/11/2019	5	-600	-20,000

Only the position traded before ex-date is subject to the position quantity adjustment. For positions that require the adjustment, the new position quantity after adjustment will be equal to the original position quantity times the quantity conversion ratio. The contract value remains unchanged.

i.e. the positions **after** corporate action adjustment will be:

Trade date	Instrument code	Quantity	Contract value
04/11/2019	5 <i>from (B)</i>	800 <i>from (Y) x (C)</i>	24,000 <i>from (Z)</i>
05/11/2019	5	-600	-20,000

4.4.2 Create Benefit Entitlement Position for Cash Dividend

Supposing there is a cash dividend shown in the Corporate Action Position Adjustment Report:

Business Date	Ex-Date	Market	Instrument Code (A)	Converted Instrument Code (B)	Quantity Conversion Ratio (C)	Instrument Code for Cash Dividend (D)	Cash Dividend Amount (E)	Instrument Code for Stock Dividend (F)	Entitled Stock Quantity (G)	Instrument Code for Rights (H)	Rights Quantity (I)
05/11/2019	05/11/2019	HKMK	5			DIV5	-0.78				

Note: Please repeat the position adjustment if more than one corporate actions with different ex-dates for the same instrument are required.

Supposing a CP trades instrument (stock) with corporate action announcement, the original traded positions **before** corporate action adjustment is shown below:

Trade date	Instrument code (X)	Quantity (Y)	Contract value (Z)
04/11/2019	5	400	24,000
05/11/2019	5	-600	-20,000

Only the position traded before ex-date is required to create the benefit entitlement position. To create the cash dividend position, the instrument code will be the Cash Dividend Code. The position quantity will be set as 0. The contract value will be equal to the original stock position quantity times the cash dividend amount.

i.e. the positions **after** corporate action adjustment will be:

Trade date	Instrument code	Quantity	Contract value
04/11/2019	5	400	24,000
04/11/2019	DIV5 from (D)	0 set as 0 for DIV	-312 from (Y) x (E)
05/11/2019	5	-600	-20,000

4.4.3 Create Benefit Entitlement Position for Stock Dividend

Supposing there is a stock dividend shown in the Corporate Action Position Adjustment Report:

Business Date	Ex-Date	Market	Instrument Code (A)	Converted Instrument Code (B)	Quantity Conversion Ratio (C)	Instrument Code for Cash Dividend (D)	Cash Dividend Amount (E)	Instrument Code for Stock Dividend (F)	Entitled Stock Quantity (G)	Instrument Code for Rights (H)	Rights Quantity (I)
05/11/2019	05/11/2019	HKMK	5					DSP5	0.13		

Note: Please repeat the position adjustment if more than one corporate actions with different ex-dates for the same instrument are required.

Supposing a CP trades instrument (stock) with corporate action announcement, the original traded positions **before** corporate action adjustment is shown below:

Trade date	Instrument code (X)	Quantity (Y)	Contract value (Z)
04/11/2019	5	400	24,000
05/11/2019	5	-600	-20,000

Only the position traded before ex-date is required to create the benefit entitlement position. To create the stock dividend position, the instrument code will be the Stock Dividend Code. The position quantity will be equal to the original stock position quantity times the entitled stock quantity. The contract value will be set as 0.

i.e. the positions **after** corporate action adjustment will be:

Trade date	Instrument code	Quantity	Contract value
04/11/2019	5	400	24,000
04/11/2019	DSP5 from (F)	52 from (Y) x (G)	0 (set as 0 for DSP)
05/11/2019	5	-600	20,000

4.4.4 Create Benefit Entitlement Position for Rights Issue / Open Offer

Supposing there is a rights issue / open offer shown in the Corporate Action Position Adjustment Report:

Business Date	Ex-Date	Market	Instrument Code (A)	Converted Instrument Code (B)	Quantity Conversion Ratio (C)	Instrument Code for Cash Dividend (D)	Cash Dividend Amount (E)	Instrument Code for Stock Dividend (F)	Entitled Stock Quantity (G)	Instrument Code for Rights (H)	Rights Quantity (I)
05/11/2019	05/11/2019	HKMK	5							SRI5	1.5

Note: Please repeat the position adjustment if more than one corporate actions with different ex-dates for the same instrument are required.

Supposing a CP trades instrument (stock) with corporate action announcement, the original traded positions **before** corporate action adjustment is shown below:

Trade date	Instrument code (X)	Quantity (Y)	Contract value (Z)
04/11/2019	5	400	24,000
05/11/2019	5	-600	-20,000

Only the position traded before ex-date is required to create the benefit entitlement position. To create the rights issue position, the instrument code will be the Rights Code. The position quantity will be equal to the original stock position quantity times the rights quantity. The contract value will be set as 0.

i.e. the positions **after** corporate action adjustment will be:

Trade date	Instrument code	Quantity	Contract value
04/11/2019	5	400	24,000
04/11/2019	SRI5 <i>from (H)</i>	600 <i>from (Y) x (I)</i>	0 <i>(set as 0 for SRI)</i>
05/11/2019	5	-600	-20,000

4.4.5 Combined Effects on Position Adjustment for Combination of Corporate Actions

Supposing there is a combo of corporate action events shown in the Corporate Action Position Adjustment Report on the same ex-date:

Business Date	Ex-Date	Market	Instrument Code (A)	Converted Instrument Code (B)	Quantity Conversion Ratio (C)	Instrument Code for Cash Dividend (D)	Cash Dividend Amount (E)	Instrument Code for Stock Dividend (F)	Entitled Stock Quantity (G)	Instrument Code for Rights (H)	Rights Quantity (I)
05/11/2019	05/11/2019	HKMK	5	5	2	DIV5	-0.78	DSP5	0.13	SRI5	1.5

Note: Please repeat the position adjustment if more than one corporate actions with different ex-dates for the same instrument are required.

Supposing a CP trades instrument (stock) with corporate action announcement, the original traded positions **before** corporate action adjustment is shown below:

Trade date	Instrument code (X)	Quantity (Y)	Contract value (Z)
04/11/2019	5	400	24,000
05/11/2019	5	-600	-20,000

Only the position traded before ex-date is subject to the position quantity adjustment and required to create the benefit entitlement position. Since there are stock split, cash dividend, stock dividend and rights issue together, it is required to adjust position quantity and create 3 benefit entitlement positions for them. The instrument code, position quantity and contract value will be produced in the same way as an individual corporate action described above.

i.e., the positions **after** corporate action adjustment will be:

Trade date	Instrument code	Quantity	Contract value
04/11/2019	5 <i>from (B)</i>	800 <i>from (Y) x (C)</i>	24,000 <i>from (Z)</i>
04/11/2019	DIV5 <i>from (D)</i>	0 <i>(set as 0 for DIV)</i>	-312 <i>from (Y) x (E)</i>
04/11/2019	DSP5 <i>from (F)</i>	52 <i>from (Y) x (G)</i>	0 <i>(set as 0 for DSP)</i>
04/11/2019	SRI5 <i>from (H)</i>	600 <i>from (Y) x (I)</i>	0 <i>(set as 0 for SRI)</i>
05/11/2019	5	-600	-20,000

4.4.6 Position Adjustment for Stock Conversion

Supposing there is a stock conversion shown in the Corporate Action Position Adjustment Report:

Business Date	Ex-Date	Market	Instrument Code (A)	Converted Instrument Code (B)	Quantity Conversion Ratio (C)	Instrument Code for Cash Dividend (D)	Cash Dividend Amount (E)	Instrument Code for Stock Dividend (F)	Entitled Stock Quantity (G)	Instrument Code for Rights (H)	Rights Quantity (I)
05/11/2019	05/11/2019	HKMK	8359	150	1						

Note: Please repeat the position adjustment if more than one corporate actions with different ex-dates for the same instrument are required.

Supposing a CP trades instrument (stock) with corporate action announcement, the original traded positions **before** corporate action adjustment is shown below:

Trade date	Instrument code (X)	Quantity (Y)	Contract value (Z)
04/11/2019	8359	5,000	6,650

Only the position traded before ex-date is subject to the position adjustment. Instrument code will be changed to Converted Instrument Code. For positions that require the adjustment, the new position quantity after adjustment will be equal to the original position quantity times the quantity conversion ratio. The contract value remains unchanged.

i.e. the positions **after** corporate action adjustment will be:

Trade date	Instrument code	Quantity	Contract value
04/11/2019	150 <i>from (B)</i>	5,000 <i>from (Y) x (C)</i>	6,650 <i>from (Z)</i>

4.5 Cross-day Position Netting

For margin calculation, CPs' positions will be netted across days at instrument level. Thus, all positions quantities and contract values of the same instrument with different trade dates, settlement dates will be added together to come up with one cross-day netted quantity and contract value for each instrument. Please note that all cross-day position netting should be performed after considering SSC / SCC and corporate action adjustments.

Supposing a CP trades an instrument every day across a period and the positions are not yet settled, the positions **before** cross-day netting are shown below:

Trade date	Settlement date	Instrument Code (A)	Quantity (B)	Contract value (C)
01-Nov-2019	05-Nov-2019	5	400	24,000
04-Nov-2019	06-Nov-2019	5	-800	-49,600
05-Nov-2019	07-Nov-2019	5	1200	73,200

The position **after** cross-day netting is shown below:

Instrument Code (D) = Grouped by (A)	Quantity (E) = Sum of (B)	Contract value (F) = Sum of (C)
5	800	47,600

The market value of the position should be determined by multiplying the market price of the instrument to the cross-day netted position quantity.

Supposing the market price of instrument 5 is \$70, the marginable position would become:

Instrument Code (D)	Quantity (E)	Contract value (F)	Market value (G) = (E) x Market price
5	800	47,600	56,000

4.6 Cross-currency Netting on MTM Requirement

Favorable MTM / MTM requirement on positions will always be netted off against each other on its own currency first. If there is net favorable MTM in one currency, it could be used to offset against the net MTM requirement in other currencies. The net favorable MTM in original currency is converted to HKD equivalent by using the exchange rate with haircut applied to mark down the amount. The net MTM requirement in original currency is converted to HKD equivalent by using the exchange rate with haircut applied to mark up the amount.

Supposing 2 CPs who are the counterparty to one another on all positions they traded:

Clearing Participant A

Instrument Code	Position long / (short) quantity	Position contract value	Currency	Instrument price	Position market value	MTM	FX rate ⁵²	Haircut rate ⁵³
700	100	40,000	HKD	380	38,000	2,000	1	0
80737	-5,000	-15,000	CNY	3.5	-17,500	2,500	1.15	3%
83188	-600	-25,200	CNY	40	-24,000	-1,200	1.15	3%
9167	100	900	USD	9.5	950	-50	7.8	1%

⁵² HKEX plans to provide the information in a separate file to facilitate relevant calculation

⁵³ Please refer to Collateral Parameters Information List ("CCMIR02")

MTM (HKD equivalent)
 $= (2,000) + [(2,500 - 1,200) \times (1.15) \times (1 + 3\%)] + [(-50) \times (7.8) \times (1 - 1\%)]$
 $= (2,000) + (1,540) - (386)$
 $= 3,154$ (+ve MTM means loss and –ve MTM means gain to CP)

Favorable MTM for Clearing Participant A = HKD0
 MTM requirement for Clearing Participant A = HKD3,154

Clearing Participant B

Instrument Code	Position long / (short) quantity	Position contract value	Currency	Instrument price	Position market value	MTM	FX rate	Haircut rate
700	-100	-40,000	HKD	380	-38,000	-2,000	1	0
80737	5,000	15,000	CNY	3.5	17,500	-2,500	1.15	3%
81388	600	25,200	CNY	40	24,000	1,200	1.15	3%
9167	-100	-900	USD	9.5	-950	50	7.8	1%

MTM (HKD equivalent)
 $= (-2,000) + [(-2,500 + 1,200) \times (1.15) \times (1 - 3\%)] + [(50) \times (7.8) \times (1 + 1\%)]$
 $= (-2,000) + (-1,450) + (394)$
 $= -3,056$ (+ve MTM means loss and –ve MTM means gain to CP)

Favorable MTM for Clearing Participant B = HKD3,056
 MTM requirement for Clearing Participant B = HKD0

4.7 Intra-day MTM Requirement Calculation

Upon the launch of VaR Platform, there would be a scheduled intra-day MTM run at around 11:00 a.m. HKT on each business day. There would also be another round of intra-day MTM run at around 2:00 p.m. HKT if there is a holiday margin call arrangement on the full trading day before long holiday⁵⁴.

There are multiple batch settlement runs in CCASS to settle the stock positions during the day. CPs could deliver stocks to settle their short positions. CPs could also arrange cash prepayments and withdraw the settled long positions resulting allocated shares intra-day. All these settlement activities would result in a change in marginable positions for MTM and margin calculation.

4.7.1 Intra-day MTM Requirement Calculation (11:00 a.m. HKT)

Since the settlement of stock positions occurs during intra-day while money settlement occurs at day-end, unposted debit and unposted credit would be resulted during intra-day MTM requirement calculation to reflect the outstanding risk exposure.

Unposted debit is the pending collection amount from the CP resulting from the settled stock positions that the counterparty has delivered.

Unposted credit is the pending refund amount to the CP resulting from the settled stock positions that the CP has delivered.

⁵⁴HKSCC will identify the applicable long holiday and issue circulars to notify the market in advance.

Unposted debit has to be included as a marginable long position during intra-day MTM requirement calculation. While for any unposted credit and cash prepayment arranged by the CPs, an offset ratio will be calculated to adjust the existing marginable long positions.

Supposing two CPs who are the counterparties to one another on all positions, positions #700 and #9167 are to be settled today. CP B has delivered 50 shares of #700. Thus, \$20,000 unposted debit is booked to CP A and \$20,000 unposted credit is booked to CP B.

For CP A, assume a cash prepayment of HKD equivalent \$11,755 has been made, which covers 25% of the total gross payable settlement amount of the day (20,000 + 900 x 7.8 + 20,000 = 47,020). Thus, a 25% offset ratio will be used to adjust the marginable long positions.

For CP B, \$20,000 unposted credit is available after the delivery of 50 shares #700, which covers 100% of the total gross payable settlement amount of the day (15,000 x 1.15 = 17,250). Thus, a 100% offset ratio will be used to adjust the marginable long positions.

Clearing Participant A

Marginable positions before cash prepayment offset

Instrument Code	Position long / (short) quantity	Position contract value	Currency	Instrument price	Position market value	MTM	FX rate	Haircut rate	Due today
700	100	20,000	HKD	380	38,000	-18,000	1	0	Y
80737	-5,000	-15,000	CNY	3.5	-17,500	2,500	1.15	3%	N
9167	100	900	USD	9.5	950	-50	7.8	1%	Y
Unposted debit	0	20,000	HKD	0	0	20,000	1	0	Y

Marginable position after cash prepayment offset (i.e., offset ratio = 25%)

Instrument Code	Position long / (short) quantity	Position contract value	Currency	Instrument price	Position market value	MTM	FX rate	Haircut rate	Due today
700	75	15,000	HKD	380	28,500	-13,500	1	0	Y
80737	-5,000	-15,000	CNY	3.5	-17,500	2,500	1.15	3%	N
9167	75	675	USD	9.5	712.5	-37.5	7.8	1%	Y
Unposted debit	0	15,000	HKD	0	0	15,000	1	0	Y

$$\begin{aligned}
 &\text{MTM (HKD equivalent)} \\
 &= (-13,500 + 15,000) + ((2,500) \times (1.15) \times (1 + 3\%)) + ((-38) \times (7.8) \times (1 - 1\%)) \\
 &= (1,500) + (2,961) - (293) \\
 &= 4,168 \text{ (+ve MTM means loss and -ve MTM means gain to CP)}
 \end{aligned}$$

Favorable MTM for Clearing Participant A = HKD0
 MTM requirement for Clearing Participant A = HKD4,168

Clearing Participant B

Marginable positions before unposted credit offset

Instrument Code	Position long / (short) quantity	Position contract value	Currency	Instrument price	Position market value	MTM	FX rate	Haircut rate	Due today
700	-50	-20,000	HKD	380	-19,000	-1,000	1	0	Y
80737	5,000	15,000	CNY	3.5	17,500	-2,500	1.15	3%	Y

9167	-100	-900	USD	9.5	-950	50	7.8	1%	Y
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Marginable positions after unposted credit offset (i.e., offset ratio = 100%)

Instrument Code	Position long / (short) quantity	Position contract value	Currency	Instrument price	Position market value	MTM	FX rate	Haircut rate	Due today
700	-50	-20,000	HKD	380	-19,000	-1,000	1	0	Y
80737	0	0	CNY	3.5	0	0	1.15	3%	Y
9167	-100	-900	USD	9.5	-950	50	7.8	1%	Y

MTM (HKD equivalent)

$$\begin{aligned}
 &= (-1,000) + ((0) \times (1.15) \times (1 - 3\%)) + ((50) \times (7.8) \times (1 + 1\%)) \\
 &= (-1,000) + (0) + (394) \\
 &= -606 \text{ (+ve MTM means loss and -ve MTM means gain to CP)}
 \end{aligned}$$

Favorable MTM for Clearing Participant B = HKD606

MTM requirement for Clearing Participant B = HKD0

4.7.2 Intra-day MTM Requirement Calculation (2:00 p.m. HKT)

Since the collection time of the intra-day MTM and the settlement obligation are the same upon the launch of VaR Platform, any stock position to be settled today including unposted debit, unposted credit, cash prepayment and allocated shares are excluded from the intra-day MTM and margin requirement calculation to avoid the collection of MTM and margin requirement from those positions which will be settled at the time of collection.

Clearing Participant A

Marginable positions before excluding due positions

Instrument Code	Position long / (short) quantity	Position contract value	Currency	Instrument price	Position market value	MTM	FX rate	Haircut rate	Due today
700	100	20,000	HKD	380	38,000	-18,000	1	0	Y
80737	-5,000	-15,000	CNY	3.5	-17,500	2,500	1.15	3%	N
9167	100	900	USD	9.5	950	-50	7.8	1%	Y
Unposted debit	0	20,000	HKD	0	0	20,000	1	0	Y

Marginable position after excluding due positions

Instrument Code	Position long / (short) quantity	Position contract value	Currency	Instrument price	Position market value	MTM	FX rate	Haircut rate	Due today
80737	-5,000	-15,000	CNY	3.5	-17,500	2,500	1.15	3%	N

MTM (HKD equivalent)

$$\begin{aligned}
 &= (2,500) \times (1.15) \times (1 + 3\%) \\
 &= 2,961 \text{ (+ve MTM means loss and -ve MTM means gain to CP)}
 \end{aligned}$$

Favorable MTM for Clearing Participant A = HKD0

MTM requirement for Clearing Participant A = HKD2,961

Clearing Participant B

Marginable positions before excluding due positions

Instrument Code	Position long / (short) quantity	Position contract value	Currency	Instrument price	Position market value	MTM	FX rate	Haircut rate	Due today
700	-50	-20,000	HKD	380	-19,000	-1,000	1	0	Y
80737	5,000	15,000	CNY	3.5	17,500	-2,500	1.15	3%	N
9167	-100	-900	USD	9.5	-950	50	7.8	1%	Y

Marginable position after excluding due positions

Instrument Code	Position long / (short) quantity	Position contract value	Currency	Instrument price	Position market value	MTM	FX rate	Haircut rate	Due today
80737	5,000	15,000	CNY	3.5	17,500	-2,500	1.15	3%	N

MTM (HKD equivalent)

$$= (-2,500) \times (1.15) \times (1 - 3\%)$$

$$= -2,789 \text{ (+ve MTM means loss and -ve MTM means gain to CP)}$$

Favorable MTM for Clearing Participant B = HKD2,789

MTM requirement for Clearing Participant B = HKD0