

Johannesburg Stock Exchange

Integrated Trading and Clearing (ITaC)

Volume PT04 – Liquidation Period and Large Exposure Margin Methodology Specifications

Version	Final 1.0
Date	22 April 2017
Number of Pages	25 (Including the Cover Page)

DOCUMENT CONTROL

Document Information

Created By	JSE Post-trade Risk team
Status	Final
Version	V1.0
Date	21 April 2017

Revision History

Date	Version	Description
April 2017	Version 1.0	First version published

Related Documents

Name	Version	Description
JSE Clear Margin Methodology	March 2016	Articulates the methodologies used by JSEC when calculating account level IM requirements
Volume PT03 – Post Trade Margining Methodology Specification (JSPAN)	4 May 2016	Provides guidance on the JSE's JSPAN Margin Methodology and the way it is calculated

Contact Details

JSE Limited One Exchange Square Gwen Lane, Sandown South Africa Tel: +27 11 520 7000 www.jse.co.za	Post Trade and Information Services ITAC Queries Email: CustomerSupport@jse.co.za
---	--

Clearing specifications disclaimer

All rights in this document vests in the JSE Limited ("JSE"). Please note that this document contains confidential and sensitive information of the JSE and as such should be treated as strictly confidential and proprietary and with the same degree of care with which you protect your own confidential information of like importance. This document must only be used by you for the purpose for which it is disclosed. Neither this document nor its contents may be disclosed to a third party, nor may it be copied, without the JSE's prior written consent. The JSE endeavours to ensure that the information in this document is correct and complete but do not, whether expressly, tacitly or implicitly, represent, warrant or in any way guarantee the accuracy or completeness of the information. The JSE, its officers and/or employees accept no liability for (or in respect of) any direct, indirect, incidental or consequential loss or damage of any kind or nature, howsoever arising, from the use of, or reliance on, this information.

Glossary

Term / abbreviation / acronym	Description
IM	Initial margin – It is the amount or collateral required when a trade is initiated. It is determined by the JSE on the basis specified by the JSE and held in respect of the aggregate position of a trading member or a client.
VM	Variation margin – The daily profit or loss on an open position of a contract. It is a margin payment or margin receipt by clearing members to JSE Clear based upon adverse price movements to cover the daily position exposure.
JSPAN	JSE’s Standard Portfolio Analysis of Risk – methodology used for calculating the base initial margin for derivatives.
Liquidation Period Add-On	The additional margin required to mitigate risk associated with positions that will take longer to liquidate that is assumed under the base IM requirement.
Large Exposure Add-On	The additional margin required to mitigate risk from exposures that are large enough to put the JSE at risk under extreme but plausible market conditions.
Additional Margin	The margin added to the IM and calculated as a percentage on IM. Different members and clients can have different additional margin percentages. Additional margin may be required by the Clearing member from his members and by the members from their clients.
Settlement Margin (SM)	The margin calculated for derivatives that are physically settled between the expiration time and the physical delivery of the underlying.
Client	All clients - whether retail, institutional, or a non-member broker - can only trade on the JSE via an authorised member. In the cash equities and bonds markets Clients may be 'Controlled' (Trading Account managed by the Member) or 'Non-Controlled', Resident or Non-Resident, and have a BEE status.
TM	Trading Member - A member is authorised by the JSE to trade in a certain JSE market. A member who trades in more than one market (e.g. Equities and Equity Derivatives) currently has a membership for each.
CM	Clearing Member - means a sub-category of authorised user of the JSE, registered to perform clearing and who has entered into an agreement with JSE Clear.
EOD	“End of day” - period after trading hours, for business days, after all batches have run just prior to shutting down JSE trading and clearing systems: <ul style="list-style-type: none"> · Business days exclude Saturdays, Sundays and any public holiday as gazetted by the government of the Republic of South Africa from time to time and · Non-trading hours refer to the time from 19h00 to 06h00.
MTM	Mark-To-Market - Recording the price or value of a security, portfolio, or account on a daily basis, to calculate profits and losses or to confirm that margin requirements are being met.

Term / abbreviation / acronym	Description
Stressed loss	VM calculated in the stress test applied compared to IM held, i.e. the shortfall in margin.
VaR	Value at risk – Value at Risk (VAR) calculates the maximum loss expected (or worst case scenario), over a given time period and given a specified degree of confidence.
ADVT	Average Daily Value Traded – the average of the last 90 days’ value traded.
Maximum Participation	The maximum value that can be traded daily in the underlying without impacting the price adversely.
EAD	Exposure at default – The total value a participant is exposed to at the time of default.
sEAD	The stressed Exposure at Default for a participant under a particular stress scenario.
ETL	Expected Tail Loss – Expected loss given that the loss will be greater than the Value at Risk (“VaR”) at a defined confidence interval and appropriate holding period for each market and instrument.
JSE Clear	The licensed Clearing House for the JSE Derivatives and cash bond market, with Clearing Members as the members.
ITaC	“Integrated trading and clearing” program refers to the enterprise wide project to provide integrated trading and clearing across all JSE markets on a single platform, not necessarily a single instance of the application.
EMAPI	External Messaging API – The application programming interface (“API”) used to integrate the JSE systems with the Real-Time Clearing (“RTC”) system.

Contents

1. INTRODUCTION	7
1.1 BACKGROUND	7
1.2 PURPOSE	7
1.3 CHANGES UNDER ITAC.....	8
2. LIQUIDATION PERIOD ADD-ON	9
2.1 CONTEXT	9
2.2 METHODOLOGY.....	9
3. LARGE EXPOSURE ADD-ON	12
3.1 CONTEXT	12
3.2 METHODOLOGY.....	12
4. SOURCE DATA	14
5. ROUNDING	16
6. ANNEXURE	17
6.1 EXAMPLE ILLUSTRATING THE RESULTS OF USING THE LIQUIDATION PERIOD ADD-ON METHODOLOGY	17
6.2 EXAMPLE ILLUSTRATING THE RESULTS OF USING THE LARGE EXPOSURE ADD-ON METHODOLOGY	22
6.3 EXAMPLE DATA IN EXCEL-FORMAT	25

1. Introduction

1.1 Background

The JSE Clear collateralises all trades through a system of margin requirements. The sufficiency of the margin is back tested against actual market experience to ensure performance is at the expected confidence interval. In addition, JSE Clear determines the amount and regularly tests the sufficiency of the total financial resources available to cover default through stress testing. Stress testing is done to test and measure the shortfall of margins in extreme market events.

The JSE Clear makes use of Initial Margin (“IM”), Variation Margin (“VM”) and Additional Margin to manage counterparty credit risk. The components for margining are illustrated below in figure 1.

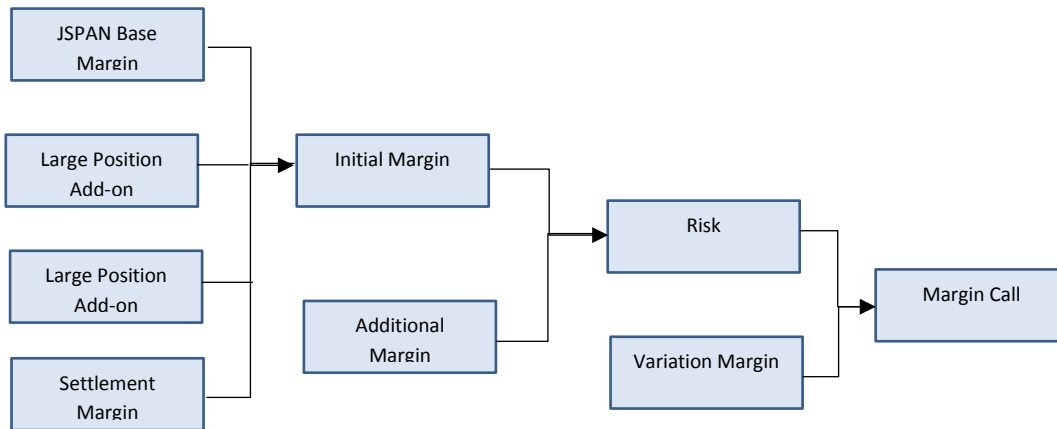


Figure 1 – Margin Constituents

JSE Clear is responsible for establishing IM levels which are commensurate with the risks and particular attributes of each product, portfolio, and market operated by JSE Clear.

1.2 Purpose

The purpose of this document is to provide the guidance on the methodologies and calculations on two out of the three components that make up IM at an account level aligned to the JSE’s Real Time Clearing System. The IM is made up of the base margin (i.e. the JSPAN); the Liquidation Period Add-on and the Large Exposure Add-on. This document focuses only on the Liquidation Period and Large Exposure Add-ons methodologies and calculations.¹ The calculations applied in the examples provided in the annexure are for Equity Derivatives Market and Currency Derivatives Market in line with the ITaC deliverables for phase 1b/c.

¹ The specifications on the methodology and calculation of the base initial margin requirement (JSPAN) are detailed in a separate document. Please refer to that document for its specifications.

1.3 Changes under ITaC

The way that the two additional components of the IM, Liquidation Period and Large Exposure Add-ons, have been implemented under ITaC is the same way as pre-ITaC environment. None of the aspects of the methodology were changed.

The structure of the rest of the document is as per the below:

- Section 2 - Describes the methodology and related calculations for the Liquidation Period IM requirement
- Section 3 - Describes the methodology and related calculations for the Large Exposure IM requirement
- Section 4 - Shows the EMAPI messages that can be used to obtain the input data required for the calculations of the Liquidation Period Add-on and the Large Exposure Add-on
- Section 5 - Gives a summary of how rounding should be applied to the various values that are calculated in the Liquidation Period and Large Exposure Add-on methodologies
- Section 6 - The annexure contains examples for the Liquidation Period Add-on and the Large Exposure Add-on

2. Liquidation Period Add-on

2.1 Context

The Liquidation Period Add-on (LPAO) is an amount that incorporates the loss that could arise from liquidating a defaulting portfolio. JSE Clear applies a more punitive IM requirement for large positions relative to small positions as these are expected to take longer to liquidate. The higher loss associated with large positions is covered by the additional margin requirement that is added to the base IM requirement (i.e. JSPAN). This supplementary IM requirement is the LPAO.

2.2 Methodology

The following methodology is used to determine the Liquidation Period Add-on:

- The Liquidation Period Add-on is calculated per underlying in a particular client's portfolio. The underlying refers to all contracts with the same underlying code and can include a wide set of instruments with the exact same underlying.
- The average daily value traded (ADVT) over the last 90 days in the underlying (τ) is used as a measure of the liquidity of the underlying.
- The maximum participation in the underlying, on any given day, is given by MP , where:

$$MP = \tau \times 33.33\% \quad \text{Equation 1}$$

The safety factor used (33.33%) ensures that the JSE is not trading more than a third of what the whole market is trading. The maximum participation is assumed to represent the maximum value of the initial notional amount that can be liquidated daily without affecting the market (without pushing the price movements above the VaR²-calculated rate of change). It is compared against the initial notional exposure to determine how many days are required to liquidate the exposure safely. Every day more positions are liquidated until the full notional has been cleared.

- A position, π , is specified in terms of the delta-adjusted notional. The delta-adjusted notional per position is given by:

$$\pi = \text{Future MTM} \times \text{Position} \times \text{Delta} \times \text{Contract size} \quad \text{Equation 2}$$

where

Delta = 1 for Futures

and

the MTM of the underlying future is used to determine the delta adjusted notional of a position in an option.

² VaR is the Value at Risk of the underlying which is the "maximum loss not exceeded with a given probability defined as the confidence level, over a given period." The time frame is the holding period. A derivatives contract with 1 Day VaR of X and 99.7% confidence level (JSE's confidence level), implies there is only 0.3% chance that the value of the underlying to this contract will move by more than X from one day to the next.

- The net notional per underlying, Π , used in the calculation for LPAO, is the delta adjusted notional per position aggregated per underlying for all the client's positions. It is given by:

$$\Pi = \text{abs}\left(\sum_{i=1}^k \pi_i\right) \quad \text{Equation 3}$$

where the client has k positions in the underlying

- For a portfolio with a net notional in an underlying of Π , the Max Potential Loss (MPL) becomes:

$$MPL = MP \cdot VaR_{t_{m+1}} + MP \cdot VaR_{t_{m+2}} + \dots + MP \cdot VaR_{t_{m+n-1}} + RN \cdot VaR_{t_{m+n}} \quad \text{Equation 4}$$

where $n = \text{Roundup}\left(\frac{\Pi}{MP}\right)$ is the actual number of trading days required to liquidate the positions Equation 5

and it takes m non-trading days to establish that the client has defaulted

and RN is the remaining notional on the last day

and VaR_t is the Value at Risk on the underlying over t days.

- Time-scaling of VaR is given by:

$$VaR_{t \text{ days}} = \sqrt{t} \cdot VaR_{1 \text{ day}} \quad \text{Equation 6}$$

- By applying the time-scaling of VaR the MPL is expressed in terms of $VaR_{1 \text{ Day}}$ ³ as:

$$MPL = MP \cdot \sqrt{m+1} \cdot VaR_{1 \text{ day}} + MP \cdot \sqrt{m+2} \cdot VaR_{1 \text{ day}} + \dots + MP \cdot \sqrt{m+n-1} \cdot VaR_{1 \text{ day}} + RN \cdot \sqrt{m+n} \cdot VaR_{1 \text{ day}} \quad \text{Equation 7}$$

This reduces to:

$$MPL = MP \cdot VaR_{1 \text{ day}} \cdot (\sqrt{m+1} \cdot \sqrt{m+2} \cdot \dots + \sqrt{m+n-1}) + RN \cdot \sqrt{m+n} \cdot VaR_{1 \text{ day}} \quad \text{Equation 8}$$

³ RTC calculates the theoretical VaR, while the official VaR to be used in the LPAO calculation will be provided by JSE Risk.

- The initial margin determined by the JSPAN methodology (IM_{J-SPAN}) caters for the loss that can be made during the first few days of liquidation and is subtracted from the MPL to obtain the LPAO for the particular underlying, u :

$$LPAO_u = \text{Max}(MPL - IM_{J-SPAN}, 0) \quad \text{Equation 9}$$

Where the IM_{J-SPAN} is estimated at the underlying-level:

$$IM_{J-SPAN} = VaR_{1day} \cdot \sqrt{LP} \cdot \Pi \quad \text{Equation 10}$$

and LP is the liquidation period for the underlying

and IM_{J-SPAN} is rounded to 0 decimals

- The same calculation is made for the other underlying instruments that the client has exposure in to obtain the full Liquidation Period Add-on for that client. The aggregated total is compared to the Liquidation Period Add-on Threshold ($LPAOTP$) to obtain the Liquidation Period Add-on for the client:

$$LPAO_{Client} = \text{Max}(\sum_{u=1}^p LPAO_u - LPAOTP, 0) \quad \text{Equation 11}$$

Where p is the number of underlyings in which the client holds positions.

3. Large Exposure Add-on

3.1 Context

The Large Exposure Add-on is the cost associated with covering the aggregate stress loss, exceeding the initial margin, which would be caused by the default of any single participant and its affiliates. This is the concentration margin whereby participants will be required to post higher levels of IM when stress-testing results indicate that a particular exposure is larger than the JSE Clear's actual pre-funded default resources.

3.2 Methodology

The Large Exposure Add-on is calculated as the degree by which a client's stressed Exposure at Default ("sEAD") across all of JSE Clear's historic stress testing scenarios exceed Large Position Add-On ("LaPoAO") threshold. The LaPoAO threshold is used as a proxy for the portion of the default fund.

Under JSE's Clear stress testing framework, the calculation of the LaPoAO for a particular client is summarised by the following process:

- The Mark-to-Market ("MTM") value of every contract on T+0 is calculated and published by the JSE.
- The stressed Mark-to-Market ("sMTM") value of every contract under a variety of scenarios are calculated. These values are calculated daily by the JSE and published on the Information Dissemination Protocol (IDP).
- The sMTM values calculated above are used to calculate the associated stressed profit and loss ("sPnL") for every contract i , under every scenario j , associated with having an open position in every contract, i.e.

$$sPnL_{ij} = sMTM_{ij} - MTM_{ij} \quad \text{Equation 12}$$

Where

The stressed profit and loss is rounded to 2 decimals

- The contract-level sPnL values calculated above are used to determine the stressed variation margin ("sVM") associated with the change in the MTM value due to the stress for the position held by a client, i.e.

$$sVM_{ij} = sPnL_{ij} \cdot Contract\ Size_i \cdot Position_{ik} \quad \text{Equation 13}$$

Where

sVM_{ij} : Is the stressed Variation Margin on instrument i for scenario j

$sPnL_{ij}$: Is the stressed Profit and Loss on instrument i for scenario j

$Contract\ Size_i$: Is the contract size of instrument i

$Position_{ik}$: Is the position in instrument i held by client k

- The stressed variation margin values of the client are aggregated per scenario:

$$sVM_j = \sum_{i=1}^m sVM_{ij} \quad \text{Equation 14}$$

Where

- sVM_j : Is the total stressed Variation Margin for the client's portfolio for scenario j
- m : Number of instruments in the client's portfolio

- The worst result (biggest loss) is identified from all the scenarios to produce the minimum stressed VM for client k .

$$sVM_k = \min(0, sVM_{1k}, sVM_{2k}, \dots, sVM_{mk}) \quad \text{Equation 15}$$

- The sEAD for client k is calculated as the sum of the total amount of IM held (JSPAN base IM and Liquidation Period Add-on) as well as worst stressed variation margin of the client, i.e.

$$sEAD_k = JSPAN\ IM_k + LPAO_k + sVM_k \quad \text{Equation 16}$$

Where

- $sEAD_k$: Is the stressed Exposure at Default for client k
- $JSPAN\ IM_k$: Is the JSPAN margin calculated for client k and is ≥ 0
- $LPAO_k$: Is the Liquidation Period Add-on margin calculated for client k and is ≥ 0

- The Large Exposure Add-on for client k is the degree by which the sEAD exceeds the Large Exposure Add-on threshold parameter in absolute terms, i.e.

$$LarExpAO_k = Abs\left(\text{Min}(sEAD_k + Threshold_{LarExpAO}, 0)\right) \quad \text{Equation 17}$$

Where

- $LarExpAO_k$: Is the Large Exposure Add-on for client k
- $Threshold_{LarExpAO}$: Is the minimum threshold that all clients' Large Exposure Add-on must exceed before it gets added to their margin requirements

4. Source Data

The JSE's Real-time Clearing system (RTC) provides an application programming interface called EMAPI which members can use to obtain data needed to replicate the Liquidation Period Add-on and Large Exposure Add-on calculations.

Note: Please refer to the EMAPI Specifications on the [JSE ITaC website](#) for more details; in particular refer to Volume PT01 – Post-trade EMAPI Common and Volume PT02 – Post-trade EMAPI Clearing for details on how to interface to RTC EMAPI.

The following tables show which EMAPI messages can be used to obtain the input data required for the calculations:

Table 1 – JSEC Liquidation Period Add-on

Input Data	EMAPI Message	EMAPI Field
Portfolio / Account	AccountPositionEvent (10032) PositionAccount (10045)	
Maximum Participation Factor	Market (299)	10033 = dailyMaximumParticipationFactor
Number of Non-Trading Days before default	Market (299)	10034 = nonTradingDaysBeforeDefault
Option Delta	OptionDataEvent	10 = Delta
MtM Prices	PriceEvent(10074)	14 = Price
Liquidation Period Add-on Value	RiskNodeEvent(10033)	35 = liquidationAddOn
Instruments	TradableInstrument (296)	10090 = Alphacode
Contract Size	TradableInstrument (296)	10062 = contractSize
Average Daily Value Traded	TradableInstrument (296)	10087 = advt
One-day VaR	TradableInstrument (296)	10089 = oneDayVar

Table 2 – JSEC Large Exposure Add-on

Input Data	EMAPI Message	EMAPI Field	Notes
Portfolio / Account	AccountPositionEvent (10032) PositionAccount (10045)		
Option Delta	OptionDataEvent	10 = Delta	
MtM Prices	PriceEvent(10074)	14 = Price	
Liquidatio Period Add-on Value	RiskNodeEvent(10033)	35 = liquidationAddOn	
Large Position Value	RiskNodeEvent(10033)	36 = largePositionAddOn	
Stressed Instrument Prices	TBC	TBC	Pending CR approval
Instruments	TradableInstrument (296)	10090 = Alphacode	
Contract Size	TradableInstrument (296)	10062 = contractSize	
Average Daily Value Traded	TradableInstrument (296)	10087 = advt	
One-day VaR	TradableInstrument (296)	10089 = oneDayVar	

5. Rounding

This section gives a summary of how rounding should be applied to the various values that are calculated in the Liquidation Period and Large Exposure Add-on methodologies. The tables below states to how many decimal places each item needs to be the rounded to. It can be assumed that unless it is specifically stated below, no rounding should take place.

Table 3 – JSEC Liquidation Period Add-on Precision

Liquidation Period Add-on Measure	Decimals
Delta Equivalent Notional	6
Notional for Total Potential Loss (“TPL”)	2
Maximum Participation	2
Theoretical IMR Margin	2

Table 4 – JSEC Large Exposure Add-on Precision

Large Exposure Add-on Measure	Decimals
Stressed Profit and Loss (sPnL)	2

6. Annexure

6.1 Example illustrating the results of using the Liquidation Period Add-on methodology

Table 5: Derivative Data

Contract ID	Contract Name	Alpha Code	Expiry Date	Instrument Type	Contract Size	Underlying Future Contract Size	Future MTM	Delta
1004039	Jun2017 MTNR Fut	MTN	2017-06-15	FUTURE	100	100	130	
1004022	Mar2017 MTNQ Fut	MTN	2017-03-16	FUTURE	100	100	185.03	
1004096	SEP2017 MTNQ Fut	MTN	2017-09-15	FUTURE	100	100	124.09	
1004093	Jun2017 SABG Call 295	SAB	2017-06-15	OPTION	1	100	8058.824422	0.777151
1004091	Jun2017 SABG Fut	SAB	2017-06-15	FUTURE	100	101	358.09	
1004066	Jun2017 SBK PHY 100 C	SBK	2017-06-15	OPTION	1	100	7178.787135	0.93324
1004065	Jun2017 SBK PHY 120 P	SBK	2017-06-15	OPTION	1	100	629.989854	-0.146387
1004024	Jun2017 SBKS Fut	SBK	2017-06-15	FUTURE	100	100	169.4	

Table 6: Underlying Spot Data

Alpha Code	ADVT	1 Day VaR	IMR Liquidation Period assumption
SAB	R 533 000 000	4.5%	2
MTN	R 1 080 000 000	5.0%	2
SBK	R 486 000 000	6.5%	2

Table 7: Global Parameters

Parameter	Value
Liquidation Period Add-On Threshold	10 000 000
Non-trading days before default is established / VM lag	1
Maximum Participation Factor	33.30%

Table 8: Client Positions

Client	Contract ID	Position	Contract Name	Alpha Code
Client 1	1004093	15 265	Jun2017 SABG Call 295	SAB
Client 2	1004022	20 000	Mar2017 MTNQ Fut	MTN
	1004039	50 000	Jun2017 MTNR Fut	MTN
	1004096	30 000	SEP2017 MTNQ Fut	MTN
	1004091	-40 000	Jun2017 SABG Fut	SAB
	1004093	30 000	Jun2017 SABG Call 295	SAB
	1004024	10 000	Jun2017 SBKS Fut	SBK
	1004065	24 000	Jun2017 SBK PHY 120 P	SBK
1004066	-9 500	Jun2017 SBK PHY 100 C	SBK	

Table 9: Consolidated Input Data

Client	Contract ID	Contract Name	Alpha Code	Expiry Date	Instrument Type	Position	Underlying Future Contract Size	Future MTM	Delta	ADVT	1 Day VaR	IMR Liquidation Period assumption	Non-trading days before default is established / VM lag	LPAO Threshold (Global Parameter)
Client 1	1004093	Jun2017 SABG Call 295	SAB	2017-06-15	OPTION	15 265	100	8058.824422	77.7151%	R 533 000 000	4.50%	2	1	R 10 000 000
Client 2	1004022	Mar2017 MTNQ Fut	MTN	2017-03-16	FUTURE	20 000	100	185.03	100%	R 1 080 000 000	5.00%	2	1	R 10 000 000
	1004039	Jun2017 MTNR Fut	MTN	2017-06-15	FUTURE	50 000	100	130	100%					
	1004096	SEP2017 MTNQ Fut	MTN	2017-09-15	FUTURE	30 000	100	124.09	100%					
	1004091	Jun2017 SABG Fut	SAB	2017-06-15	FUTURE	-40 000	100	358.09	100.0000%	R 533 000 000	4.50%	2		
	1004093	Jun2017 SABG Call 295	SAB	2017-06-15	OPTION	30 000	100	8058.824422	77.7151%	R 486 000 000	6.50%	2		
	1004024	Jun2017 SBKS Fut	SBK	2017-06-15	FUTURE	10 000	100	169.4	100%					
	1004065	Jun2017 SBK PHY 120 P	SBK	2017-06-15	OPTION	24 000	100	629.989854	-14.6387%					
1004066	Jun2017 SBK PHY 100 C	SBK	2017-06-15	OPTION	-9 500	100	7178.787135	93.3240%						

Table 10: Delta Equivalent Notional per Instrument

Client	Tradable Instrument ID	Contract	Net Qty	Alpha Code	Delta Dependent on vols	MTM of underlying Future	Contract Size of underlying Future	Delta Adjusted Notional
Client 1	1004093	Jun2017 SABG Call 295	15 265	SAB	77.71510%	358.09	100	424 809 687
Client 2	1004022	Mar2017 MTNQ Fut	20 000	MTN	100.00000%	185.03	100	370 060 000
	1004039	Jun2017 MTNR Fut	50 000	MTN	100.00000%	130.00	100	650 000 000
	1004096	SEP2017 MTNQ Fut	30000	MTN	100.00000%	124.09	100	372 270 000
	1004091	Jun2017 SABG Fut	-40 000	SAB	100.00000%	358.09	100	-1 432 360 000
	1004093	Jun2017 SABG Call 295	30 000	SAB	77.71510%	358.09	100	834 870 005
	1004024	Jun2017 SBKS Fut	10 000	SBK	100.00000%	169.40	100	169 400 000
	1004065	Jun2017 SBK PHY 120 P	24 000	SBK	-14.63870%	169.40	100	-59 515 099
	1004066	Jun2017 SBK PHY 100 C	-9 500	SBK	93.32400%	169.40	100	-150 186 313

Table 11: Liquidation Period Add-on per underlying

Client	Alpha Code	Notional for TPL	Abs (Notional for TPL)	ADVT	Maximum Participation Amount (Equation 1)	1 Day VaR	Days to liquidate ⁴	Full Days to Liquidate (Roundup Days to Liquidate)	Non-trading days before default is established / VM lag	Full array (Summation of time scale arrays) **	Effective full array (full array less excluded array)	Loss on Full Days' Trades (Equation 3)	Volumes to liquidate on last day (RN = mod (delta adjusted notional, MP))	Last Day's Change in price (Sqrt of full days to liquidate)	Loss on Last Day's Trades (Equation 3)
Client 1	SAB	R 424 809 687	R 424 809 687	R 533 000 000	R 177 489 000	4.50%	3.393	4	1	4.146	3.146	R 25 129 229.25	R 69 831 687	2.000	R 6 284 851.87
Client 2	MTN	R 1 392 330 000	R 1 392 330 000	R 1 080 000 000	R 359 640 000	5.00%	4.871	5	1	6.146	5.146	R 92 540 125.90	R 313 410 000	2.236	R 35 040 303.24
	SAB	R -597 489 995	R 597 489 995	R 533 000 000	R 177 489 000	4.50%	4.366	5	1	6.146	5.146	R 41 103 239.25	R 65 022 995	2.236	R 6 542 812.68
	SBK	R -40 301 412	R 40 301 412	R 486 000 000	R 161 838 000	6.50%	1.249	2	1	1	0	R 0.00	R 40 301 412	1	R 3 704 662.22

Notes:

* The non-trading days, before default is established, are added since the liquidation of the portfolio can't start until after the number of days it takes to establish the default is determined.

** Time Scaling Arrays used are as per the below time period:

t	1	2	...	n
\sqrt{t}	$\sqrt{1}$	$\sqrt{2}$...	\sqrt{n}
$\sum_{t=1}^t \sqrt{t}$	$\sqrt{1}$	$\sqrt{1} + \sqrt{2}$...	$\sum_{t=1}^n \sqrt{t}$

In the interim calculations, the full number of days to liquidate a portfolio is reduced by 1 in determining the full array calculations.

⁴ Non-trading days before default is established + delta adjusted notional ÷ MP

Table 12: Liquidation Period Add-on per underlying (continued)

Client	Aggregated Alpha Code	Maximum Potential Loss ("MPL" = Loss on full days' trades + Loss on last days' trades)	Actual Margin % Required on Large Position (MPL ÷ Absolute Notional)	Theoretical IMR Amount (delta adjusted notional x Var_{1day} x Sqrt of IMR liquidation period) ***	Liquidation Period Add-on Amount ("LPAO") (max (MPL – Theoretical IM Amount, 0)) ****
Client 1	SAB	R 31 414 081	7.3949%	R 27 034 723	R 4 379 358.16
Client 2	MTN	R 127 580 429	9.1631%	R 98 452 598	R 29 127 830.68
	SAB	R 47 646 052	7.9744%	R 38 024 030	R 9 622 021.48
	SBK	R 3 704 662	9.1924%	R 3 704 662	R 0.00

Table 13: Liquidation Period Add-on per client

Client	Liquidation Period Add-on Amount ("LPAO") (max (MPL – Theoretical IM Amount, 0)) ****	LPAO Threshold	Add-On Amount
Client 1	R 4 379 358.16	R 10 000 000	R 0.00
Client 2	R 38 749 852.16	R 10 000 000	R 28 749 852.16

Notes:

*** The theoretical IM amount already covered by the JSPAN is calculated.

**** The LPAO calculated above differs from the LPAO used. The LPAO used = max (LPAO calculated – LPAO threshold, 0). The LPAO threshold is removed from the total LPAO calculated.

6.2 Example illustrating the results of using the Large Exposure Add-on methodology

Table 14: Summary of JSE Provided Input Data

Client	Contract ID	Position	Contract Name	Alpha Code	Expiry Date	Instrument Type	Contract Size	Future MTM	Delta
Client 1	1004093	15 265	Jun2017 SABG Call 295	SAB	2017-06-15	OPTION	1	8058.82442	0.777151
Client 2	1004022	20 000	Mar2017 MTNQ Fut	MTN	2017-03-16	FUTURE	100	185.03	
	1004039	50 000	Jun2017 MTNR Fut	MTN	2017-06-15	FUTURE	100	130	
	1004096	30 000	SEP2017 MTNQ Fut	MTN	2017-09-15	FUTURE	100	124.09	
	1004091	-40 000	Jun2017 SABG Fut	SAB	2017-06-15	FUTURE	100	358.09	
	1004093	30 000	Jun2017 SABG Call 295	SAB	2017-06-15	OPTION	1	8058.82442	0.777151
	1004024	10 000	Jun2017 SBKS Fut	SBK	2017-06-15	FUTURE	100	169.4	
	1004065	24 000	Jun2017 SBK PHY 120 P	SBK	2017-06-15	OPTION	1	629.989854	-0.14639
	1004066	-9 500	Jun2017 SBK PHY 100 C	SBK	2017-06-15	OPTION	1	7178.78714	0.93324

Table 15: Client-level inputs

Client	JSPAN Value (R)	Liquidation Period Add-on Value (R)
Client 1	27 034 722.96	0.00
Client 2	140 181 291.14	28 749 852.16

Table 16: Global Parameters

Parameter	Value
Large Exposure Threshold	R 40 000 000
Include Liq Per AO in LEA Calc?	Y

Table 17: Stressed MTM from stressed prices (R) – Published by the JSE

Tradable Instrument ID	Contract	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	Scenario 11	Scenario 12	Scenario 13	Scenario 14	Scenario 15	Scenario 16	Scenario 17	Scenario 18	Scenario 19	Scenario 20	Scenario 21
1004039	Jun2017 MTNR Fut	156.00	104.00	244.40	15.60	138.19	123.63	130.58	131.50	130.00	125.00	117.85	126.69	127.73	140.27	148.01	130.52	125.78	131.17	127.08	244.40	15.60
1004093	Jun2017 SABG Call 295	14 065.81	2 429.57	37 829.15	0.00	9 935.73	6 841.26	8 180.25	8 336.73	8 058.82	7 055.40	5 776.64	7 409.80	7 565.12	10 182.61	12 040.94	7 977.62	7 477.14	7 801.31	7 510.31	37 829.15	0.00
1004091	Jun2017 SABG Fut	429.71	286.47	673.21	42.97	380.65	340.54	359.70	362.21	358.09	344.30	324.61	348.96	351.82	386.38	407.69	359.52	346.45	361.31	350.03	673.21	42.97
1004066	Jun2017 SBK PHY 100 C	10 401.90	4 225.51	21 848.18	0.00	8 200.14	6 442.30	7 248.67	7 349.30	7 178.79	6 586.99	5 779.51	6 791.56	6 900.21	8 402.19	9 377.73	7 192.35	6 758.85	7 200.30	6 844.36	21 848.18	0.00
1004065	Jun2017 SBK PHY 120 P	243.15	1 449.51	7.50	9 967.00	521.20	815.12	617.01	580.73	629.99	753.79	989.27	720.55	669.25	381.10	295.64	528.48	866.22	371.87	722.00	7.50	9 967.00
1004024	Jun2017 SBKS Fut	203.28	135.52	318.47	20.33	180.07	161.10	170.16	171.35	169.40	162.88	153.56	165.08	166.44	182.78	192.86	170.08	163.89	170.92	165.59	318.47	20.33
1004022	Mar2017 MTNQ Fut	222.04	148.02	347.86	22.20	196.69	175.96	185.86	187.16	185.03	177.91	167.73	180.31	181.79	199.65	210.66	185.77	179.02	186.70	180.87	347.86	22.20
1004096	SEP2017 MTNQ Fut	148.91	99.27	233.29	14.89	131.91	118.01	124.65	125.52	124.09	119.31	112.49	120.93	121.92	133.89	141.28	124.59	120.06	125.21	121.30	233.29	14.89

Table 18: Stressed Profit and Loss Results (R)

Client	Tradable Instrument ID	Contract	Net Qty	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	Scenario 11	Scenario 12	Scenario 13	Scenario 14	Scenario 15	Scenario 16	Scenario 17	Scenario 18	Scenario 19	Scenario 20	Scenario 21
Client 1	1004093	Jun2017 SABG Call 295	15 265	6006.99	-5629.26	29770.32	-8058.82	1876.90	-1217.56	121.43	277.90	0.00	-1003.43	-2282.18	-649.03	-493.70	2123.79	3982.12	-81.20	-581.69	-257.52	-548.51	29770.32	-8058.82
Client 2	1004022	Mar2017 MTNQ Fut	20 000	37.01	-37.01	162.83	-162.83	11.66	-9.07	0.83	2.13	0.00	-7.12	-17.30	-4.72	-3.24	14.62	25.63	0.74	-6.01	1.67	-4.16	162.83	-162.83
	1004039	Jun2017 MTNR Fut	50 000	26.00	-26.00	114.40	-114.40	8.19	-6.37	0.58	1.50	0.00	-5.00	-12.15	-3.31	-2.27	10.27	18.01	0.52	-4.22	1.17	-2.92	114.40	-114.40
	1004096	SEP2017 MTNQ Fut	30 000	24.82	-24.82	109.20	-109.20	7.82	-6.08	0.56	1.43	0.00	-4.78	-11.60	-3.16	-2.17	9.80	17.19	0.50	-4.03	1.12	-2.79	109.20	-109.20
	1004091	Jun2017 SABG Fut	-40 000	71.62	-71.62	315.12	-315.12	22.56	-17.55	1.61	4.12	0.00	-13.79	-33.48	-9.13	-6.27	28.29	49.60	1.43	-11.64	3.22	-8.06	315.12	-315.12
	1004093	Jun2017 SABG Call 295	30 000	6006.99	-5629.26	29770.32	-8058.82	1876.90	-1217.56	121.43	277.90	0.00	-1003.43	-2282.18	-649.03	-493.70	2123.79	3982.12	-81.20	-581.69	-257.52	-548.51	29770.32	-8058.82
	1004024	Jun2017 SBKS Fut	10 000	33.88	-33.88	149.07	-149.07	10.67	-8.30	0.76	1.95	0.00	-6.52	-15.84	-4.32	-2.96	13.38	23.46	0.68	-5.51	1.52	-3.81	149.07	-149.07
	1004065	Jun2017 SBK PHY 120 P	24 000	-386.84	819.52	-622.49	9337.01	-108.79	185.13	-12.98	-49.26	0.00	123.80	359.28	90.56	39.26	-248.89	-334.35	-101.51	236.23	-258.12	92.01	-622.49	9337.01
	1004066	Jun2017 SBK PHY 100 C	-9 500	3223.11	-2953.28	14669.39	-7178.79	1021.36	-736.48	69.88	170.52	0.00	-591.80	-1399.28	-387.22	-278.58	1223.40	2198.94	13.56	-419.94	21.52	-334.43	14669.39	-7178.79

Table 19: Stressed Variation Margin Results (R)

Client	Tradable Instrument ID	Contract	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	Scenario 11	Scenario 12	Scenario 13	Scenario 14	Scenario 15	Scenario 16	Scenario 17	Scenario 18	Scenario 19	Scenario 20	Scenario 21
Client 1	1004093	Jun2017 SABG Call 295	91696702	-85930654	454443935	-123017887	28650879	-18586053	1853629	4242144	0	-15317359	-34837478	-9907443	-7536331	32419654	60787062	-1239518	-8879498	-3931043	-8373005	454443935	-123017887
Client 2	1004022	Mar2017 MTNQ Fut	74020000	-74020000	325660000	-325660000	23320000	-18140000	1660000	4260000	0	-14240000	-34600000	-9440000	-6480000	29240000	51260000	1480000	-12020000	3340000	-8320000	325660000	-325660000
	1004039	Jun2017 MTNR Fut	130000000	-130000000	572000000	-572000000	40950000	-31850000	2900000	7500000	0	-25000000	-60750000	-16550000	-11350000	51350000	90050000	2600000	-21100000	5850000	-14600000	572000000	-572000000
	1004096	SEP2017 MTNQ Fut	74460000	-74460000	327600000	-327600000	23460000	-18240000	1680000	4290000	0	-14340000	-34800000	-9480000	-6510000	29400000	51570000	1500000	-12090000	3360000	-8370000	327600000	-327600000
	1004091	Jun2017 SABG Fut	-286480000	286480000	-1260480000	1260480000	-90240000	70200000	-6440000	-16480000	0	55160000	133920000	36520000	25080000	-113160000	-198400000	-5720000	46560000	-12880000	32240000	-1260480000	1260480000
	1004093	Jun2017 SABG Call 295	180209700	-168877800	893109600	-241764600	56307000	-36526800	3642900	8337000	0	-30102900	-68465400	-19470900	-14811000	63713700	119463600	-2436000	-17450700	-7725600	-16455300	893109600	-241764600
	1004024	Jun2017 SBKS Fut	33880000	-33880000	149070000	-149070000	10670000	-8300000	760000	1950000	0	-6520000	-15840000	-4320000	-2960000	13380000	23460000	680000	-5510000	1520000	-3810000	149070000	-149070000
	1004065	Jun2017 SBK PHY 120 P	-9284160	19668480	-14939760	224088240	-2610960	4443120	-311520	-1182240	0	2971200	8622720	2173440	942240	-5973360	-8024400	-2436240	5669520	-6194880	2208240	-14939760	224088240
	1004066	Jun2017 SBK PHY 100 C	-30619545	28056160	-139359205	68198505	-9702920	6996560	-663860	-1619940	0	5622100	13293160	3678590	2646510	-11622300	-20889930	-128820	3989430	-204440	3177085	-139359205	68198505

Table 20: Aggregated Stressed Variation Margin Results at a Client Level (R)

Client	Scenario 1	Scenario 2	Scenario 3	Scenario 4	Scenario 5	Scenario 6	Scenario 7	Scenario 8	Scenario 9	Scenario 10	Scenario 11	Scenario 12	Scenario 13	Scenario 14	Scenario 15	Scenario 16	Scenario 17	Scenario 18	Scenario 19	Scenario 20	Scenario 21
Client 1	91 696 702	-85 930 654	454 443 935	-123 017 887	28 650 879	-18 586 053	1 853 629	4 242 144	0	-15 317 359	-34 837 478	-9 907 443	-7 536 331	32 419 654	60 787 062	-1 239 518	-8 879 498	-3 931 043	-8 373 005	454 443 935	-123 017 887
Client 2	166 185 995	-147 033 160	852 660 635	-63 327 855	52 153 120	-31 417 120	3 227 520	7 054 820	0	-26 449 600	-58 619 520	-16 888 870	-13 442 250	56 328 040	108 489 270	-4 461 060	-11 951 750	-12 934 920	-13 929 975	852 660 635	-63 327 855

Table 21: Aggregated Large Exposure Add-on, at a Client Level - LaPoAO (R)

Client	Worst Stressed VM	JSPAN Margin	Liquidation Period Add-on Margin	Total Loss	Large Exposure Threshold	Loss Adjusted for Threshold	Final Add-On
Client 1	-123 017 887.30	27 034 722.96	0.00	-95 983 164	40 000 000	55 983 164	55 983 164
Client 2	-147 033 160.00	140 181 291.14	28 749 852.16	0	40 000 000	0	0

Notes: 1. The JSPAN and Liquidation Period Add-on values calculated at EoD on the client's portfolio need to be used.

2. The LPAO excludes the threshold of R40 000 000.

6.3 Example Data in Excel-format

This pdf-file has an Excel file attached to it which contains the data referred to in the annexure.