JSE CLEAR
COLLATERAL RISK
MANAGEMENT FRAMEWORK

OCTOBER 2025

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Version Control

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Owner	JSE Clear Risk
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Approved by	JSE Clear Risk Committee
	JSE Clear Board

Version History

Version	Date	Summary of changes	Author
1.0	March 2022	• Initial draft.	JSE Clear Risk team
1.0	July 2022	• Added approach to managing Wrong-way risk in the context of SA Government bonds. • Revised haircut methodology to be based on a 99.96% confidence interval 3-day price stress, rather than worst-case 2-day stress. • Added section on Liquidity risk management.	JSE Clear Risk team
2.0	October 2023	• Revised measure for the proportion of securities held by JSE Clear that could be sold on the day of default.	JSE Clear Risk team
3.0	October 2024	Regular review: • Minor updates relating to Bond CCP (cumulative contingent VM gain offset with IM requirement). • Updated liquidation period from 3 days to 2 days – impacts concentration limits and valuation haircuts. • Reported market repo liquidity to be considered in ADVT calc for concentration limits.	JSE Clear Risk team
4.0	October 2025	Regular review: • Added section on minimum cash requirement / max allowable % in securities. Max allowable % in securities amended to up to 50% (from 35%). • ADVT lookback period, exclusion of outliers, and trade types considered in ADVT calculation added.	JSE Clear Risk Team

1. Introduction

Initial margin is either paid to, or by, a member or client whenever the risk of loss, as determined by JSE Clear, changes with respect to the aggregate position of such member or client. Clearing members pay additional margin to the JSE Clear Default Fund. Initial margin is taken in the form of ZAR cash, and securities. Cash is held in trust by JSE Clear and is invested on behalf of market participants by JSE Clear, or an agent thereof, according to an investment mandate approved by the JSE Clear Board. This framework details the way in which JSE Clear will manage securities held as initial margin and default fund collateral, and the associated risks thereof. The framework sets out JSE Clear's securities collateral eligibility criteria, collateral valuation, collateral haircut and concentration risk limit methodologies.

Securities will be accepted to cover a portion of the initial margin[1] of market participants and a portion of the additional margin posted by clearing members to the Default Fund.

Securities will only be accepted from participants with a Segregated Depository Account (SDA) at Strate, the Central Securities Depository (CSD). The participant's Central Securities Depository Participant (CSDP) will be required to auto-commit to pledging securities as part of JSE Clear's procedures.

Securities collateral management is facilitated by JSE Clear's clearing systems with integration into a triparty collateral management service, facilitated by the Strate Collateral Management Solution (SCMS). Through these systems, JSE Clear can calculate and execute end-of-day and intraday margin calls, and monitor indicative margin requirements and re-value collateral in near real-time throughout the day. Collateral will be managed against exposures at account level and applicable securities will be pledged against the exposure by considering the securities available in the collateral givers SDA account, according to JSE Clear's collateral eligibility list, asset valuations, haircuts and concentration limits

2. Minimum cash requirement

To reduce liquidity risk in the normal course of business and in the case of a participant default, at least 50% of the initial margin requirement, and least 50% of the clearing member's additional margin requirement with respect to the default fund, must be covered by Rand cash. The remainder (up to 50%) of a market participant's initial margin obligation and a clearing member's additional margin obligation to the default fund may be covered in acceptable securities.

3. Eligible securities

Only liquid, South African Government bonds denominated in ZAR will be accepted by JSE Clear as securities collateral. It should be noted that JSE Clear may expand the list of eligible securities in the future.

All securities accepted as collateral will be assessed against the eligibility criteria below:
- Nominal value in issue is greater than R100 billion.

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[1] In the cash bonds market, the calculated IM requirement is offset by the cumulative variation margin (VM) gain (if applicable) since the transaction date (if applicable), and the IM requirement post cumulative VM offset is required to be settled by the participant in cash and/or securities collateral.

- ADVT of more than R500 million.
- Term to maturity greater than 6 months.
- Ability to value the security and determine the valuation haircut and concentration limits.
- Availability of data to support these functions.

A list of eligible securities will be published on the JSE Clear website. Eligible collateral will be reviewed at least annually, or as required.

4. Collateral valuation

JSE Clear will mark securities to market daily and will adjust the amount of collateral to be paid to (or from) JSE Clear and market participants in cash to cover resulting changes in initial margin requirements. JSE Clear may choose to revalue securities and adjust cash requirements intra-day if deemed necessary.

The JSE Gilt Clearing House (GCH) formula is the current accepted bond pricing formula applied by JSE Clear for conventional fixed (including zero) coupon bonds with two coupon payment dates per year, one of which coincides with an anniversary of the bond's maturity date, on which date the whole capital of the bond is redeemed. Refer to *Appendix A: GCH Bond Pricing Formula* for details of the bond pricing formula.

Haircuts will be applied to each security that is eligible to be posted as collateral[2]. A discounted value from the mark-to-market value will be used to cover the margin requirement.

5. Haircut methodology

A 'haircut' is the difference between the current market value of an asset and the value ascribed to that asset when it is pledged as collateral for the mitigation of counterparty credit risk exposure. A haircut represents the potential loss of value of an asset due to factors such as:

- Price volatility;
- The probable cost of liquidating collateral following an event of default due to the impact of liquidation on market price; and
- The possibility of the issuer of the collateral defaulting.

Securities collateral carries more risk than cash collateral and therefore a greater value of securities must be pledged compared to the equivalent cash collateral. When determining the sufficiency of the cash and securities posted by a market participant to cover its obligations, JSE Clear will value the cash paid and the securities pledged to JSE Clear for this purpose at their market value less any haircut applicable to those securities.

$$Collateral\ value\ after\ haircut = \frac{Market\ value\ of\ collateral}{(1 + haircut\%)}$$

Collateral haircuts are calculated considering, as a minimum, a 99.96% confidence interval (CI) 2-day price stress by analysing daily price time series of the security over a rolling 20-year lookback period (with an appropriate stress period), if available. The 2-day price stress aligns with the 2-day liquidity risk appetite (based on ADVT and the market participation assumption) for a security when setting concentration limits (section 5) – limiting aggregate collateral positions in a security to a value that JSE Clear can readily liquidate in 2 days without adversely impacting market prices based on average daily value traded (ADVT). Where required, historically observed price stress scenarios will be supplemented with hypothetical stresses to ensure that haircuts are conservative. If severe volatility is experienced intraday such that the valuation haircut may not be sufficient to protect against observed or possible price movements, JSE Clear will update security prices, haircuts and collateral amounts intraday.

The following principles guide the calculation of haircuts:
- Haircuts are intended to reflect the collateral value during stressed market conditions and should take into account extreme price moves (historical and hypothetical);
- The price timeseries of the individual security will be used to determine the 99.96% confidence interval (CI) price move if sufficient history is available (including a period of extreme volatility/stress), or an appropriate conversative proxy where suitable timeseries data of the security is not available;
- 99.96% CI price moves will be applied to inform a conservative and more stable haircut that is less likely to increase sharply during stressed market conditions and thereby negate the need for pro-cyclicality adjustments;
- A liquidity risk buffer may be applied in the haircut calculation by increasing the number of days considered in determination of the haircut from 2 days up to an appropriate level based on severity of the stress event, if the 2-day 99.96% price stress (assumed minimum liquidation period) is deemed to be an inadequate price stress for a security due to factors such as decline in the security's liquidity and/or material increase in volatility, amongst others;
- Consideration of foreign exchange risk is not necessary as only ZAR cash and ZAR South African government bonds will be accepted;
- The impact of Wrong-way risk (WWR) - the potential loss that may be suffered during the Default Management Process, due to an unfavourable correlation between the counterparty's creditworthiness, the value of its collateral pool and the value of its derivatives portfolio - will be considered, where applicable:
  - In the context of the initial eligible collateral list limited to specific liquid South African Government bonds, the scenario that could introduce potential WWR, while highly unlikely, is the default of a large local clearing member bank. Given the systemic importance and the close relationship between banks and the Sovereign in a concentrated local market (small number of relatively large interrelated local banks and Sovereign operating in a common industry/sector and country) the default is likely to be correlated with an adverse impact on Government bond prices that will materially reduce bond collateral values, increasing risk of JSE Clear and other market participants.
  - An explicit upfront WWR haircut buffer is considered superfluous for SA Government bonds while the probability of default of the local clearing member banks is low and standard haircuts are already very conservative. JSE Clear conducts regular credit monitoring of clearing members as part of financial risk

reporting. This is supplemented with ad hoc credit monitoring, as required. In the unlikely scenario that the credit worthiness of one or more systemically important clearing members deteriorates materially and the risk of a default becomes a probable event, JSE Clear will proactively review and adjust the management of securities collateral to reduce exposure to impacted securities through changes to the eligibility criteria, concentration limits and haircuts.

The calculation of collateral haircuts is informed by the JSE Clear Stress Testing Methodology and Stress Testing Scenarios. Haircut values will be monitored at least quarterly and more frequently if deemed necessary.

6. Concentration limits

In a securities collateral portfolio, concentration risk can be defined as any single collateral exposure or group of collateral exposures with the potential to produce losses large enough to threaten the CCP's overall health or its ability to maintain its core business. A collateral exposure is concentrated if the exposure of a particular position exceeds the aggregate market demand during the anticipated liquidation period (assumed to be under stressed market conditions). The market demand for a security is a function of both the market capacity and the credit quality of the particular security or instrument.

In the event of a default, concentrated collateral positions would be more difficult to liquidate or substitute quickly, leading to potentially large losses. To avoid material losses, concentration risk is managed by collateral concentration limits, to be applied to client and trading member accounts:

- To avoid undue concentration of collateral in a particular asset class, type of security, obligor, etc; and
- To restrict the maximum amount of securities collateral a market participant may pledge to JSE Clear.

JSE Clear has defined three types of concentration risk limits to ensure control over the management of concentration risk to JSE Clear. The combination of aggregate and account-level fixed ZAR value security (ISIN) limits and account level max security (ISIN) % weight limits (diversification limits) enable JSE Clear to appropriately risk manage concentrations at the instrument/issuance, security issuer, client account and clearing member level. Limits are based on the liquidity of the security.

6.1. Clearing member aggregate security concentration limit

A defined ZAR value aggregate security limit (limit defined per ISIN code / security code) at the clearing member level covering the total pledged security for a specific ISIN / security code under the clearing member i.e. across clients, trading members and the clearing member's house account.

The aggregate security risk appetite and limit is based on the value of securities that can be traded or liquidated in a 2-day liquidation period at the instrument's average daily value traded[3] (ADVT) and a conservative market participation under a cover 1 default assumption (default of the single largest clearing member). The market

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[3] Average daily value traded (ADVT) based on bond spot and repo trade data (SD - Structured Deals, OX- Option Exercise, FOV - Free of value trade types are excluded from ADVT) and large outliers in trade data will be excluded.

participation assumption reflects the assumed proportion of the market ADVT that the CCP can readily liquidate per day without negatively impacting market prices. Market participation is assumed to be 25% (1/4 of ADVT). The ADVT is based on a rolling 90-day lookback period, and the largest 9 (10%) values (by magnitude) are excluded from the dataset as outliers.

$$Aggregate\ risk\ appetite\ per\ Clearing\ Member_{security\ 1}$$
$$= 2\ day\ liq.period\ \times\ ADVT_{security\ 1}\ \times\ market\ participation$$

For example, if the R186 government bond has an average daily value traded of R4 billion the aggregate security concentration limit would be:

2 (days) x 4 billion x 1/4 = R2 billion per clearing member for the R186 government bond

6.2. Account-level concentration limit

A defined ZAR value security limit (limit defined per ISIN code / security code) will be imposed on the individual client account level. Once the individual client account concentration limit for a security is reached, JSE Clear will value any further pledge of the security in excess of the limit as zero.

Account-level security limits are determined following a top-down approach, by first calculating the aggregate security limit at the clearing member level and then allocating the aggregate security limit at the clearing member level across the clearing member's house account and individual trading member and client accounts.

Allocation of account-level concentration limits may consider:
- Liquidity/ADVT of the security;
- The type(s) and nature of the collateral pledged;
- Client exposure and margin requirements;
- Potential relationship between client and issuer of securities collateral that could lead to an adverse impact on risk exposure in the event of default (wrong-way risk); and
- Client portfolio diversification and credit risk of the counterparty/client amongst other factors.

The ability to set client level limits is crucial in the context of wrong-way risk and limiting the acceptance of collateral where there is risk of significant correlation between the credit risks of the counterparty and the issuer of the collateral, as this will diminish the effectiveness of the collateral pledged for initial margin.

Counterparts are not allowed to pledge their own issues (or issues of closely related or linked entities) as collateral as this introduces a specific wrong-way risk (WWR). It is assumed that the security becomes worthless in the event of default, therefore no collateral value can be recognised for specific WWR.

6.3. Account-level diversification limit

A percentage (%) weight security limit (limit defined per ISIN code / security code) may be imposed at the individual client account level, defining the maximum proportion or weight that a security may contribute towards the recognised securities collateral portfolio for the client.

The diversification limit is intended to reduce the risk of extreme price moves on a single security or poorly diversified securities collateral portfolio.

For example, with a diversification limit of 25%, if a client had R186 bonds in their collateral portfolio and was able to pledge R10 million towards their initial margin requirement (in this example R10 million is the maximum initial margin amount that the client could theoretically collateralise with securities), if the R186 was their only security in the collateral portfolio, only 25% of the R10 million maximum allowable securities collateral value will be recognised towards the client's initial margin requirement i.e. R2.5 million. The balance of the R186 collateral above the 25% diversification limit would be valued at zero. To achieve greater collateralisation through securities the client must pledge different eligible securities in a diversified, liquid collateral portfolio. Concentration limits are reviewed at least quarterly and more frequently if deemed necessary.

7. Liquidity risk management

JSE Clear will calculate the appropriate amount of liquid resources required to ensure continued prudent management of its liquidity profile and payment obligations. The quantum of this requirement will be reviewed annually or when a material market event occurs. Details regarding JSE Clear's liquidity management principles can be found in the JSE Clear Liquidity Policy and details on the quantification methodology can be found in the JSE Clear Stress Testing Policy and associated documentation.

In order to place JSE Clear in a financial position to exercise its power to settle obligations as described above, the maximum amount that JSE Clear will pay on behalf of a clearing member to a market counterparty will be limited to the amount that the clearing member has paid to JSE Clear as initial and additional margin for its own positions or to the amount of the initial margin paid by the market participants for which the clearing member clears, plus the quantum of the default fund.

Where a portion of the initial margin and/or default fund is held in securities, and there is a need provide liquidity to a value over and above the amount of cash margin of the defaulter, JSE Clear will only provide liquidity against the value of securities collateral once the securities have been sold to lock in the price and confirm the proceeds that will be realised once the trades have settled. Liquidity stress testing will be performed daily to monitor the adequacy of JSEC's liquid resources, and will consider that:

- A conservative proportion of the securities can be sold on the day of a clearing member default.
- If a default is declared by 12pm (2 hours after the margin payment deadline of 10am) this would allow for approximately 4 hours of trading before the window for high value payments closes after which payment of the defaulter's obligations by JSE Clear would not be possible.
- The proportion of securities collateral that can be liquidated on the day of default is a function of:
  - C - the value of securities collateral pledged
  - A - the average daily value traded (ADVT) of the securities collateral
  - M - the market participation assumption (i.e. 25% of ADVT per day)
  - R - the remaining trading hours on the day of default
  - T - typical bond trading day is approximately 11 hours

$$estimated\ time\ to\ liquidate\ securities\ collateral\ (days) = \frac{C}{MA}$$

proportion of securities collateral that can be liquidated on the day of default

$$= \min\left[100\%, \quad \frac{RMA}{TC} \times 100\%\right]$$

- Liquidity could then be provided against the realised value plus the value of the defaulter's cash margin to settle the defaulter's obligations.

8. Governance

This policy is owned by the JSE Clear Chief Risk Officer and will be reviewed annually or when there are any material changes.

The JSE Clear JSEC Risk Committee will recommend the initial approval of this policy by the JSE Clear JSEC Board or when there are material changes. The regular annual review of this policy will be approved by the JSE Clear Risk Committee.

9. Appendix A: GCH bond pricing formula

1. BONDS WITH MORE THAN 6 MONTHS TO REDEMPTION

$$\text{Unrounded All-in Price} = V_i^{\frac{d_1}{d_2}} \left(\frac{1}{2} g \left(a_n^i + e \right) + 100 V_i^n \right)$$

Where

d_1	=	number of days from settlement date to next interest date
d_2	=	number of days from last to next interest date or from settlement date to next interest date if settlement falls on an interest date
I	=	yield at which bond trades, as a percentage
V_i	=	$1 / (1 + I/200)$
	=	present value of 1 payable in 6 months' time
g	=	coupon as a percentage
n	=	number of complete six month periods from next interest date to redemption date
a_n^i	=	$(1 - V_i^n) / (I/200)$
	=	present value of an annuity of 1 per six months, payable in arrears
	=	1 if the bond is cum and 0 if ex

$$\text{Accrued Interest} = \frac{d_2 e \ - \ d_1}{365} \times g$$

Clean Price = All-in price - Accrued interest

Note:

1. Rounding convention: Clean price is rounded to 5 decimal places, accrued interest then rounded to 5 decimal places and added back to the clean price to arrive at the all-in price

2. Bonds are considered to be cum interest on a coupon date

2. BONDS WITH LESS THAN 6 MONTHS TO REDEMPTION

$$\text{Unrounded All-in price} \quad = \quad \frac{100 + e \times \dfrac{g}{2}}{1 + \dfrac{d_1}{365} \times \dfrac{i}{100}}$$

with definitions as before

$$\text{Accrued interest} \quad = \quad \text{as for longer bonds}$$

Rounding as with longer bonds.

3. PRICE TO YIELD

The implied yield of a bond is the yield which produces an unrounded all-in price equal to the target all-in price, rounded to 5 decimal places.

4. PRECISION

All calculations and intermediate results should be carried to at least 11 significant digits; and preferably to full double precision (15-16 significant digits).

10. Appendix B: Governance committee actions

No.	Ref	Action Item	Frequency	Applicable Governance Forum
1.	7	The JSE Clear JSEC Risk Committee will recommend the initial approval of this policy by the JSE Clear JSEC Board or when there are material changes. The regular annual review of this policy will be approved by the JSE Clear Risk Committee.	Not specified	• JSE Clear Risk Committee • JSE Clear Board