South African Reserve Bank
Prudential Authority

Prudential Standard FSI 4.1

Market Risk Capital Requirement

Objectives and Key Requirements of this Prudential Standard

This Standard sets out the details for calculating the market risk capital requirement for insurers using the standardised formula to calculate the Solvency Capital Requirement (SCR).

The ultimate responsibility for the prudent management of the financial soundness of an insurer rests with its board of directors. The board of directors must ensure that the insurer has systems and controls in place to adequately calculate its market risk capital requirement according to the Financial Soundness Standards for Insurers.

The calculation of the capital requirement for market risk is based on specified stress scenarios applied to the following components of market risk:

- *Interest rate risk;*
- *Equity risk;*
- *Property risk;*
- *Currency risk;*
- *Spread and default risk;*
- *Concentration risk; and*
- *Illiquidity premium risk.*

The overall capital requirement for market risk is determined by aggregating the capital requirements of each individual risk component using a correlation matrix prescribed in this Standard.

Table of Contents

1. Application

1.1. This Standard applies to all insurers licensed under the Insurance Act, 2017 (the Act), other than microinsurers, Lloyd's and branches of foreign reinsurers.

1.2. Unless otherwise indicated, all references to "insurer" in this Standard can be read as a reference to life insurers, non-life insurers and reinsurers. Similarly, a reference to "insurance" obligations/policies in this Standard can be read as a reference to "reinsurance" obligations/policies, unless otherwise specified.

2. Roles and Responsibilities

2.1. Ultimate responsibility for the prudent management of the financial soundness of an insurer rests with the insurer's board of directors. The board of directors must ensure the insurer meets the Solvency Capital Requirement (SCR) on a continuous basis, regardless of the approach taken to its computation. The board of directors must also ensure that the insurer has in place appropriate systems, procedures and controls to meet the principles and requirements of this Standard on an ongoing basis.

2.2. An insurer's head of actuarial function is responsible for expressing an opinion to the board of directors regarding the accuracy of the calculations and the appropriateness of the assumptions underlying the capital requirement for market risk.

2.3. An insurer's auditor, appointed under section 32 of the Act, must audit the financial soundness of an insurer in accordance with its legal and regulatory obligations. The auditor must report to the board of directors and Prudential Authority any matters identified during the performance of its responsibilities that may cause the insurer to be not financially sound.

2.4. The roles and responsibilities of the board of directors and the head of actuarial function are described in more detail in the Governance and Operational Standards for Insurers (GOI 3).

3. Commencement and Transition Provisions

3.1. This Standard commences on 1 July 2018.

Version Number	Commencement Date
1	July 2018

4. Scope and Key Elements of Market Risk

4.1. Market risk is the risk of loss arising from movements in market prices on the value of an insurer's assets and liabilities or of loss arising from the default of the insurer's counterparties. Exposure to market risk is measured by the impact of movements in financial variables such as stock prices, interest rates, real estate prices and exchange rates.

4.2. The calculation of the market risk capital requirement under the standardised formula is based on the application of specified stress scenarios for each of the following components of market risk:

a) Interest rate risk;
b) Equity risk;
c) Property risk;
d) Currency risk;
e) Spread and default risk;
f) Concentration risk; and
g) Illiquidity premium risk.

4.3. The overall capital requirement for market risk is determined by combining the capital requirements for each market risk component above using the formula set out in section 4.7 below.

4.4. All assets and liabilities of an insurer that are exposed to movements in financial variables should be included in the calculation of the market risk capital requirement. In determining which of the market risk components apply to an instrument, insurers should consider the underlying characteristics of the instrument and its exposures to various financial variables. Attachment 1 of this Standard provides further details on the treatment of specific instruments for the purposes of calculating the capital requirement for market risk, including collective investment funds.

4.5. In calculating the capital requirements associated with each component of market risk, allowance may be made for changes in policyholder behaviour under the specified stress scenarios, as well as the effect of eligible risk mitigation instruments used to hedge market risk (e.g. derivatives). The risk of impairment from counterparty default on such instruments, however, must be taken into account in the calculation of the capital requirement for the relevant market risk component or sub-component. The method for assessing impairment for counterparty default risk on eligible risk mitigation instruments is set out in Attachment 2 of FSI 4 (Calculation of the SCR Using the Standardised Formula).

4.6. A different treatment is applied to Infrastructure assets for financial soundness purposes as set out in this Standard. Attachment 1 of this Standard sets out the qualifying conditions for assets to be classified as Infrastructure assets.[1]

Calculating the overall market risk capital requirement

4.7. The capital requirement for market risk (SCR_{Mkt}) must be calculated by combining the capital requirements for each market risk component using the following formula:

$$SCR_{Mkt} = \sqrt{\sum_{r,c} CorrMkt_{r,c} \cdot Mkt_r \cdot Mkt_c} + AdjSES$$

Where:

$CorrMkt_{r,c}$	=	The entries of the correlation matrix $CorrMkt$ defined in section 4.8 below
Mkt_r, Mkt_c	=	Capital requirements for the individual market risk components r and c according to the rows and columns

[1] The Prudential Authority reserves the right to prescribe an asset as an Infrastructure asset in accordance with section 36 of the Act.

of the correlation matrix $CorrMkt$

$AdjSES$ = An adjustment factor for potential double-counting of the loss-absorbing capacity of technical provisions (refer to section 4.9 below)

4.8. The correlation matrix $CorrMkt$ is defined as:

$CorrMkt$	Interest	Equity	Property	Spread and default	Currency	Concen-tration	Illiquidity premium
Interest	1						
Equity	A	1					
Property	A	0.75	1				
Spread and default	A	0.75	0.5	1			
Currency	0.25	B	0.25	0.25	1		
Concentration	0	0	0	0	0	1	
Illiquidity premium	0	0	0	-0.5	0	0	1

Where:

A = 0, if the capital requirement for nominal level interest rate curve risk (as calculated under section 5.7 below) is derived from applying a level increase in the interest rate term structure; or

0.5, if the capital requirement for nominal level interest rate curve risk (as calculated under section 5.7 below) is derived from applying a level decrease in the interest rate term structure.

B = 0, if the capital requirement for currency risk (as calculated under section 8.3 below) is derived from the risk of the Rand appreciating against other currencies; or

0.5, if the capital requirement for currency risk (as calculated under section 8.3 below) is derived from the risk of the Rand depreciating against other currencies.

4.9. Insurers must take into account the potential for double-counting of loss-absorbing capacity in technical provisions when calculating the market risk capital requirement. The loss-absorbing capacity of technical provisions refers to the extent to which an insurer is able to pass on risks to policyholders, by way of changes to policyholder benefits. The adjustment factor ($AdjSES$) calculates the adjustment that is required to

the market risk capital requirement using a "single equivalent stress" for the various market risk components, where there is double-counting of loss-absorbing capacity in technical provisions. Attachment 2 sets out the methodology required to calculate the adjustment factor ($AdjSES$).

5. Interest Rate Risk

5.1. Interest rate risk arises when the market value of assets and liabilities are sensitive to changes in market yield curves or interest rate volatilities. This includes both the nominal and real yield curves.

5.2. All assets and liabilities that are sensitive to changes in the yield curve should be included in the calculation of the interest rate risk capital requirement, including fixed-income securities, financing instruments (e.g. loan capital), policy loans, interest rate derivatives, and all other items included in the valuation of technical provisions.

5.3. The capital requirement for interest rate risk (Mkt_{int}) must be calculated by combining the capital requirements for interest rate "curve" risk and interest rate "volatility" risk using the following formula:

$$Mkt_{int} = \sqrt{\sum_{r,c} CorrInt_{r,c} \cdot Mkt_{int,r} \cdot Mkt_{int,c}}$$

Where:

$CorrInt_{r,c}$	=	The entries of the correlation matrix $CorrInt$ below
$Mkt_{int,r}$, $Mkt_{int,c}$	=	Capital requirements for the sub-components of interest rate risk r and c according to the rows and columns of the correlation matrix $CorrInt$, as calculated under sections 5.6 and 5.16 below

The correlation matrix $CorrInt$ is defined as:

$CorrInt$	Curve	Volatility
Curve	1	
Volatility	0.5	1

5.4. In calculating the capital requirement for interest rate risk, an insurer may assume that management actions can take place under the stress scenarios, including changes to future bonus rates on policies with discretionary participation features. The type and extent of management actions that an insurer may assume in the stresses must consider whether the stress is assumed to be insurer-specific or industry-wide. For interest rate risk, insurers should assume that the stresses result entirely from industry-wide events.

5.5. Where a causal relationship exists between interest rate changes (including changes to interest rate curves or volatilities) and policyholder behaviour, the calculation of the interest rate risk capital requirement may take into account changes to policyholder behaviour.

Interest rate curve risk

5.6. The capital requirement for interest rate curve risk (Mkt_{int_curve}) must be calculated as:

$$Mkt_{int\_curve} = \sqrt{\sum_{r,c} CorrIntCurve_{r,c} \cdot Mkt_{int\_curve,r} \cdot Mkt_{int\_curve,c}}$$

Where:

$CorrIntCurve_{r,c}$	=	The entries of the correlation matrix $CorrIntCurve$ below
$Mkt_{int\_curve,r}$, $Mkt_{int\_curve,c}$	=	Capital requirements for the sub-components of interest rate curve risk r and c according to the rows and columns of the correlation matrix $CorrIntCurve$, as calculated under sections 5.7 and 5.9 below

The correlation matrix $CorrIntCurve$ is defined as:

$CorrIntCurve$	Nominal	Real
Nominal	1	
Real	0.25	1

5.7. The capital requirement for the nominal interest rate curve risk captures the risk arising from changes in the nominal yield curve. The capital requirement for nominal interest rate curve risk ($Mkt_{int\_curve,nominal}$) must be calculated as:

$$Mkt_{int\_curve,nominal} = max\left(Mkt_{int\_curve,nominal}{}^{up}, Mkt_{int\_curve,nominal}{}^{down}, 0\right)$$

Where:

$Mkt_{int\_curve,nominal}{}^{up}$	=	$\Delta BOF \mid upwards\ nominal\ shock$
$Mkt_{int\_curve,nominal}{}^{down}$	=	$\Delta BOF \mid downwards\ nominal\ shock$
$\Delta\ BOF$	=	The change in the value of basic own funds
$upwards\ nominal\ shock$	=	An instantaneous increase in the nominal interest rate term structure used to value nominal interest rate sensitive items. The magnitude of the nominal interest rate shocks that must be used across the term structure for this scenario is set out in Attachment 3 of this Standard.
$downwards\ nominal\ shock$	=	An instantaneous decrease in the nominal interest rate term structure used to value nominal interest rate sensitive items. The magnitude of the nominal interest rate shocks that must be used across the term structure for this scenario is set out in

Attachment 3 of this Standard.

5.8. When applying the upward and downward shocks to the nominal yield curve, the real yield curve must be assumed to remain unchanged.

5.9. The capital requirement for the real interest rate curve risk ($Mkt_{int\_curve,real}$) must be calculated as:

$$Mkt_{int\_curve,real} = max\left(Mkt_{int\_curve,real}{}^{up}, Mkt_{int\_curve,real}{}^{down}, 0\right)$$

Where:

$Mkt_{int\_curve,real}{}^{up}$	=	$\Delta BOF \mid upwards\ real\ shock$
$Mkt_{int\_curve,real}{}^{down}$	=	$\Delta BOF \mid downwards\ real\ shock$
$\Delta\ BOF$	=	The change in the value of basic own funds
$upwards\ real\ shock$	=	An instantaneous increase in the real interest rate term structure used to value real interest rate sensitive items. The magnitude of the real interest rate shocks that must be used across the term structure for this scenario is set out in Attachment 3 of this Standard.
$downwards\ real\ shock$	=	An instantaneous decrease in the real interest rate term structure used to value real interest rate sensitive items. The magnitude of the real interest rate shocks that must be used across the term structure for this scenario is set out in Attachment 3 of this Standard.

5.10. When applying the upward and downward shocks to the real yield curve, the nominal yield curve must be assumed to remain unchanged.

5.11. Notwithstanding the prescribed shocks to nominal and real interest rates set out in Attachment 3, insurers must apply a minimum absolute change in interest rates of one percentage point (+1% in the upward stresses and –1% in the downward stresses). Where the nominal interest rate prior to the shock is less than 1%, the post-shock nominal interest rate in the downward scenario should be assumed to be 0%.[2] The floor of 0% under the downward scenario does not apply when applying shocks to real interest rates.

5.12. The interest rate shocks to nominal and real interest rate term structures must be applied to the spot discount rates used to value the relevant asset or liability,[3] i.e.:

a) For liabilities discounted using the prescribed risk-free interest rate term structure when valuing technical provisions, the shocked interest rate should be calculated as:

$$i_t \cdot (1 + f_t)$$

[2] This floor of 0% for nominal interest rates applies to both spot and forward nominal rates.

[3] The government bond curve published by the Prudential Authority (see FSI 2.2 (Valuation of Technical Provisions)) is provided as forward rates. These rates should be converted to spot rates before being subjected to the shocks discussed in this section.

Where:

i_t = The risk-free spot interest rate at term *t* used in the valuation of technical provisions

f_t = The relevant interest rate shock at term *t* as set out in Attachment 3

b) For liabilities matched with swap-based assets which an insurer values using the swap curve, the shocked spot interest rate should be calculated as:

$r_t \cdot (1 + f_t)$

Where:

r_t = The spot interest rate from the relevant swap curve at term *t* used in the valuation of technical provisions

c) For assets, insurers should add the absolute change in the relevant risk-free or swap curve rate to the relevant rate used to value the assets; for example, the shocked spot interest rates should be calculated as:
   a) $i_t \cdot (1 + f_t)$ for government bonds;
   b) $i_t + c_t + i_t \cdot f_t$ for corporate bonds, where c_t is the relevant credit spread for the corporate bond at term *t*; and
   c) $r_t \cdot (1 + f_t)$ for swaps.

5.13. Where an insurer is exposed to interest rate movements in a foreign currency, the nominal and real interest rate term structures for the foreign currency should be stressed using the same shocks as for the relevant South African (Rand) interest rate term structure.

Interest rate volatility risk

5.14. Interest rate volatility risk arises when the market value of assets and liabilities are sensitive to changes in the expected future volatility of market yield curves.

5.15. The implied volatility related to swaptions will typically be derived from market-observed data and long-term assumptions derived by the insurer. Insurers that are exposed to interest rate volatility risk should have in place an assumption setting process to combine market-observed data with long-term assumptions.

5.16. Where insurers are exposed to interest rate volatility risk, the capital requirement for interest rate volatility risk (Mkt_{int_vol}) must be calculated as:

$Mkt_{int\_vol} = \Delta BOF | swaption\ implied\ vol\ shock$

Where:

$\Delta\ BOF$ = The change in the value of basic own funds

$swaption\ implied\ vol\ shock$ = An increase in all swaption implied volatility assumptions, determined in accordance with sections 5.17 to 5.19 below

5.17. For swaption implied volatility assumptions derived from market-observed data, the post-shock swaption implied volatility at term *t* must be calculated as:

$$v_s(t) = v_b(t) + \frac{0.1}{\sqrt{t}}$$

Where:

$v_s(t)$ = The post-shock swaption implied volatility at term *t*

$v_b(t)$ = The swaption implied volatility at term *t*, prior to the application of the shock

5.18. For swaption implied volatility assumptions derived from realised interest rate volatilities, the post-shock swap implied volatility should be determined by:

a) Applying a 10 percentage point addition to the realised interest rate volatilities from the past 12 months (volatilities from prior years should remain unchanged);
b) Determining the percentage point increase in the term-one interest rate implied volatility assumption and averaging this increase across all tenors for which an assumption is set; and
c) Increasing the volatilities at each other term-tenor pair by the result from point b) using the same formula set out in section 5.17 above.

5.19. An insurer should apply its internal volatility assumption setting methodologies to determine the full implied volatility term structure and surfaces as required to value its embedded derivatives after applying the above shocks.

6. Equity Risk

6.1. Equity risk arises when the market value of assets and liabilities are sensitive to changes in the market prices for equities or their volatilities.

6.2. All exposures subject to equity risk must be taken into account in the calculation of the equity risk capital requirement, unless otherwise specified. This includes alternative investments such as private equity, hedge funds, derivatives, managed futures, and investments in Special Purpose Vehicles (SPVs) which cannot be allocated to spread risk.

6.3. Any equity investments in insurance-related participations in the same sector as the insurer, e.g. a life insurer with a participation that undertakes life insurance-related business, should be excluded from the calculation of the equity risk capital requirement.[4] Equity exposures arising from participations that are required to be deducted from Own Funds as set out in FSI 2.3 (Determination of Eligible Own Funds) should also be excluded from the calculation of the equity risk capital requirement. All other equity participations should be included in the calculation of the equity risk capital requirement.

6.4. Where insurers hold short positions in equity (including put options), these should be netted off against long equity positions only if the short position meets the requirements to be considered as an eligible risk mitigation instrument set out in Attachment 1 of FSI 4 (Calculation of the SCR Using the Standardised Formula). All short equity positions that do not meet the requirements of an eligible risk mitigation instrument should be disregarded when calculating the equity risk capital requirement (except where the circumstances described in section 6.13 below apply).

[4] The capital requirement associated with such participations must be calculated according to the methodology set out in Attachment 3 of FSI 4 (Calculation of the SCR Using the Standardised Formula).

6.5. The capital requirement for equity risk (Mkt_{eq}) must be calculated by combining the capital requirements for equity "price" risk and equity "volatility" risk using the following formula:

$$Mkt_{eq} = \sqrt{\sum_{r,c} CorrEq_{r,c} \cdot Mkt_{eq,r} \cdot Mkt_{eq,c}}$$

Where:

$CorrEq_{r,c}$	=	The entries of the correlation matrix $CorrEq$ below
$Mkt_{eq,r}$, $Mkt_{eq,c}$	=	Capital requirements for the sub-components of equity risk r and c according to the rows and columns of the correlation matrix $CorrEq$, as calculated under sections 6.9 and 6.16 below

The correlation matrix $CorrEq$ is defined as:

$CorrEq$	Price	Volatility
Price	1	
Volatility	0.5	1

6.6. In calculating the capital requirement for equity risk, an insurer may assume that management actions can take place under the stress scenarios, including changes to future bonus rates on policies with discretionary participation features. The type and extent of management actions that an insurer may assume in the stresses must consider whether the stress is assumed to be insurer-specific or industry-wide. For equity risk, insurers should assume that the stresses result entirely from industry-wide events.

6.7. Where a causal relationship exists between equity price or volatility changes and policyholder behaviour, the calculation of the equity risk capital requirement may take into account changes to policyholder behaviour.

Equity price risk

6.8. Equities must be split into one of the following four categories when determining the capital requirement for equity price risk:[5]

a) Global equity – covering equities listed in regulated markets in the countries which are members of the European Economic Area (EEA) or the Organisation for Economic Co-operation and Development (OECD);
b) SA equity – covering equities listed on any South African stock exchange;
c) Infrastructure assets equity – covering equities for Infrastructure assets as defined in FSI 1 (Framework for Financial Soundness of Insurers) and in Attachment 6 of this Standard; and
d) Other equity – covering all other equities not included in the global, SA and Infrastructure assets categories, including equities listed in emerging markets

[5] Dual-listed shares should be included in the category that represents the exchange on which the shares were bought.

(excluding South Africa), unlisted equity, hedge funds and other investments with equity risk exposure.

6.9. The capital requirement for equity price risk (Mkt_{eq_price}) must be calculated as:

$$Mkt_{eq\_price} = \sqrt{\sum_{r,c} CorrIndex_{r,c} \cdot Mkt_{eq\_price,r} \cdot Mkt_{eq\_price,c}}$$

Where:

$CorrIndex_{r,c}$	=	The entries of the correlation matrix $CorrIndex$ below
$Mkt_{eq\_price,r}$, $Mkt_{eq\_price,c}$	=	Capital requirements for the equity price risk in each category of equity r and c according to the rows and columns of the correlation matrix $CorrIndex$, as calculated under section 6.10 below

The correlation matrix $CorrIndex$ is defined as:

$CorrIndex$	Global	SA	Infrastructure assets	Other
Global	1			
SA	0.75	1		
Infrastructure assets	0.75	0.75	1	
Other	0.75	0.75	0.75	1

6.10. The capital requirement for equity price risk in relation to each category *i* ($Mkt_{eq\_price,i}$) must be calculated as:

$$Mkt_{eq\_price,i} = max(\Delta BOF | equity\ shock_i, 0)$$

Where:

$\Delta\ BOF$	=	The change in the value of basic own funds
$equity\ shock_i$	=	A prescribed fall in the value of equities in category *i*, as calculated under section 6.11 below

6.11. The prescribed fall in the value of equities in category *i* ($equity\ shock_{price\_i}$) under the $equity\ shock_i$ stress scenario must be calculated as:

$$equity\ shock_{price\_i} = base\ equity\ shock_i + symmetric\ adjustment_i$$

Where:

The $base\ equity\ shock_i$ parameters for each category *i* are set out in the table below:

	Global	SA	Infrastructure assets	Other
$base\ equity\ shock_i$	39%	43%	33%	49%

The calculation of the $symmetric\ adjustment_i$ for each category *i* is set out in section 6.12 below.

6.12. The symmetric adjustment factor for each category *i* except for Infrastructure assets ($symmetric\ adjustment_i$) must be calculated as:

$$symmetric\ adjustment_i = min\left[10\%\,, max\left(-10\%\,, 50\%\cdot\left(\frac{CI_i - AI_i}{AI_i} - b_i\right)\right)\right]$$

Where:

CI_i = Current index value for category *i*, where the index for category *i* is set out in the table below

AI_i = The three-year moving monthly average index (equal weightings) for category *i*, where the index for category *i* is set out in the table below

b_i = The parameters set out in the table below

Category *i*	Index for Category *i*	b_i
Global	MSCI World Developed Markets Price Index	8%
SA	JSE Allshare Equity Price Index	15%
Other	JSE Allshare Equity Price Index	15%

The symmetric adjustment factor for Infrastructure assets must be calculated as 77% of the symmetric adjustment factor for SA equity.

6.13. If the application of the $equity\ shock_i$ stress scenario results in a capital requirement for equity price risk that is less than zero based on the prescribed fall in equity values for category *i* (i.e. if $Mkt_{eq\_price,i} < 0$), then the stress should be replaced by an equal but opposite shock (i.e. an increase in equity values). In this case, all short equity positions must be taken into account, including short positions that do not satisfy the requirements to be classified as an eligible risk mitigation instrument set out in Attachment 1 of FSI 4 (Calculation of the SCR Using the Standardised Formula).

Equity volatility risk

6.14. Equity volatility risk relates to the sensitivities of the market value of assets and liabilities to changes in the expected future volatility of equities.

6.15. The implied volatility related to equity options will typically be derived from market-observed data and long-term assumptions derived by the insurer. Insurers that are

exposed to equity volatility risk should have in place an assumption setting process to combine market-observed data with long-term assumptions.

6.16. Where insurers are exposed to equity volatility risk, the capital requirement for equity volatility risk (Mkt_{eq_vol}) must be calculated as:

$$Mkt_{eq\_vol} = \Delta BOF | equity\ implied\ vol\ shock$$

Where:

$\Delta\ BOF$	=	The change in the value of basic own funds
$equity\ implied\ vol\ shock$	=	An increase in all equity implied volatility assumptions, determined in accordance with sections 6.17 and 6.18 below

6.17. The equity implied volatility assumptions after the application of the shock must be determined as follows:

a) All market-observed equity implied volatilities must be increased by 15 percentage points (i.e. an absolute stress of 15%) up until a term to maturity of three years;
b) Where an insurer uses realised equity volatilities in place of market implied volatilities in its assumption setting process, the realised equity volatilities for the past 12 months should be increased by 15 percentage points (volatilities from prior years should remain unchanged); and
c) All long-term equity implied volatility assumptions which are not determined directly from market data, as well as market-observed equity implied volatilities beyond term to maturity of three years, must be calculated as:

$$v_s(t) = v_b(t) + \frac{0.15}{\sqrt{t-2}}$$

Where:

$v_s(t)$	=	The post-shock equity implied volatility at term *t*
$v_b(t)$	=	The equity implied volatility at term *t*, prior to the application of the shock

6.18. An insurer should apply its internal volatility assumption setting methodologies to determine the full implied volatility term structure and surfaces as required to value its embedded derivatives after applying the above shocks.

7. Property Risk

7.1. Property risk arises when the market value of assets and liabilities are sensitive to changes in the level of market prices of property.

7.2. All assets and liabilities exposed to property risk should be included in the calculation of the property risk capital requirement, including:

a) Land, buildings and immovable-property rights; and
b) Property investment for the own use of the insurer.

7.3. For clarity, the following property-related investments should be excluded from the calculation of the property risk capital requirement:[6]

a) An investment in a company engaged in real estate management, real estate development or similar activities;
b) An investment in a company which borrowed funds external to the insurance group to leverage investments in properties; and
c) Direct or indirect participations in real estate companies that generate periodic income or which are otherwise intended for investment purposes.

7.4. Where insurers hold short positions in property (e.g. through holdings in listed property trusts), these should be netted off against long property positions only if the short position meets the requirements to be considered as an eligible risk mitigation instrument set out in Attachment 1 of FSI 4 (Calculation of the SCR using the standardised formula). All short positions in property that do not meet the requirements of an eligible risk mitigation instrument should be disregarded when calculating the property risk capital requirement (except where the circumstances described in section 7.6 below apply).

7.5. The capital requirement for property risk (Mkt_{prop}) must be calculated as:

$$Mkt_{prop} = max(\Delta BOF | property\ shock, 0)$$

Where:

$\Delta\ BOF$	=	The change in the value of basic own funds
$property\ shock$	=	An instantaneous decrease of 25% in property values

7.6. If the application of the $property\ shock$ stress scenario results in a capital requirement for property risk that is less than zero (i.e. if $Mkt_{prop} < 0$), then the stress should be replaced by an equal but opposite shock. In this case, all short positions in property must be taken into account, including short positions that do not satisfy the requirements of an eligible risk mitigation instrument set out in Attachment 1 of FSI 4 (Calculation of the SCR using the standardised formula).

7.7. In calculating the capital requirement for property risk, an insurer may assume that management actions can take place under the stress scenario, including changes to future bonus rates on policies with discretionary participation features. The type and extent of management actions that an insurer may assume in the stress must consider whether the stress is assumed to be insurer-specific or industry-wide. For property risk, insurers should assume that the stress results entirely from industry-wide events.

7.8. Where a causal relationship exists between property price changes and policyholder behaviour, the calculation of the property risk capital requirement may take into account changes to policyholder behaviour.

[6] These investments should instead be treated as equity and included in the calculation of the equity risk capital requirement.

8. Currency Risk

8.1. Currency risk arises when the market value of assets and liabilities are sensitive to changes in currency exchange rates. For the purpose of this Standard, all currencies other than South African Rand should be considered as “foreign currencies”.

8.2. All assets and liabilities that are exposed to movements in exchange rates should be included in the calculation of the currency risk capital requirement. This should include any investment in instruments denominated in a foreign currency. For clarity:

a) Unlisted equity and property located outside of South Africa should be included in the calculation of the currency risk capital requirement;
b) Dual-listed shares which are listed on any South African stock exchange and purchased on an offshore exchange should be included in the calculation of the currency risk capital requirement; and
c) All other dual-listed shares which are listed on any South African stock exchange may be excluded from the calculation of the currency risk capital requirement.

8.3. The capital requirement for currency risk (Mkt_{fx}) must be calculated as:

$$Mkt_{fx} = max(Mkt_{fx}^{up}, Mkt_{fx}^{down}, 0)$$

Where:

Mkt_{fx}^{up}	=	$max(\Delta\ BOF|fx_{upwardshock}, 0)$
Mkt_{fx}^{down}	=	$max(\Delta\ BOF|fx_{downwardshock}, 0)$
$\Delta\ BOF$	=	The change in the value of basic own funds
$fx_{upwardshock}$	=	An instantaneous rise of 50% in the value of all foreign currencies against the Rand (i.e. the Rand depreciates). The post-shock exchange rate under this scenario (E_{up}) should be calculated as: $E_{up} = E/(1 + 0.5)$, where E is the relevant exchange rate prior to the shock
$fx_{downwardshock}$	=	An instantaneous fall of 30% in the value of all foreign currencies against the Rand (i.e. the Rand appreciates). The post-shock exchange rate under this scenario (E_{down}) should be calculated as: $E_{down} = E/(1 - 0.3)$

8.4. In calculating the capital requirement for currency risk, an insurer may assume that management actions can take place under the stress scenarios, including changes to future bonus rates on policies with discretionary participation features. The type and extent of management actions that an insurer may assume in the stresses must consider the stress is assumed to be insurer-specific or industry-wide. For currency risk, insurers should assume that the stresses result entirely from industry-wide events.

8.5. Where a causal relationship exists between exchange rate movements and policyholder behaviour, the calculation of the currency risk capital requirement may take into account changes to policyholder behaviour.

9. Spread and Default Risk

9.1. Spread risk arises when the market value of assets and liabilities are sensitive to changes in credit spreads over the risk-free interest rate term structure. Default risk arises from potential losses due to credit default events, such as the default of the counterparty or issuer of a financial instrument held by an insurer.

9.2. The two credit risk components (i.e. spread risk and default risk) should cover mutually exclusive sets of assets. That is, assets that are included in the calculation of the spread risk capital requirement should be excluded from the default risk capital requirement, and assets that are included in the calculation of the default risk capital requirement should be excluded from the spread risk capital requirement.

9.3. The capital requirement for spread and default risk (Mkt_{sp+def}) must be calculated as:

$$Mkt_{sp+def} = Mkt_{sp} + Mkt_{def}$$

Where:

Mkt_{sp}	=	The capital requirement for spread risk, as calculated under section 9.11 below
Mkt_{def}	=	The capital requirement for default risk, as calculated under section 9.15 below

9.4. All assets and liabilities that are subject to movements in credit spreads must be included in the calculation of the spread risk capital requirement, including:

a) Government and corporate bonds;
b) Subordinated debt instruments;
c) All other debt and fixed-income securities, including hybrid debt instruments;
d) Asset-backed securities;
e) Structured credit products such as collateralised debt obligations;
f) Credit derivatives, including credit default swaps, total return swaps, and credit linked notes;
g) Participating interests;
h) Loans; and
i) Participation in investment pools.

9.5. The default risk capital requirement applies to three kinds of exposures – referred to as “type 1”, “type 2” and “type 3” exposures. Separate calculations are required for the different types of exposures in determining the default risk capital requirement.

9.6. Type 1 exposures cover exposures where the counterparty or issuer of the instrument may be rated, and consist of exposures in relation to:

a) Deposits with ceding institutions, if the number of independent counterparties does not exceed 15;
b) Capital, initial funds, letters of credit as well as any other commitments received by the insurer which have been called up but are unpaid, if the number of independent counterparties does not exceed 15;
c) Guarantees, letters of credit, letters of comfort which the insurer has provided, as well as any other commitments which the insurer has provided and which depend on the credit standing of a counterparty;
d) Recoverables from eligible risk mitigation instruments; and

e) Assets not captured elsewhere in the calculation of the market risk capital requirement.

9.7. Type 2 exposures cover exposures where the counterparty or issuer of the instrument is likely to be unrated, and consist of exposures in relation to:

a) Receivables from intermediaries;
b) Policyholder debtors, including mortgage loans;
c) Deposits with ceding institutions, if the number of independent counterparties exceeds 15; and
d) Capital, initial funds, letters of credit as well as any other commitments received by the insurer which have been called up but are unpaid, if the number of independent counterparties exceeds 15.

9.8. Type 3 exposures are exclusively for cash held at banking institutions.

Assigning credit ratings for spread and default risk

9.9. The calculation of the capital requirements for spread risk and default risk relies on the assignment of credit ratings to instruments. The basis on which credit ratings are assigned in this Standard (and throughout the Financial Soundness Standards for Insurers) is through credit quality steps, which reflect long term historic probabilities of default, rather than external credit ratings. The use of credit quality steps allows for different external and internal ratings to be used in a consistent manner.

9.10. Where an insurer relies on external ratings to assign an instrument to the appropriate credit quality step and there is more than one external rating available, the historic default rates associated with each rating category must be assessed in order to assign the instrument to the most appropriate credit quality step. The credit quality step that is assigned should reflect the credit quality of the instrument and not the entity issuing the instrument.

Spread risk

9.11. The capital requirement for spread risk (Mkt_{sp}) must be calculated as:

$$Mkt_{sp} = Mkt_{sp}^{ib} + Mkt_{sp}^{cd}$$

Where:

Mkt_{sp}^{ib}	=	The capital requirement for spread risk on interest bearing instruments, as calculated under section 9.12 below
Mkt_{sp}^{cd}	=	The capital requirement for spread risk on credit derivatives, as calculated under section 9.14 below

9.12. The capital requirement for spread risk on interest bearing instruments (Mkt_{sp}^{ib}) must be calculated as:

$$Mkt_{sp}^{ib} = max(\Delta\ BOF \mid spread\ shock\ ib, 0)$$

Where:

$\Delta\ BOF$	=	The change in the value of basic own funds
$spread\ shock\ ib$	=	An instantaneous decrease in the value of interest bearing instruments due to the widening of credit

spreads, calculated as:

$$\sum_{i,d}\left(MV_{i,d}\cdot factor_{i,d}\cdot LGD\_adj\right)$$

Where:

$MV_{i,d}$ is the market value of each interest bearing instrument with credit quality step *i* and duration *d*;

$factor_{i,d}$ is the spread risk factor, as set out in Parts A and B of Attachment 4, applied to each interest bearing instrument with credit quality step *i* and duration *d*; and

LGD_adj is an adjustment factor to reflect cases where the loss-given-default for the interest bearing instrument is higher or lower than senior unsecured debt. If the rating assigned to the interest bearing instrument is based on an entity rating or the rating of a senior unsecured instrument, the adjustment factor must be set according to the values set out in Part D of Attachment 4. If an instrument rating is used to assign the credit quality step for the interest bearing instrument, the adjustment factor should be set to 1.

9.13. Insurers may choose to apply a simplified method to calculate the capital requirement for spread risk on interest bearing instruments, provided that:

a) The simplification is proportionate to the nature, scale and complexity of the risk; and
b) The standard calculation of the spread risk capital requirement for interest bearing instruments is an undue burden for the insurer.

Part C of Attachment 4 sets out the methodology for calculating the capital requirement for spread risk on interest bearing instruments under the simplified method.

9.14. The capital requirement for spread risk on credit derivatives (Mkt_{sp}^{cd}) must be calculated as:

$$Mkt_{sp}^{cd} = max(Mkt_{sp\_upward}^{cd}, Mkt_{sp\_downward}^{cd})$$

Where:

$Mkt_{sp\_upward}^{cd}$	=	$max(\Delta\ BOF|up\ CD\ spread\ shock, 0)$
$Mkt_{sp\_downward}^{cd}$	=	$max(\Delta\ BOF|down\ CD\ spread\ shock, 0)$
$\Delta\ BOF$	=	The change in the value of basic own funds
$up\ CD\ spread\ shock$	=	An instantaneous widening of credit spreads, applied as an absolute addition (in basis points) to the credit spread on the reference instrument of the credit

derivatives. Part E of Attachment 4 sets out the magnitude of the absolute increase in credit spreads that must be applied based on the credit quality step of the reference instrument of the credit derivative.

$down\ CD\ spread\ shock$ = An instantaneous narrowing of credit spreads, applied as a relative decrease to the credit spread on the reference instrument of the credit derivatives. Part E of Attachment 4 sets out the magnitude of the relative decrease in credit spreads that must be applied based on the credit quality step of the reference instrument of the credit derivative.

Default risk

9.15. The capital requirement for default risk (Mkt_{def}) must be calculated as:

$$Mkt_{def} = \sqrt{\sum_{r,c} CorrDef_{r,c} \cdot Mkt_{def,type\_r} \cdot Mkt_{def,type\_c}} + Mkt_{def,type\_3}$$

Where:

$CorrDef_{r,c}$ = The entries of the correlation matrix $CorrDef$ below

$Mkt_{def,type\_r}$, $Mkt_{def,type\_c}$ = Capital requirements for default risk in relation to each type of exposure r and c according to the rows and columns of the correlation matrix $CorrDef$, as calculated under sections 9.17 and 9.26 below

$Mkt_{def,type\_3}$ = Capital requirements for type 3 default risk as calculated under section 9.27 below

The correlation matrix $CorrDef$ is defined as:

$CorrDef$	Type 1	Type 2
Type 1	1	
Type 2	0.75	1

9.16. The exposures may be net exposures for the purposes of calculating the capital requirement for default risk only if the offsetting items would be available in the event of default.

Default risk for type 1 exposures

9.17. The capital requirement for default risk in relation to type 1 exposures ($Mkt_{def,type\_1}$) must be calculated as:

$$Mkt_{def,type\_1} = min\left(\sum_i LGD_i, 3 \cdot \sqrt{V}\right)$$

Where:

V = The variance of the loss distribution for type 1 exposures, as calculated under section 9.18 below

LGD_i = The loss-given-default of type 1 exposures to each independent counterparty/issuer *i*, as calculated under section 9.21 below

9.18. The variance of the loss distribution for type 1 exposures (V) must be calculated as:

$$V = \sum_j \sum_k u_{j,k} \cdot y_j \cdot y_k + \sum_j v_j \cdot z_j$$

Where:

j, k = The index for credit quality steps

y_j = $\sum_i LGD_i$, where the index *i* denotes each independent counterparty/issuer of type 1 exposures (with credit quality step *j*) held by the insurer

z_j = $\sum_i (LGD_i)^2$

$u_{j,k}$ = $\frac{p_j \cdot (1 - p_j) \cdot p_k \cdot (1 - p_k)}{(1 + \gamma) \cdot (p_j + p_k) - p_j \cdot p_k}$

v_j = $\frac{(1 + 2 \cdot \gamma) \cdot p_j \cdot (1 - p_j)}{2 + 2 \cdot \gamma - p_j}$

γ = 0.25

p_j = The probability of default of the counterparty or issuer of the type 1 exposure for credit quality step *j*, as set out in the table below

Credit Quality Step (*j*)	p_j
1	0.01%
2	0.02%
3	0.03%
4	0.06%
5	0.09%
6	0.11%
7	0.16%
8	0.22%
9	0.39%
10	0.54%
11	0.81%

Credit Quality Step (*j*)	p_j
12	1.39%
13	2.50%
14	5.37%
15	8.72%
16	20.00%
17	25.00%
18	30.00%

9.19. Where an insurer has more than one counterparty/issuer which is not independent (e.g. counterparties belonging to the same corporate group), a probability of default to the whole set of dependent counterparties should be assigned. This overall probability of default should be calculated as the average probability of default of the counterparties/issuers, weighted by the corresponding loss-given-default of the exposures.

9.20. Type 1 exposures to unrated banks should be assigned a credit quality step at least one step lower than the lowest rated South African bank.

9.21. The loss-given-default parameter for each type 1 exposure to independent counterparty/issuer *i* (LGD_i) should be calculated as the loss the insurer would incur if the counterparty/issuer defaulted. To account for the potential recovery of the counterparty/issuer, the loss-given-default parameters may be amended by a factor of $(1 - RR)$, where RR denotes the recovery rate of the counterparty/issuer.

9.22. Insurers should apply the standard loss-given-default ratios (LGD_{ratio}) in the following table when calculating the LGD_i parameters:

Nature of type 1 exposure	LGD_{ratio}
Fully cash covered with regular marking to market of the collateral	5%
Significantly over collateralised	18%
Fully collateralised	35%
Partially collateralised	42.5%
Unsecured and ranked *pari passu* with other unsecured claims	45%
Less than 50% of assets of the counterparty/issuer are pledged as collateral for other creditors	72%
More than 50% of assets of the counterparty/issuer are pledged as collateral for other creditors	86%

Nature of type 1 exposure	LGD_{ratio}
Equity, junior debt, mezzanine debt or preference shares exposures, and structurally subordinated exposures	100%

9.23. For recoverables from eligible reinsurance contracts, the loss-given-default parameter for each independent counterparty *i* (LGD_i) should be calculated as:

$$LGD_i = max(LGD_{ratio} \cdot (Recoverables_i - Collateral_i), 0)$$

Where:

LGD_{ratio}	=	The percentage loss due to default of the counterparty, based on the structure of the eligible reinsurance arrangement (e.g. taking into account collateralisation, ring-fencing of assets or other arrangements) and adjusted for the risk of impairment on the best estimate recoverable due to counterparty default
$Recoverables_i$	=	The best estimate recoverables from the eligible reinsurance contract from each counterparty *i*, including any other debtors arising out of the reinsurance arrangement[7]
$Collateral_i$	=	The value of collateral associated with the eligible reinsurance contract from counterparty *i*, adjusted for market risk shocks that should apply to the assets used as collateral

9.24. For recoverables from derivatives, the loss-given-default parameter for each independent counterparty *i* (LGD_i) should be calculated as:

$$LGD_i = max(LGD_{ratio} \cdot (MarketValue_i - Collateral_i), 0)$$

Where:

LGD_{ratio}	=	The percentage loss due to default of the counterparty/issuer, based on the structure of the derivative and adjusted for the risk of impairment on the best estimate recoverable due to counterparty default[8]
$MarketValue_i$	=	The market value of the derivative to counterparty *i*
$Collateral_i$	=	The value of collateral in relation to the derivative to counterparty *i*, adjusted for market risk shocks that should apply to the assets used as collateral

[7] The best estimate of recoverables may be netted with liabilities to the same legal entity to the extent the recoverables could be set off in case of the default of the legal entity.

[8] For exchange traded derivatives, the loss-given-default should be calculated based on the collateralisation requirements of the relevant exchange and instrument.

9.25. Insurers may choose to group type 1 exposures from a range of counterparties/issuers. Where an insurer applies this approach to calculate the capital requirement for default risk in relation to type 1 exposures, the lowest credit quality step and the highest loss-given-default measure applicable to the individual exposure in the group must be applied to the total exposure of the group.

Default risk for type 2 exposures

9.26. The capital requirement for default risk in relation to type 2 exposures ($Mkt_{def,type\_2}$) must be calculated as:

$$Mkt_{def,type\_2} = \Delta BOF | \ type\ 2\ default\ shock$$

Where:

$\Delta\ BOF$	=	The change in the value of basic own funds
$type\ 2\ default\ shock$	=	An instantaneous fall in the value of type 2 exposures of the amount: $15\% \cdot E + 90\% \cdot E_{past\_due}$ Where: E_{past_due} is the sum of the values of receivables from intermediaries which are past due for more than three months; and E is the sum of the values for all other type 2 exposures.

Default risk for type 3 exposures

9.27. The capital requirement for default risk on cash exposures ($Mkt_{def,type\_3}$) must be calculated as:

$$Mkt_{def,type\_3} = \Delta BOF | \ type\ 3\ default\ shock$$

Where:

$\Delta\ BOF$	=	The change in the value of basic own funds
$type\ 3\ default\ shock$	=	An instantaneous decrease in the value of cash due to the default of the banking institution, calculated as: $\sum_i (Cash_i \cdot factor_i)$ Where: $Cash_i$ is the value of cash at each banking institution with credit quality step *i*; and $factor_i$ is the default risk factor applied to cash at each banking institution with credit quality step

i, as set out in section 9.28 below.

9.28. For cash at each banking institution with credit quality step *i* use the table below for $factor_i$:

Credit Quality Step *i*	$factor_i$
1	0.10%
2	0.19%
3	0.27%
4	0.49%
5	0.68%
6	0.80%
7	1.08%
8	1.37%
9	2.06%
10	2.56%
11	3.27%
12	4.35%
13	5.68%
14	7.96%
15	10.10%
16	14.47%
17	15.38%
18	15.86%

9.29. Type 3 exposures to unrated banks should be assigned a credit quality step at least one step lower than the lowest rated South African bank.

10. Concentration Risk

10.1. Concentration risk refers to the risk of potential losses on investments over and above the systematic risks arising from the portfolio of investments when the portfolio of investments is not sufficiently diversified.

10.2. For the purposes of this Standard, the scope of concentration risk is restricted to the risk related to the accumulation of exposures with the same counterparty, or group of related counterparties (i.e. exposures related to the same corporate group).[9] The scope does not include other types of concentrations such as geographic or industry concentrations.

[9] The cash and short-term deposits held at South African banks are treated as a separate counterparty to other assets with the same counterparty.

10.3. All assets other than the following should be assessed for concentration risk:

a) Assets held in respect of life insurance obligations where the investment risk is borne by the policyholders;
b) Exposures of an insurer to a counterparty which belongs to the same corporate group, provided that the following conditions are met:
    i. The counterparty is an insurer or a financial holding company, asset management company or ancillary services company subject to appropriate prudential requirements;
    ii. The counterparty is included in the same consolidation as the insurer on a full basis in South Africa or in a jurisdiction that the Prudential Authority has given equivalence status to;
    iii. There is no current or foreseen material practical or legal impediment to the prompt transfer of own funds or repayment of liabilities from the counterparty to the insurer; and
    iv. The counterparty is subject to the same risk evaluation, measurement and control procedures as the insurer.
c) Certain exposures to governments, international organisations, banks and first-party insurance structures based on conditions set out in Attachment 5 of this Standard.

10.4. The calculation of the concentration risk capital requirement (Mkt_{conc}) must be performed in three steps:

a) Calculation of excess exposures per counterparty (step 1);
b) Determination of concentration risk capital requirements per counterparty (step 2); and
c) Aggregation of concentration risk capital requirements across all counterparties (step 3).

10.5. The excess exposures per counterparty *i* (XS_i) under step 1 must be calculated as:

$$XS_i = max\left(\frac{E_i}{Assets_{xl}} - CT_i, 0\right)$$

Where:

E_i	=	Total exposure-at-default to counterparty *i*, as calculated under section 10.6
$Assets_{xl}$	=	Total assets considered in the scope of the concentration risk module (including government bonds) with no allowance for loss-given-default
CT_i	=	The concentration threshold to counterparty *i*, which depends on the credit quality step of the counterparty *i*, as set out in the table below

Credit Quality Step of counterparty *i*	Concentration Threshold (CT_i)
1 to 9	10% for cash and short-term deposits held at South African banks 3% for all other exposures
10 to 18	5% for cash and short-term deposits held at South African banks 1.5% for all other exposures

10.6. Where an insurer has more than one exposure to counterparty *i*, E_i should be calculated as the aggregate of the exposures-at-default to the counterparty. For debt instruments, cash deposits and eligible risk mitigation instruments, the calculation of E_i should be the product of the exposure multiplied by the loss-given-default as given in section 9.22.

10.7. Where an insurer has more than one exposure to a counterparty, the credit quality step that should be assigned to the total exposure should be calculated as the rounded average of the credit quality steps of the individual exposures to that counterparty, weighted by the exposure-at-default.

10.8. The calculation of the concentration risk capital requirement per counterparty *i* ($Conc_i$) under step 2 must be calculated as:

$$Conc_i = \Delta BOF | concentration\ shock_i$$

Where:

$\Delta\ BOF$ = The change in the value of basic own funds

$concentration\ shock_i$ = An instantaneous decrease in the value of E_i, where the decrease in value must be calculated as:

$$XS_i \cdot\ g_i\ \cdot\ Assets_{xl}$$

g_i = A factor dependent on the credit quality step of the counterparty *i*, as set out in the table below

Credit Quality Step of counterparty *i*	g_i
1 to 6	0.12
7	0.19
8	0.27
9	0.36
10	0.45
11	0.53
12	0.56

Credit Quality Step of counterparty *i*	g_i
13	0.58
14	0.61
15	0.63
16	0.66
17	0.68
18	0.71
Unrated	0.73

10.9. For unrated counterparties that are insurers regulated by the Prudential Authority that have sufficient eligible own funds to meet their MCR, g_i must be set according to the SCR cover ratio of the insurance counterparty, based on the table below:

SCR cover ratio	g_i
196%	0.12
175%	0.21
122%	0.27
100%	0.645
95%	0.73

Where the SCR cover ratio of the counterparty falls between the ratios specified above, the g_i factor should be linearly interpolated from the values in the table. Where the SCR cover ratio exceeds 196%, the g_i factor should be set to 0.12. Where the SCR cover ratio is less than 95% or eligible own funds are insufficient to meet the MCR, the g_i factor should be set to 0.73.

10.10. The concentration risk capital requirements per counterparty must then be aggregated (step 3) using the following formula to determine the overall capital requirement for concentration risk (Mkt_{conc}):

$$Mkt_{conc} = \sqrt{\sum_i \left(Conc_i^2\right)}$$

10.11. For certain assets, the standard concentration risk requirements set out in this section of the Standard do not apply, and an alternative treatment is required. These assets include covered bonds, properties, government securities, deposits with South African banks, collective investment vehicles and first-party insurance structures. The treatment of these assets is outlined in Attachment 5 of this Standard.

10.12. In calculating the capital requirement for concentration risk, an insurer may assume that management actions can take place to reduce exposure to concentration risk. The type and extent of management actions that an insurer may assume must consider whether the cause of the stress is assumed to be insurer-specific or industry-wide. For concentration risk, insurers should assume that concentration risk

is entirely due to insurer-specific factors, except for concentrations to South African banks, where they may assume the cause to be industry-wide.

11. Illiquidity Premium Risk

11.1. Illiquidity premium risk refers to the risk of a change in basic own funds resulting from a decrease in the illiquidity premium used in the valuation of technical provisions.[10]

11.2. The capital requirement for illiquidity premium risk (Mkt_{ip}) must be calculated as:

$$Mkt_{ip} = max(\Delta BOF | illiquidity\ premium\ shock, 0)$$

Where:

$\Delta\ BOF$	=	The change in the value of basic own funds
$illiquidity\ premium\ shock$	=	A 65% fall in the value of the illiquidity premium used in the valuation of technical provisions

[10] The effect of an increase of the illiquidity premium is captured in the calculation of the spread risk capital requirement as set out in section 9 of this Standard.

Attachment 1: Treatment of Specific Instruments

This Attachment provides further details on the treatment of specific instruments for the purposes of calculating the market risk capital requirement.

A. Treatment of collective investment vehicles

1. The determination of the market risk capital for collective investment vehicles must consider the economic substance of the vehicle's assets. Wherever possible, insurers should assess the capital requirements for collective investment vehicles by applying a "look-through" approach. The look-through approach requires insurers to assess the risks of the assets underlying the investment vehicle, and apply capital requirements for the relevant components of market risk to the underlying assets.

2. Insurers should apply the look-through approach to both passively and actively managed funds. The look-through approach should also be applied to other forms of indirect exposures which may be held by a collective investment vehicle, such as investments in entities functioning primarily as holding entities for underlying assets.[11]

3. Where a number of iterations of the look-through approach is required (e.g. where an investment fund is invested in other investment funds), the number of iterations should be sufficient to ensure that all material market risk associated with the underlying assets is captured.

4. Where a collective investment vehicle is not sufficiently transparent to allow for the implementation of a look-through approach, insurers should use the investment mandate of the fund to assess the market risk capital requirement ("mandate-based approach"). Under the mandate-based approach, insurers should assume that the fund invests in accordance with its mandate in such a manner to produce the maximum overall capital requirement. That is, if a fund's mandate allows the fund to allocate funds to asset classes within a certain range, insurers should assume that the fund invests in an asset allocation that produces the maximum overall capital requirement.

5. As a third option to the look-through and mandate-based approaches, insurers may treat the collective investment vehicle as "other equity" (as defined in section 6.8 of this Standard) and apply the calculations associated with the equity risk capital requirement.

B. Other assets and instruments

1. Certain debt or capital instruments that share characteristics of both interest rate securities and equity, such as preference shares, should be considered as the composite of these components and each component should be stressed under the relevant market risk module. Where this is not possible and a single market risk is dominant, then the instrument should be considered under that market risk module, otherwise the instrument should be treated as "other equity" (as defined in section 6.8 of this Standard).

2. Commodities should be considered as "other equity" for the purpose of this Standard.

[11] For clarity, a look-through approach is not required for investments in listed equities, tradable securities or other financial instruments based on repackaged loans.

3. Direct property or equity investments should not be considered to be interest rate sensitive for the purpose of this Standard.

4. Assets and liabilities that arise from repurchase agreements should be treated in the following manner:

    a) An insurer that agrees to repurchase collateral at a future date should take into account any risks associated with that collateral in their market risk capital requirement (e.g. interest rate risk, spread risk and default risk), even though the insurer does not hold the collateral; and
    b) An insurer that lends collateral as part of a repurchase agreement should take account of any concentration risk, interest rate risk, spread and default risk associated with the items exchanged for the collateral, and the counterparty default risk of the repo-seller.

5. If the management of an insurer's assets representing employees' benefits liabilities has been outsourced, and the insurer is liable for any loss of value of these assets, then the outsourcing arrangement should be looked-through for the calculation of the market risk capital requirement. The effect of all market risk stress scenarios should be reflected in the post-stress value of employees' benefits.

6. The equity exposure of mutual funds should be allocated on a look-through basis as specified for collective investments vehicles above.

7. AHIs should be assessed on a look-through basis by considering the underlying assets and liabilities of the AHI for each of the shocks discussed in this Standard as if the assets and liabilities were on the balance sheet of the insurer.

8. Any investments that may be subject to additional funding calls in the event of losses being incurred by the insurer should be taken into account in the calculation of the market risk capital requirement.

Attachment 2: Adjustment for Potential Double-Counting of Loss-Absorbing Capacity of Technical Provisions

This Attachment sets out the methodology to calculate the adjustment factor to take into account the potential double-counting of loss-absorbing capacity in technical provisions.

1. Insurers must take into account the potential double-counting of loss-absorbing capacity assumed in technical provisions when calculating their market risk capital requirement, by incorporating the adjustment factor ($AdjSES$) in the aggregation formula set out in section 4.7 of this Standard. The calculation of the adjustment factor must take into account assumptions relating to the losses absorbed by technical provisions at the product group or fund level, under a single equivalent stress described below.

2. The adjustment factor ($AdjSES$) must be calculated as:

   $$AdjSES = \sum_i AdjSES_i$$

   Where:

   i = The index to denote the product group/fund *i*. The summation *i* applies up to the value *n*, where *n* represents the number of product groups/funds where there may be potential double-counting of loss-absorbing capacity.[12]

   $AdjSES_i$ = The adjustment factor for product group/fund *i*, calculated as:

   $$max\left(0, -(BELbase_i - BEL\_min_i - SES\_delta\_BEL_i)\right)$$

   The difference between $BELbase_i$ and BEL_min_i represents the maximum loss-absorbing capacity of technical provisions for each product group/fund where there is potential for double-counting of loss-absorbing capacity.

   $BELbase_i$ = The best estimate liability for product group/fund *i* ("base case liabilities")

   BEL_min_i = The best estimate liability where the assets backing the base case liabilities are set equal to 10% of that used in $BELbase_i$, for product group/fund *i*. For simplicity, insurers may apply the same risk-free curve to value $BELbase_i$ when calculating BEL_min_i. Alternatively, the yield curves (nominal and real) used to value BEL_min_i may be shocked by the product of $RedFact\_L1_{r,i}$ and $RedFact\_L2_{r,i}$, where each of these factors is defined in section 3 below.

[12] For the purposes of this calculation, product groups/funds where there may be potential double-counting of loss-absorbing capacity are limited to all policies with discretionary participation features.

$SES\_delta\_BEL_i$ = The single equivalent stress to the best estimate liability for product group/fund *i*, as calculated under section 3 below. The single equivalent stress is an estimated value of the change in the best estimate liability where all market risk stresses (other than volatility stresses) occur concurrently, but to a lesser extent, such that the total effect would be consistent with the aggregated result of the various (individually shocked) market risk stresses (taking into account diversification between market risk components).

3. The single equivalent stress to the best estimate liability for product group/fund *i* ($SES\_delta\_BEL_i$) must be calculated as:

$$SES\_delta\_BEL_i = \sum_r Delta\_BEL_{r,i} \cdot RedFact\_L1_{r,i} \cdot RedFact\_L2_{r,i}$$

Where:

r = The index to denote the market risk components and sub-components set out in the table below

$Delta\_BEL_{r,i}$ = The change in the best estimate liability from applying the shocks related to the market risk (sub-)component *r* for product group/fund *i*, that form part of the change in basic own funds when calculating the relevant market risk (sub-) component capital requirement for product group/fund *i*. If the capital requirement for the relevant market risk (sub-)component is zero for the product group/fund *i*, this parameter should also be set to zero.

$RedFact\_L1_{r,i}$ = Reduction factors for market risk (sub-)component *r* and product group/fund *i* in respect of the highest level of aggregation in the market risk aggregation formula, as calculated under sections 10 to 13 below

$RedFact\_L2_{r,i}$ = Reduction factors for market risk (sub-)component *r* and product group/fund *i* in respect of the lower levels of aggregation in the market risk aggregation formula, as calculated under sections 4 to 9 below

The market risk (sub-)components are defined according to the following table:

r	**Market risk component or sub-component**	**Risk level**
1	nominal interest upward shock	market risk sub-component
2	nominal interest downward shock	market risk sub-component

r	**Market risk component or sub-component**	**Risk level**
3	real interest upward shock	market risk sub-component
4	real interest downward shock	market risk sub-component
5	global equity shock	market risk sub-component
6	South African equity shock	market risk sub-component
7	other equity shock	market risk sub-component
8	property shock	market risk component
9	spread shock: bonds	market risk sub-component
10	spread shock: structured credit products	market risk sub-component
11	spread shock: credit derivatives	market risk sub-component
12	default shock	market risk sub-component
13	currency upward shock	market risk sub-component
14	currency downward shock	market risk sub-component
15	concentration risk shock	market risk component

4. The reduction factors ($RedFact\_L1_{r,i}$ and $RedFact\_L2_{r,i}$) are calibrated according to the change in assets resulting from the various market risk shocks. The lower level reduction factors ($RedFact\_L2_{r,i}$) should be calculated as set out in the following table:

r	**Market risk (sub-)component**	**Calculation of $RedFact\_L2_{r,i}$**
1	nominal interest upward	refer to sections 7 to 9 below
2	nominal interest downward	refer to sections 7 to 9 below
3	real interest upward	refer to sections 7 to 9 below
4	real interest downward	refer to sections 7 to 9 below
5	global equity shock	refer to sections 5 and 6 below
6	South African equity shock	refer to sections 5 and 6 below
7	other equity shock	refer to sections 5 and 6 below
8	property shock	= 1
9	spread shock: bonds	= 1 if $Delta\_A_{9,i} < Delta\_BEL_{9,i}$ = 0 otherwise
10	spread shock: structured credit	= 1 if $Delta\_A_{10,i} < Delta\_BEL_{10,i}$

r	**Market risk (sub-)component**	**Calculation of $RedFact\_L2_{r,i}$**
	products	= 0 otherwise
11	spread shock: credit derivatives	= 1 if $Delta\_A_{11,i} < Delta\_BEL_{11,i}$ = 0 otherwise
12	default shock	= 1 if $Delta\_A_{12,i} < Delta\_BEL_{12,i}$ = 0 otherwise
13	currency upward shock	=1 if the currency upward shock is the worst position that applies to the total balance sheet = 0 otherwise
14	currency downward shock	=1 if the currency downward shock is the worst position that applies to the total balance sheet = 0 otherwise
15	concentration risk shock	= 1

Where:

$Delta\_A_{r,i}$ = The change in assets from applying the shocks related to the market risk (sub-)component *r* for product group/fund *i*, that form part of the change in basic own funds when calculating the relevant market risk (sub-)component capital requirement for product group/fund *i*. If the capital requirement for the relevant market risk (sub-)component is zero for the product group/fund *i*, this parameter should also be set to zero.

5. In order to calculate the lower level reduction factors for the equity risk sub-components, the aggregated absolute change in asset values for all equity sub-risks ($Agg\_Abs\_Delta\_Eq_i$) should first be calculated for each product group/fund *i* as follows:

$$Agg\_Abs\_Delta\_Eq_i = \sqrt{\sum_{r,c \in \{5,6,7\}} CorrIndex_{r,c} \cdot ABS(Delta\_A_{r,i}) \cdot ABS(Delta\_A_{c,i})}$$

Where:

$CorrIndex$ = The correlation matrix used to aggregate global, South African and other equity risk as defined in section 6.9 of this Standard

r, c = The index for the equity risk sub-components set out in the table in section 4 above

6. The lower level reduction factors for the equity risk sub-component *r* must then be calculated as:

$$RedFact\_L2_{r,i} = \frac{\sqrt{\sum_{c \in \{5,6,7\}} CorrIndex_{c,r} \cdot ABS(Delta\_A_{c,i})}}{Agg\_Abs\_Delta\_Eq_i}$$

7. In order to calculate the lower level reduction factors for the interest rate risk sub-components, the aggregated absolute change in asset values for all interest rate risk sub-components ($Agg\_Abs\_Delta\_Int_i$) should first be calculated for each product group/fund *i* as follows:

1. $$Agg\_Abs\_Delta\_Int_i = \sqrt{\sum_{r,c \in \{1,2,3,4\}} CorrIntA_{r,c} \cdot ABS(Delta\_A_{r,i}) \cdot ABS(Delta\_A_{c,i}) \cdot I_{r,i} \cdot I_{c,i}}$$

   Where:

   $CorrIntA$ = The expanded correlation matrix used to aggregate nominal and real interest rate risk sub-components as defined in section 8 below

   r, c = The index for the interest rate risk sub-components set out in the table in section 4 above

   $I_{r,i}$ = Parameters as defined in the table below

r	**Interest rate risk sub-component**	**Calculation of $I_{r,i}$**
1	nominal interest upward shock	= 1 if the nominal interest rate upward shock is the worst position that applies to the total balance sheet = 0 otherwise
2	nominal interest downward shock	= 1 if the nominal interest rate downward shock is the worst position that applies to the total balance sheet = 0 otherwise
3	real interest upward shock	= 1 if the real interest rate upward shock is the worst position that applies to the total balance sheet = 0 otherwise
4	real interest downward shock	= 1 if the real interest rate downward shock is the worst position that applies to the total balance sheet = 0 otherwise

8. The expanded correlation matrix $CorrIntA$ is defined as:

$CorrIntA$	**1**	**2**	**3**	**4**
1 – nominal interest up	1			
2 – nominal interest down	-1	1		
3 – real interest up	0.25	0.25	1	

4 – real interest down	0.25	0.25	-1	1

9. The lower level reduction factors for the interest rate risk sub-component *r* must then be calculated as:

$$RedFact\_L2_{r,i} = \frac{\sqrt{\sum_{c \in \{1,2,3,4\}} CorrIntA_{c,r} \cdot ABS\left(Delta\_A_{c,i}\right) \cdot I_{c,i}}}{Agg\_Abs\_Delta\_Int_i}$$

10. In order to calculate the higher level reduction factors ($RedFact\_L1_{r,i}$), a set of "high level market risks" (*k*) need to be defined. The absolute change in assets for each high level market risk *k* and product group *i* ($Abs\_Delta\_A_{k,i}$) should then be calculated. The following table sets out the high level market risks (*k*) and the calculation of $Abs\_Delta\_A_{k,i}$ for each high level market risk:

k	**High Level Market Risks**	**Calculation of $Abs\_Delta\_A_{k,i}$**
1	interest	= $Agg\_Abs\_Delta\_Int_i$, as calculated in section 7 above
2	equity	= $Agg\_Abs\_Delta\_Eq_i$, as calculated in section 5 above
3	property	= $ABS\left(Delta\_A_{8,i}\right)$
4	spread and default	= $\sum_{r \in \{9,10,11,12\}} RedFact\_L2_{r,i} \cdot ABS\left(Delta\_A_{r,i}\right)$
5	currency	= 0, if the direction of currency stress that applies for product group *i* (as determined by the worst loss in basic own funds from the currency stress) differs from that which applies to the total balance sheet = $ABS\left(Delta\_A_{r,i}\right)$, if *r* is the currency stress that results in the worst loss in basic own funds
6	concentration	= $ABS\left(Delta\_A_{15,i}\right)$

11. The aggregated value of the absolute changes in asset values for the high level market risks for product group/fund *i* ($Agg\_Abs\_Delta\_A_i$) must then be calculated as:

$$Agg\_Abs\_Delta\_A_i = \sqrt{\sum_{j,k \in \{1,2,3,4,5,6\}} CorrMkt_{j,k} \cdot Abs\_Delta\_A_{j,i} \cdot Abs\_Delta\_A_{k,i}}$$

Where:

$CorrMkt$ = The correlation matrix used to aggregate the high level market risk components as defined in section 4.8 of this Standard

j, k = The index for the high level market risks set out in the table in section 10 above

12. The interim high level reduction factors ($RedFact_{k,i}$) for each high level market risk *k* and product group/fund *i* must then be calculated as:

$$RedFact_{k,i} = \frac{\sqrt{\sum_{j \in \{1,2,3,4,5,6\}} CorrMkt_{j,k} \cdot Abs\_Delta\_A_{j,i}}}{Agg\_Abs\_Delta\_A_i}$$

13. The final high level reduction factors for each market risk (sub-)component and product group/fund *i* ($RedFact\_L1_{r,i}$) should then be derived using the mapping in the table below:

r	**Market risk (sub-)component**	***k***	**Mapping**
1	nominal interest upward	1	$RedFact\_L1_{1,i} = RedFact_{1,i}$
2	nominal interest downward	1	$RedFact\_L1_{2,i} = RedFact_{1,i}$
3	real interest upward	1	$RedFact\_L1_{3,i} = RedFact_{1,i}$
4	real interest downward	1	$RedFact\_L1_{4,i} = RedFact_{1,i}$
5	global equity shock	2	$RedFact\_L1_{5,i} = RedFact_{2,i}$
6	South African equity shock	2	$RedFact\_L1_{6,i} = RedFact_{2,i}$
7	other equity shock	2	$RedFact\_L1_{7,i} = RedFact_{2,i}$
8	property shock	3	$RedFact\_L1_{8,i} = RedFact_{3,i}$
9	spread shock: bonds	4	$RedFact\_L1_{9,i} = RedFact_{4,i}$
10	spread shock: structured credit products	4	$RedFact\_L1_{10,i} = RedFact_{4,i}$
11	spread shock: credit derivatives	4	$RedFact\_L1_{11,i} = RedFact_{4,i}$
12	default shock	4	$RedFact\_L1_{12,i} = RedFact_{4,i}$
13	currency upward shock	5	$RedFact\_L1_{13,i} = RedFact_{5,i}$
14	currency downward shock	5	$RedFact\_L1_{14,i} = RedFact_{5,i}$
15	concentration risk shock	6	$RedFact\_L1_{15,i} = RedFact_{6,i}$

Attachment 3: Shocks to Apply for Interest Rate Curve Risk

This Attachment sets out the upward and downward interest rate shocks that must be used in calculating the capital requirement for interest rate curve risk.

A. Nominal interest rate curve shocks

1. The upward and downwards shocks that must be applied to the nominal spot interest rate term structure under section 5.7 of the Standard are set out in the table below:

Maturity (t) (in years)	Upward shock ($s_{nom}^{up}(t)$)	Downward shock ($s_{nom}^{down}(t)$)
0.25	78.55%	–48.06%
0.5	78.55%	–48.06%
1	93.08%	–52.87%
2	82.38%	–50.73%
3	64.68%	–44.65%
4	51.24%	–38.86%
5	42.12%	–34.37%
6	36.49%	–31.37%
7	33.19%	–29.55%
8	31.19%	–28.45%
9	29.88%	–27.74%
10	29.08%	–27.30%
11	28.80%	–27.14%
12	28.99%	–27.26%
13	29.55%	–27.62%
14	30.36%	–28.12%
15	31.35%	–28.74%
16	32.51%	–29.46%
17	33.80%	–30.24%
18	35.20%	–31.09%
19	36.66%	–31.95%
20	38.16%	–32.82%
21	39.67%	–33.68%
22	41.15%	–34.52%
23	42.57%	–35.32%
24	43.91%	–36.07%
25	45.18%	–36.78%

Maturity (*t*) (in years)	Upward shock ($s_{nom}^{up}(t)$)	Downward shock ($s_{nom}^{down}(t)$)
26	46.59%	–37.57%
27	48.03%	–38.38%
28	49.31%	–39.09%
29	50.22%	–39.60%
30	50.57%	–39.79%

2. The shocks in the table above must be applied as relative increases to the relevant nominal spot interest rate at term *t.* That is, the nominal interest rates must be multiplied by $\left(1 + s_{nom}^{up}(t)\right)$ for the upward shock, and by $\left(1 + s_{nom}^{down}(t)\right)$ for the downward shock.

3. Where a term to maturity is not specified in the table above, insurers should interpolate between the nearest two specified points.

4. For maturities greater than 30 years, the upwards shock of +50.57% and the downwards shock of –39.79% should be maintained.

B. Real interest rate curve shocks

1. The upward and downwards shocks that must be applied to the real spot interest rate term structure under section 5.9 of the Standard are set out in the table below:

Maturity (*t*) (in years)	Upward shock ($s_{real}^{up}(t)$)	Downward shock ($s_{real}^{down}(t)$)
0.25	75.89%	–75.89%
0.5	75.89%	–75.89%
1	75.89%	–75.89%
2	75.89%	–75.89%
3	67.36%	–67.36%
4	65.52%	–65.52%
5	63.95%	–63.95%
6	61.17%	–61.17%
7	58.22%	–58.22%
8	56.74%	–56.74%
9	54.07%	–54.07%
10	54.81%	–54.81%
11	54.50%	–54.50%
12	53.56%	–53.56%
13	53.89%	–53.89%

Maturity (*t*) (in years)	Upward shock ($s_{real}^{up}(t)$)	Downward shock ($s_{real}^{down}(t)$)
14	54.89%	–54.89%
15	55.33%	–55.33%
16	54.40%	–54.40%
17	53.02%	–53.02%
18	52.27%	–52.27%
19	52.23%	–52.23%
20	52.72%	–52.72%
21	53.60%	–53.60%
22	54.81%	–54.81%
23	56.32%	–56.32%
24	58.10%	–58.10%
25	60.11%	–60.11%
26	62.29%	–62.29%
27	64.42%	–64.42%
28	66.25%	–66.25%
29	67.54%	–67.54%
30	68.02%	–68.02%

2. The shocks in the table above must be applied as relative increases to the relevant real spot interest rate at term *t.* That is, the real interest rates must be multiplied by $\left(1 + s_{real}^{up}(t)\right)$ for the upward shock, and by $\left(1 + s_{real}^{down}(t)\right)$ for the downward scenario.

3. Where a term to maturity is not specified in the table above, insurers should interpolate between the nearest two specified points.

4. For maturities greater than 30 years, the upwards shock of +68.02% and the downwards shock of –68.02% should be maintained.

Attachment 4: Spread Risk Factors

This Attachment sets out the relevant factors and methodologies to be used in calculation of the capital requirement for spread risk.

A. Spread risk factors for interest bearing instruments

1. The following table sets out the spread risk factors ($factor_{i,d}$) for calculating the capital requirement for spread risk on interest bearing instruments, as required under section 9.12 of the Standard. For instruments issued by governments, central banks, multilateral development banks and international organisations, the spread risk set out in Part B of this Attachment must be applied instead. The spread risk factors to apply will depend on the credit quality step (*i*) of the issuer of the interest bearing instrument, and the duration (*d*) of the instrument.

Credit Quality Step *i*	**Duration (*d*) in years**						
	1	**2**	**3**	**5**	**10**	**15**	**20**
1	0.14%	0.27%	0.40%	0.65%	1.30%	1.94%	2.58%
2	0.26%	0.44%	0.62%	0.98%	1.88%	2.78%	3.68%
3	0.36%	0.58%	0.80%	1.24%	2.34%	3.44%	4.54%
4	0.65%	0.96%	1.27%	1.88%	3.42%	4.96%	6.49%
5	0.91%	1.28%	1.66%	2.40%	4.26%	6.11%	7.97%
6	1.07%	1.48%	1.89%	2.70%	4.73%	6.77%	8.80%
7	1.44%	1.92%	2.40%	3.35%	5.75%	8.14%	10.54%
8	1.83%	2.38%	2.92%	4.01%	6.74%	9.46%	12.19%
9	2.75%	3.42%	4.09%	5.43%	8.78%	12.14%	15.49%
10	3.41%	4.15%	4.89%	6.37%	10.06%	13.76%	17.46%
11	4.36%	5.17%	5.99%	7.62%	11.70%	15.78%	19.86%
12	5.81%	6.69%	7.58%	9.36%	13.80%	18.24%	22.68%
13	7.58%	8.50%	9.42%	11.26%	15.87%	20.47%	25.08%
14	10.62%	11.55%	12.49%	14.35%	19.02%	23.69%	28.36%
15	13.47%	14.42%	15.36%	17.26%	21.99%	26.73%	31.46%
16	19.29%	20.17%	21.05%	22.82%	27.22%	31.62%	36.02%
17	20.51%	21.33%	22.15%	23.80%	27.91%	32.02%	36.13%
18	21.15%	21.91%	22.67%	24.19%	27.98%	32.02%	36.13%

2. The duration measure to be used by insurers in determining the relevant spread risk factor to apply should be the modified duration. For variable interest rate bonds, the modified duration should be equivalent to the duration of a fixed income bond with coupon payments equal to the forward interest rate.

3. Insurers should apply a minimum duration of one year and a maximum of 20 years.

4. Insurers should apply appropriate interpolation methods to calculate the spread risk factors between the durations specified above.

5. Instruments with the highest possible international scale local currency rating from a credit rating agency may be assigned a spread risk factor of 0%.

6. For Infrastructure assets, the spread risk factors should be calculated as 70% of the factors given in the table above.

B. Spread risk factors for exposures to governments, central banks, multilateral development banks and international organisations

1. For interest bearing instruments issued or demonstrably guaranteed by the South African Government or Reserve Bank denominated in Rand, no spread risk capital requirement applies.

2. For all other interest bearing instruments, the calculations are the same as for those under section 9 of this Standard, noting that an interest bearing instrument considered in this section could have a different probability of default than an interest bearing instrument not considered in this section, even though the assigned credit ratings might be similar for both instruments. In such cases the two instruments might have different credit quality steps.

3. Where an instrument is denominated in a currency that is different from the counterparty's local currency, the credit quality step should take into account the counterparty's ability to repay foreign currency obligations.

C. Simplified calculation for spread risk on interest bearing instruments

1. The simplified method for determining the capital requirement for spread risk on interest bearing instruments (Mkt_{sp}^{ib}) must be calculated as:

$$Mkt_{sp}^{ib} = MV^{ib} \cdot \sum_{i,d}\left(\%MV_{i,d}^{ib} \cdot factor_{i,d}\right) + \Delta\, Liab_{inv}$$

Where:

MV^{ib}	=	Total market value of the insurer's interest bearing portfolio
$\%MV_{i,d}^{ib}$	=	The proportion of the insurer's interest bearing portfolio with credit quality step *i* and average duration of *d* (weighted by the market value of all instruments in the portfolio with credit quality step *i*)
$factor_{i,d}$	=	The spread risk factor applicable to the interest bearing portfolio with credit quality step *i* and average duration of *d* (weighted by the market value of all instruments in the portfolio with credit quality step *i*), as set out in the relevant table in Part A or B of this Attachment
$\Delta\, Liab_{inv}$	=	The overall impact on the liabilities of investment policies with embedded options and guarantees, based on a drop in the value of assets related to these policies of: $MV^{ib} \cdot \sum_{i,d}\left(\%MV_{i,d}^{ib} \cdot factor_{i,d}\right)$ subject to a floor of zero.

D. Loss-given-default adjustment factor for interest bearing instruments

1. The following table sets out the loss-given-default adjustment factor (LGD_{adj}) that must be applied for interest bearing instruments under section 9.12 of this Standard, where the rating is based on an entity rating or the rating of a senior unsecured instrument.

Nature of interest bearing instrument exposure	$\boldsymbol{LGD_{adj}}$
Fully cash covered with regular marking to market of the collateral	0.11
Significantly over collateralised	0.40
Fully collateralised	0.78
Partially collateralised	0.94
Unsecured and ranked *pari passu* with other unsecured claims	1.00
Less than 50% of assets of the counterparty/issuer are pledged as collateral for other creditors	1.60
More than 50% of assets of the counterparty/issuer are pledged as collateral for other creditors	1.91
Equity, junior debt, mezzanine debt or preference shares exposures, and structurally sub-ordinated exposures	2.22

E. Credit derivatives

1. The following table sets out the magnitude of the upward and downward spread risk shocks that must be applied to determine the spread risk capital requirement on credit derivatives as set out in section 9.14 of this Standard. The shocks to apply will depend on the credit quality step (*i*) of the reference instrument of the credit derivative.

Credit Quality Step (*i*)	**Upward shock ($s_{CD}^{up}(t)$)**	**Downward shock ($s_{CD}^{down}(t)$)**
1	0.59%	-75%
2	0.68%	-75%
3	0.85%	-75%
4	1.12%	-75%
5	1.35%	-75%
6	1.48%	-75%
7	1.86%	-75%
8	2.25%	-75%
9	3.19%	-75%
10	3.85%	-75%

Credit Quality Step (*i*)	Upward shock ($s_{CD}^{up}(t)$)	Downward shock ($s_{CD}^{down}(t)$)
11	4.80%	-75%
12	6.26%	-75%
13	8.08%	-75%
14	11.07%	-75%
15	13.92%	-75%
16	20.12%	-75%
17	21.21%	-75%
18	21.67%	-75%

2. The upward shocks ($s_{CD}^{up}(t)$) should be applied as an absolute addition to the credit spreads, while the downward shocks ($s_{CD}^{down}(t)$) should be applied as a relative decrease to the credit spreads.

Attachment 5: Adjustments to Standard Concentration Risk Requirements

This Attachment details the treatment of specific asset classes in the concentration risk module set out in section 10 of this Standard, including those that differ to the standard requirements.

A. Covered bonds

1. The concentration threshold applicable to covered bonds when included in the concentration risk module should be 15% when the asset has a credit quality step of 3 or better (the standard concentration threshold factors apply for covered bonds with a credit quality step below 3).

B. Properties

1. Insurers should include in the calculation of the concentration risk capital requirement exposures to a single property higher than 5% of total assets included in the scope of the concentration risk module.

2. In assessing concentration risks in respect of properties, the insurer should take into account both properties directly owned and those indirectly owned (e.g. property funds), and both ownership and any other real exposure (mortgages or any other legal right regarding properties).

3. Properties located in the same building or sufficiently nearby should be considered a single property.

4. The risk concentration capital requirement per property *i* must be calculated in the same manner as other concentration risk exposures (i.e. refer to step 2 of the calculation of the concentration risk capital requirement under section 10.8 of this Standard), with a g_i factor of 0.12 applying.

C. Exposures to governments, central banks, multilateral development banks and international organisations

1. No concentration risk capital requirement applies to borrowings by, or demonstrably guaranteed by, the South African Government or Reserve Bank denominated in Rand.

2. For all other exposures, the calculations are the same as for those under section 10 of this Standard, noting that an exposure considered in this section could have a different probability of default than an exposure not considered in this section, even though the assigned credit ratings might be similar for both instruments. In such cases the two exposures might have different credit quality steps.

3. Where an exposure is denominated in a currency that is different from the counterparty's local currency, the credit quality step should take into account the counterparty's ability to repay foreign currency obligations.

D. Exposures to bank deposits

1. Bank deposits denominated in Rand whose full value is covered by a government guarantee scheme in South Africa may be exempted from the assessment of concentration risk, provided that the guarantee is applicable unconditionally to the

insurer and there is no double-counting of the effects of the guarantee with any other element of the SCR calculation.

E. Collective investment vehicles

1. Exposures via collective investment vehicles or other entities whose activity is mainly the holding and management of an insurer's own investments should be considered on a look-through basis (refer to Attachment 1) when assessing concentration risk.[13] Where a look-through approach is adopted, aggregation of underlying exposures to the same counterparty or related counterparties should be undertaken.

2. If a look-through approach is not adopted, insurers should assess the concentration risk of such exposures at the investment fund level.

F. First-party insurance structures

1. Subject to prior approval by the Prudential Authority, intra-group asset pooling arrangements of captive insurers, or investments by a captive insurer in listed and market quoted debt instruments related to the group may be exempted for the purposes of calculating the concentration risk capital requirement. This exemption is subject to the condition that legally enforceable contractual terms exist, which ensure that the liabilities of the captive insurer will be offset by the intra-group exposures it holds against other entities in the group.

[13] The same holds for tranches of collateralised debt obligations and similar investments embedded in structured products.

Attachment 6: Qualifying Criteria for Infrastructure Assets

This Attachment sets out the criteria that an investment in an Infrastructure project entity must satisfy in order to qualify as an Infrastructure asset.

1. The Infrastructure project entity can meet its financial obligations under sustained stresses that are relevant for the risk of the project.

2. The cash flows that the Infrastructure project entity generates for debt providers and equity investors are predictable. Predictable cash-flows are set out in Part A of this Attachment.

3. The Infrastructure assets and Infrastructure project entity are governed by a contractual framework that provides debt providers and equity investors with a high degree of protection including the following:

    a) Where the revenues of the Infrastructure project entity are not funded by payments from a large number of users, the contractual framework shall include provisions that effectively protect debt providers and equity investors against losses resulting from the termination of the project by the party which agrees to purchase the goods or services provided by the Infrastructure project entity; and
    b) The Infrastructure project entity has sufficient reserve funds or other financial arrangements to cover the contingency funding and working capital requirements of the project.

4. Where investments are in bonds or loans, this contractual framework shall also include the following:

    a) Debt providers have security to the extent permitted by applicable law in all assets and contracts necessary to operate the project;
    b) Equity is pledged to debt providers such that they are able to take control of the Infrastructure project entity prior to default;
    c) The use of net operating cash flows after mandatory payments from the project for purposes other than servicing debt obligations is restricted; and
    d) Contractual restrictions on the ability of the Infrastructure project entity to perform activities that may be detrimental to debt providers, including that new debt cannot be issued without the consent of existing debt providers.

5. The Infrastructure assets and Infrastructure project entity must have a credit rating assigned to it. An internal rating will be subject to scrutiny by the Prudential Authority.

6. The Infrastructure assets and Infrastructure project entity must be located in South Africa and considered in the interest of the South African public.

A. Predictable cash flows

1. The cash flows generated for debt providers and equity investors shall not be considered predictable unless all except an immaterial part of the revenues satisfies the following conditions:

    a) The revenues are availability-based;
    b) The revenues are subject to a rate-of-return regulation;
    c) The revenues are subject to a take-or-pay contract; or
    d) The level of output or the usage and the price shall independently meet the following criteria:
        i. It is regulated;

ii. It is contractually fixed; or
iii. It is sufficiently predictable as a result of low demand risk.

2. Where the revenues of the Infrastructure project entity are not funded by payments from a large number of users, the party which agrees to purchase the goods or services provided by the Infrastructure project entity shall be the South African government be it national, provincial or local.