



# BERMUDA MONETARY AUTHORITY

## THE BERMUDA CAPITAL AND SOLVENCY RETURN

### 2012 INSTRUCTION HANDBOOK FOR CLASS 4 AND CLASS 3B (RE)INSURERS

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## Introduction to the Capital and Solvency Return

### Introduction

- 1 The Capital and solvency return is an annual return relating to an insurer's<sup>1</sup> risk management practices and to the information used by an insurer to calculate its enhanced capital requirement ("ECR") and target capital level ("TCL") as may be prescribed by or under Rules made under section 6A of the Act. Every Class 3B or Class 4 insurer shall submit to the Bermuda Monetary Authority ("the BMA") a completed Capital and solvency return on or before its filing date.
- 2 The Capital and solvency return is used to calculate an insurer's ECR, an additional capital and surplus requirement imposed by or under Rules made under section 6A of the Act. The ECR of an insurer at the end of its relevant year is the higher of the Bermuda Solvency Capital Requirement ("the BSCR") model and an approved internal capital model, provided that the ECR amount is equal to or exceeds the Minimum Margin of Solvency. The TCL, also an additional capital and surplus requirement, of an insurer is calculated as 120% of the ECR.
- 3 The BSCR model calculates a risk-based capital measure by applying capital factors to capital and solvency return elements, including investments and other assets, premiums and reserves, operational risk, and insurer-specific catastrophe exposure measures, in order to establish an overall measure of capital and surplus for statutory solvency purposes. The capital factor established for each risk element, when applied to that element, produces a required capital and surplus amount. The individual capital amounts generated for each risk element (excluding operational risk) are then summed. Covariance adjustments are made to arrive at the BSCR (after covariance adjustment), which is further adjusted to include insurer-specific operational risk and capital add-ons, as assessed by the BMA to finally produced the BSCR of an insurer.
- 4 An insurer's available statutory capital and surplus divided by the BSCR gives the BSCR ratio and an insurer's available statutory capital and surplus divided by the ECR gives the ECR ratio. The BSCR and ECR ratios will assist the BMA regulators in evaluating the financial strength of each insurer.
- 5 The BSCR, ECR and TCL establish measures of solvency capital levels that are used by the BMA to monitor the capital adequacy of Class 3B and Class 4 insurers.

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<sup>1</sup> In this document, the term "insurer" includes "reinsurers".

## **Purpose**

- 6 This document presents the instructions for use by persons responsible for computing the required capital and surplus and for submitting the completed Capital and solvency return, including the BSCR model, to the BMA.
- 7 The Capital and solvency return contains diverse risk elements of an insurer's operation and will likely require the participation of experienced individuals within the accounting, finance, and actuarial areas of the insurer. In order to ensure accurate completion, insurers are highly advised to refer to this instruction handbook.

## **Overview**

- 8 These instructions contain the following sections in the Capital and solvency return, which include the different risk elements contained in the BSCR model:
  - Submission
  - Attachments
  - Company Information
  - Forms 1A, 2A and 8
  - Schedule of Fixed Income Investments by Rating Category (Schedule II)
  - Schedule of Net Loss and Loss Expense Provisions by Line of Business (Schedule III)
  - Schedule of Premiums Written by Line of Business (Schedule IV)
  - Schedule of Risk Management (Schedule V)
  - Schedule of Fixed Income Securities (Schedule VI)
  - Schedule of Commercial Insurer's Solvency Self-Assessment (Schedule IX)
  - Catastrophe Risk Return (Schedule X)
  - Schedule of Loss Triangles or Reconciliation of Net Loss Reserves (Schedule XI)
  - Schedule of Eligible Capital (Schedule XII)

- Commercial Insurer Risk Assessment
- Summary
- Fixed Income Investment Risk
- Equity Investment Risk
- Interest Rate / Liquidity Risk
- Credit Risk
- Premium Risk
- Reserve Risk
- Catastrophe Risk

- 9 The filing guidance relating to Forms 1A, 2A and 8 has been published in the Insurance Accounts Regulations 1980. The filing guidance relating to Schedules II, III, IV, V, VI, IX, X, XI and XII, and operational risk will be published in the Rules. The electronic copy of Forms 1A, 2A, and 8, and Schedules II, III, IV, V, VI, IX, X, XI and XII, and operational risk have also been included in the Capital and solvency return and have been appropriately linked to the BSCR model, where applicable.
- 10 Also included is an appendix containing a glossary of terms that is meant to clarify the meaning of any terms used within the Capital and solvency return, as well as provide guidance on reconciling totals.

### **Changes to the BSCR Formula**

- 11 Periodically, changes to the BSCR formula may be necessary due to changes in capital and solvency return, accounting requirements, and enhancements to the formula or to the capital factors. Any such changes will be communicated to insurers in a timely fashion, in order to allow adequate time for insurers to collect any additional information required.

### **Workpapers and Supporting Documents**

- 12 Workpapers and documents used to prepare the BSCR submission should be retained and kept available for examination and discussion with the BMA, should the need arise.

### **Contact Person for Questions**

- 13 Questions pertaining to the content or meaning of any of the items in this report should be addressed to [riskanalytics@bma.bm](mailto:riskanalytics@bma.bm) or directed to the Assistant Director of Risk Analytics Department of the BMA, David Kaniaru at 441-278-0307 or [dkaniaru@bma.bm](mailto:dkaniaru@bma.bm).

## Submission

### 1 BACKGROUND

Both an electronic version and printed version of the Capital and solvency return should be forwarded to the BMA on or before its specified filing date. Insurers are advised to refer to the BSCR E-Filing Manual, available on the BMA website, for guidance on electronic filing. Insurers are also advised not to alter or modify the Capital and solvency return or any part thereof.

### 2 ITEMS

Reported in — Select units in which the monetary values are reported i.e. in units, in thousand units.

Input Data — Input data in each form and schedule, applicable.

Validate Data — Validate the input data after completion by clicking the “VALIDATE DATA” button.

Submit — Submit the Capital and solvency return by clicking the “SUBMIT” button.

## Attachments

### 1 BACKGROUND

Insurers can attach any necessary files through this Attachments sheet, up to 20 files for each category provided. The attached files are embedded in the Capital and solvency return and submitted to the BMA when submission was successful. The BSCR E-Filing Manual provides guidance on how to attach, view and remove files.

## Company Information

### 1 ITEMS

Company Name — Input the name of the Class 4 or 3B insurer, as it appears on the Certificate of Registration.

Date Incorporated or Organized — Input the date that the insurer was licensed by the BMA to conduct business in Bermuda.

Registration No. — Input the registration number of the insurer, as it appears on the Certificate of Registration.

Date Commenced Business — Input the date that the insurer began writing business as a licensed Bermuda company.

Contact Person Information — Input the insurer's contact person who will be the main conduit through which the BMA will make and respond to inquiries about the BSCR and related information. The contact person also has the responsibility to ensure that all amounts reported in the Capital and solvency return correspond to the insurer's statutory financial return, where appropriate.

## Forms 1A, 2A and 8

### 1 BACKGROUND

The Statutory balance sheet (Form 1A), Statutory statement of income (Form 2A), and Statutory statement of capital and surplus (Form 8) must be completed by the insurer in accordance with the filing guidance relating to these Forms found in the Insurance Accounts Regulations 1980.

Additionally, the insurer must ensure that amounts reported in these Forms correspond to the statutory financial return, where appropriate.

## Schedule of Fixed Income Investments by Rating Categories (Schedule II)

### 1 BACKGROUND

The Schedule of fixed income investments by rating categories or Schedule II provides a breakdown of an insurer's quoted and unquoted investments by rating categories. The BMA has identified and defined 8 categories for fixed income investments.

Line item 8 'Total' of Schedule II for quoted bonds and debentures and unquoted bonds and debentures should correspond to the balance reported in Form 1A, lines 2(b) and 3(b), respectively, for the relevant year.

To complete this Schedule appropriately, insurers are advised to refer to the Fixed income investment risk section or to the Instructions Affecting Schedule II in the Rules.

## Schedule of Net Loss and Loss Expense Provisions by Line of Business (Schedule III)

### 1 BACKGROUND

The Schedule of net loss and loss expense provisions by line of business or Schedule III provides a breakdown of an insurer's net loss and loss expense provisions by statutory lines of business. The BMA has identified and defined 24 statutory lines of business.

Line item 25 'Total' of Schedule III for net loss and loss expense provisions should correspond to the balance reported in Form 1A, line 17(d) for the relevant year.

To complete this Schedule appropriately, insurers are advised to refer to the Reserve risk section or to the Instructions Affecting Schedule III in the Rules.

## Schedule of Premiums Written by Line of Business (Schedule IV)

### 1 BACKGROUND

The Schedule of premiums written by line of business or Schedule IV provides a breakdown of an insurer's gross premiums written and net premiums written by statutory lines of business. Insurers are required to separate gross premiums written into 'unrelated' and 'related' business according to the 24 prescribed statutory lines of business.

Line item 25 'Total' of Schedule IV for total gross premiums written and net premiums written should correspond to the balance reported in Form 2A, Lines 1(c) and 3, respectively, for the relevant year.

To complete this Schedule appropriately, insurers are advised to refer to the Premium risk section or to the Instructions Affecting Schedule IV in the Rules.

## Schedule of Risk Management (Schedule V)

### 1 BACKGROUND

The Schedule of risk management or Schedule V provides particulars of the following matters:

(a) Governance and group structure – Insurers are requested to complete Schedule V(a) *Governance and group structure* for their convenience.

(b) Intra-group exposures and risk concentrations – Insurers are requested to complete Schedule V(b) *Intra-group exposures and risk concentrations* for their convenience.

(c) Effective duration of assets

(d) Effective duration of liabilities

(e) Description of the effective duration of assets and liabilities calculations and key assumptions

(f) Investment policy

(g) Gross probable maximum loss

(h) Net probable maximum loss

(i) Average annual loss (excluding property catastrophe)

(j) List of statutory lines and statutory territories that have catastrophe exposures – Insurers are required to complete Schedule X(d) *Cat return*.

(k) Projected net premiums written, projected underwriting profit/loss, projected net income/loss, and description of underwriting strategy

(l) Actual attritional losses and large claims losses – relevant year

(m) Financial impact and description of stress and scenarios – Insurers are required to complete Schedule V(c) *Stress/Scenario Tests*. To complete this section appropriately, insurers are to refer to the *2011 Capital and Solvency Return: Stress/Scenario Analysis – Class 4, Class 3B, and Insurance Groups* available on the BMA website.

(n) Description of the insurer’s risk management program

(o) Risk register

To complete this Schedule appropriately, insurers are advised to refer to the Instructions Affecting Schedule V in the Rules.

## Schedule of Fixed Income Securities (Schedule VI)

### 1 BACKGROUND

The Schedule of fixed income securities or Schedule VI contains particulars of Schedule II in detail.

(a) Security type

(b) Amount per Form 1A, Lines 2(b) and 3(b) – disclosing the amounts contributing to (reflected in) Lines 2(b) and 3(b) of Form 1A.

(c) Face value

(d) Fair value

(e) Average effective yield-to-maturity

(f) Average rating of the security type (if applicable)

(g) Average effective duration of the security type

(h) Average effective convexity of the security type

(i) Effective duration of the portfolio

(j) Effective convexity of the portfolio

To complete this Schedule, insurers are advised to refer to the Instructions Affecting Schedule VI in the Rules.

## Schedule of Commercial Insurer's Solvency Self-Assessment (Schedule IX)

### 1 BACKGROUND

The Schedule of commercial insurer's solvency self-assessment (CISSA) or Schedule IX shall provide particulars of the following matters:

(a) CISSA capital summary – disclosing the insurer's own capital computations, insurer's comparison of the CISSA capital to regulatory capital, insurer's plans for raising additional capital and contingency arrangements impacting the available capital.

(b) CISSA general questions – providing information on an insurer's risk management and governance program, the review and approval of CISSA, and integration of CISSA into the strategic decision making process.

(c) CISSA assessment of material risks of the insurer – providing information on an insurer's assessment of material risks, determination of both the quality and quantity of capital required to cover its risks, the forward looking analysis and its ability to manage its capital needs, the review and approval of CISSA and the governance and controls surrounding model(s)/tool(s) used to compute the CISSA capital.

Refer to “Commercial Insurer's Solvency Self-Assessment (CISSA) 2011 Instruction Handbook” for the details of instructions. A copy of this instruction handbook is available in the BMA's website.

## Catastrophe Risk Return (Schedule X)

### 1 BACKGROUND

The Catastrophe Risk Return ('Cat Return') or Schedule X shall provide the following matters:

- (a) Total exceedance probability ("EP") curves
- (b) EP curve for insurance
- (c) EP curve for region-perils
- (d) Statutory lines of business and zones exposure per region-perils
- (e) Accumulations overview
- (f) Data analysis
- (g) Reinsurance disclosures
- (h) Insurance terrorism exposure
- (i) Reinsurance terrorism limits
- (j) Assumed exchange rates

Refer to "Catastrophe Risk Return Guidelines (January 2011)" for the details of instructions. A copy of these guidelines is available in the BMA's website.

## Schedule of Loss Triangles or Reconciliation of Net Loss Reserves by Lines of Business (Schedule XI)

### 1 BACKGROUND

An insurer shall provide either a Schedule of loss triangles (Schedule XI(a)) or a Reconciliation of net loss reserves by lines of business (Schedule XI(b)). For purposes of completing these Schedules, the BMA has prescribed 8 statutory lines of business:

<u>Number</u>	<u>Loss triangle lines of business</u>	<u>Number</u>	<u>Statutory lines of business (Schedule III)</u>
1	Property Catastrophe	1	Property Catastrophe
2	Property	2	Property
		6	Aviation
		10	Energy Offshore / Marine
		18	International Motor
		22	Retro Property
3	Property Non-Proportional	3	Property Non-Proportional
		7	Aviation Non-Proportional
		11	Energy Offshore / Marine Non-Proportional
		19	International Motor Non-Proportional
4	Casualty	4	Personal Accident
		12	US Casualty
		14	US Professional
		20	International Casualty Non-Motor
		24	Health
5	Casualty Non-Proportional	5	Personal Accident Non-Proportional
		13	US Casualty Non-Proportional
		15	US Professional Non-Proportional
		21	International Casualty Non-Motor Non-Proportional
6	Financial lines	8	Credit / Surety
		9	Credit / Surety Non-Proportional
7	Other specialty lines	16	US Specialty
		17	US Specialty Non-Proportional
8	Structured/Finite lines	23	Structured / Finite Reinsurance

## Schedule of Eligible Capital (Schedule XII)

### 1 BACKGROUND

The Schedule of eligible capital or Schedule XII requires insurers to assess the quality of their capital resources eligible to satisfy their regulatory capital requirement levels.

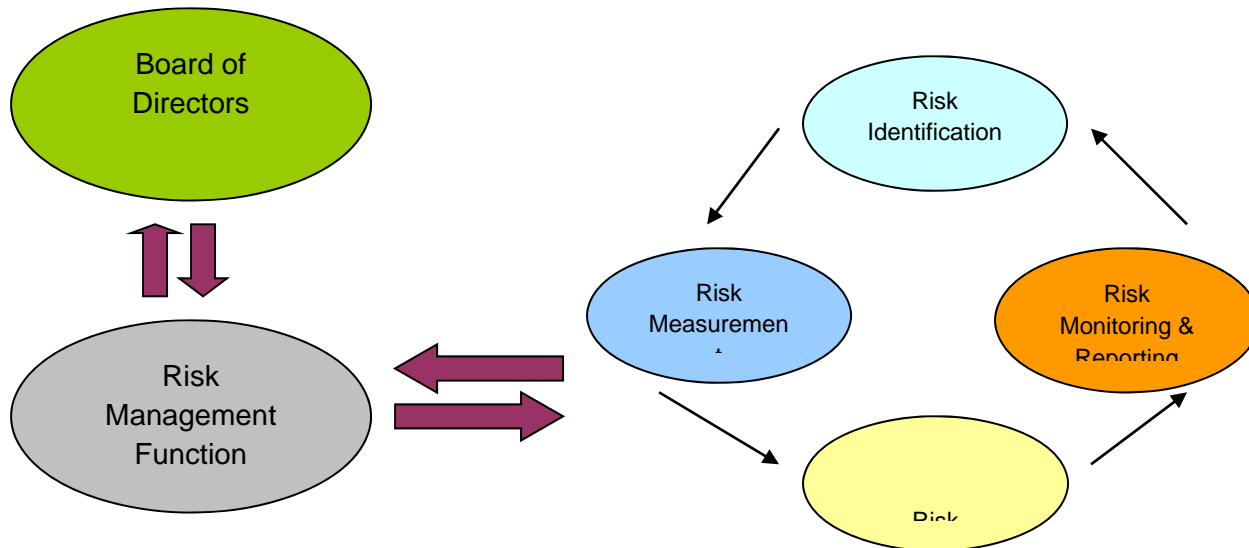
The purpose of this Schedule is to consider the uniqueness of capital instruments in their ability to protect policyholders on a going concern basis or run-off basis and during times of distress such as a winding-up or insolvency in the determination of capital adequacy.

Refer to the “Eligible Capital Rules 2011” for details. A copy of these Rules is available in the BMA website.

## Commercial Insurer Risk Assessment

### 1 BACKGROUND

The Commercial Insurer Risk Assessment (CIRA) Framework assesses the quality of the insurer's risk management function surrounding its operational risk exposures. Operational risk is the risk of loss arising from inadequate or failed internal processes, people, systems or external events. Operational risk also includes legal risks. Reputational risks arising from strategic decisions do not count as operational risks. The CIRA Framework emphasizes the interrelationships between the Risk Management and Corporate Governance functions as seen below:



The Board of Directors has an influential role in establishing, inter alia, the strategic direction and risk culture of the insurer. The BMA views the Risk Management function as a critical tool to furnish the Board with the necessary information to make appropriate decisions and assist the insurer's management in steering the organization forward.

The Risk Management function within the CIRA has 4 components: Risk Identification, Risk Measurement, Risk Response, and Risk Monitoring & Reporting. The insurer will undertake the self-assessment by answering the questions related to the calibre of its risk management processes in place to address the material risk arising from each operational risk area.

The CIRA Framework embodies a maturity model approach to identify an insurer's developmental stage with respect to a specific operational risk area. It rewards the insurer for achieving progress in each risk management area. It reviews the following 8 operational risk exposures as follows:

- a) Business Processes Risk – includes a risk of errors arising from data entry, data processing, or application design.
- b) Business Continuity Risk – includes a risk of an event that threatens or disrupts an insurer's continuous operations.
- c) Compliance Risk – includes a risk of legal or regulatory breaches or both.
- d) Information System Risk – includes a risk of unauthorized access to systems and data, data loss, utility disruptions, software and hardware failures, and inability to access information systems.
- e) Distribution Channels Risk – includes a risk of disruption to an insurer's distribution channel arising from employment of inexperienced or incapable brokers or agents.
- f) Fraud Risk – includes a risk of misappropriation of assets, information theft, forgery, or fraudulent claims.
- g) Human Resources Risk – includes a risk of employment of unethical staff, inexperience or incapable staff, failure to train or retain experienced staff, and failure to adequately communicate with staff.
- h) Outsourcing Risk – includes a risk of miscommunication of responsibilities in relation to outsourcing, breach of outsource service agreements or entering into inappropriate service agreements.

The CIRA Framework applies the components within the Risk Management function to each operational risk area. The insurer assesses each operational risk area and selects the applicable descriptor under the “Dimension” column that reflects the developmental stage of the insurer’s process surrounding the specific risk area.

In order to be credited for a relevant score within the CIRA Framework, the insurer must fulfill the criteria in the “Dimension” column. In its assessment, if the insurer finds itself between stages, the insurer must select the lower stage. The insurer can supplement the selection with additional comments that can be made at the end of each risk management function.

The total scores for each component within the CIRA Framework are aggregated and produce the pertinent Operational Risk Charge percentage. The Operational Risk Charge ranges from 1% to 10%. The relevant Operational Risk Charge percentage is applied to the “BSCR (After Covariance Adjustment)” subtotal. The resultant figure is the Operational Risk Capital Charge.

The CIRA is to be signed off by two Directors of the insurer, one of which must be a resident Director, where the insurer has a resident Director on its Board.

2 ITEMS

(a) Corporate Governance – the insurer assesses each statement in the “Dimension” column and places an “X” in the column “Implemented” where the Corporate Governance function meets the criteria (200 points for each fulfilled area). The worksheet will automatically aggregate all scores.

The insurer may provide comments in the space provided to support its responses.

*Board of Directors*

Dimension	Implemented	Score
Sets risk policies, practices and tolerance limits for all material foreseeable operational risks at least annually and ensures they are communicated to relevant business units		200
Monitors adherence to operational risk tolerance limits more regularly than annually		200

Dimension	Implemented	Score
Receives, at least annually, reports on the effectiveness of material operational risk internal controls as well as management’s plans to address related weaknesses		200
Ensures that systems and/or procedures are in place to identify, report and promptly address internal control deficiencies related to operational risks		200
Promotes full, open and timely disclosure from senior management on all significant issues related to operational risk		200
Ensures that periodic independent reviews of the risk management function are performed and receives the findings of the review		200

(b) Risk Management Function – the insurer assesses each statement in the “Dimension” column and places an “X” in the column “Implemented” where the Risk Management function meets the criteria (150 points for each fulfilled area). The worksheet will automatically aggregate all scores.

The insurer may provide comments in the space provided to support its responses.

*Risk Management Function:*

Dimension	Implemented	Score
Is independent of other operational units and has direct access to the Board of Directors		150
Is entrenched in strategic planning, decision making and budgeting process		150
Ensures that the risk management procedures and policies are well documented and approved by the Board of Directors		150
Ensures the risk management policies and procedures are communicated throughout the organisation		150
Reviews operational risk management processes and procedures at least annually		150

Dimension	Implemented	Score
Ensures that loss events arising from operational risks are documented and loss event data is integrated into enterprise risk management		150
Documents its risk management recommendations for operational units, ensures that deficiencies have remedial plans and progress on the execution of such plans are reported to the Board of Directors at least annually		150

(c) Risk Identification – the insurer is to answer the following question:

“Has the insurer taken steps to identify material risks arising from the Operational Risk Areas identified below?”

If the answer to the question is “No” then the insurer does not have to complete the matrix/grid. If the answer to the question is “Yes” then the insurer is to identify the stage of progression of each Operational Risk Area based on the Dimension descriptor. The insurer is then to input an “X” in the grid corresponding to the stage in the matrix table under the relevant Operational Risk Area.

The insurer may provide comments in the space provided to support its responses.

*Risk Identification Processes:*

Progression		Dimension	Operational Risk Areas							
Stage	Scoring		Fraud	HR	Outsourcing	Distribution Channel	Business Processes	Business Continuity	IT	Compliance
1	50	“ad hoc”								
2	100	Implemented but not standardised across the organisation								
3	150	Implemented, well documented policies and procedures that are understood by relevant staff, and standardised across the entire organisation								

Progression		Dimension	Operational Risk Areas							
Stage	Scoring		Fraud	HR	Outsourcing	Distribution Channel	Business Processes	Business Continuity	IT	Compliance
4	200	In addition to Stage 3, processes are reviewed at least annually with the view to assessing effectiveness and introducing improvements								

(d) Risk Measurement – the insurer is to answer the following question:

“Has the insurer taken steps to measure material risks arising from the Operational Risk Areas identified below?”

If the answer to the question is “No” then the insurer does not have to complete the matrix/grid. If the answer to the question is “Yes” then the insurer is to identify the stage of progression of each Operational Risk Area based on the Dimension descriptor. The insurer is then to input an “X” in the grid corresponding to the stage in the matrix table under the relevant Operational Risk Area.

The insurer may provide comments in the space provided to support its responses.

*Risk Measurement Processes:*

Progression		Dimension	Operational Risk Areas							
Stage	Scoring		Fraud	HR	Outsourcing	Distribution Channel	Business Processes	Business Continuity	IT	Compliance
1	50	“ad hoc”								
2	100	Implemented but not standardised across the organisation								
3	150	Implemented, well documented policies and procedures that are understood by relevant staff, and standardised across the entire organisation								

Progression		Dimension	Operational Risk Areas							
Stage	Scoring		Fraud	HR	Outsourcing	Distribution Channel	Business Processes	Business Continuity	IT	Compliance
4	200	In addition to Stage 3, processes are reviewed at least annually with the view to assessing effectiveness and introducing improvements								

(e) Risk Response – the insurer is to answer the following question:

“Has the insurer taken steps to control and/or mitigate material risks arising from the Operational Risk Areas identified below?”

If the answer to the question is “No” then the insurer does not have to complete the matrix/grid. If the answer to the question is “Yes” then the insurer is to identify the stage of progression of each Operational Risk Area based on the Dimension descriptor. The insurer is then to input an “X” in the grid corresponding to the stage in the matrix table under the relevant Operational Risk Area.

The insurer may provide comments in the space provided to support its responses.

*Risk Response Processes:*

Progression		Dimension	Operational Risk Areas							
Stage	Scoring		Fraud	HR	Outsourcing	Distribution Channel	Business Processes	Business Continuity	IT	Compliance
1	50	“ad hoc”								
2	100	Implemented but not standardised across the organisation								

Progression		Dimension	Operational Risk Areas							
Stage	Scoring		Fraud	HR	Outsourcing	Distribution Channel	Business Processes	Business Continuity	IT	Compliance
3	150	Implemented, well documented policies and procedures that are understood by relevant staff, and standardized across the entire organisation								
4	200	In addition to Stage 3, processes are reviewed at least annually with the view to assessing effectiveness and introducing improvements								

(f) Risk Monitoring & Reporting – the insurer is to answer the following question:

“Has the insurer taken steps to monitor and report material risks arising from the Operational Risk Areas identified below?”

If the answer to the question is “No” then the insurer does not have to complete the matrix/grid. If the answer to the question is “Yes” then the insurer is to identify the stage of progression of each Operational Risk Area based on the Dimension descriptor. The insurer is then to input an “X” in the grid corresponding to the stage in the matrix table under the relevant Operational Risk Area.

The insurer may provide comments in the space provided to support its responses.

*Risk Monitoring & Reporting Processes:*

Progression		Dimension	Operational Risk Areas							
Stage	Scoring		Fraud	HR	Outsourcing	Distribution Channel	Business Processes	Business Continuity	IT	Compliance
1	50	“ad hoc”								
2	100	Implemented but not standardized across the organisation								

Progression		Dimension	Operational Risk Areas							
Stage	Scoring		Fraud	HR	Outsourcing	Distribution Channel	Business Processes	Business Continuity	IT	Compliance
3	150	Implemented, well documented policies and procedures that are understood by relevant staff, and standardised across the entire organisation								
4	200	In addition to Stage 3, processes are reviewed at least annually with the view to assessing effectiveness and introducing improvements								

(g) Operational Risk Charge Calculation

Subject to the BMA having a different opinion and reassessing the charge through an onsite inspection, the “Total Operational Risk Capital Charge” is applied to the insurer’s BSCR (After Covariance Adjustment) sub-total for purposes of arriving at its ECR for the year-end filing.

(i) Overall CIRA Score – the aggregate of all the total scores from the Corporate Governance, Risk Management Function, Risk Identification, Risk Measurement, Risk Response, Risk Monitoring & Reporting assessment used to determine the Operational Risk Charge %.

(ii) CIRA Scoring Grid – the applicable Operational Risk Charge % that would be used to determine the insurer’s Total Operational Risk Capital Charge.

Overall Score	Applicable Operational Risk Charge % “BSCR (After Covariance Adjustment)”
<= 5200	10%
> 5200 <= 6000	9%
> 6000 <= 6650	8%
> 6650 <= 7250	7%

Overall Score	Applicable Operational Risk Charge % “BSCR (After Covariance Adjustment)”
> 7250 <= 7650	6%
> 7650 <= 7850	5%
> 7850 <= 8050	4%
> 8050 <= 8250	3%
> 8250 <=8450	2%
> 8450	1%

(iii) Total Operational Risk Capital Charge – calculated using the [Operational Risk Charge % x BSCR (After Covariance Adjustment)].

## Summary

### 1 BACKGROUND

The Summary Exhibit has seven key features: Required Capital and Surplus, Available Statutory Capital and Surplus, Minimum Margin of Solvency, ECR and Target Capital Level (“the TCL”), Ratios, Solvency Capital Distribution chart, and Regulatory Action Level graph. Each feature is described below. At the bottom of the page the BSCR formula for combining the various risk capital charges is displayed. The only financial data input into the Summary Exhibit is the BMA approved Capital Contribution of the insurer.

### 2 REQUIRED CAPITAL AND SURPLUS

The BSCR is determined according to the following formula:

$$BSCR = \sqrt{C_{fi}^2 + C_{eq}^2 + C_{int}^2 + C_{prem}^2 + \left(\frac{1}{2}C_{cred} + C_{rsvs}\right)^2 + \left(\frac{1}{2}C_{cred}\right)^2 + C_{cat}^2} + C_{op}, \text{ where}$$

$C_{fi}$  = capital charge in respect of fixed income investment risk;

$C_{eq}$  = capital charge in respect of equity investment risk;

$C_{int}$  = capital charge in respect of interest rate / liquidity risk;

$C_{prem}$  = capital charge in respect of premium risk;

$C_{rsvs}$  = capital charge in respect of reserve risk;

$C_{cred}$  = capital charge in respect of credit risk;

$C_{cat}$  = capital charge in respect of catastrophe risk; and

$C_{op}$  = capital charge in respect of operational risk.

This formula utilizes the square root rule to aggregate the various risks under the assumption that the risks are at least partially independent of one another, and therefore, some diversification benefit is provided when combining the risk charges. The credit risk and reserve risk are combined to reflect the assumption that part of credit risk is directly related to reserve risk. The end result is the BSCR (after covariance adjustment).

The operational risk capital charge is the operational risk charge multiplied by the BSCR (after covariance adjustment). The risk charge ranges from 1% to 10% based on each insurer's self-assessment of the Commercial Insurer's Risk Assessment ("CIRA") framework.

Capital add-ons / reductions may be assessed where the BMA believes that an insurer's risk profile deviates significantly from the risk assumptions underlying the ECR or from the insurer's assessment of its risk management policies and practices. These include, but are not limited to, items such as: provisions for reserve deficiencies or premium inadequacies, significant growth in premiums, and quality of risk management surrounding operational risk.

The BSCR is equal to the sum of the BSCR (after covariance adjustment), operational risk capital charge, and capital add-ons / reductions (if assessed).

### 3 AVAILABLE STATUTORY CAPITAL AND SURPLUS

Available Statutory Capital and Surplus is defined as the Total Statutory Capital and Surplus of the insurer, including subsequent Capital Contribution less Capital Add-ons / Reductions (BMA assessment). All capital contributions are to be approved by the BMA, and all capital add-ons / reductions are determined at the discretion of the BMA.

### 4 MINIMUM MARGIN OF SOLVENCY

The Minimum Margin of Solvency ("the MSM") is prescribed by the Insurance Returns and Solvency Regulations 1980.

### 5 ECR AND TCL

The ECR is the higher of the MSM and the BSCR / approved internal capital model.

The TCL is equal to 120% of the ECR.

6 RATIOS

The BSCR Ratio is the ratio of the Available Statutory Capital and Surplus to the BSCR.

The ECR Ratio is the ratio of the Available Statutory Capital and Surplus to the ECR.

7 SOLVENCY CAPITAL DISTRIBUTION CHART

The Solvency Capital Distribution chart displays the relative contribution of each charge to the BSCR, prior to the covariance adjustment.

8 REGULATORY ACTION LEVEL GRAPH

The Regulatory Action Level graph displays the insurer's Available Statutory Capital and Surplus position relative to the BMA's regulatory action guidelines, where Regulatory Action Level 1 is equal to the insurer's ECR and Regulatory Action Level 2 is equal to the insurer's TCL.

9 ITEMS

(a) — Required Capital and Surplus – The calculation of the Required Capital and Surplus is used for the purpose of determining the required capital level.

Line Item		Description
1	Fixed Income Investment Risk	Based on current year fixed income investment risk (Column (3), Row (c)).
2	Equity Investment Risk	Based on current year equity investment risk (Column (3), Row (d)).
3	Interest Rate / Liquidity Risk	Based on current year interest rate / liquidity risk (Column (4)).

Line Item		Description
4	Premium Risk	Based on current year premium risk (Column (3), Row (e)).
5	Reserve Risk	Based on current year reserve risk (Column (3), Row (c)).
6	Credit Risk	Based on current year credit risk (Column (3), Row (e)).
7	Catastrophe Risk	Based on current year catastrophe risk (Row (i)).
8	BSCR (Prior to Covariance Adjustment)	BSCR (Prior to Covariance Adjustment) is the sum of the line items (1) to (7) above.
9	BSCR (After Covariance Adjustment)	BSCR (After Covariance Adjustment) is the resulting amount after applying the square root rule on line item (8) to reflect a diversification benefit when aggregating all the risks described above.
10	Operational Risk (%)	Operational Risk (%) is the applicable operational risk charge % of “BSCR After Covariance Adjustment” based on the overall score derived from the CIRA framework as prescribed by the BMA.
11	Operational Risk Capital Charge (\$)	Operational Risk Capital Charge (\$) is the resulting amount when the operational risk (%), as prescribed in line item (10), is applied to the BSCR (After Covariance Adjustment).
12	Capital Add-On / Reduction	Capital Add-Ons / Reductions on the Required Capital and Surplus may be assessed where the BMA believes that an insurer’s risk profile deviates significantly from (i) the assumptions underlying the ECR applicable to it; or (ii) the assessment of its risk management policies and practices in calculating the ECR applicable to it.

Line Item		Description
13	BSCR	BSCR is the sum of the line items (9), (11) and (12) above.

10 ITEMS

**(b) — Available Statutory Capital and Surplus** – The calculation of the Available Statutory Capital and Surplus is used for the purpose of determining the appropriate regulatory action level.

Line Item		Description
1	Total Statutory Capital and Surplus	Based on the current year statutory financial statements of the insurer; as reported on Form 1A, Line (40).
2	Capital Contribution	Capital Contributions must be approved by the BMA. Note that a Capital Contribution increases the Total Statutory Capital and Surplus.
3	Pre-Adjustment Available Statutory Capital and Surplus	Pre-Adjustment Available Statutory Capital and Surplus is the sum of lines (1) and (2) above.
4	Capital Add-Ons / Reductions (BMA assessment)	Capital Add-ons / Reductions may be assessed where the BMA believes that an insurer's risk profile deviates significantly from the risk assumptions underlying the ECR.
5	Available Statutory Capital and Surplus	Available Statutory Capital and Surplus is the sum of lines (3) and (4) above.

## Fixed Income Investment Risk

### 1 BACKGROUND

There are various categories of assets comprising of bonds, loans, and other miscellaneous investments that are used to determine the Fixed Income Investment Risk capital charge. The capital and solvency return value of all fixed income securities held by the insurer should be reported. Quoted and unquoted issues are combined. Bonds and mortgage-backed securities issued by any governmental authority (including non-US jurisdictions, government agencies, and government-sponsored enterprises) are to be reported as Government. The government agencies and/or government-sponsored enterprises include: Government National Mortgage Association (Ginnie Mae), the Federal National Mortgage Association (Fannie Mae), and the Federal Home Loan Mortgage Corporation (Freddie Mac), etc. All non-government bonds are to be segregated according to the latest available AM Best, S&P, Moody's, or Fitch ratings of the issuers with non-rated bonds assigned to Non-Rated. Where the ratings differ between agencies, insurers are to segregate according to the most conservative rating. All other types of fixed income securities not included in Line 6 or 7 may be segregated as Lines 1 to 5 or 8 as appropriate.

Where applicable the amounts must reconcile to the appropriate line(s) of the insurer's Form 1A or Schedule II, as identified below.

### 2 FIXED INCOME INVESTMENT RISK CAPITAL CHARGE

The fixed income investment risk charge calculation can be summarised by the following formula:

$$C_{fi} = \sum_i \chi_i \times FIastclass_i, \quad \text{where}$$

$i$  ranges over the classes set out below;

$\chi_i$  = BMA supplied asset class capital charge factor for type of fixed income asset class  $i$ ; and

$FIastclass_i$  = value of investment in fixed income asset class  $i$ .

3 ITEMS

(a) — Bonds by Rating Category – Total must reconcile to Form 1A, Lines (2b) and (3b).

Line Item		Description
1	Government Bonds	All quoted and unquoted bonds or mortgage-backed securities issued by any government authority (including non-US jurisdiction, government agencies, and government-sponsored enterprises); as reported on Schedule II, Line (1) in the “Total” Column.
2	High Investment Grade Bonds (AAA & AA)	All quoted and unquoted non-government bonds rated AAA & AA by rating agencies mentioned above or equivalent; as reported on Schedule II, Line (2) in the “Total” Column.
3	Medium Investment Grade Bonds (A)	All quoted and unquoted non-government bonds rated A by rating agencies mentioned above or equivalent; as reported on Schedule II, Line (3) in the “Total” Column.
4	Low Investment Grade Bonds (BBB)	All quoted and unquoted non-government bonds rated BBB by rating agencies mentioned above or equivalent; as reported on Schedule II, Line (4) in the “Total” Column.
5	Non-Investment Grade Bonds	All quoted and unquoted non-government bonds rated as non-investment grade by rating agencies mentioned above or equivalent; as reported on Schedule II, Line (5) in the “Total” Column.
6	Mortgage-backed securities	All quoted and unquoted mortgage-backed securities not issued by any government agencies or government-sponsored enterprises; as reported on Schedule II, Line (6) in the “Total” Column.
7	Mutual Funds	All quoted and unquoted mutual funds; as reported on Schedule II, Line (7) in the “Total” Column.
8	Non-Rated Bonds	All quoted and unquoted non-government bonds non-rated by rating agencies mentioned above or equivalent; as reported on Schedule II, Line (8) in the “Total” Column.

(b) — Other Fixed Income Investments

Line Item		Description
1	Mortgage Loans	Based on current year Form 1A, Line (5c).
2	Collateral Loans	Based on current year Form 1A, Line (8).
3	Cash and Time Deposits	Based on current year Form 1A, Line (1).

## Equity Investment Risk

### 1 BACKGROUND

There are various categories of equity investments comprising common stocks, preferred stocks, real estate, and other miscellaneous investments that are used to determine the Equity Investment Risk capital charge. All non-affiliated stocks held by the insurer should be input, including both quoted and unquoted issues.

Stocks and real estate should be reported on a basis consistent with that used for purposes of statutory financial reporting. For example, if real estate was reported at market value on Form 1A of the latest statutory submission to the BMA, then the market value of real estate should be input to the BSCR. Where applicable, the amounts must reconcile to the appropriate line(s) of the insurer's Form 1A.

### 2 EQUITY INVESTMENT RISK CAPITAL CHARGE

The equity investment risk charge calculation can be summarised by the following formula:

$$C_{eq} = \sum_i \chi_i \times Eqastclass_i, \quad \text{where}$$

$i$  = ranges over the classes set out below;

$\chi_i$  = BMA supplied asset class capital factor for type of equity class  $i$ ; and

$Eqastclass_i$  = value of investment in corresponding asset class  $i$ .

3 ITEMS

(a) — Common Stocks

Line Item		Description
1	Quoted Common Stocks	Based on current year Form 1A, Line (2c)-i.
2	Unquoted Common Stocks	Based on current year Form 1A, Line (3c)-i.
3	Mutual Funds	Based on current year Form 1A, Lines (2c)-iii and (3c)-iii.

(b) — Preferred Stocks

Line Item		Description
1	Quoted Preferred Stocks	Based on current year Form 1A, Line (2c)-ii.
2	Unquoted Preferred Stocks	Based on current year Form 1A, Line (3c)-ii.

(c) — Other Equity Investments

Line Item		Description
1	Real Estate: Company -Occupied Less Encumbrances	Based on current year Form 1A, Line (7a).
2	Real Estate: Other Properties Less Encumbrances	Based on current year Form 1A, Line (7b).
3	Other Equity Investments	Based on current year Form 1A, Lines (2e) and (3e).
4	Other Tangible Assets – Net of Segregated Account Companies	Based on current year Form 1A, Lines (13e) and (14d) less Line (13b); all other equity-related assets, including derivatives, deposit assets, other sundry assets, letters of credit, guarantees to affiliates, and other instruments.

## Interest Rate / Liquidity Risk

### 1 BACKGROUND

The interest rate / liquidity risk charge is based on Form 1A amounts for quoted and unquoted bonds and debentures - other, preferred stocks, and mortgage loans. It represents the risk that these assets may lose market value when interest rates are rising. The charge is calculated by applying the “shock” of a 2.0% increase in interest rates to the asset portfolio given the insurer’s effective asset and liability durations.

### 2. INTEREST RATE / LIQUIDITY RISK CAPITAL CHARGE

The interest rate / liquidity risk charge calculation can be summarised by the following formula:

$$C_{\text{int}} = \text{bonds} \times \text{duration} \times \text{marketdecline}, \quad \text{where}$$

*bonds* = quoted and unquoted value of bonds and debentures - other, preferred stocks or mortgage loans;

*duration* = the higher of 1 or the insurer’s effective asset duration less the insurer’s effective liability duration or the insurer’s effective liability duration less the insurer’s effective asset duration; and

*marketdecline* = assumed interest rate shock supplied by BMA.

### 3 ITEMS

Bonds and Debentures – Based on current year Form 1A, Lines (2a)-ii and (3a)-ii; total quoted and unquoted value of bonds and debentures – other - portfolio (excluding bonds and debentures held – to – maturity which are to be valued at amortised cost).

Preferred Stocks – Based on current year Form 1A, Lines (2c)-ii and (3c)-ii; total quoted and unquoted value of preferred stocks portfolio.

Mortgage Loans – Based on current year Form 1A, Line (5c); total amortized cost (outstanding principal amount less any provision made for doubtful collection) of mortgage loan portfolio.

Effective Duration of Assets – The effective duration calculation is based on the bonds and debentures – other (Form 1A, Lines (2a)-ii and (3a)-ii, preferred stocks (Form 1A, Lines (2c)-ii and (3c)-ii, and mortgage loans portfolios (Form 1A, Line (5c)). The effective asset duration is pulled from Schedule V, Line (c).

Effective Duration of Liabilities – The effective duration calculation is based on the reserves (Form 1A, Lines (17) and (18)). The effective liability duration is pulled from Schedule V, Line (d).

## Credit Risk

### 1 BACKGROUND

Credit risks are partitioned into four categories: accounts and premiums receivable, reinsurance balances receivable, all other receivables, and reinsurance recoverable balance. Where applicable, amounts should reconcile to the corresponding line(s) of the insurer's Form 1A.

### 2 CREDIT RISK CAPITAL CHARGE

The credit risk charge calculation can be summarised by the following formula:

$$C_{cred} = \sum_i \delta_i \times debtor_i, \quad \text{where}$$

$\delta_i$  = BMA supplied credit risk capital charge factor for type of debtor  $i$ ; and

$debtor_i$  = receivable amount from debtor  $i$ .

### 3 ITEMS

(a) — Accounts and Premiums Receivable – (i) amounts receivable on account of policies of insurance from any person, whether an affiliate or not, should be included; (ii) amounts due from reinsurers and funds held by ceding reinsurers should not be included; (iii) all uncollectible amounts, as determined by the insurer, should be deducted.

Line Item		Description
1	In Course of Collection	Based on current year Form 1A, Line (10a).

Line Item		Description
2	Deferred - Not Yet Due	Based on current year Form 1A, Line (10b).
3	Receivables from Retrocessional Contracts Less: Collateralized Balances	Based on current year Form 1A, Line (10c) less collateralized balance as reported in Notes to Form 1A.  Collateralized balances are all collaterals issued in favour of the insurer relating to accounts and premiums receivable. Assets accounted in Form 1A, Line (34) should not be included here.

**(b) — Reinsurance Balances Receivable** – (i) amounts receivable on account of policies of reinsurance from any person, whether an affiliate or not, should be included; (ii) any amount included in ‘Accounts and Premiums Receivable’ and ‘Funds Held by Ceding Reinsurers’ should not be included; (iii) all uncollectible amounts, as determined by the insurer, should be deducted.

Line Item		Description
1	Foreign Affiliates	Based on current year Form 1A, Line (11a).
2	Domestic Affiliates	Based on current year Form 1A, Line (11b).
3	Pools & Associations	Based on current year Form 1A, Line (11c).
4	All Other Insurers	Based on current year Form 1A, Line (11d).

Line Item		Description
5	Less: Letters of Credit	Based on current year Notes to Form 1A, Line (11). Letters of credit are the amount of the letters of credit issued in favour of the insurer relating to reinsurance receivable. Assets accounted for in Form 1A, Line (14) should not be included here.  Note that this item is to be entered as a positive number.
6	Less: Funds Held under Reinsurance Contracts	Based on current year Form 1A, Line (34c).  Note that this item is to be entered as a positive number.

(c) — All Other Receivables

Line Item		Description
1	Funds Held by Ceding Reinsurers	Based on current year Form 1A, Line (12c).
2	Accrued Investment Income	Based on current year Form 1A, Line (9).
3	Investments in and Advances to Affiliates	Based on current year Form 1A, Line (4c).

(d) — Reinsurance Recoverable Balance

Line Item		Description
1	Foreign Affiliates	Based on current year Form 1A, Line (17b)-i.
2	Domestic Affiliates	Based on current year Form 1A, Line (17b)-ii.
3	Pools & Associations	Based on current year Form 1A, Line (17b)-iii.
4	All Other Insurers	Based on current year Form 1A, Line (17b)-iv.

## Premium Risk

### 1 BACKGROUND

The premium risk charge is based on reported net premiums written for the latest calendar year by predefined statutory lines of business. Note that although net premiums written for Property Catastrophe business are input to this section, they do not enter the calculation of the premium risk charge. All capital requirements pertaining to catastrophe exposures are explicitly calculated in the Catastrophe Risk section.

The first step of the calculation applies a statutory line of business specific premium risk capital factor to the respective net premiums written amounts. In the second step of the calculation, a concentration adjustment is determined to reflect the overall diversification of the premium risk. Finally, there is a further adjustment to reflect the fact that some of the lines of business premiums other than Property Catastrophe, include a loading for losses resulting from natural catastrophes. The appropriate risk charge for this portion of the premiums is calculated in the Catastrophe Risk section; the premium risk charge is reduced to avoid double counting.

The concentration adjustment factor is based on the ratio of the largest individual line of net premiums written to total net premiums written. If all net premiums written are allocated to a single line of business (other than Property Catastrophe), this ratio is equal to 100%. If net premiums written are evenly spread among 5 lines of business (other than Property Catastrophe), this ratio is equal to 20%. The concentration adjustment factor is obtained by multiplying this ratio by 40% and then adding 60%. So for an insurer with only one line of business the concentration adjustment factor is 100%, which means that no adjustment is made for diversification and the required premium risk charge is the same as that calculated in the first step. For an insurer with net premiums written that are evenly spread among 5 lines of business the concentration adjustment factor is 68%, leading to a required premium risk charge that is lower than the sum of all the individual lines of business premium risk charges calculated in the first step.

### 2 PREMIUM RISK CAPITAL CHARGE

The premium risk charge calculation can be summarised by the following formula:

$$C_{prem} = \left[ \sum_{i>1} \alpha_i \times lineprem_i \right] \times \left[ \max_{i>1} \left\{ \frac{lineprem_i}{totalprem} \right\} \times \mu + \mathcal{G} \right] - \left[ avgpremcap \times \frac{avgannloss}{catlossratio} \right], \text{ where}$$

- $\alpha_i$  = line of business  $i$  premium risk capital charge factor;
- $totalprem$  = total premium measure over all lines of business (except Property Catastrophe), i.e.  $\sum_{i>1} lineprem_i$  ;
- $lineprem_i$  = premium measure for line of business  $i$  ;
- $\mu$  = additional concentration adjustment factor equal to 40%;
- $\varrho$  = minimum concentration adjustment factor equal to 60%;
- $avgpremcap$  = weighted average premium risk capital charge factor (after concentration adjustment);
- $avgannloss$  = average annual loss estimated with catastrophe models; and
- $catlossratio$  = expected industry average catastrophe loss ratio provided by BMA.

### 3 ITEMS

(a) — Lines of Business – As categorized by the twenty-four predefined statutory lines of business.

Line Item		Description
1	Net Premiums Written	Column (1): Current year net premiums written (after reinsurance) by predefined statutory line of business, as reported on Schedule IV, Lines (1) to (24). Total must tie to the Total Net Premiums Written of Form 2A, Line (3).
2	Capital Factor	Column (2): Supplied by BMA; premium charge factors for individual lines of business.

Line Item		Description
3	Required Capital	Column (3): Calculated using [Column (1) x Column (2)]; premium charge amounts for individual lines of business.

(b) — Concentration Adjustment Calculation – Calculates a factor that determines how much credit is given for diversification of premium risk across all lines of business other than Property Catastrophe.

Line Item		Description
1	Maximum Premium	Row (i): Calculated using Max [Column (1) of (a) excluding Property Catastrophe]; largest premium amount appearing in Column (1) of (a), excluding the premium amount for Property Catastrophe.
2	Total Premium	Row (ii): Calculated using Sum [Column (1) of (a) excluding Property Catastrophe]; total of premium amounts appearing in Column (1) of (a), excluding the premium amount for Property Catastrophe.
3	Maximum Premium / Total Premium	Row (iii): Calculated using [Row (i) / Row (ii)]; ratio that measures the degree of concentration.
4	Maximum Adjustment	Row (iv): Supplied by BMA; parameter that limits the maximum credit that is given for diversification.
5	Minimum Adjustment Factor	Row (vi): Calculated using [1 - Row (iv)]; lower bound for the concentration adjustment factor. The formula ensures that no diversification credit will be given when all net premiums written other than Property Catastrophe are concentrated in a single line of business.
6	Concentration Adjustment Factor	Calculated using [Row (iii) x Row (iv) + Row (vi)].

(c) — Required Capital Charge – Calculated using [(Total of Column (3) of (a)) x (Concentration Adjustment Factor)]; premium risk capital charge, after concentration factor adjustment, but before adjustment for natural catastrophe exposure.

(d) — Catastrophe Premium Adjustment Calculation – Calculation reflects a reduction to the required premium risk capital for the "catastrophe-exposed" portion of the premium that is otherwise contemplated within the catastrophe risk capital charge. See Catastrophe Risk section for further information.

Line Item		Description
1	Average Annual Loss Excluding Property Catastrophe (AAL)	Row (i): Pulled from Catastrophe Risk section; the expected net natural catastrophe loss (after reinsurance), including reinstatement premiums, for annual aggregate exposure to all risks and perils other than those relating to the Property Catastrophe line of business. See Catastrophe Risk section for further information.
2	Industry Catastrophe Loss Ratio	Row (ii): Pulled from Catastrophe Risk section; used to calculate the embedded catastrophe premiums from lines of business other than Property Catastrophe. See Catastrophe Risk section for further information.
3	Average Capital Factor	Row (iii): Calculated using (c) / [Row (ii) of (b)]; ratio of required premium risk capital charge after concentration adjustment to total net premiums written excluding Property Catastrophe.
4	Catastrophe Premium Adjustment	Calculated using [Row (i) / Row (ii) x Row (iii)].

(e) — Required Capital Charge Adjusted for Catastrophe Premium – Calculated using [(c) - (d)]; the premium risk capital charge (after concentration factor and catastrophe adjustment) is carried to the Summary section.

## Reserve Risk

### 1 BACKGROUND

The reserve risk charge is based on the statutory net loss and loss expense provisions by predefined statutory lines of business. The first step of the calculation applies a line of business specific reserve risk capital factor to the respective reserve amounts. In the second step of the calculation a concentration adjustment is determined to reflect the overall diversification of the reserve risk.

The concentration adjustment factor is based on the ratio of the largest individual line of business reserve to total reserves. If all reserves are allocated to a single line of business, this ratio is equal to 100%. If the reserves are evenly spread among 5 lines of business, this ratio is equal to 20%. The concentration adjustment factor is obtained by multiplying this ratio by 40% and then adding 60%. So for an insurer with only one line of business the concentration adjustment factor is 100%, which means that no adjustment is made for diversification and the required reserve risk charge is the same as that calculated in the first step. For an insurer with reserves that are evenly spread among 5 lines of business the concentration adjustment factor is 68%, leading to a required reserve risk charge that is lower than the sum of all the individual line of business reserve risk charges calculated in the first step.

### 2 RESERVE RISK CAPITAL CHARGE

The reserve risk charge calculation can be summarised by the following formula:

$$C_{rsvs} = \left[ \sum_i \beta_i \times lineRSVS_i \right] \times \left[ \max_i \left\{ \frac{lineRSVS_i}{totalRSVS} \right\} \times \mu + \mathcal{G} \right], \quad \text{where}$$

$\beta_i$  = individual line of business reserve risk charge factor;

$totalRSVS$  = total reserves over all lines of business, i.e.  $\sum_i lineRSVS_i$  ;

$lineRSVS_i$  = reserves for individual line of business  $i$  ;

$\mu$  = additional concentration adjustment factor equal to 40%; and

$\rho$  = minimum concentration adjustment factor equal to 60%.

3 ITEMS

(a) — Lines of Business – As categorized by the twenty-four predefined statutory lines of business.

Line Item		Description
1	Net Loss and Loss Expense Provisions	Column (1): Net loss and loss expense provisions by predefined statutory line of business, as reported on Schedule III, Lines (1) to (24). Total must tie to the Net Loss and Loss Expense Provisions of the statutory financial statements (Form 1A, Line (17) d) and should be input on an undiscounted basis.
2	Capital Factor	Column (2): Supplied by BMA; reserve charge factors for individual lines of business.
3	Required Capital	Column (3): Calculated using [Column (1) x Column (2)]; reserve charge amounts for individual lines of business.

(b) — Concentration Adjustment Calculation – Calculates a factor that determines how much credit is given for diversification of reserve risk across all lines of business.

Line Item		Description
1	Maximum Reserve	Row (i): Calculated using Max [Column (1) of (a)]; largest reserve amount appearing in [Column (1) of (a)].
2	Total Reserve	Row (ii): Calculated using Sum [Column (1) of (a)]; total of reserve amounts appearing in [Column (1) of (a)].

Line Item		Description
3	Maximum Reserve / Total Reserve	Row (iii): Calculated using [Row (i) / Row (ii)]; this ratio measures the degree of concentration.
4	Maximum Adjustment	Row (iv): Supplied by BMA; parameter that limits the maximum credit that is given for diversification.
5	Minimum Adjustment Factor	Row (vi): Calculated using [1 - Row (iv)]; lower bound for the concentration adjustment factor. The formula ensures that no diversification credit will be given when all net premiums written are concentrated in a single line of business.
6	Concentration Adjustment Factor	Calculated using [Row (iii) x Row (iv) + Row (vi)].

(c) — Required Capital Charge – Calculated using [(Total of Column (3) of (a)) x (Concentration Adjustment Factor)]; the reserve capital charge (after concentration factor adjustment) is carried to the Summary section.

## Catastrophe Risk

### 1 BACKGROUND

The catastrophe risk charge is based on insurer-specific catastrophe risk modelling output. All exposures and premiums used in the Probable Maximum Loss (PML) and AAL calculations should include amounts for second, third, and subsequent events or losses following the initial loss event. Modeled losses should include demand surge, storm surge, fire following earthquakes and secondary uncertainty.

The calculated catastrophe risk charge has two components. The first component is the average premium shortfall for the top 1% worst case scenarios (i.e. at the 99.0% TVar level). The second component is a credit risk charge for reinsurance recoverables under the 1% worst case scenarios. Since the PML calculations use annual aggregate exposure for all risks the formula uses an imputed Total Catastrophe Premium in its calculation of the premium shortfall component. In addition to actual Property Catastrophe Premiums, this imputed Total Catastrophe Premium is based on the AAL divided by the industry catastrophe loss ratio as determined by the BMA.

### 2 CATASTROPHE RISK CAPITAL CHARGE

The catastrophe risk charge calculation can be summarised by the following formulae:

$$C_{cat} = NetPML - Netcatprem + CR_{PML}, \quad \text{where}$$

$Netcatprem$  = Property catastrophe premium + (modeled AAL) / (estimated industry catastrophe loss ratio); and

$CR_{PML}$  = Credit risk charge associated with reinsurance recoveries of ceded catastrophe losses.

### 3 ITEMS

(a) — Gross Probable Maximum Loss – Based on the insurer’s CAT models; probable maximum gross natural catastrophe loss (prior to reinsurance) at the 99.0% TVar level for annual aggregate exposure to all related risks and perils, including reinstatement premiums, for the year following the “relevant year” as reported on Schedule V, Line (g).

(b) — Net Probable Maximum Loss – Based on the insurer’s CAT models; probable maximum net natural catastrophe loss (after reinsurance) at the 99.0% TVar level for annual aggregate exposure to all related risks and perils, including reinstatement premiums, for the year following the “relevant year” as reported on Schedule V, Line (h).

(c) — Average Annual Loss Excluding Property Catastrophe (AAL) – Based on the insurer CAT models; the expected net natural catastrophe loss (after reinsurance), including reinstatement premiums, for annual aggregate exposure to all related risks and perils other than those relating to the Property Catastrophe line of business for the year following the “relevant year” as reported on Schedule V, Line (i). The AAL should be calculated from the same underlying loss distribution used to determine the Gross PML and Net PML (excluding the property catastrophe component).

(d) — Industry Catastrophe Loss Ratio – Supplied by BMA; used to calculate the embedded catastrophe premiums from lines of business other than Property Catastrophe.

(e) — Property Catastrophe Premium – Copied from Premium Risk section; current year net premiums written amount for Property Catastrophe line of business as reported on Schedule IV, Line (1).

(f) — Total Catastrophe Premium – is calculated using  $[(c) / (d) + (e)]$ ; used to calculate the embedded catastrophe premiums from lines of business other than Property Catastrophe.

(g) — Credit Risk Capital Factor – Supplied by BMA; credit risk factor applied to ceded catastrophe losses at the 99.0% TVar level.

(h) — Credit Risk Charge – Calculated using  $[(a) - (b) \times (g)]$ ; ceded catastrophe losses times the catastrophe credit risk capital factor.

(i) — Catastrophe Capital Charge – Calculated using  $[(b) - (f) + (h)]$ ; the catastrophe capital charge is carried to the Summary section.

## Appendix A - Glossary

**Act** – Means the Insurance Act 1978.

**Approved Internal Capital Model** – Means a model approved under paragraph 5 of the Rules.

**Available Statutory Capital and Surplus** – Available Statutory Capital and Surplus is defined as Total Statutory Capital and Surplus including subsequent Capital Contribution including "Deductions". All capital contributions are to be approved by the BMA, and all adjustments are determined at the discretion of the BMA.

**Average Annual Loss ("AAL")** – Based on insurer CAT models; mean expected net natural catastrophe loss (after reinsurance), including reinstatement premiums, for annual aggregate exposure to all related risks and perils other than those relating to the Property Catastrophe line of business for the year following the "relevant year" as reported on Schedule V. The AAL should be calculated from the same underlying loss distribution used to determine the Gross PML and Net PML (excluding the property catastrophe component).

**Bermuda Monetary Authority ("BMA")** – The BMA is responsible for the licensing, supervision and regulation of financial institutions including those conducting deposit-taking, insurance, investment and trust business in Bermuda. It is also the issuing authority for Bermuda's bank notes and coinage, as well as providing a range of services and advice to Government on insurance incorporations and on banking and other financial and monetary matters.

**Bermuda Solvency Capital Requirement ("BSCR")** – Establishes a measure of solvency capital that is used by the BMA to monitor the capital adequacy of Class 4 and 3B insurers domiciled in Bermuda. The BSCR is determined by combining the calculated capital for each risk category (excluding operational risk) and applying a covariance adjustment with the square root rule, which is further adjusted to include insurer-specific operational risk and capital add-on.

**BSCR Ratio** – The BSCR Ratio is the ratio of the Available Statutory Capital and Surplus to the BSCR (after covariance adjustment).

**Capital and Solvency Return** – Means such return relating to the insurer's risk management practices and to the information used by the insurer to calculate its ECR as may be prescribed by or under Rules made under section 6A.

**CAT** – Abbreviation of the word catastrophe.

**Catastrophe Risk** – Means the risk of a single catastrophic event or series of catastrophic events that lead to a significant deviation in actual claims from the total expected claims;

**Class 4 (Re)insurers** – A body corporate is registrable as a Class 4 (re)insurer if at the time of its application for registration it has a total statutory capital and surplus of not less than \$100,000,000 and intends to carry on insurance business including excess liability business or property catastrophe reinsurance business.

**Class 3B (Re)insurers** – A body corporate is registrable as a Class 3B (re)insurer if at the time of its application for registration it intends to carry on insurance business in circumstances where its percentage of unrelated business exceeds or is projected to exceed, 50% of net premiums written or net loss and loss expense provisions and where the unrelated business premium exceeds \$50,000,000.

**Concentration Adjustment Factor** – The concentration adjustment factor is used in relation to the premium risk and the reserve risk. It is based on the ratio of the largest individual line of business amount to total amount. The Factor will decrease as the number of lines of business increases to a minimum value of 60%.

**Concentration Risk** – Means the risk of exposure to losses associated with inadequate diversification of portfolios of assets or liabilities.

**Credit Risk** – Includes the risk of loss arising from an insurer’s inability to collect funds from debtors.

**Enhanced Capital Requirement (“ECR”)** – Establishes a measure of solvency capital that is used by the BMA to monitor the capital adequacy of Class 4 and 3B insurers domiciled in Bermuda. It is equal to the higher of a Class 4 and 3B insurer’s approved internal capital model/BSCR or MSM.

**ECR Ratio** – The ECR Ratio is the ratio of Available Statutory Capital and Surplus to the ECR.

**Form 1A** – Statutory balance sheet as defined by the BMA.

**Form 2A** – Statutory statement of income as defined by the BMA.

**Form 8** – Statutory statement of capital and surplus as defined by the BMA.

**Insurance (Prudential Standards) (Class 4 and Class 3B Solvency Requirement) Rules 2008, including any amendments thereto (“Rules”)** – Under section 6A of the Act, the BMA may make Rules prescribing prudential standards in relation to (a) ECR, (b) Capital and solvency returns, (c) Insurance reserves, and (d) Eligible capital that must be complied with by Class 4 and Class 3B insurers.

**Legal Risk** – Means the risk arising from (a) an insurer’s failure to comply with statutory or regulatory obligations; or (b) failure to comply with its bye-laws; or (c) failure to comply with any contractual agreement.

**Liquidity Risk** – Means (a) the risk arising from an insurer’s inability to meet its obligations as they fall due or (b) an insurer’s inability to meet such obligations except at excessive costs.

**Market Risk** – Means the risk arising from fluctuations in values of, or income from, assets or in interest rates or exchange rates.

**Non-Rated Bonds** – Bonds that have not been rated by AM Best, Standard & Poor's, Moody's, Fitch or equivalent agencies.

**Operational Risk** – Means the risk of loss resulting from inadequate or failed internal processes, people and systems or from external events including legal risk.

**PML** – See Probable Maximum Loss definition.

**Premium Risk** – Means the risk that premium is insufficient to meet future obligations.

**Probable Maximum Loss (“PML”)** – Based on insurer CAT models; probable maximum loss is the anticipated maximum loss that can occur with a certain level of probability. The BSCR utilizes a probable maximum natural catastrophe loss at a 99.0% TVaR level for annual aggregate exposure to all related risks and all perils, including reinstatement premiums.

**Quoted** – Assets that are carried at fair value quoted on an exchange or a determinable market.

**Rated Bonds** – Bonds rated with respect to the latest available AM Best, Standard & Poor's, Moody's, Fitch or equivalent agencies.

**Regulatory Action Level** – Defined by BMA's regulatory action guidelines.

**Relevant Year** – In relation to an insurer, means its financial year.

**Reputational Risk** – Includes risk of adverse publicity regarding an insurer's business practices and associations.

**Required Capital and Surplus** – see Enhanced Capital Requirement.

**Reserve Risk** – Means the risk that an insurer's reserves would be insufficient to satisfy its obligations.

**Retrocessional Contracts** – Reinsurance contract whereby one reinsurer transfers all or part of the reinsurance risk that it has assumed or will assume to another reinsurer.

**Rules** – See Insurance (Prudential Standards) (Class 4 and Class 3B Solvency Requirements) Rules 2008, including any amendments thereto.

**Schedule II** – Schedule of fixed income investments by rating category as defined by the BMA.

**Schedule III** – Schedule of loss and loss expense provisions by line of business as defined by the BMA.

**Schedule IV** – Schedule of premium written by line of business as defined by the BMA.

**Schedule V** – Schedule of risk management as defined by the BMA.

**Schedule VI** – Schedule of fixed income securities as defined by the BMA.

**Schedule IX** – Schedule of commercial insurer's solvency self-assessment as defined by the BMA.

**Schedule X** – Catastrophe risk return as defined by the BMA.

**Schedule XI** – Schedule of loss triangles (Schedule XI(a)) or reconciliation of net loss reserves (Schedule XI(b)) as defined by the BMA.

**Schedule XII** – Schedule of eligible capital as defined by the BMA.

**Square Root Rule** – The square root rule is an approximation of the covariance effect of the risk categories.

**Strategic Risk** – Means the risk of an insurer’s inability to implement appropriate business plans and strategies, make decisions, allocate resources, or adapt to changes in the business environment.

**Tail Value-at-Risk (“TVaR”)** – Means the conditional average potential given that the loss outcome exceeds a given threshold.