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Technical Specifications for RBC 2 YE2018 Parallel Run

MAS

Monetary Authority of Singapore

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1 APPLICABILITY OF RBC 2

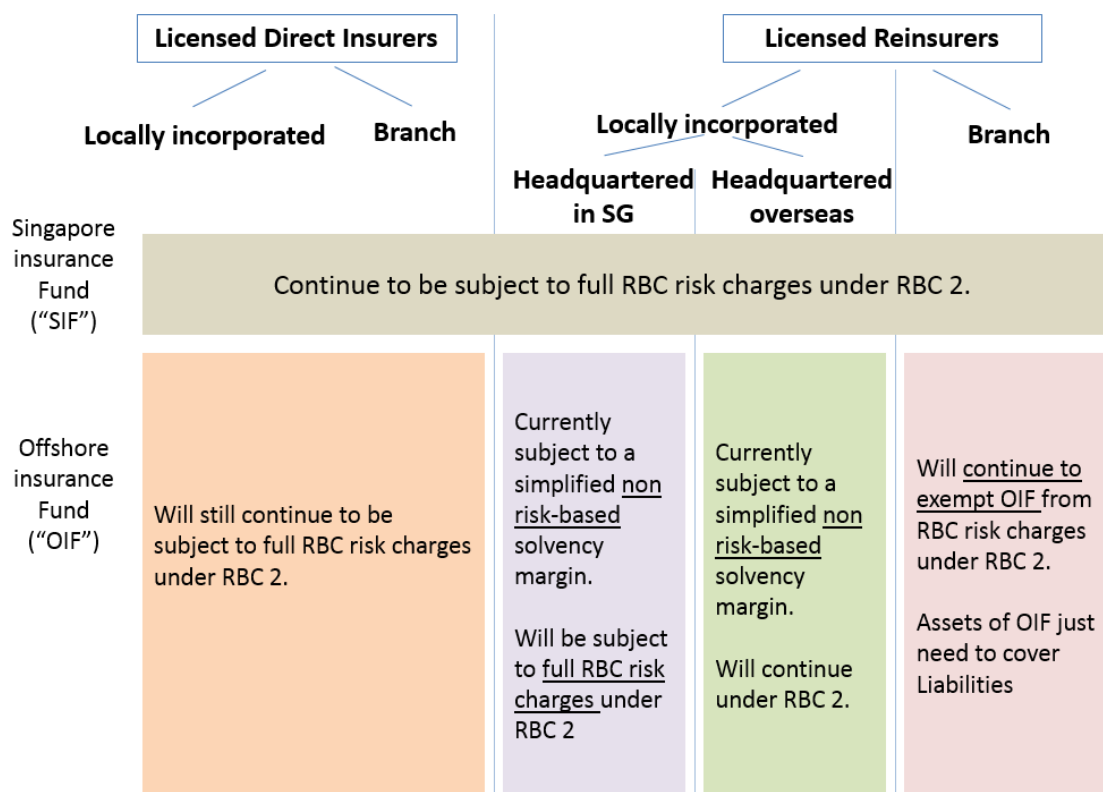
1.1 MAS has conducted three rounds of impact studies on the RBC 2 proposals. The most recent impact study was conducted from September to November 2018. All insurers (with the exception of captives, Lloyd's insurers and marine mutuals) participated in the 2018 impact study.

1.2 Consistent with the approach taken under previous impact studies, **all insurers (with the exception of captives, Lloyd's insurers and marine mutuals) will be required to conduct a parallel run based on the finalised proposals in this technical specifications document for the year ended 31 December 2018.** This will allow the insurers to assess the impact of finalised RBC 2 proposals on their capital positions and prepare for RBC 2 implementation from 1 January 2020. MAS expects to conduct a final parallel run for the year ended 31 December 2019.

1.3 Locally incorporated reinsurers which are headquartered in Singapore (where MAS is the home supervisor) are to assume that RBC 2 will be applied immediately on its offshore insurance funds as well as its branches for the purpose of the parallel run based on 31 December 2018 valuation date. Locally incorporated reinsurers that are headquartered overseas (where MAS is not the home supervisor) will continue to be subject to the current simplified solvency requirements¹, whilst reinsurance branches will be exempt from solvency requirements for the offshore insurance fund². This is elaborated in Section 7 of the Third Consultation Paper, and summarised in the diagram below.

¹ For avoidance of doubt, the OIF of locally incorporated reinsurers that are headquartered overseas (where MAS is not the home supervisor) is only subject to the current simplified solvency requirements (as described in footnote 98 of the "RBC 2 Review – Third Consultation paper" issued in July 2016 ("Third Consultation Paper"), and not subject to any of the requirements set out in Section 4 of this document.

² For avoidance of doubt, the OIF of licensed reinsurance branches is exempted from any form of solvency requirements, including those set out in Section 4 of this document.



1.4 Instructions on the YE2018 parallel run can be found in Section 7 of this document. Excel workbooks with forms designed to capture the necessary information for analysis are provided to insurers for completion, as elaborated below.

1.5 To perform the parallel run, the following documents are made available:

- (a) This technical specifications document;
- (b) MAS_RBC 2 workbook YE2018.xlsx – main workbook for results of the parallel run ("Main Workbook");
- (c) MAS_MA_YE2018.xlsx – workbook for deriving the amount of Matching Adjustment ("MA Workbook");
- (d) SGD and USD Spot Rates_YE2018_Smith Wilson.xlsx – workbook for generating discount rates for liabilities ("Discount Rate Workbook"); and
- (e) Questionnaire for YE2018 RBC 2 Parallel Run.docx – Questionnaire on additional details requested on the parallel run ("Questionnaire").

2 PRESCRIBED CAPITAL REQUIREMENT (“PCR”) AND MINIMUM CAPITAL REQUIREMENT (“MCR”)

2.1 The Capital Adequacy Ratio (“CAR”) and Fund Solvency Ratio (“FSR”) remain relevant under RBC 2, meaning that insurers will be asked to compute these two ratios. The CAR continues to be the ratio of Financial Resources (“FR”) / Total Risk Requirements (“TRR”) at the company level. In the case of the FSR, it will be the ratio of FR / TRR at the adjusted fund level, instead of the insurance fund level (see the table below). Notwithstanding that, insurers are still required to ensure that there are sufficient assets to meet liabilities at insurance fund level. Adjusted fund level is for the sole purpose of monitoring solvency requirement.

Current Fund Levels under RBC	Adjusted Fund Levels under RBC 2
<ul style="list-style-type: none"> • Singapore Insurance Fund (“SIF”) – Participating (“Par”) • SIF Non-Par • SIF – Investment-linked (“Linked”) • Offshore Insurance Fund (“OIF”) – Par • OIF – Non-Par • OIF – Linked • SIF – General • OIF – General 	<ul style="list-style-type: none"> • SIF – Par • SIF – Others • OIF – Par • OIF – Others

Solvency Intervention Levels

2.2 MAS will set two transparent triggers for supervisory intervention when assessing the capital adequacy³ of an insurer, at both the company and adjusted fund level:

- (a) PCR, which is the higher supervisory intervention level at which the insurer is required to hold sufficient FR to meet the TRR which correspond to a Value-at-Risk (“VaR”) of 99.5%⁴ confidence level over a one-year period. Section 4 of this document provides details on the risk requirements⁵ (calibrated at 99.5% VaR), whilst Section 5 provides details on how FR is computed; and

³ Similar to existing requirements under regulation 4 of the Insurance (Valuation and Capital) Regulations 2004, financial resources of the insurer at a company level shall also not be less than \$5million at all times.

⁴ The 99.5% confidence level corresponds to an implied credit rating of at least an investment grade, and many insurance regulators of major jurisdictions have targeted this level in setting their regulatory capital requirements, including the global insurance capital standards being developed currently.

⁵ The relevant risk requirements, and the definitions of the risks under RBC 2 can be found in **Appendix 1**.

- (b) MCR, which is the lower supervisory intervention level at which the insurer is required to hold sufficient FR to meet the TRR which correspond to a VaR of 90%⁶ confidence level over a one-year period. MCR is calibrated as 50% of the PCR.

2.3 An insurer would have met the PCR at the company and adjusted fund level when its CAR and FSR are at least 100% respectively. If the insurer does not meet the PCR, that is, the CAR or FSR falls below 100%, the insurer will need to submit to MAS a plan and restore its capital position within a timeframe agreed with MAS. During periods of exceptional market stresses, MAS has the discretion to allow insurers more time to restore their capital positions to PCR level.

2.4 If an insurer does not meet the MCR, that is, the CAR or FSR falls below 50%, MAS may require the insurer to stop new business, withdraw the insurer's licence, or adopt any regulatory measure deemed necessary and in accordance with its mandate.

2.5 Given that RBC 2 is a more comprehensive and risk-sensitive framework than the current RBC, any capital add-ons for supervisory purposes is expected to occur under relatively more limited circumstances. As set out in the Third Consultation Paper, such circumstances may include, but not limited to:

- (a) Where the risk profile of the insurer is higher than the industry level that has been used in the calibration of the risk requirements under RBC 2;
- (b) To account for higher operational risks such as when an insurer exhibits severe operational control deficiencies and the prescribed formula does not adequately buffer for the increased operational risks;
- (c) To account for deficiencies in the insurer's controls and processes which may lead to gross under-estimation of policy liabilities or capital positions, as well as inaccurate financial figures;
- (d) To account for deficiencies in the insurer's own economic capital model; and
- (e) To account for offshore risks if it is assessed that a reinsurer did not manage these risks adequately.

2.6 The high impact surcharge will still be relevant for systemically relevant insurers, but the capital add-on is not expected to be significant.

2.7 Supervisory capital add-ons and high impact surcharge, where applicable, will effectively bring the higher supervisory solvency intervention level to a level higher than the PCR which is calibrated at VaR 99.5%. For example, if for a particular insurer, the supervisory capital add-on is 30% and high impact surcharge is not applicable, this means that the insurer

⁶ Which corresponds to an implied credit rating of B- and represents a 1-in-10-year event.

will have to hold a CAR of at least 130%. If the insurer does not meet 130%, it would trigger supervisory actions equivalent to those of not meeting the PCR (i.e. CAR of at least 100%).

2.8 Notwithstanding supervisory capital add-ons and surcharges, the onus is on insurers to determine the buffer to hold above the PCR in accordance with factors such as internal economic capital computations and market expectations, including that of rating agencies and analysts.

3 VALUATION OF ASSETS AND LIABILITIES

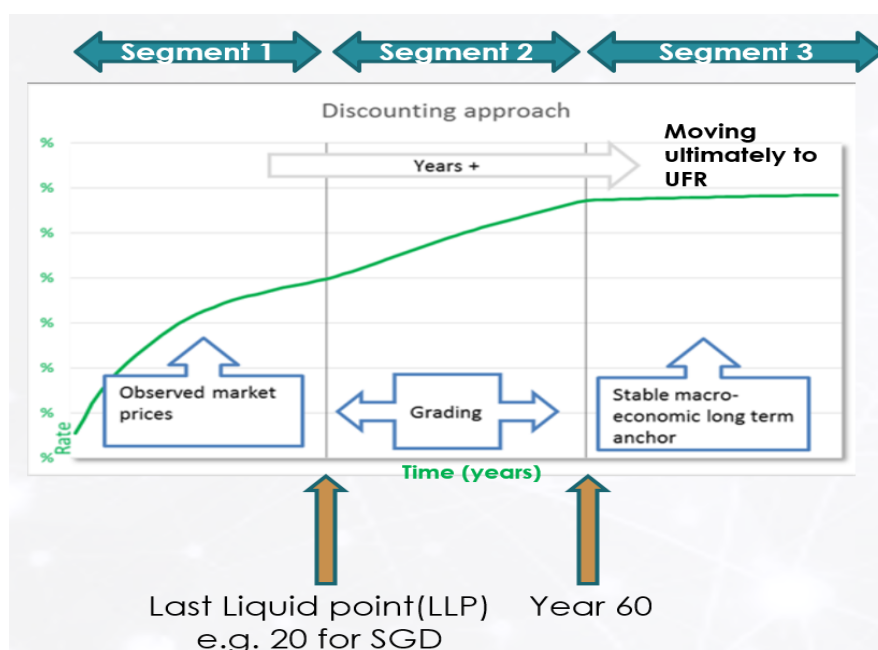
3.1 Unless otherwise specified in this document, valuation of all assets and liabilities should be done in accordance with the Insurance (Valuation and Capital) Regulations 2004⁷ for the purpose of the parallel run.

Discounting Approach

Discounting of life business

3.2 A three-segment approach is used in deriving the risk-free yield curve for discounting the liability cash flows under RBC 2:

- (a) Segment 1: Liquid segment based on market information on government bonds;
- (b) Segment 2: Extrapolation between first and third segment, using Smith-Wilson method⁸ to extrapolate between the last liquid point (“LLP”) to the commencement of Segment 3;
- (c) Segment 3: Convergence to the Ultimate Forward Rate (“UFR”).



3.3 The UFR will be determined as the sum of expected real interest rate and expected inflation rate. This is aligned with the approach taken by the International Association of Insurance Supervisors (“IAIS”) on the design of the global insurance capital standard (“ICS”). Under ICS, the UFR (also known as the Long-Term Forward Rate in ICS) is determined as the

⁷ Which has been recently amended in December 2018.

⁸ The Smith-Wilson method was also used in the 2018 impact study. Under QIS 2, a simple linear approach was used.

sum of the expected real interest rate and the expected inflation rate, which is based on central bank inflation targets⁹.

3.4 For the purpose of the parallel run, the UFR for SGD and USD denominated liabilities remains at 3.8%¹⁰. MAS has adopted the proposed LLP and convergence period under ICS for the purpose of RBC 2 (the LLP is known as Last Observed Term in ICS). The LLPs for SGD and USD denominated liabilities remain unchanged at 20 years and 30 years respectively. The convergence point remains as 60 years for both currencies.

3.5 MAS has derived the spot risk-free discount rates to be used for discounting SGD and USD denominated liabilities and has provided the rates in the Discount Rate Workbook to insurers. MAS has derived the yield curves for these two currencies as this covers more than 99% of the life insurers' liabilities in aggregate.

3.6 For liabilities in other currencies, the workbook provided can be used or modified to derive the spot risk-free discount rates. Please refer to the Last Observed Term, convergence period and Long-Term Forward Rate for the relevant currency as specified in the ICS 2018 Field Testing Technical Specifications¹¹ for the LLP, convergence period and UFR respectively. The workbook will allow insurers to generate the spot risk-free discount rates for LLPs of 20 and 30 years¹² once parameters such as spot risk-free rates in Segment 1, UFR, and speed of convergence of forward rates to UFR (which is determined by the alpha parameter¹³) are entered into the workbook. The workbook uses the Smith-Wilson method to extrapolate discount rates in Segment 2 of the yield curve.

3.7 Insurers that write direct life business and/or life reinsurance business are allowed to apply adjustments to the above derived risk-free discount rates when discounting the liability cash flows, subject to certain conditions being met. The details of such adjustments are elaborated under Section 6.

Discounting of general business

3.8 For general insurance business, no discounting will be required for liability durations of more than one year, if the impact is not deemed to be material. Discounting will not be necessary for liability durations of one year or less. Where discounting is carried out, the

⁹ Where the central bank does not produce an inflation target, historical inflation can be used as a proxy for inflation target.

¹⁰ Based on expected real interest rate of 1.8% and expected inflation of 2.0%.

¹¹ Details are provided on pages 36 – 37 of the ICS 2018 Field Testing Technical Specifications, which can be found in <https://www.iaisweb.org/page/supervisory-material/insurance-capital-standard>.

¹² For other LLP beside 20 and 30 years, insurers can modify the workbook accordingly to follow the same basis of calculation.

¹³ Guidance on determining the alpha parameter is provided in the workbook.

approach will be the same as for life business for both SGD and non-SGD denominated liabilities (except that the adjustments mentioned in paragraph 3.7 will not apply).

Treatment of Negative Reserves for Valuation

3.9 Insurers should not value the liability in respect of any policy to be less than zero, unless there are monies due to the insurer when the policy is terminated on valuation date (e.g. surrender penalty), in which event the value of the liability in respect of that policy may be negative to the extent of the amount due to the insurer. Part of the negative reserves will be recognised however as positive regulatory adjustment to the available capital. This will be discussed under Section 5.

Valuation of Long-term Medical Policies

3.10 Insurers are required to hold policy liabilities for long-term medical policies as the sum of the following components:

- a) An amount which is adequate to cover the cost of future expected claims and expense outgo, allowing for future expected premiums and investment income, including provision for adverse deviation (“PAD”). The term of projection would depend on the contract boundary definition set out below; and
- b) An amount which is adequate to cover the cost of claims which has already been incurred prior to the valuation date i.e. claims liabilities. This comprises reported but not settled (“RBNS”) claims and incurred but not reported (“IBNR”) claims.

Contract Boundary Considerations

3.11 MAS has previously noted differences in insurers’ valuation methodology¹⁴ for long-term medical policies. MAS has thus introduced the definition of contract boundary for such policies to ensure consistency in the valuation approach and to avoid undue recognition of large amount of negative reserves arising from these policies (given that the premium rates are adjustable). Hence, the valuation of long-term medical policies should consider the boundaries of the contract, to be determined as follows:

- a) Cash flows are within the boundary of the insurance contract if they arise from rights and obligations that exist during the period in which the insurer has a substantive obligation to provide the policyholder with the contracted insurance coverage or other services. A substantive obligation ends when the following criteria are satisfied:

¹⁴ For example, the view could be that the contract boundary should just be up to the next re-pricing date, whilst another could be that the contract boundary should be till natural expiry of the policy.

- (i) the insurer has the unconstrained practical ability to reassess the risks of the contract or a portfolio of contracts and, as a result, can set a price or level of benefits that fully reflects the reassessed risk of that portfolio; and
 - (ii) the pricing of premiums for the coverage up to the date when risks are reassessed, do not reflect risks related to periods beyond the reassessment date.
- b) When assessing whether the insurer has the practical ability to set a price that fully reflects the risks in the contract or portfolio, it is to consider all the risks that it would normally consider when underwriting equivalent contracts on the renewal date for the remaining coverage.
- c) Insurers should disclose its selection of contract boundary, including the justification, in the Questionnaire. In particular, the insurer should justify its practical ability to reassess the risks and as a result, set a price or level of benefits that fully reflect the reassessed risks of the portfolio of contracts. Going forward, such disclosure will be required in the actuarial investigation report.
- d) The insurer should regularly assess if there is any change in circumstances that may affect its practical ability to reprice (per paragraph 3.11(a)(i)). For instance, if the insurer foresees restrictions to such practical ability, it should then value the liabilities of the portfolio based on a longer term projection (i.e. up to the natural expiry of the policies within the portfolio).

3.12 For medical riders attached to long-term medical policies, the contract boundary should be determined based on the considerations in paragraph 3.11. However, the contract boundary of the riders should not be longer than that of the main plan's.

3.13 The computation of C1 risk requirements for long-term medical policies is to follow the same contract boundary as that pre-determined for the liability valuation.

Valuation of Investment-Linked Funds

3.14 Insurers are to project unit and non-unit reserves at the risk-free rate (as defined in paragraph 3.5) for investment-linked funds. This also means that insurers are to provide the negative reserves (after applying the proposed C1 insurance shocks) for regulatory adjustment in Form A and "Fund Level Info" of the Main Workbook based on the same approach (i.e. project and discount both unit and non-unit reserves at risk-free rate).

Provision for Adverse Deviation ("PAD")

3.15 Insurers are to update their current methodology or assumptions on the proposed changes to the C1 insurance risk requirement calibration, where applicable. The method of setting the PAD as half of the prescribed loadings for C1 risk requirements is just a common practice for the PAD, specified under SAS SAP L02. Regardless of the method used, the

actuary should be able to justify the appropriateness of the approach used, and should take into account the principles and considerations specified in SAS SAP L02.

4 COMPONENTS OF REQUIRED CAPITAL

C1 Requirements – Life Business

4.1 The shocks to be applied, at the homogeneous risk grouping level (which is described in paragraph 4.3), under RBC 2 are as follow:

C1 Risk Requirements	Factors
Mortality Risk Requirement	+20% to Best Estimate (“BE”) mortality rates where the payment of benefits is contingent on mortality risk
Longevity Risk Requirement	-25% to BE mortality rates where the payment of benefits is contingent on longevity risk
Disability Risk Requirement	+20% to BE disability rates where the payment of benefits is contingent on disability risk
Dread Disease Risk Requirement¹⁵	+40% to BE rates during periods <u>where premium rates are guaranteed</u> and +30% to BE rates during periods <u>where premium rates are not guaranteed</u> , and where the payment of benefits is contingent on dread disease risk
Other Insured Events (Accident & Health) Risk Requirement¹⁶	+40% to BE rates during periods <u>where premium rates are guaranteed</u> and +30% to BE rates during periods <u>where premium rates are not guaranteed</u>
Insurance Catastrophe Risk Requirement¹⁷	Absolute increase in the rate of policyholders dying over the following year of 1 per 1000 (only applicable to policies which are contingent on mortality risk). The impact should be computed net of the effect of reinsurance, if there is appropriate reinsurance arrangement in place.

¹⁵ For limited pay policy, the 40% shock should apply where the premium term has ended as there are no further premium receipts after that.

¹⁶ MAS Intends to refine the calibration approach and shock factors when more credible data becomes available in the future.

¹⁷ MAS considers it conceptually sound to have the morbidity component in this risk module, but recognises that it is still an evolving area and not many jurisdictions have the morbidity component. Hence MAS proposes to monitor developments internationally before deciding to incorporate the morbidity component at a suitable juncture in future.

Expense Risk Requirement	120% in first year and 110% thereafter of the insurer's best estimate of its future experience (including expense inflation)
Lapse Risk Requirement	<p><u>Highest of the lapse risk requirements calculated based on the following 3 lapse stresses:</u></p> <ul style="list-style-type: none"> a) Change in liability value based on permanent increase of +50% on BE lapse rates; b) Change in liability value based on permanent decrease of -50% on BE lapse rates; c) Mass Lapse event (as elaborated below) <p><u>Calculation of risk requirement for mass lapse event:</u></p> <p>The risk charge for mass lapse event should be calculated assuming an immediate surrender of 30% of individual policies and 50% of group policies, for all policies which provide cash value on surrender.</p> <p>For a given homogeneous risk group as described in paragraph 4.3, where the surrender value ("Aggregate SV") is higher than the policy liability, the excess of Aggregate SV over the policy liability is to be calculated as a mass lapse risk requirement (Mass Lapse_Risk Charge).</p> <p>Hence, Mass Lapse_Risk Charge is calculated as:</p> <p><i>For individual policies,</i></p> $30\% * \max(\text{Aggregate SV} - \text{Policy Liability}, 0)$ <p><i>For group policies,</i></p> $50\% * \max(\text{Aggregate SV} - \text{Policy Liability}, 0)$ <p>Notes:</p> <p><i>Lapse risk is the risk of loss or change in liabilities due to a change in the expected exercise rates of policyholder options. The module takes into account all legal and contractual policyholder options which can significantly change the value of the future cash flows.</i></p> <p><i>This includes options to fully or partly terminate, surrender, renew, extend, reduce or increase insurance coverage as well as reduction or suspension of premium payments and changes in take up options such as annuitisation options.</i></p>

	<i>As such, insurers need to consider the type of options for the upward shock or downward shock appropriately. For example, where the option allows for an increase in insurance cover (i.e. extension of cover), the +50% should be applied to the rate that would apply if the option is not taken up under the upward shock scenario. As a rule of thumb, the +50% shock is meant to be applied in a manner that increases lapses and the -50% is meant to be applied in a manner that decreases lapses.</i>
Conversion of Options Risk Requirement	+50% on BE conversion rates (for options provided to the policy owner) or -50% on BE conversion rates, whichever produces a higher liability value

4.2 There are different ways to design an insurance product. For example, long-term care can be provided to meet the needs of people with either a dread disease or disability, resulting in them not being able to care for themselves for long periods of time. The shock to be applied will correspond to the underlying best estimate assumption.

Homogeneous Risk Grouping

4.3 Insurers are allowed to group policies into homogeneous risk groups ("HRG"s) for the purpose of applying the C1 insurance risk stresses under RBC 2, instead of performing the stresses at each policy level. For this purpose, an HRG consists of portfolios of products (or policies) with similar risk characteristics.

4.4 Insurers should consider the appropriate manner to group policies into homogeneous risks groups for the purpose of calculating the various C1 risk charges. The insurers should exercise prudence on the granularity of policy groupings. The more homogeneous the policy groupings, the lesser the extent of off-setting effects between policies for any particular risk. In grouping the policies or products into HRGs, the insurers carefully consider at least the following (non-exhaustive) items:

- Underwriting policy
- Risk profile of policyholders
- Product features, in particular guarantees
- Future management actions

4.5 Products that are more susceptible to mortality risks (e.g. products with high death benefits) should be grouped separately from those which are more prone to longevity risks (e.g. annuities, long-term care products, products with high survival benefits).

4.6 Policies should be grouped according to their major product features that may lead to similar lapse behaviour and risks within the group. For instance, products with more guarantees may be at a greater risk of having lower than expected lapse rates, while products with high surrender benefits may face greater risk when there are higher than expected lapse rates.

4.7 Policies in the Participating Funds (or Sub-Funds) should be grouped according to the risk sharing rules allowed by the insurers' internal participating fund governance policy for the various C1 insurance risks.

4.8 For avoidance of doubt, the valuation of liability is required to be performed at each policy level. The grouping of policies into HRGs is only for the application of various C1 risk stresses and hence for the sole purpose of computation of C1 risk requirements.

4.9 Insurers should disclose its basis for grouping policies into HRGs and the justification of the appropriateness in the Questionnaire. Going forward, such disclosure including any changes from previous year's basis and the resulting impact, will be required in the actuarial investigation report.

4.10 The insurer should apply the following correlation matrix to derive the diversified C1 requirements for life business:

	Mortality	Longevity	Disability	Dread Disease	Other Insured Events	Catastrophe	Expense	Lapse	Conversion of Options
Mortality	1	-0.25	0.25	0.5	0.5	0.25	0.25	0	0
Longevity	-0.25	1	0	0.25	0.25	0	0.25	0.25	0.25
Disability	0.25	0	1	0.5	0.5	0.25	0.5	0	0
Dread Disease	0.5	0.25	0.5	1	0.5	0.5	0.5	0	0
Other Insured Events	0.5	0.25	0.5	0.5	1	0.75	0.5	0	0
Catastrophe	0.25	0	0.25	0.5	0.75	1	0.25	0.25	0.25
Expense	0.25	0.25	0.5	0.5	0.5	0.25	1	0.5	0.5
Lapse	0	0.25	0	0	0	0.25	0.5	1	0
Conversion of Options	0	0.25	0	0	0	0.25	0.5	0	1

4.11 The formula to derive the diversified C1 requirements for life business is as follows:

$$\sqrt{\sum \text{CorrLife}_{r,c} * \text{Life}_r * \text{Life}_c}$$

where

$\text{CorrLife}_{r,c}$ = the entries of the correlation matrix

$\text{Life}_r, \text{Life}_c$ = Risk Requirement for Individual life sub-risks according to the rows and columns of correlation matrix

C1 Requirement is floored at zero.

Please note that the formula has been built into the Main Workbook to automate the computation of the diversified C1 requirements.

C1 Requirements - General Business

4.12 The factors and methodology to derive C1 requirements for general business will remain the same as specified in the Insurance (Valuation and Capital) Regulations 2004. The insurance catastrophe risk requirement is being calibrated by the industry workgroup (expected to be finalised within 2019) and will be implemented minimally a year after the 1 Jan 2020 implementation date of RBC 2 (industry will be consulted). The Main Workbook has built in a placeholder for the insurance catastrophe risk requirement for general business. For the parallel run, insurers should leave this field as blank.

Diversification of C1 Requirements between Life and General Business

4.13 Diversification benefits will be recognised when summing the relevant¹⁸ C1 life and C1 general (excluding A&H business) insurance risk requirements for a composite insurer. The total C1 requirements for both life and general business, taking into account of diversification, are to be calculated as follows:

$$\sqrt{C1_{life}^2 + C1_{general\ excluding\ A\&H}^2} + C1_{general\ (A\&H\ only)}$$

where $C1_{life}$ is the C1 requirements for life business (subject to footnote 18);

$(C1_{general\ excluding\ A\&H})$ is the C1 requirements for general business excluding accident and health business;

$(C1_{general\ (A\&H\ only)})$ is the C1 requirements for general business for accident and health business only

Please note that the calculations for this item have already been built into the Main workbook.

C2 Requirements

4.14 The shocks to be applied under RBC 2 are as follow:

C2 Requirements	Factors
Equity Investment Risk Requirement	To calculate the equity investment risk requirement, insurers are to:

¹⁸ The relevant C1 life risk requirements that could be diversified with the general C1 risk requirements would take into account of the fungibility of capital between the insurance funds.

	<ul style="list-style-type: none"> Apply the following factors to the market value of each equity exposure: <table border="1" data-bbox="646 286 1295 407"> <tr> <td>Equities listed in Developed Markets</td><td>35%</td></tr> <tr> <td>Other equities¹⁹</td><td>50%</td></tr> </table> The equity investment risk requirement is then taken to be the aggregate of the calculations for all equity exposures <p>Additional Notes:</p> <p>Note 1: The types of instruments for which the equity investment risk requirement is applicable to are as specified in paragraph 2(1) of the Fourth Schedule of the Insurance (Valuation and Capital) Regulations 2004. Debt instruments which are convertible into equity at the option of the issuer or automatically by the terms of the instruments shall be characterised as equity exposures. Insurer should convert its equity derivative instruments into notional positions in the relevant underlying equity instruments and use the current market value of the underlying instruments to calculate its market risk capital requirement for equity position risk.</p> <p>Note 2: Insurers should refer to the constituent countries in MSCI's World Equity Index for countries that are to be classified as Developed Markets for risk charging purposes. For ease of reference, this list has been provided in Appendix 2.</p> <p>Note 3: Please refer to Appendix 3 for the treatment of Collective Investment Schemes ("CIS").</p> <p>Note 4: Investments in commodities should be treated as equity investments, and the risk charge for "Other equities" will apply.</p>	Equities listed in Developed Markets	35%	Other equities ¹⁹	50%
Equities listed in Developed Markets	35%				
Other equities ¹⁹	50%				
Interest Rate Mismatch Risk Requirement	<ul style="list-style-type: none"> To calculate the interest rate mismatch risk requirement, insurers are to: <ul style="list-style-type: none"> Recompute the value of interest rate sensitive assets and liabilities under the upward interest rate scenario, adjusting the relevant yield curve²⁰ by the absolute upward interest 				

¹⁹ These include equities listed in other markets, unlisted equities, including private equity and hedge funds, and commodities.

²⁰ In order to derive the absolute upward and downward interest rate adjustments, insurers are to multiply the percentage adjustments by the:

rate adjustment, and calculating the resulting change in Net Assets²¹.

- ii. Recompute the value of interest rate sensitive assets and liabilities under the downward interest rate scenario, adjusting the relevant base yield curve by the absolute downward interest rate adjustment, and calculating the resulting change in Net Assets.
- iii. Taking the larger of the reduction in Net Assets from (i) and (ii) as the interest rate mismatch risk requirement.

Time of Cash Flow	Upward Adjustment (%)	Downward Adjustment (%)
3M	100	-75
6M	100	-70
1Y	100	-70
2Y	100	-70
3Y	95	-65
4Y	95	-65
5Y	90	-60
6Y	85	-55
7Y	80	-50
8Y	80	-50
9Y	75	-45
10Y	70	-40
11Y	65	-40
12Y	60	-35
13Y	60	-35
14Y	55	-30
15Y	50	-30
16Y	45	-30
17Y	40	-30
18Y	35	-25
19Y	30	-25
20Y+	25	-25

- For policy liabilities, the risk free spot discount rates as prescribed under the scenario. The upward and downward interest rate adjustments should not be applied to the MA or IP spreads.
- For assets, the government yield curve relevant to the asset

²¹ Taken to be the value of the Assets less Liabilities

	<p>For cash flows that occur between the time periods specified in the table above, please apply the upward and downward adjustments of the closest term.</p> <p><u>Simplified approach</u></p> <ol style="list-style-type: none"> i. Insurers may use the modified duration of the asset to approximate the change in value of each interest rate sensitive security. ii. For bonds with optionality (e.g. callable bonds), insurers should use the effective duration and this can be determined using: <ol style="list-style-type: none"> ○ Under upward interest rate up scenario, use term to final maturity. ○ Under downward interest rate scenario, use term to first call date. <p>The "after shock" market price of the callable bond should not exceed the present value of [call price + all cash flows payable before and on the first call date].</p> <p><u>Additional Notes:</u></p> <p>Note 5: The types of instruments for which the interest rate mismatch risk requirement is applicable to are specified in paragraph 3(1) of the Fourth Schedule of the Insurance (Valuation and Capital) Regulations 2004 under debt investment risk requirements. Debt instruments which are convertible into equity at the option of the issuer or automatically by the terms of the instruments shall be characterised as equity exposures. Insurer should convert its interest rate-related derivatives into notional positions in the relevant underlying instruments and use the current market value of the principal amount of the underlying instruments to calculate its interest rate risk capital requirement.</p> <p>Note 6: For the purpose of calculating Net Assets, the liabilities shall refer to:</p> <ul style="list-style-type: none"> • In respect of life business, the Policy Liabilities for non-participating funds or investment-linked funds and the minimum condition liability for participating funds. For universal life, the minimum condition liability should be used. • In respect of general business, the Policy Liabilities. An insurer may elect not to recompute the value of liabilities for an insurance fund
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	<p>established and maintained in respect of general business, in which case the change in value of liabilities under the upward and downward interest rate scenarios is zero.</p> <p>Note 7: For clarity, the upward and downward percentage interest rate adjustments are to be applied on the relevant base yield curve.</p> <p>The relevant base yield curve after applying the interest rate adjustments is subject to a minimum of zero.</p> <p>Note 8: The calculated absolute interest rate adjustments are to be subject to a maximum of 200 basis points for both upward and downward scenarios.</p> <p>Note 9: Please refer to Appendix 4 for more instructions and guidance related to the calculation of the interest rate mismatch risk requirement, including the use of modified duration approach. Some examples are also provided for insurers’ reference.</p>												
Credit Spread Risk Requirement	<ul style="list-style-type: none">▪ To calculate the credit spread risk requirement, insurers are to:<ul style="list-style-type: none">i. First identify the relevant constant <u>basis point credit spread adjustment</u> in the table below for each credit-related security, which is to be determined based on the remaining term and credit rating²² of the security.ii. Insurers should then revalue the security by adding this constant credit spread adjustment on the relevant yield curve for the security, calculating the resulting fall in value of the security.iii. Repeat the same calculation for all credit-related securities, and take the aggregate resulting fall in value of all securities as the credit spread risk requirement. <p>Short-term ratings</p> <table><tr><th>Credit Rating²³</th><th>A1+</th><th>A1</th><th>A2</th><th>A3</th><th>B and below</th></tr><tr><td>Adjustment</td><td>105</td><td>120</td><td>165</td><td>245</td><td>540</td></tr></table>	Credit Rating ²³	A1+	A1	A2	A3	B and below	Adjustment	105	120	165	245	540
Credit Rating ²³	A1+	A1	A2	A3	B and below								
Adjustment	105	120	165	245	540								

²² Insurers are expected to perform an appropriate level of due diligence prior to the use of any credit rating for the purpose of calculating regulatory capital requirements.

²³ The ratings illustrated in this table make reference to Standard and Poor's long and short term ratings. Insurers can also use equivalent ratings from Moody's Investor Services, Fitch Inc and A.M. Best Company to derive the appropriate credit spread adjustment.

Long-term ratings

Term\ Credit Rating	AAA	From AA- to AA+	From A- to A+	From BBB- to BBB+	From BB- to BB+	B+ and below
Up to 5 years	105	120	165	245	405	540
Between 5 to 10 years	95	115	145	230	365	500
>10 years	90	95	125	215	355	475

Simplified approach

- i. Insurers may use the modified duration of the asset to approximate the change in value of each interest rate sensitive security.
- ii. For bonds with optionality (e.g. callable bonds), insurers should use the effective duration and this can be determined using:
 - Under upward interest rate up scenario, use term to final maturity.
 - Under downward interest rate scenario, use term to first call date.

The "after shock" market price of the callable bond should not exceed the present value of [call price + all cash flows payable before and on the first call date].

Additional Notes:

Note 10: The types of instruments for which the credit spread risk requirement is applicable to are as specified in paragraph 3(1) of the Fourth Schedule of the Insurance (Valuation and Capital) Regulations 2004 under debt investment risk requirement. Debt instruments which are convertible into equity at the option of the issuer or automatically by the terms of the instruments should be characterised as equity exposures. Insurer should convert its credit-related derivatives into notional positions in the relevant underlying instruments and use the current market value of the principal amount of the underlying instruments to calculate its credit risk capital requirement.

Note 11: For debt securities issued by a Statutory Board in Singapore and recognised multilateral agencies (as listed in Table 2 of the Sixth

Schedule of the Insurance (Valuation and Capital) Regulations 2004), the credit spread adjustments would be 50% of that applied on an “AAA”-rated corporate bond.

Note 12: Please refer to **Appendix 4** for more instructions and guidance related to the calculation of the credit spread risk requirement.

Note 13: For unrated debt securities, these are to adopt a credit spread adjustment in between “BB” and “BBB”, which is as follows:

Term\Credit rating	Unrated
Up to 5 years	325
Between 5 to 10 years	298
More than 10 years	285

Note 14: Insurers which meet MAS’ criteria under either of the approaches set out in **Appendices 5 and 6** will be able to fully (or partially) use the internal credit rating determined by their internal credit rating model (or process) in deciding which credit spread shock to apply in the case of unrated bonds.

Note 15: Currently the recognised²⁴ External Credit Assessment Institutions (“ECAIs”) are Moody’s Investor Services, Standard and Poor’s Corporation, Fitch Inc and A.M. Best Company Inc. ECAIs that meet the eligibility criteria set out in **Appendix 7** would also be recognised²⁵ under RBC 2.

Note 16: Debt securities that are issued by central governments or central banks of countries or territories that have a sovereign credit rating of at least “A-”, are exempt from the credit spread risk charge module.

Note 17: Debt securities that are issued by central governments or central banks that have a sovereign credit rating lower than “A-” are subject to the credit spread risk requirement; however if these are in the national currency of the country, these can be notched up to the next higher credit rating when deriving the credit spread adjustment that should be applied under this risk module.

Note 18: Debt securities that are issued by public sector entities (equivalent of Singapore statutory boards in other countries) that are fully guaranteed by central governments or central banks are to adopt

²⁴ As set out in Table 1 of the Sixth Schedule of the Insurance (Valuation and Capital) Regulations 2004. The list of recognised ECAIs will remain under RBC 2.

²⁵ Whilst this was not specifically consulted under RBC 2, it follows from developments in IAIS with respect to the development of the ICS and is also consistent with banking capital framework.

	<p>the credit rating of the relevant sovereign's credit ratings when deriving the credit spread adjustment that should be applied under this risk module.</p> <p>For unrated debt securities that are issued by public sector entities that are not fully guaranteed by central governments or central banks, a credit spread shock of between "BB" and "BBB" will apply²⁶.</p> <p>Note 19: Please refer to Appendix 8 for the treatment of guarantees and collaterals.</p> <p>Note 20: Please refer to Appendix 9 for the treatment of structured products and derivatives.</p>
Property Investment Risk Requirement	<p>To calculate the property investment risk requirement, insurers are to apply:</p> <ul style="list-style-type: none"> ▪ 30% risk charge to the current market value of each property exposure for immovable property, for both investment and self-occupied purpose; or ▪ Look-through approach (as described for CIS) for collective real estate investment vehicles. Where the insurer chooses not to or is unable to adopt a look-through approach, a risk charge of 50% on the value of the CIS will apply. <p>The property investment risk requirement is then taken to be the aggregate of the calculations for all property exposures.</p> <p><u>Additional Notes:</u></p> <p>Note 21: Investments in companies that are engaged in real estate management or real estate project development or similar activities should be treated as equity investments.</p>
Foreign Currency Mismatch Risk Requirement	<ul style="list-style-type: none"> ▪ This risk module is applicable to all insurance funds of the insurer established and maintained under the Act (i.e. SIF and OIF) ▪ The foreign currency mismatch risk charge is 12%. ▪ In calculating the foreign currency mismatch risk exposure:

²⁶ Nonetheless, if the unrated bonds exhibit features that are close to junk bonds, the insurer is expected to apply a higher risk charge for prudence.

	<p>i. For SIF, the same calculations as prescribed in the Insurance (Valuation and Capital) Regulations 2004²⁷ will apply, i.e. foreign currency risk exposure is the higher of</p> <ul style="list-style-type: none"> a. the aggregate of net positions of the insurer in currencies where the net open position is positive; b. the absolute value of the aggregate of net open positions of the insurer in currencies where the net open position is negative, <p><i>less</i> 10% of the (total value of assets less reinsurers' share of policy liabilities in the insurance fund), subject to a minimum of zero.</p> <p>ii. For OIF, the same calculations as prescribed in the Insurance (Valuation and Capital) Regulations 2004 for SIF will apply, except that the concession of 20% of the (total value of fund assets less reinsurers' share of policy liabilities) will apply instead of 10% i.e. foreign currency risk exposure is the higher of</p> <ul style="list-style-type: none"> a. the aggregate of net positions of the insurer in currencies where the net open position is positive; b. the absolute value of the aggregate of net open positions of the insurer in currencies where the net open position is negative, <p><i>less</i> 20% of the (total value of assets less reinsurers' share of policy liabilities in the insurance fund), subject to a minimum of zero.</p>
Counterparty Default Risk Requirement	<ul style="list-style-type: none"> ▪ This will cover the following sub-modules: <ul style="list-style-type: none"> i. Loan counterparty risk ii. Derivative counterparty risk iii. Reinsurance recoverable counterparty risk iv. Outstanding premiums counterparty risk

²⁷ Regulation 7 of the Fourth Schedule

	<ul style="list-style-type: none"> v. Bank deposit counterparty risk vi. Any other counterparty risk for exposures which are currently addressed in the miscellaneous risk requirement and that have not been addressed by the credit spread risk module, including but not limited to: <ul style="list-style-type: none"> ○ intra-group balances not related to a contract of insurance ○ any general guarantee of indebtedness and acceptance originating from the insurer which has not been accounted for as a liability in respect of policies ○ any contingent liability relating to any specific transaction to the insurer, other than any guarantee or acceptance that has been accounted for as a liability in respect of policies ▪ The Counterparty Default Risk Charge will not be applicable to balances due from other insurance funds, shareholders fund and overseas branches. ▪ In order to calculate the counterparty default risk requirement, the insurer should: <ul style="list-style-type: none"> i. first calculate the risk exposures for each counterparty in each sub-module. The calculation of risk exposures remains the same as that prescribed in the Insurance (Valuation and Capital) Regulations 2004; ii. calculate the risk requirement for each counterparty as the product of the risk exposure to a particular counterparty in (i) and the relevant default risk factor based on the credit rating²⁸ of the counterparty as set out in Table 1: <ul style="list-style-type: none"> a. For Reinsurance Recoverables ≤ 1 year; otherwise 100% risk charge applies;
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²⁸ The ratings illustrated in this table make reference to Standard & Poor's credit ratings. Insurers can also use equivalent ratings from other recognised ECAs such as Moody's Investor Services, Fitch Inc and A.M. Best Company Inc to derive the appropriate default risk charge. Insurers are expected to perform an appropriate level of due diligence prior to the use of any credit rating (other than those from rating agencies listed here) for the purpose of calculating regulatory capital requirements.

- b. For Outstanding Premiums (Direct/General/Facultative Reinsurance Business) and Agents' Balances ≤ 1 year; otherwise 100% risk charge applies;
 - c. For Outstanding Premiums from Treaty Reinsurance Business ≤ 2 years; otherwise 100% risk charge applies;
 - d. For deposits with a bank or deposit-taking institution:
 - that can be unconditionally withdrawn within 6 months, apply a factor of 50% to **Table 1**
 - otherwise as per **Table 1**;
 - e. For intra-group balances (arising from any transaction which is not related to a contract of insurance or balances due from other insurance funds, shareholders fund, head office, overseas branches or related corporations) outstanding ≤ 90 days; otherwise 100% risk charge applies;
 - f. For all other counterparty exposures, **Table 1**.
- iii. Repeat the same calculation for all counterparties, and take the aggregate as the resulting total counterparty default risk requirement.

Table 1:

Rating	Default Risk Charge (%)
AAA	0.5
From AA- to AA+	1.0
From A- to A+	2.0
From BBB- to BBB+	5.0
From BB- to BB+	10.5
From B- to B+	20.0
CCC+ and below	48.5

Additional Notes:

Note 22: Unrated counterparties are to be treated as having a rating of between "BB- to BB+" and "BBB- to BBB+"; a default risk charge of 7.75% will apply.

Note 23: Ageing of outstanding premium for annual and multi-year policies of direct life and general insurance business starts from **billable**

	<p>date (excludes the effects of the delays by the insurer in policy issuance and billing)</p> <p>Note 24: Ageing of outstanding premiums for reinsurance business starts from accrual date for reinsurers (except for facultative reinsurance where billable date will be used).</p> <p>Note 25: Please refer to Appendix 8 for the treatment of guarantees and collaterals.</p>
Miscellaneous risk requirement	Any other assets ²⁹ (for example, fixed assets): To apply a risk factor of 8%

4.15 The formula to derive the diversified C2 requirements is as follows:

$$C2 = C2_{misc} + \sqrt{C2_{market}^2 + C2_{default}^2 + 2 \times Corr_{m,d} \times C2_{market} \times C2_{default}}$$

where

$Corr_{m,d} = 0.5$

$C2_{market}$ = Market-related C2 requirements (described below)

$C2_{default}$ = C2 Counterparty Default risk requirement

$C2_{misc}$ = C2 Miscellaneous risk requirement

4.16 Market-related C2 requirements consist the following:

- Equity investment risk requirement
- Interest rate mismatch risk requirement
- Credit spread risk requirement
- Property investment risk
- Foreign currency mismatch risk requirement

²⁹ With the exception of cash and any financial asset to which paragraph 1(5) of the Fourth Schedule of the Insurance (Valuation and Capital) Regulations 2004 (extracted below) applies:

“Where a licensed insurer holds a position in any security, futures contract, forward contract, foreign exchange contract or other financial asset for which no method for computation of a C2 requirement has been prescribed in this Schedule, the insurer shall —

(a) immediately consult the Authority; and

(b) until otherwise directed by the Authority —

(i) add 100% of the current market value of the position to the miscellaneous risk requirement ; or

(ii) calculate an appropriate C2 requirement for the position in the manner that the Authority may otherwise direct.”

MAS intends to keep this approach under RBC 2.

4.17 Market-related C2 requirements will be derived as follow:

$$C2_{market} = \sqrt{\sum Corr_{i,j} \times Market_i \times Market_j}$$

where

$Corr_{i,j}$ = the correlation parameter for market risk sub-modules i and j

$Market_i$, $Market_j$ = Risk requirements for market risk sub-modules i and j respectively.

- Where interest rate mismatch risk requirement is determined using the upward interest rate scenario, $Corr_{i,j}$ is equal to the value set out in row i and in column j of the following correlation matrix:

	Equity	Interest Rate	Credit Spread	Property	FX mismatch
Equity	1	0.1	0.8	0.8	0.1
Interest Rate	0.1	1	0.1	0.1	0.1
Credit Spread	0.8	0.1	1	0.5	0.1
Property	0.8	0.1	0.5	1	0.1
FX Mismatch	0.1	0.1	0.1	0.1	1

- Where interest rate mismatch risk requirement is determined using the downward interest rate scenario, $Corr_{i,j}$ is equal to the value set out in row i and in column j of the following correlation matrix:

	Equity	Interest Rate	Credit Spread	Property	FX mismatch
Equity	1	0.5	0.8	0.8	0.1
Interest Rate	0.5	1	0.5	0.25	0.1
Credit Spread	0.8	0.5	1	0.5	0.1
Property	0.8	0.25	0.5	1	0.1
FX Mismatch	0.1	0.1	0.1	0.1	1

Ageing of Outstanding Premium

4.18 When computing the counterparty default risk requirements for outstanding premium, insurers are to use billable³⁰ date as the start date for ageing of outstanding premium for annual and multi-year policies of direct life and general insurance business.

4.19 "Billable date" refers to the date which part or all of each premium can first be billed without taking into consideration any credit period given. For example, in the case of an annual paying policy with an inception date of 1.1.2018, the premium will be considered billable on 1.1.2018, 1.1.2019 etc. regardless of whether insurers may send the bill to policyholders earlier or later. Similarly, for a monthly paying policy with an inception date of 1.1.2018, the premium will be considered billable on 1.1.2018, 1.2.2018, 1.3.2018 etc.

4.20 For avoidance of doubt, there is no change to the current approach of ageing of outstanding premium for reinsurance business (i.e. ageing starts from accrual date for reinsurance business), except for facultative reinsurance business, where ageing will be on a billable date basis.

Operational Risk Requirement

4.21 The operational risk requirement to be computed for each fund (i.e. adjusted fund level) as the higher of:

- a) $4\% \text{ of } GP_1 + \text{Max}(0, 4\% \times ((GP_1 - GP_0) - 20\% \times GP_0))$
- b) 0.5% of Gross (of reinsurance) policy liabilities³¹

For individual direct life business:

GP₁: Gross weighted premium income³² for the 12 months preceding the valuation date (without deducting premium ceded to reinsurance). For example, for valuation date as of 31 December 2018, this item is for the year from 1 January 2018 to 31 December 2018.

³⁰ Billable date excludes the effects of the delays by the insurer in policy issuance and billing.

³¹ As defined in the Insurance (Valuation and Capital) Regulations 2004. In the case for Participating fund, this relates to the Minimum Condition Liabilities as defined in the regulations (i.e. guaranteed benefits only).

³² For life business, this will be the same basis used for the submission of business statistics to LIA. The prevailing formula used by LIA for the calculation of weighted premium is as follows:

- i. For single premium, 10% of single premium;
- ii. For annual premium, 100% of annual premium;
- iii. Where premium obligation is less than 10 years, weighted premium will be based on the number of years of payment x 10%. For example, an annual premium policy with a 7-year limited premium payment term will calculate its weighted premium as 70% of annual premium.

GP₀: Gross weighted premium income for the 12 months preceding GP₁. For example, for valuation date as of 31 December 2018, this item is for the year from 1 January 2017 to 31 December 2017

For life business (other than individual direct life) and general business:

GP₁: Gross written premium income for the 12 months preceding the valuation date (without deducting premium ceded to reinsurance). For example, for valuation date as of 31 December 2018, this item is for the year from 1 January 2018 to 31 December 2018.

GP₀: Gross written premium income for the 12 months preceding GP₁. For example, for valuation date as of 31 December 2018, this item is for the year from 1 January 2017 to 31 December 2017

4.22 The total operational risk requirement for each fund will be subject to an overall cap of 10% of the TRR (after diversification benefit and excluding operational risk requirement) of the same fund for the insurer. Insurer is to report the lower of the operational risk requirement based on the above formula or 10% of TRR of the same fund under RBC 2.

4.23 Insurers are required to provide information used to derive the operational risk requirement under the tab “Ops Risk” in the Main Workbook. Please note that the calculation for the operational risk requirement based on the information provided has already been built into the Main Workbook.

Diversification benefit between asset and insurance risks

4.24 Diversification benefit is recognised between asset and insurance risks. The diversified C1 and C2 requirements are to be calculated as follows:

$$\sqrt{C1^2 + C2^2}$$

where C1 is the C1 requirements for both life and general business;

and C2 is the C2 requirements

4.25 The diversified C1 and C2 requirements will be reported in Form A of the Main Workbook based on above formula. Please note that the calculations for this item have already been built into the workbook.

4.26 The TRR will then be the sum of the diversified C1 and C2 requirements (as computed above) and the operational risk requirement.

5 COMPONENTS OF AVAILABLE CAPITAL

5.1 This section specifies the composition of Financial Resources. Unless otherwise specified in this document, the insurer should refer to the requirements set out in Insurance (Valuation and Capital) Regulations 2004.

5.2 The total Financial Resources of the insurer are the sum of the following components:

- a) Tier 1 Capital;
- b) Tier 2 Capital; and
- c) Regulatory adjustments

5.3 Tier 1 Capital and Tier 2 Capital comprises the following:

Tier	Components
Tier 1 Capital	<i>Sum of</i>
	(a) Aggregate of surpluses of all insurance funds other than a participating fund;
	(b) Balances in the surplus account of each participating fund;
	(c) Where it is a licensed insurer incorporated in Singapore, the <i>sum of</i> :
	i. Paid-up ordinary share capital which comply with the requirements in Appendix 11 ;
	ii. Surpluses of overseas branch operations;
	iii. Retained earnings;
	iv. Additional Tier 1 ("AT1") Capital, which will be the sum of the capital instruments issued by the insurer that comply with the requirements in Appendix 12 .
	<i>Less</i>
	Reinsurance adjustment
	<i>Less</i>

	Financial resource adjustment, comprising: <ul style="list-style-type: none"> • Loans to or guarantees granted for a related corporation, and other unsecured amounts owed to the insurer by a related corporation³³ • Charged assets • Deferred tax assets³⁴ • Intangible assets • Other financial resource adjustments
	<i>Less</i>
	Adjustment for asset concentration (formerly C3 requirements)
Tier 2 Capital	Tier 2 Capital of a licensed insurer incorporated in Singapore shall be the sum of the capital instruments issued by the insurer that comply with the requirements in Appendix 13 .

5.4 For a licensed insurer incorporated in Singapore, Common Equity Tier 1 (“CET1”) Capital will be taken to mean Tier 1 Capital less AT1 Capital.

5.5 A licensed insurer must ensure that at all times³⁵:

- a) the CET1 Capital of the insurer is not less than 60%³⁶ of sum of total risk requirements (excluding the risk requirements of participating funds) of the insurer; and

³³ See paragraph 5.23 of this Section for further instructions.

³⁴ Deferred tax assets that do not rely on future profitability of the insurer can be included in financial resources. An overinstallment of tax or current year tax losses carried back to prior years may give rise to a claim or receivable from the government or relevant tax authority. Such amounts are usually classified as current tax assets for accounting purposes. The recovery of such a claim or receivable does not rely on the future profitability of the insurer or any insurance group entity, and can be recognised in financial resources.

³⁵ The following floors will replace the existing Tier 1 and Tier 2 limits under the current RBC framework.

³⁶ For the avoidance of doubt, this specific floor is only applicable for licensed insurers incorporated in Singapore.

- b) the Tier 1 Capital of the insurer is not less than 80% of the sum of total risk requirements (excluding the risk requirements of participating funds) of the insurer.

5.6 An insurer intending to issue or recognise any AT1 Capital instrument or Tier 2 Capital instrument for the purpose of inclusion as AT1 Capital or as Tier 2 Capital respectively should comply with the submission requirements stated in **Appendix 14**.

5.7 Capital instruments that have been approved by MAS prior to the implementation of RBC 2 shall continue to qualify as Tier 1 Capital (for an existing instrument approved as a Tier 1 resource) and Tier 2 Capital (for an existing instrument approved as a qualifying Tier 2 instrument), as the case may be.

Reinsurance Adjustment

5.8 The reinsurance adjustment will be calculated as:

A x B, where

A= Reinsurance reduction, which is broadly the reduction in the value of liabilities due to reinsurance ceded to the reinsurance counterparty. This amount can be reduced by reinsurance deposits and collateral arrangements, trust arrangements and the use of Letter of Credit;

B= The counterparty default risk factor which depends on the credit rating of the reinsurer

5.9 When performing the parallel run for the year ending 31 December 2018, insurers should assume that the following proposals relating to the computation of reinsurance adjustment will be effected immediately:

- a) To remove the recognition of the reinsurance arrangement between a Head Office and its branch in Singapore. This means there should not be any reinsurance reduction (when valuing the insurers' liabilities) and no reinsurance adjustment resulting from these arrangements between branch and Head Office³⁷;

³⁷ This is notwithstanding that MAS will continue to work with the few affected insurers to finalise the acceptable measures (e.g. trust or segregated accounts, letter of credit) that could mitigate the impact, prior to the implementation of RBC 2. MAS will be allowing a longer transition time of at least 1-2 years for the de-recognition of the reinsurance arrangements with Head Office to take effect after RBC 2 is implemented from 1 Jan 2020.

- b) To continue to recognise reinsurance arrangement between an insurer and its downstream entities³⁸, subject to safeguards such as collaterals and letter of credit for the benefit of ceding insurer being in place before recognition can be given.;
- c) To include claims liabilities (including RBNS and IBNR) in the reinsurer's share of the liabilities for general business for the calculation of the Reinsurance Adjustment;
- d) To recognise the use of letter of credit in reducing the Reinsurance Adjustment, when the criteria specified in **Appendix 10** is met. A corresponding counterparty default risk charge will need to be set up under the Counterparty Default Risk Requirement to account for the counterparty risk exposure to the seller of the letter of credit.

5.10 MAS will continue recognising reinsurance arrangements where risks written by the Singapore branch are included in the Head Office's reinsurance arrangements with third party reinsurers, regardless of whether the branch has a legal right to receive the recoveries directly from the third party reinsurers. This is subject to the following safeguards:

- a) where reinsurance recoverables have already been paid from third party reinsurers, pending distribution from the Head Office, the amount would be subject to the risk charge that is dependent on the credit rating of the Head Office for the initial ageing period of 90 days. Once past the ageing period, 100% risk charge will be levied (see paragraph 6.60 of Third Consultation Paper);
- b) where Singapore branch does not have a legal right to receive the recoveries directly from the third party reinsurers or is not a named party to the contract, Head Office will have to provide a written confirmation (e.g. letter of comfort) to MAS that the Singapore branch is indeed covered within its reinsurance arrangements with third party reinsurers. The letter should also contain other relevant details pertaining to the arrangements, such as how reinsurance recoverables to the branch will be determined (see paragraph 6.61 of Third Consultation Paper).

³⁸ This includes a Singapore subsidiary reinsuring with its subsidiary, or a Singapore branch reinsuring with a subsidiary of its Head Office. For avoidance of doubt, the definition of downstream entities **will not include** examples where a Singapore subsidiary reinsures to another subsidiary of the parent company or another subsidiary within the group, nor where a Singapore subsidiary reinsures to a branch of the parent company or another branch within the group (as mentioned in 6.62 to 6.65 of the Third Consultation Paper).

5.11 When calculating the reinsurance adjustment, apply the same counterparty default factors as in **Table 1** on the reinsurance reduction³⁹ from the various reinsurance counterparties:

Rating	Default Risk Charge (%)
AAA	0.5
From AA- to AA+	1.0
From A- to A+	2.0
From BBB- to BBB+	5.0
From BB- to BB+	10.5
From B- to B+	20.0
CCC+ and below	48.5

5.12 The same calculation is then repeated for all reinsurance counterparties, and the total reinsurance adjustment for the fund is the aggregate sum of all the corresponding reinsurance adjustments.

5.13 For counterparties that are unrated, a default risk charge of 7.75% will apply.

Example:

Total Reinsurance Reduction = 100,000

Reinsurance Counterparty	(1) Reinsurance Reduction	(2) Counterparty credit rating	(3) Counterparty Default Risk Charge	Reinsurance Adjustment Columns (1) x (3)
Counterparty A	55,000	AA	1.0%	550

³⁹ The reinsurance reduction:

(a) in the case of the life business of the insurer, is equal to the reduction in the value of the liabilities of the insurer in respect of its participating policies, non-participating policies and investment-linked policies due to reinsurance ceded to that reinsurance counterparty; or

(b) in the case of the general business of the insurer, is equal to the reduction in premium liabilities and claim liabilities of the insurer in respect of its general business due to reinsurance ceded to that reinsurance counterparty

For (a) and (b) above, Insurance (Valuation and Capital) Regulations 2004 currently allows “Special Risk” that is ceded by way of reinsurance to a counterparty to be excluded from the computation of reinsurance adjustment. Under RBC 2, such preferential treatment for “Special Risk” will be removed. The insurer is thus required to consider the counterparty risk of whom the “Special Risk” is ceded to in its computation of reinsurance adjustment based on paragraph 5.11.

Counterparty B	35,000	BBB	5.0%	1,750
Counterparty C	10,000	Unrated	7.75%	775
Total				3,075

The resulting total reinsurance adjustment is therefore 3,075.

5.14 Insurers are also required to provide impact analysis for the proposals mentioned above respectively in the Main Workbook under the tab “Rein Info”.

Adjustment for Asset Concentration (Former C3 Requirements)

5.15 Under RBC 2, C3 requirements under the current RBC would instead be treated as a deduction from the Financial Resources i.e. the asset holdings which exceed the prescribed concentration limits (as set out in Table 14 of the Sixth Schedule in Insurance (Valuation and Capital) Regulations 2004) is to be deducted from the Financial Resources. The assets that are deducted from Financial Resources will not be subject to further risk requirements.

5.16 Insurers should calculate the amounts of assets above the prescribed concentration limits based on the adjusted fund levels as described in Section 2 of this document.

5.17 For avoidance of doubt, the OIF of licensed reinsurance branches and locally incorporated reinsurers that are not headquartered in Singapore, will not be subject to this treatment of asset concentration.

Regulatory Adjustment

Allowances for provisions for non-guaranteed benefits (“APNGB”)

5.18 APNGB of a participating fund shall be calculated as set out in the Insurance (Valuation and Capital) Regulations 2004, except that the 50% limit on aggregate present value of non-guaranteed benefits and PAD is removed. For avoidance of doubt, the limit of Policy Assets less MCL still remains.

5.19 Please note that the concept of adjusted and non-adjusted capital ratio still applies when determining the amount of APNGB to be adjusted.

Negative Reserves

5.20 Part of the negative reserves can be recognised as a form of positive regulatory adjustment to Financial Resources at both the fund and company level. The portion of the negative reserves that are already recognised within policy liabilities (i.e. the monies due to the insurer when policy is terminated) should not be considered again for purpose of regulatory adjustment, to prevent double recognition.

5.21 To determine the amount of negative reserves to be recognised, the insurer will need to apply all insurance shocks prescribed under the proposed RBC 2 C1 requirements, in the same manner as if it is determining the C1 requirements, and applying the same correlation matrix (set out in paragraph 4.10), to derive the after-shock negative reserves. This amount is then added on as a regulatory adjustment to each fund respectively. Please note that the formula has been built into the Main Workbook to automate the computation of the negative reserves to be recognised after the C1 insurance shocks.

5.22 For avoidance of doubt, for UL and participating policies, negative reserves should be determined based on the liability for the guaranteed cashflows projected based on best estimate assumptions and discounted at risk free rates (or inclusive of adjustment for Matching Adjustment or Illiquidity Premium where applicable).

Financial Resource Adjustment - Loans to or Guarantees for Related Corporations, or Unsecured Amounts Owed by Related Corporations

5.23 As per current RBC framework, loans to or guarantees for related corporations or unsecured amount owed by related corporations are deducted from the Financial Resources as Financial Resource Adjustment. The amount deducted is calculated as the outstanding amount multiplied by the counterparty factors in Table 11 of the Insurance (Valuation and Capital) Regulations 2004. This is in view that consideration should be given⁴⁰ to the credit rating of the related party in applying the Financial Resource Adjustment, i.e. an amount due from a higher rated related entity should result in a lower deduction from Financial Resources as compared to the same amount due from a lesser rated entity.

5.24 For the purposes of RBC 2, a similar approach would remain. The loans to or guarantees for related corporations, or unsecured amount owed by related corporations will also be deducted from Financial Resources as Financial Resource Adjustment. The amount to be deducted would be the outstanding amount multiplied by the following table:

⁴⁰ This is articulated in the consultation paper on “Proposed Revision to the RBC Framework – Financial Resource Adjustment, Reinsurance Adjustment and C2 Risk Requirements” issued in July 2011.

Rating	Counterparty Factor (%)
From AA- to AAA+	20
From A- to A+	50
BBB+ and below	100

6 ADJUSTMENTS TO RISK-FREE DISCOUNT RATES – MATCHING ADJUSTMENT (“MA”) AND ILLIQUIDITY PREMIUM (“IP”)

6.1 As mentioned in paragraph 3.7, insurers that write direct life business and/or life reinsurance business are allowed to apply a positive adjustment to the above derived risk-free discount rates when discounting the liability cash flows, subject to certain conditions being met. This section will elaborate on these adjustments.

6.2 **Such adjustments will not be applicable for general business (whether direct or reinsurance) given its typical liability profile.** As such, an insurer that only writes general business will not need to perform the parallel run or additional analyses for such adjustments.

Scope of MA and IP

6.3 The following table summarises the applicability of the MA and IP with respect to the type of insurer, currency, product and insurance fund.

	MA	IP
Applicable Insurers (See note 1)	Insurers writing direct life business	Insurers writing life business ⁴¹
Applicable Currencies (See note 2)	Liabilities denominated in SGD or USD	
Applicable Products (See note 3)	All products that can meet the eligibility criteria as specified in Appendix 16 , <u>with the exception of investment-linked products (“ILPs”)</u>	For direct life business, non-ILPs which are classified as Whole Life, Endowment, or Annuity in Form 14 ⁴² For life reinsurance business, IPs should only apply for reinsurance arrangements which exhibit similar characteristics as the direct life insurance products eligible for IP
Applicable Funds (See note 4)	Participating Fund and Non-Participating Fund	

Note 1:

- **The MA is applicable to direct life business only.**

⁴¹ For avoidance of doubt, this would include both direct life and life reinsurance business.

⁴² From 1 Jan 2019, Form 14 would be renamed as Form L6. The classification remains the same.

- **The IP is applicable for both direct life business and life reinsurance business.** However, as the calibration of the IP was based on the products offered by, and the profile of corporate bonds held by direct life insurers (**Appendix 16**), MAS reserves the right to review and refine the IP for life reinsurance business at a subsequent stage .

Note 2:

- **The MA and IP are applied to SGD- and USD-denominated liabilities.** This already makes up more than 99% of liabilities for direct life insurers.
- As the calibration of the IP was based on data provided by direct life insurers, the IP is likewise restricted to SGD- and USD-denominated liabilities for life reinsurance business.

Note 3:

- **Insurers will not be allowed to apply MA or IP on ILPs** as there is less predictability in the cash flows arising, for example, from fluctuations in fund management fees due to price movements in the underlying assets of the ILP funds.
- **IP is applied only on non-ILPs classified as Whole Life, Endowment, or Annuity in Form 14, without the need for the insurer to apply the predictability test to ascertain eligibility.**
- **For avoidance of doubt, for any product eligible for MA or IP, either the MA or IP where applicable is to be applied (subject to meeting the necessary conditions), but not both at the same time.**
- For life reinsurance business, the IP should only be applied to reinsurance arrangements that exhibit similar characteristics as the direct life insurance products (e.g. Whole Life, Endowment and Annuity Products) that qualify for IP. The reinsurer should make its own assessment and be able to justify why the reinsurance arrangements can qualify for IP. Any such justification should be provided in the Questionnaire.

Note 4:

- Based on the explanation in Note 3 on the exclusion of ILPs, **investment-linked funds will not be eligible for MA or IP.**

Matching Adjustment

6.4 The rationale and operation of the MA and IP are explained in the Third Consultation Paper. MAS has further updated the eligibility criteria based on analysis of the 2018 impact study results and feedback received from the industry. See **Appendix 16** for the updated criteria, with updates marked up as red underlined text.

6.5 Flexibility is provided to insurers to structure their MA portfolios provided the criteria in **Appendix 16** can be met by the MA portfolio. The predictability test for the MA should be applied at the level of the MA portfolio. SGD- and USD-denominated products may be included into the same MA portfolio.

6.6 **As the assets and liabilities within each MA portfolio should be explicitly identified and managed separately⁴³ from the other assets in the insurance fund, each MA portfolio should have sufficient assets to meet both the guaranteed and non-guaranteed benefits of the products within the portfolio⁴⁴.** The requirements specified below apply to the liabilities for guaranteed benefits of the products within the MA portfolio and the assets backing these liabilities within the MA portfolio.

6.7 **Predictability will be evaluated based on the aggregate change in the liabilities of the MA portfolio, measured against future cash outflows [i.e. Change in Liabilities/Present Value of Benefits and Expenses], to avoid distortion by small or negative liabilities in response to the following shocks⁴⁵:**

- (a) **Mortality;**
- (b) **Longevity;**
- (c) **Disability;**
- (d) **Dread Disease;**
- (e) **Other Insured Events; and**
- (f) **Lapse (excluding mass lapse event⁴⁶).**

The liabilities for non-participating products are the sum of the liabilities for guaranteed benefits corresponding to the products, before the application of the PAD, based on risk-free rates, and are allowed to be negative.

⁴³ Ring-fencing in the legal sense such as establishing a separate insurance fund for an MA portfolio, is not necessary, as long as the insurer is able to explicitly identify and manage the assets separately from the other assets in the insurance fund, to ensure that these assets are not exposed to the risk of forced sale to support other liabilities.

⁴⁴ For example, equities and other assets may be needed to support the non-guaranteed benefits for participating products within the MA portfolio.

⁴⁵ Expenses have been excluded for simplicity, as this is usually within the control of the insurers. Moreover, its impact is immaterial. Likewise, conversion option is excluded due to its immaterial impact.

⁴⁶ For avoidance of doubt, the lapse shock for this purpose is only limited to a + and – 50% change to the best estimate lapse rates, i.e. no lapse event. Excluding mass lapse shock from the predictability criteria is noted to be consistent with the approach taken for the middle bucket in 2018 ICS Field Testing.

The liabilities for participating products are based on guaranteed benefits i.e. the sum of the minimum condition liabilities, before the application of the PAD, based on risk-free rates, and are allowed to be negative.

The magnitude of the shocks to be applied shall be the same as the corresponding C1 risk factors. The same correlation matrix used to determine the diversified C1 requirements for life business is to be used to determine the net increase in liabilities for the purpose of evaluating predictability.

6.8 To qualify for the MA, the MA portfolio as a whole should meet the predictability criteria using the above evaluation method. **A predictability threshold of not more than 15%⁴⁷ for Single Premium/Fully paid-up business and not more than 10% for the other business, based on Change in Liabilities/Present Value of Benefits and Expenses, will apply. Please note that the threshold of 15% is only allowed for MA portfolios consisting entirely of single premium and/or fully paid-up policies.**

6.9 Excess asset cash flows (i.e. those not needed to meet liability cash flows⁴⁸) that may arise in a particular year can be brought forward to meet later year shortfalls, but the MA portfolio yield will be adjusted to be consistent with the “revised” asset cash flows. These excess cash flows can be carried forward to earn interest income at the risk-free forward rates. **Appendix 17** includes an example on how the MA portfolio yield should be adjusted. The adjustment in yield is necessary as the pattern of the cash flows is now changed. The liability yield would be floored at the original liability yield, similar to how the asset yield would also be treated.

6.10 A further refinement has been introduced to the calculation of the MA arising from the reallocation of excess asset cash flows and excess premium income. Where the insurer has relied on such reallocations to meet the constraints on extent of cash flow mismatching criteria as specified in **Appendix 16**, the MA calculation will be adjusted downwards to reflect the risk that the excess assets and excess premium income could only be invested in eligible assets that earn less than the full spread of the MA portfolio. More details on the adjustment is provided in **Appendix 16**.

⁴⁷ The thresholds were updated based on feedback received from the industry that the criteria specified in QIS 2 had disadvantaged single premium and fully paid-up business as compared with QIS 1. Both single premium and fully paid-up business were unaffected by the change in formula used for the predictability test under QIS 1 and QIS 2 but the lower threshold in QIS 2 had reduced the amount of single premium and fully paid-up business that qualified for MA under QIS 2.

⁴⁸ Only excess premium income (i.e. the portion not necessary to meet benefit and expense cash flows) can be reallocated, i.e. benefit and expense cash flows cannot be reallocated.

6.11 **The MA for a particular MA portfolio is determined as the average yield of the assets backing the liabilities for guaranteed benefits over the average risk-free liability yield⁴⁹, less the spreads for default and downgrade.** The methodology for determining the costs of default and downgrade can be found in **Appendix 18**. The calculation of the MA is automated in the MA Workbook. The MA will be floored at the level of IP⁵⁰ that would have been applicable to the MA portfolio⁵¹. More details on the operation of the floor is provided in **Appendix 16**.

Illiquidity Premium

6.12 The IP operates in a similar manner as MA, and is intended to be applied to products that have a lower level of cash flow predictability than the MA, or where the insurer is unable or unwilling to meet the more extensive requirements under the MA. The framework for the IP is provided in **Appendix 19**, with some updates to the parameters.

6.13 MAS has calibrated the IP based on a Reference Portfolio of SGD- and USD-denominated bonds of at least investment grade⁵² held by the industry⁵³ in the participating fund and non-participating fund. For the purpose of the parallel run, the IP for the Reference Portfolio is maintained at 55 bps, and applies to both Qualifying Debt Securities and Other Debt Securities⁵⁴. This revised calibration of the IP was based on 50% of the Reference Spread, and is further explained in **Appendix 20**.

6.14 The actual IP to be applied by the insurer will depend on the amount of Qualifying Debt Securities and Other Debt Securities the insurer has. **The actual IP applicable to insurers should be calculated at the insurance fund level by the insurer taking into account of its Strategic Asset Allocation (“SAA”) extracted from the latest board-**

⁴⁹ A minor refinement has been introduced where the term in which the liability yield is calculated would be capped at the term of the asset cash flows, but the operation of this cap would not cause the term in which the liability yield is calculated to fall below the LLP.

⁵⁰ i.e. the IP that would have been applicable based on the asset allocation of the MA portfolio.

⁵¹ It is possible for the MA to fall below the IP that would have been applicable had the MA not being applied, for example when credit spreads narrow rapidly. As the application of the MA requires the insurer to meet more stringent requirements compared with IP (which does not have pre-requisites other than the underlying product being classified as Whole Life, Endowment and Annuity in Form 14), the introduction of the floor results in the MA being not worse off than IP.

⁵² Including multilateral agencies and Singapore statutory boards.

⁵³ Based on the asset data collected from insurers listed in **Appendix 15**, prior to QIS 2.

⁵⁴ The IP for Other Debt Securities is limited to that for Qualifying Debt securities to mitigate the risk of insurers increasing the proportion in lower rated debt securities in the Reference Portfolio.

approved investment policy⁵⁵. Where the SAA is differentiated by product segment or product line, the IP may vary by product segment or product line. This calculated fund level IP, or segment-specific IP as the case may be, should then be applied to the risk-free discount rates for eligible products in the insurance fund. There is no need to make any adjustments to the SAA arising from the creation of MA portfolios. An example of how the fund level IP should be determined is provided in **Appendix 20**.

6.15 During the impact study for the year ended 31 December 2017, insurers were asked to perform projections based on a flat IP which does not depend on the amount of Qualifying Debt Securities and Other Debt Securities that the insurer has. This design for the IP will no longer be included in the parallel run as the 2018 impact study showed instances whether over-correction was noted during credit spread widening scenario.

Asset Data Collection for Illiquidity Premium

6.16 The creation of MA portfolios by insurers is likely to change the composition⁵⁶ of the Reference Portfolio that was used to calibrate the IP. The IP may need to be re-calibrated in the future to take into account changes in the composition of the Reference Portfolio. MAS will monitor the interaction between MA and IP, and if necessary, re-calibrate the IP.

Applicable Bases to Investigate for MA and IP

6.17 The application of MA and IP should be done in accordance to the Basis specified in Section 7 of this document. Each Basis is designed to allow MAS to further fine-tune the design for MA and IP, in particular the treatment of MA and IP after the LLP. For the purpose of the parallel run, the MA and IP will continue to be recognised in full up to the LLP. Beyond the LLP, the MA and IP will however taper to 10 bps⁵⁷ over a shorter period instead of over the entirety of Segment 2 of the yield curve⁵⁸.

⁵⁵ Where a range exist for the strategic asset allocation for each of the asset class, use the central allocation.

⁵⁶ For example, moving longer dated bonds to MA portfolios to satisfy the cash flow matching requirement for MA may result in a shortening in the overall duration of the remaining bonds which may impact the calibration of the IP.

⁵⁷ The choice of 10 bps is made for the purpose of the parallel run MAS may adjust this in future, pending for example, developments of ICS.

⁵⁸ This further shortening of tapering period for the MA and IP was made to further reduce the likelihood of liabilities decreasing more than assets when credit spreads widen, which would result in financial resources increasing, and vice-versa.

Impact of MA and IP on Risk Requirements and Regulatory Adjustments

6.18 The C1, C2 (other than the C2 credit spread requirement as specified below) and operational risk requirements as well as any negative reserves recognised as regulatory adjustment, should include the impact of MA and IP in the discount rates used to determine the risk requirements. Likewise, the minimum condition liability of the participating fund used in the calculation of the allowance for provision for non-guaranteed benefits (“APNGB”) of a participating fund should be determined taking into account the MA and IP, and the scope of MA and IP as specified in this section.

6.19 For portfolios where the MA is applied, the C2 credit spread risk requirement is **reduced** by applying a modified MA (i.e. MA’). This modified MA (i.e. MA’) should be calculated based on a percentage of the credit spread adjustment applicable to the assets within the MA portfolio. This modified MA will then be added to the MA when determining the C2 credit spread risk requirement. Please note that the recognition of MA’ should likewise be consistent with the MA that is already present before the application of the credit spread adjustment, i.e. recognised in full up to the LLP, and tapers after the LLP depending on the Basis selected.

6.20 MA’ should be calculated as follows:

$$MA' = \sum W_i * F_i * CS_{adj\ i} \text{ where;}$$

W_i is the weight corresponding to the proportion of bonds in rating and duration band category i ; and

F_i is the adjustment factor for rating and duration band category i . The adjustment factor is set at 80% for bonds with AAA, AA and A credit ratings, and 50% for assets with BBB credit rating; and

$CS_{adj\ i}$ is the credit spread adjustment for rating and duration band category i

The values of $CS_{adj\ i}$ and F_i are provided in the following table:

Credit Rating	Maturity (years)	$CS_{adj\ i}$ (bps)	F_i
AAA	[0, 5]	105	80%
AA	[0, 5]	120	80%
A	[0, 5]	165	80%
BBB	[0, 5]	245	50%
AAA	[5.001, 10]	95	80%
AA	[5.001, 10]	115	80%

A	[5.001, 10]	145	80%
BBB	[5.001, 10]	230	50%
AAA	[10.001, 15]	90	80%
AA	[10.001, 15]	95	80%
A	[10.001, 15]	125	80%
BBB	[10.001, 15]	215	50%
AAA	>15	90	80%
AA	>15	95	80%
A	>15	125	80%
BBB	>15	215	50%

6.21 Please note that the derivation of the MA' has been built into the MA Workbook.

Treatment of Diversification

6.22 The assets and liabilities within each MA portfolio should be explicitly identified and managed separately from the other assets in the Insurance fund, to ensure that they are not exposed to the risk of forced sale to support other liabilities. The benefits of diversification for each MA portfolio are therefore limited to diversification within the MA portfolio only. This has been taken into account in the Main Workbook.

7 SUBMISSION INSTRUCTIONS

7.1 As mentioned in Section 1, all insurers (with the exception of captives, Lloyd's insurers and marine mutuals) will be required to conduct a parallel run based on the finalised proposals in this technical specifications document for the year ended 31 December 2018.

7.2 **Insurers are required to submit the parallel run results in the format prescribed in the workbooks provided.** The forms within the workbooks are designed to capture the information needed for the analysis. The workbooks must not be modified⁵⁹ in any way.

7.3 The completed workbooks and Questionnaire should be submitted to MAS **no later than 2 July 2019**. Insurers are strongly encouraged to send all queries to the parallel run to RBC2con@mas.gov.sg. **The submitted results are to be based on the valuation date of 31 December 2018.** All amounts are to be shown in **thousands** of Singapore dollars (SGD).

7.4 **The completed workbooks should be submitted by the insurer via an email attachment to the insurer's liaison officer in MAS, using AES 256 encryption or higher.** The insurers should deliver the corresponding alphanumeric password of minimum 12 characters in length or encryption key via a separate transmission channel (e.g. telephone) to MAS. MAS uses WinZip12 AES 256 encryption to protect such information. **As for the Questionnaire, this should be completed via an online survey via the link that is provided to the insurers via the circular ID 07/19.**

7.5 An insurer that **only** writes general business will **just need to submit one set of results based on the specifications set out in Sections 2 to 5**. There is no need to apply any credit stresses mentioned in paragraph 7.8 below.

Specific Instructions for Insurer Writing Life Business

7.6 An insurer that writes life business (as a direct life or life reinsurer), will need to carry out more iterations of projections due to the additional analyses on MA⁶⁰ and IP, mentioned in Section 6. We will also investigate the impact of credit stresses (i.e. credit spread widening) in these additional analyses.

⁵⁹ Except for the Discount Rate Workbook, where it is necessary to generate the discount rates for currencies with LLPs other than 20 years or 30 years.

⁶⁰ Though MA is not applicable for life reinsurer, IP may be. Hence a life reinsurer would need to perform the additional analyses.

7.7 Insurers are required to **submit results based on the following Bases**⁶¹:

- a) **Basis 3a:** This is the default position, where the projections are done based on the specifications set out in Sections 2 to 6. Recognition of MA and/or IP in full up to LLP, and tapers to 10 bps⁵⁷ in 10 years after the LLP;
- b) **Basis 3b:** Same as Basis 3a, but MA and/or IP tapers to 10 bps⁵⁷ in 15 years after the LLP;
- c) **Basis 5:** Without any MA and/or IP, i.e. risk-free rates only. This is to allow us to assess the effectiveness of the MA/IP design.

Additional Notes on the Bases:

The same products or HRGs should be used in all Bases. For avoidance of doubt, where MA or IP is applied to a particular product or HRG in Bases 3a and 3b, a zero MA or IP should be applied to these same products and HRGs in Basis 5. In other words, under Basis 5, all products and HRGs should be discounted at risk-free rates. However, in terms of their classification in the Main Workbook, HRGs where MA or IP have been applied in Bases 3a and 3b should continue to be classified as having MA or IP under Basis 5, although these HRGs would be discounted at the risk-free rates under Basis 5⁶². This allows MAS to analyse the impact of MA and IP by HRGs.

For Bases 3a and 3b:

- Insurers can use the Discount Rate Workbook provided to generate the spot discount rates which incorporate the MA or IP. Instructions on how this can be done is provided in the workbook.
- Where the insurer is able to satisfy the cash flow matching requirement beyond the LLP, full recognition of MA can be given up to the point where liability cash flows can be matched. The tapering of MA and/or IP will commence immediately thereafter. The workbook provided to generate the spot discount rates contains specifications on incorporating this special case for MA.

7.8 In addition to the Base Scenario which is performed under the Bases mentioned above, insurers are also required to submit results on a credit spread widening scenario

⁶¹ For ease of comparing with the 2018 impact study, the same naming convention of the various Bases has been retained, albeit with further differentiation of Basis 3 to reflect the two distinct periods where MA and/or IP tapers off.

⁶² For example, in the tab MA_IP_Valn_SIF of the Main Workbook, HRGs where MA or IP have been applied should continue to be classified under “Products using Matching Adjustment” or “Products using Illiquidity Premium” in Basis 5, and not under “Products not using Matching Adjustment or Illiquidity Premium”.

on all Bases specified above. Such credit stresses would help MAS to better assess the effectiveness of the design and calibration of the MA and IP under different Bases. The details of the credit spread widening scenario is as follows:

	Details
Credit spread widening scenario	<p>An upward shock of 150 bps on credit spreads</p> <p><u>For MA: Bases 3a and 3b</u></p> <p>MA should be recalculated assuming the yields for corporate bonds increased⁶³ by 150 bps from that used in Base Scenario, applicable in full up to the LLP. The impact to MA after the LLP will follow the respective Basis. Additional instructions on how the MA should be recalculated in response to credit spread widening is provided in the MA Workbook.</p> <p><u>For IP: Bases 3a and 3b</u></p> <p>(a) IP applicable to both Qualifying Debt Securities and Other Debt Securities is increased by 75 bps⁶⁴ to 130 bps⁶⁵ (up from 55 bps in Base Scenario);</p> <p>(b) The actual fund level IP is to be determined by insurers, based on the SAA of the insurer, and determined per the specifications in Section 6.</p> <p><u>Basis 5</u></p> <p>No impact to liabilities as only risk-free rates are used to discount liability cash flows.</p> <p><u>Impact of credit spread widening scenario</u></p> <p>For avoidance of doubt, for products such as universal life, the best estimate investment return used in calculating the policy liability should not be assumed to increase under the credit spread widening scenario.</p>

⁶³ An implicit simplifying assumption was made in that the spreads for default and downgrade remain unchanged under the stress scenario. This is reasonable as the spreads for default and downgrade provided for the Base Scenario are based on long-term probabilities of default and long-term transition matrix from Standard & Poors.

⁶⁴ The IP for Qualifying Debt Securities and Other Debt Securities is increased by $50\% \times 150 = 75$ bps from Base Scenario, with 50% being the revised k-factor for the Reference Portfolio.

⁶⁵ This assumes that the IP will be updated regularly to reflect the credit spread widening.

7.9 The table below provides more details on the treatment of MA and IP for the various segments of the yield curve for discounting liability cash flows:

	Recognition of MA and IP in Segment 1	Treatment of MA and IP in Segment 2*	Treatment of MA and IP in Segment 3
Basis 3a	Recognised in full, i.e. added to spot risk-free discount rates	Tapers to 10 bps in 10 years	MA and/or IP recognised in as 10 bps on top of spot risk-free rates**
Basis 3b		Tapers to 10 bps in 15 years	
Basis 5	No MA and/or IP applicable, i.e. risk-free rates only		

*Please note the special case elaborated above on full recognition of MA beyond the LLP

** Please note that the 10 bps spread for MA and/or IP is to be added to the spot risk-free rates

7.10 As the MA depends on the actual yield of the assets of the insurer, and the IP depends on the Strategic Asset Allocation of the relevant insurance fund, the derivation of spot discount rates under Bases 3a and 3b will need to be done by insurers for both the Base Scenario and Credit Spread Widening Scenario. The table below provides more information on the party generating the discount rates for discounting liability cash flows:

	Spot Discount Rates including MA	Spot Discount Rates including IP
Basis 3a*	Generated by insurers	Generated by insurers
Basis 3b*		
Basis 5	Risk-free rates provided by MAS	Risk-free rates provided by MAS

*For products not qualifying for MA or IP in Bases –3a and 3b, the spot risk-free discount rates for Basis 5 will apply

Submission of Documents

7.11 The naming convention for submission of the Main Workbook is as follows:

Scenario	Basis	To be submitted by			How the workbook should be named in the submission to MAS
		Direct Life/ Composite Insurer	Direct General Insurer & General Reinsurer	Life/ Composite Reinsurer	
Base	3a	√ (all scenarios will apply)		√, (if IP is applicable)	Base_Basis 3a_RBC2_YE18
Base	3b				Base_Basis 3b_RBC2_YE18
Base	5		√	√	Base_Basis 5_RBC2_YE18
Credit Spread Widening	3a				Stress_Basis 3a_RBC2_YE18

Credit Spread Widening	3b			✓ (if IP is applicable)	Stress_Basis 3b_RBC2_YE18
Credit Spread Widening	5				Stress_Basis 5_RBC2_YE18

7.12 For the MA Workbook, a separate workbook should be submitted for each MA portfolio of products. Separate workbooks should be submitted for the base and credit spread widening scenarios. The naming convention for submission of the MA Workbook is as follows:

Scenario	How the workbook should be named in the submission to MAS
Base	Base_MAn_<PAR TYPE>_<FUND>_RBC2_YE18
Credit Spread Widening	Stress_MAn_<PAR TYPE>_<FUND>_RBC2_YE18

Where:

<PAR TYPE>: Par or NP

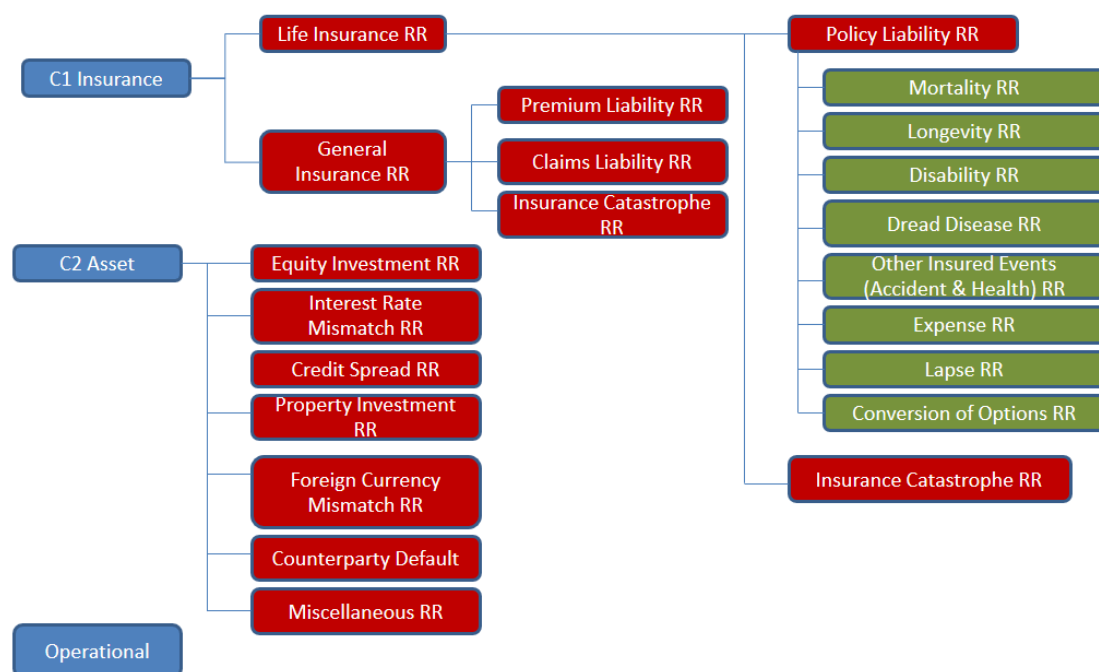
<FUND>: SIF or OIF

n: n-th MA portfolio, n = 1, 2, 3, ...

Appendix 1

TYPE OF RISK REQUIREMENTS AND DESCRIPTION OF RISKS

Diagram 1: Risk Modules under RBC 2



Type of risk requirements	Description of risk
Mortality risk	Mortality risk is the risk associated with the variability in liability cash flows due to the incidence of death.
Longevity risk	Longevity risk is the risk associated with the variability in liability cash flows due to increasing life expectancy.
Disability risk	Disability risk is the risk associated with the variability in liability cash flows due to the incidence of policyholder's disability claims, as well as recovery or termination rates.
Dread disease risk	Dread disease risk is the risk associated with the variability in liability cash flows due to the incidence of dread disease claims, as well as recovery or termination rates.
Other insured events (A&H) risk	Other insured events (A&H) risk is the risk associated with the variability in liability cash flows due to the incidence of

	accident and health claims as well as recovery or termination rates.
Expense risk	Expense risk is the risk associated with the variability in liability cash flows due to the incidence of expenses incurred.
Lapse risk	Lapse risk is the risk associated with the variability in liability cash flows due to the incidence of lapses (including forfeitures, surrenders etc) by policyholders. Includes consideration of a mass lapse event.
Conversion of options risk	Conversion of options risk is the risk associated with the variability in liability cash flows due to the incidence of policyholders exercising available options (for example, convertible term).
Life insurance catastrophe risk	Life insurance catastrophe risk stems from extreme or irregular events which effects are not sufficiently captured in the other C1 requirements.
Premium liability risk	Premium liability risk is associated with future claims and is the risk that the amount set aside for claims and expenses against unearned premiums will prove inadequate.
Claims liability risk	Claims liability risk is associated with incurred claims, i.e. existing claims, and is the risk that the amount set aside for claims that have already occurred will prove inadequate.
General insurance catastrophe risk	General insurance catastrophe risk stems from extreme or irregular events which effects are not sufficiently captured in requirements for premium liability risk and claim liability risk.
Equity investment risk	Equity investment risk is the risk of economic loss due to changes in the price of equity exposures.
Interest rate mismatch risk	Interest rate mismatch risk is the risk arising from changes in market interest rates, which affect the prices of debt securities and policy liabilities where the valuation of policy liabilities requires discounting of future policy liability cash flows using the market yield of the relevant yield curve.
Credit spread risk	Credit spread risk is the risk of change in value due to movements in the market price of credit risk. This includes both the credit default as well as credit spread widening risk.

Property investment risk	Property risk is the risk of economic loss due to changes in the price of property exposures.
Foreign currency mismatch risk	Foreign currency mismatch risk is the risk of economic loss due to adverse movements in the value of foreign currencies against the Singapore dollar.
Counterparty default risk	Counterparty default risk is the risk of economic loss due to unexpected default of the counterparties and debtors of insurers.
Miscellaneous risk	<p>Miscellaneous risk covers risk of loss in value for fixed assets and assets that are non-financial instruments.</p> <p>It excludes:</p> <ul style="list-style-type: none"> • Risks that have been covered in the other C2 risk requirements • Non-standard instruments as described under paragraph 1(5) of the Fourth Schedule of the Insurance (Valuation and Capital) Regulations 2004, which would be retained under RBC 2
Operational risk	Operational risk refers to the risk of loss arising from complex operations, inadequate internal controls, processes and information systems, organisational changes, fraud or human errors, (or unforeseen catastrophes including terrorist attacks).

Appendix 2**LIST OF COUNTRIES IN MSCI WORLD EQUITY INDEX⁶⁶****MSCI - Developed Countries**

Australia
Austria
Belgium
Canada
Denmark
Finland
France
Germany
Hong Kong SAR
Ireland
Israel
Italy
Japan
Netherlands
New Zealand
Norway
Portugal
Singapore
Spain
Sweden
Switzerland
United Kingdom
United States

⁶⁶ The developed countries listed are based on the constituents of the MSCI World Index as of 6 May 2019. Should the constituents change, insurers are to update accordingly.

Appendix 3**TREATMENT OF COLLECTIVE INVESTMENT SCHEMES**Instructions and Clarifications

1. For Collective Investment Schemes (“CIS”), the insurer may calculate the asset risk charge by looking-through to the underlying securities held by the CIS and treating the asset holdings as separate and distinct investments. Each of these assets should then be subject to the relevant C2 risk module.
2. For CIS which invests a portion or entirely in debt securities or debt derivatives, the insurer can treat the underlying debt securities which are of the same currency as a single debt security and calculate the risk charges based on the relevant risk modules by assuming the average maturity, coupon and credit quality of the debt securities or debt derivatives.
3. Insurers will also be allowed to allocate the underlying exposures in reference to the investment mandate of the scheme. But in doing so, the allocation must be done in such a manner as to produce the maximum overall capital requirement, i.e. in that it invests, to the maximum extent allowed, in the asset class that attracts the highest risk requirement, and then continues making investments in descending order until the maximum total investment level is reached. An example has been included later to illustrate this.
4. In cases where the insurer chooses not to adopt the look-through approach, either based on the actual allocation of the underlying exposures or the investment mandate, the insurer can apply a 50% risk charge to the market value of the CIS.
5. Where a look-through approach is taken, the insurer must provide and maintain sufficient evidence to demonstrate that the proposed allocation of the investment exposure of the CIS into the relevant risk charge modules is justifiable and reasonable.
6. Insurers should consult MAS should there be any uncertainty on the risk requirement treatment for its Collective Investment Scheme holdings.

Example illustrating how insurers should make reference to the investment mandate of the CIS when deriving a suitable risk charge

A CIS has a mandate that states that it invests 20-30% in listed Singapore equities and 70-80% in equities listed in Other Markets. For risk charging purposes, since equities that are listed in “Other markets” attract a higher risk charge, it should be assumed that the CIS invests 20% in listed Singapore equities and 80% in equities listed in Other Markets in order to produce the maximum overall capital requirement for the CIS.

The resulting risk charge for the entire CIS is therefore $(20\% \times 35\%) + (80\% \times 50\%) = 47\%$

Appendix 4

**CALCULATION OF INTEREST RATE MISMATCH AND
CREDIT SPREAD RISK REQUIREMENTS**Instructions and Clarifications

1. The government yield curves derived by insurers must be based on market observable yields. Insurers can refer to paragraph 4.2.4 of SAS SAP L02 for various approaches that can be taken to determine the market yield of government curves.⁶⁷
2. Insurers should then adjust the relevant yield curve⁶⁸ relevant to the interest rate exposure by adding to the relevant yield curve, the absolute amounts of the calculated upward and downward interest rate adjustments, to revalue the assets and liabilities under the upward and downward scenarios respectively.
3. For interest rate sensitive assets, where the market value of exposures in a particular currency is immaterial (less than 5% of the total market value of all interest rate sensitive assets), the insurer may use the US Government yield curve as a proxy of the actual government yield curve, as well as, to determine the interest rate adjustments for exposures in that currency
4. Floating rate instruments are to assume a term until the next coupon reset date.
5. For bonds with optionality (e.g. callable bonds), to determine the duration:
 - Under upward interest rate up scenario, use term to final maturity
 - Under downward interest rate scenario, use term to first call date

The "after shock" market price of the callable bond should not exceed the present value of [call price + all cash flows payable before and on the first call date].

⁶⁷ We note that this guidance note is for the valuation of policy liabilities for life business and paragraph 4.2.4 provides guidance for determination of SGS market yields specifically. However, the approaches proposed can also be used to determine the market yield of other government curves, and thus can be used for the purposes of interest rate and credit spread risk charging as detailed under this appendix.

⁶⁸ For policy liabilities and risk-free assets (government securities), the relevant yield curve is the corresponding government yield curve. For other assets, insurers should calculate a single spread over the relevant government yield curve that equates the discounted present value of cash flows to the market value of the asset. Insurers should then assume that the relevant base yield curve for these assets is the sum of the government yield curve plus the constant spread.

6. For credit spread adjustments, insurers should similarly revalue the exposures by adding the constant spread adjustment (determined based on the remaining term and credit rating of that security) to the relevant yield curve of the security.

Sample calculations of interest rate mismatch and credit spread risk requirements for asset exposures

Example 1 – Government Bond

USD Government Bond					
Credit Rating	AA				
Remaining Term:	3 years				
Coupon per 100:	2				
Redemption:	100				
Market Price:	100				
1) Identify the relevant government yield curve for the corporate bond.					
The relevant government yield curve is the United States Government Securities yield curve.					
2) Derive the relevant yield curve for the corporate bond.					
Time, t	Cash Flows	US Gov Yield (Illustrative rates only)	Present Value Factor	Present Value ("PV") of Cash Flows using SGS yield	
0	-	-			
1	2	1.00%	0.9901	1.98	
2	2	1.20%	0.9764	1.95	
3	102	2.00%	0.9423	96.12	
				100.05	
For interest rate mismatch risk calculation - Compute the change in value of the corporate bond under the upward and downward scenarios					
1) Derive absolute interest rate adjustments for the interest rate mismatch risk requirement calculation.					
*Do note that if the resulting calculated absolute adjustment exceeds 200 basis points, then the adjustment will be capped at 200 bps.					
Time, t	US Gov Yield (Illustrative rates only)	% Upward Adjustment	Absolute Upward Adjustment = US Gov Yield * % Upward Adjustment	% Downward Adjustment	Absolute Downward Adjustment = US Gov Yield * % Downward Adjustment
0	-	-			
1	1.00%	100%	1.00%	-70%	-0.70%
2	1.20%	100%	1.20%	-70%	-0.84%
3	2.00%	95%	1.90%	-65%	-1.30%

Interest rate mismatch risk requirement

SGD Corporate Bond							
Credit Rating	AA						
Remaining Term:	5 years						
Coupon per 100:	4						
Redemption:	100						
Market Price:	105						
1) Identify the relevant government yield curve for the corporate bond.							
Since the currency of this corporate bond is SGD, the relevant government yield curve is the Singapore Government Securities ("SGS") yield curve.							
2) Derive the relevant yield curve for the corporate bond.							
Calculate single spread over the SGS that equates the discounted present value of the cash-flows to the market value of the corporate bond.							
0.99%							
Relevant Yield Curve = SGS (+) constant spread							
Present Value Factor							
PV of Cash Flows using SGS yield (+) constant spread							
Time, t	Cash Flows	SGS Yield (Illustrative rates only)	Present Value Factor	Present Value ("PV") of Cash Flows using SGS yield			
0	-	-			-		
1	4	0.30%	0.9970	3.99	1.29%	0.9873	3.95
2	4	0.50%	0.9901	3.96	1.49%	0.9709	3.88
3	4	1.00%	0.9706	3.88	1.99%	0.9427	3.77
4	4	1.50%	0.9422	3.77	2.49%	0.9064	3.63
5	104	2.00%	0.9057	94.20	2.99%	0.8632	89.77
				109.80			105.00
For interest rate mismatch risk calculation - Compute the change in value of the corporate bond under the upward and downward scenarios							
1) Derive absolute interest rate adjustments for the interest rate mismatch risk requirement calculation.							
*Do note that if the resulting calculated absolute adjustment exceeds 200 basis points, then the adjustment will be capped at 200 bps.							
The absolute adjustments are derived by multiplying the government yield curve relevant to the corporate bond, by the relevant prescribed % adjustments.							
Absolute Upward Adjustment = SGS * % Upward Adjustment							
Absolute Downward Adjustment = SGS * % Downward Adjustment							
Time, t	SGS Yield (Illustrative rates only)	% Upward Adjustment		% Downward Adjustment			
0	-	-					
1	0.30%	100%	0.30%	-70%	-0.21%		
2	0.50%	100%	0.50%	-70%	-0.35%		
3	1.00%	95%	0.95%	-65%	-0.65%		
4	1.50%	95%	1.43%	-65%	-0.98%		
5	2.00%	90%	1.80%	-60%	-1.20%		
2) Compute the change in value of the corporate bond under the upward and downward scenarios.							
PV of Cash Flows using Relevant Yield (+) Absolute Downward Adjustment							
Time, t	Cash Flows	Relevant Yield (+) Absolute Upward Adjustment	Present Value Factor	PV of Cash Flows using Relevant Yield (+) Absolute Upward Adjustment	Relevant Yield (+) Absolute Downward Adjustment	Present Value Factor	
0	-	-			-		
1	4	1.59%	0.9844	3.94	1.08%	0.9894	3.96
2	4	1.99%	0.9614	3.85	1.14%	0.9777	3.91
3	4	2.94%	0.9168	3.67	1.34%	0.9610	3.84
4	4	3.91%	0.8577	3.43	1.51%	0.9418	3.77
5	104	4.79%	0.7915	82.32	1.79%	0.9153	95.19
				97.20			110.67
Reduction in bond value (upward scenario):				7.80	(downward scenario): -5.67		

Credit spread risk requirement

SGD Corporate Bond						
Credit Rating	AA					
Remaining Term:	5 years					
Coupon per 100:	4					
Redemption:	100					
Market Price:	105					
For Credit Spread risk calculation - Compute the change in value of the corporate bond						
1) Identify the relevant constant basis point credit spread adjustment for the corporate bond.						
Term\Credit Rating	AAA	From AA- to AA+	From A- to A+	From BBB- to BBB+	From BB- to BB+	B+ and below
0-5	105	120	165	245	405	540
5-10	95	115	145	230	365	500
>10	90	95	125	215	355	475
2) Calculate the change in value of the corporate bond by adding this constant credit spread adjustment on the relevant yield curve for the bond						
Time, t	Cash Flows	Relevant Yield (+) credit spread adjustment	Present Value Factor	PV of Cash Flows using Relevant Yield (+) credit spread adjustment		
0	-	-				
1	4	2.49%	0.9757	3.90		
2	4	2.69%	0.9484	3.79		
3	4	3.19%	0.9102	3.64		
4	4	3.69%	0.8652	3.46		
5	104	4.19%	0.8146	84.72		
				99.52		
Reduction in bond value from credit spread adjustment:				5.48		

The applicable credit spread adjustment based on term and credit rating of the corporate bond

Example 3 – Using Modified Duration Approach

SGD Corporate Bond						
Credit Rating	AA					
Remaining Term:	5 years					
Coupon per 100:	4					
Redemption:	100					
Market Price:	105					
Coupon frequency	Annual					
1) Get the yield to maturity (YTM)						
YTM	2.91%					
2) Compute the modified duration						
Modified Duration	4.51					
For interest rate mismatch risk calculations - Compute the change in value of the corporate bond under the upward and downward scenarios						
1) Derive absolute interest rate adjustments for the interest rate mismatch risk requirement calculations						
*Do note that if the resulting calculated absolute adjustment exceeds 200 basis points, then the adjustment will be capped at 200 bps.						
Time, t	SGS Yield (Illustrative rates only)	% Upward Adjustment	Absolute Upward Adjustment = SGS * % Upward Adjustment		% Downward Adjustment	Absolute Downward Adjustment = SGS * % Downward Adjustment
4	1.40%	95%	1.33%		-65%	-0.91%
5	2.00%	90%	1.80%		-60%	-1.20%
2) Compute the change in value of the corporate bond under the upward and downward scenario						
Reduction in bond value		Upward 8.52	Downward -5.68	Where modified duration is in between duration specified in the prescribed table, to apply the adjustments corresponding to the closest term. i.e. 5 in this case.		
For Credit Spread risk calculations - Compute the change in value of the corporate bond						
1) Identify the relevant constant basis point credit spread adjustment for the corporate bond.						
Term\Credit Rating	AAA	From AA- to AA+	From A- to A+	From BBB- to BBB+	From BB- to BB+	B+ and below
0-5	105	120	165	245	405	540
5-10	95	115	145	230	365	500
>10	90	95	125	215	355	475
2) Calculate the change in value of the corporate bond using modified duration						
Reduction in bond value		5.68				

Appendix 5

APPROACHES FOR RECOGNISING INSURER'S INTERNAL CREDIT RATING MODEL AND PROCESS FOR UNRATED CORPORATE BONDS

1 Singapore insurers generally hold a sizeable proportion⁶⁹ of long-dated unrated bonds to match long-term liabilities, in view of a domestic market shortage of long-dated government and rated corporate bonds. A significant proportion of these bonds are issued by Singapore statutory boards. The rest of the unrated bond holdings are mostly issued by financially strong corporates in Singapore that did not seek a rating. The credit spread shock for unrated bonds⁷⁰ is by default set as the average of the credit spread shock for "BB" and "BBB" rated bonds⁷¹.

2 During the RBC 2 consultation phase, the industry had suggested that MAS specify the criteria for an admissible internal credit rating model. Insurers must satisfy these criteria before they are allowed to use the internal credit rating derived from such a model to read off the corresponding prescribed credit spread risk shock for unrated bonds. MAS has subsequently consulted on a set of criteria in the 2016.

3 Since then, MAS has been engaging insurers who have indicated interest in getting their internal credit rating process recognised for unrated bonds, to better understand their rating process and the level of expertise and oversight. This is with a view to better calibrate the proposal to recognise the insurers' internal credit rating process for unrated bonds.

4 Under RBC 2, two approaches will be allowed, **based on whether an insurer is applying for recognition of (1) an internal credit rating model or (2) an internal credit rating process. The internal credit rating derived under either approach are then applied to the RBC2 prescribed credit spread shocks for credit spread risk requirement computation.** For avoidance of doubt, for bonds issued by Singapore statutory boards and recognised multilateral agencies, the credit spread to be applied would still be 50% of that proposed for a "AAA"- rated corporate bond, unless the insurer is of the view that it would not be prudent to do so.

⁶⁹ Insurers have on average been collectively holding around 10 - 20% of their corporate bond holdings in the form of unrated bond issuances.

⁷⁰ With the exception of bonds issued by Singapore statutory boards and recognised multilateral agencies, where the prescribed credit spread shock under RBC 2 is 50% of that proposed for a "AAA"- rated corporate bond.

⁷¹ However, if the unrated bond exhibit features that are close to junk bonds, the insurer is expected to apply a higher risk charge for prudence.

a) Approach 1: Full recognition under internal credit rating model

5 An insurer with an internal credit rating model and has minimally derived its own probability of default parameters used in the model will be allowed to recognise the internal credit rating of their corporate bonds under the RBC2 framework, subject to the conditions below.

- i. The internal credit rating model must comply with the relevant requirements in MAS Notice 637⁷², including:
- ii. An insurer shall apply in writing for approval from MAS if it intends to adopt such an internal credit rating model to recognise the internal credit rating of their corporate bonds under the RBC2 framework;
- iii. MAS may grant approval to adopt such an internal credit rating model subject to such conditions or restrictions as may be imposed by MAS.
- iv. Other criteria cover aspects such as:
 - a. Application and definition of default⁷³ under the model
 - b. Definition of model parameters and their derivation⁷⁴, such as probability of default, and where relevant, loss given default and exposure after default
 - c. Minimum requirements on information and data used for deriving estimates of model parameters⁷⁵
 - d. Model validation standards⁷⁶;
- v. An insurer that has received approval to adopt such an internal credit rating model shall apply the derived credit rating to all its externally rated and

⁷² MAS is an integrated supervisor and the criteria to fulfil for recognition of internal credit rating should be aligned where relevant across different types of financial institutions. MAS Notice 637 can be found in this [link](#). Although reference has been made here to the relevant provisions under MAS Notice 637 for the purpose of this parallel run technical specifications, the applicable requirements would be set out in the relevant legislation for RBC 2.

⁷³ MAS Notice 637 Annex 7X

⁷⁴ MAS Notice 637 Annex 7Y

⁷⁵ MAS Notice 637 Annex 7AA

⁷⁶ MAS Notice 637 Annex 7AB

unrated corporate bonds and is not permitted to apply the default RBC 2 treatment of using a credit spread shock of in between “BB” and “BBB” for unrated corporate bonds .

6 Interested insurers intending to seek approval for such an internal credit rating model are encouraged to engage MAS early.

b) **Approach 2: Partial recognition under internal credit rating process**

7 An insurer with an established internal credit rating process⁷⁷ will be allowed to use its internally derived credit rating for its unrated corporate bond (with the exception of investments in unrated infrastructure bond and unrated structured product)⁷⁸, subject to the conditions below:

- i. Meet governance-based criteria which is largely similar to what was consulted in the Third RBC 2 consultation paper, covering mainly board and senior management oversight, internal validation, and independent review. Details of the criteria is listed in **Appendix 6**;
- ii. Notify MAS at least 3 months in advance of the recognition, confirming that that the governance criteria set out in **Appendix 6** has been met;
- iii. Only scoresheets developed by/with ECAs recognised by MAS⁷⁹ for licensed insurers, unless otherwise agreed with MAS, shall be permitted for use under this process;
- iv. Upon adopting and implementing this approach, any internal rating recognised is capped at “BBB”⁸⁰-rating equivalent for the unrated corporate bond, even if the internal credit rating is better. An insurer shall consistently use the internal credit rating derived for its unrated corporate bond under this approach, even if it is worse than the default rating of average of “BB”

⁷⁷ This is not an internal credit rating model as insurers do not derive their own parameters for model calibration (e.g. probability of default and loss given default parameters)

⁷⁸ Reasons for the carve out are mainly due to the lack of expertise on insurers for rating such investments compared to a plain vanilla corporate bonds, as well as less pool of similar assets that are externally rated for insurers to back-test against their own rating methodology to meet validation requirements. MAS will separately consult on the treatment of infrastructure investments and structured products this year.

⁷⁹ The list of recognised ECAs for licensed insurers is set out in Table 1 of the Sixth Schedule in Insurance (Valuation and Capital) Regulations 2004. These are Moody’s Investor Services, Standard and Poor’s Corporation, Fitch Inc and A. M. Best Company Inc.

⁸⁰ The rating illustrated here makes reference to S&P’s credit rating.

and “BBB” rating. i.e. insurer shall not apply the RBC 2 treatment of using a credit spread shock in between “BB” and “BBB” for unrated corporate bonds; and

- v. MAS may derecognise the insurer’s internal credit rating process, if the process does not, or subsequently does not, comply with the criteria set out in **Appendix 6**.

Appendix 6**CRITERIA FOR RECOGNITION OF INTERNAL CREDIT RATING PROCESS (“PROCESS”) FOR UNRATED BONDS UNDER PROPOSED APPROACH 2****1) Board Oversight**

- a) The Board is responsible for ensuring that the governance around the process is adequate. This will include ensuring that process is being used for its intended purpose and that applicable controls are put in place, and that these controls remain adequate on an ongoing basis. Accordingly, the insurer shall undertake efforts to equip the Board with a clear understanding of the objectives, basis and the controls in place for the process. The insurer shall ensure that the information provided to the Board is adequate for the Board to perform its roles effectively.
- b) The Board may delegate some of its responsibilities with respect to the process to senior management or staff, or committees comprising senior management or staff. However, accountability of the Board shall not be delegated and the Board shall continue to exercise oversight to ensure that its delegated responsibilities are effectively carried out.
- c) The insurer shall inform the Board of material changes to the process. The insurer shall also inform the Board of any significant exceptions from established policies and procedures, or weakness in respect of process. By way of example, persistent occurrences of significant differences between realised and predicted outcomes of ratings shall be reported. This could happen when back-testing of internal ratings differ consistently from external ratings.

2) Senior Management Oversight

- a) The Insurer shall ensure that Senior Management exercises active oversight to ensure the continuing appropriateness of the process and its use.
- b) The insurer shall ensure that the Senior Management has a good understanding of the design and operation of the-process and its use. The insurer shall ensure that Senior Management approves material aspects of these areas and material differences between established procedure and actual practice, and reports significant issues to the Board on a regular and timely basis.
- c) The insurer shall establish comprehensive and adequate written policies and procedures relating to the oversight and control of the process and its use. At a minimum, these policies and procedures shall include –

- i) The roles and responsibility of the Board, Senior Management and other personnel involved in the process;
 - ii) The internal control processes and independent oversight of the design and operation of the process and its use;
 - iii) The matters which the insurer considers material and the authority and approval levels for these matters; and
 - iv) The frequency and level of detail of reporting to the Board.
 - d) Only scoresheets developed by/with ECAs recognised by MAS for licensed insurers, unless otherwise agreed with MAS, shall be permitted for use under this process.
 - e) The insurer shall also ensure that Senior Management ascertain, on an ongoing basis, that the process –
 - i) Provides for a meaningful assessment of the characteristics of the bond exposures of the insurer, and a meaningful differentiation of risk; and
 - ii) is consistent with all applicable rules and regulations as well as established internal policies.
 - f) The insurer shall ensure that Senior Management and staff in the credit risk control functions meet regularly to discuss the consistency of rating assignments, areas for improvement, and the status of efforts to improve previously identified deficiencies.
 - g) The insurer shall ensure that Senior Management ensures that the staff responsible for any aspect of the model, including rating assignments, credit risk control and internal validation, are adequately qualified and trained to undertake their respective roles.
- 3) Regular reporting to Board and Senior Management
- a) The insurer should integrate internal ratings into regular reporting to the Board and Senior Management on the changes in risk profile of its corporate bond holdings. The depth and frequency of information provided to these parties shall be commensurate with the operations, size and risk profile of the insurer.
 - b) At a minimum, the insurer shall ensure that the Board and Senior Management get regular reports on the following material bond portfolios –

- i) Risk profile by internal grade;
- ii) Risk rating migration across grades with emphasis on unexpected results;
- iii) Results of internal validation, including results of replication tests performed to check for systemic biases in rating assignments; and
- iv) Reports from internal audit and credit risk control functions on material issues.

4) Credit Risk Control Function

- a) The insurer shall establish a credit risk function that is responsible for the design/selection, implementation and rating assignment activities and reporting on the effectiveness of the framework. The credit risk function should be structurally and functionally independent from the personnel and management functions responsible for originating exposures.
- b) The insurer shall ensure that the evaluation of the performance and remuneration of the credit risk control unit takes into consideration how well the credit risks are managed (e.g. the reliability and consistency of ratings)
- c) The credit risk control function shall have oversight and supervision responsibilities of the process, and ultimate responsibilities for the ongoing assessments of the performance of and alterations to the process.

5) Internal validation

- a) Internal validation encompasses a range of processes and activities that contribute to the internal assessment of the insurer of whether it is capable of deriving consistent and appropriate ratings. An insurer should be able to demonstrate to the satisfaction of MAS upon request, that its internal validation process enables it to assess the performance of its internal rating process consistently and meaningfully, and its internal validation is robust and likely to remain so.
- b) The insurer shall perform regular internal validation of its process (at least annually).
- c) There should be consistency of rating process with checks against external ratings by ECAs recognised by MAS (including back-testing of internal ratings for externally rated corporate bonds) and across portfolios.

- d) The insurer shall ensure that no person responsible for the design or implementation of the process for that class of exposures participates in the validation work relating to that class of exposure.

6) Independent review of internal validation

- a) The insurer shall ensure that the Internal Audit reporting to the Audit Committee reviews the internal validation processes, that the validation processes are implemented as designed and are effective. In performing this role, Internal Audit may seek the assistance of other internal or third party specialists, as long as overall responsibility remains with Internal Audit. Such specialists shall not be involved in or responsible for –
 - i) the design, selection or implementation of the process used for that class of exposures; and
 - ii) the origination of exposures for that class of exposures.
- b) The insurer shall ensure that Internal Audit conducts regular reviews (at least annually) of the ongoing validation of internal ratings.

7) Documentation

- a) The insurer shall ensure that the internal validation is comprehensively documented.
- b) The insurer shall ensure that the documentation of the rating criteria includes at least the following:
 - i) The rationale for the choice of rating criteria, including analyses demonstrating that the rating criteria and procedures are likely to result in ratings that meaningfully differentiate risk, and that the rating criteria have taken all relevant and material transaction characteristics into account;
 - ii) The rationale for assigning a corporate bond to a particular rating where more than one rating methodology is used;
 - iii) The relationship between corporate bond grades in terms of the level of risk each grade implies, and the risk of each grade in terms of both a description of the probability of default typical for corporate bonds assigned to that grade and the criteria used to distinguish that level of credit risk;

- iv) The periodic review of rating criteria and procedures to determine whether the rating criteria remain fully applicable to the current portfolio taking into account external conditions.
- c) The insurer shall ensure that the documentation of the rating process includes at least the following:
 - i) The responsibilities of the parties that rate and approve rating grades;
 - ii) The definition of what constitutes a rating exception and override, and the situations where exceptions and overrides can be used and the approval authorities for such exceptions and overrides;
 - iii) The frequency of rating reviews, including the policy on refreshing relevant criteria;
 - iv) The history of significant changes in the rating process to enable easy identification of any changes made to the rating process; and
 - v) The organisation of rating assignment, including the internal control structure.

Appendix 7

RECOGNITION OF EXTERNAL CREDIT ASSESSMENT INSTITUTIONS ("ECAI")

- 1 MAS may recognise an ECAI if MAS –
 - (a) is satisfied that the ECAI meets the recognition criteria⁸¹ set out under paragraph 7.3.53 of MAS Notice 637⁸²; and
 - (b) has received a letter of support from an licensed insurer stating that it intends to use the external credit assessments of that ECAI for the purposes of calculating regulatory capital requirements under RBC2.
- 2 The recognition of an ECAI by MAS shall be for the sole purpose of calculating regulatory capital requirements by an insurer under RBC 2, and shall not be taken as regulation of the ECAI or licensing or approval of the ECAI to do business in Singapore.
- 3 MAS may revoke its recognition of an ECAI if the ECAI no longer meets the criteria set out in MAS Notice 637.
- 4 The recognition criteria listed in MAS Notice 637 broadly covers:
 - i. **Objectivity:** The methodology for assigning credit assessments of a recognised ECAI shall be rigorous, systematic and subject to validation based on historical experience. Credit assessments shall be subject to ongoing review and responsive to changes in financial condition of the entity assessed. An assessment methodology for each market segment, including rigorous backtesting, shall have been established for at least one year, and preferably at least three years.
 - ii. **Independence:** A recognised ECAI should not be subject to economic, political and any other pressures that may influence its credit assessments. The credit assessment process should be as free as possible from any constraints which could arise in situations where the composition of the board of directors or the shareholder structure of the ECAI may be seen as creating a conflict of interest.

⁸¹ MAS Notice 637 Part VII Division 3 Sub-division 5

⁸² Although reference has been made here to the relevant provisions under MAS Notice 637 for the purpose of this parallel run technical specifications, the applicable requirements would be set out in the relevant legislation for RBC 2.

- iii. **International Access and Transparency:** The individual credit assessments of a recognised ECAI, the key elements underlying the assessments and whether the issuer participated in the assessment process shall be publicly available on a non-selective basis, unless they are private assessments. In addition, the general procedures, methodologies and assumptions for arriving at assessments used by a recognised ECAI shall be publicly disclosed.
- iv. **Disclosure:** A recognised ECAI should publicly disclose its code of conduct, the general nature of its compensation arrangements with assessed entities, its assessment methodologies (including the definition of default, the time horizon and the meaning of each credit assessment), the actual default rates experienced in each credit assessment category, and the transitions of the assessments, for example, the likelihood of “AA” ratings becoming “A” over time.
- v. **Resources:** A recognised ECAI should have sufficient resources to carry out credit assessments properly. These resources should allow for sufficient ongoing contact with senior and operational levels within the entities assessed in order to add value to the credit assessments.
- vi. **Credibility:** To some extent, credibility is derived from the criteria above. In addition, the reliance on an ECAI’s external credit assessments by independent parties (e.g. investors, insurers, trading partners) would be evidence of the credibility of the assessments of the ECAI. The credibility of an ECAI is also underpinned by the existence of internal procedures to prevent the misuse of confidential information.

4 The list of recognised ECAIs for licensed insurers is currently set out in Table 1 of the Sixth Schedule in Insurance (Valuation and Capital) Regulations 2004, and this list will remain under RBC 2.

Appendix 8

TREATMENT OF GUARANTEES AND COLLATERAL

1. Where the insurer holds eligible collateral against an asset or the asset has been guaranteed, the insurer may recognise the effects of these risk mitigants and risk requirements may be reduced accordingly.

Collateral

2. Eligible collateral held against an asset may be considered in place of the asset. Where the risk-adjusted value of the collateral does not fully cover the full value of the asset, only the covered portion can be replaced.
3. The risk-adjusted value of eligible collateral shall be determined as follows:

Rating	Haircut	Collateralisation Factor
Cash	0%	100%
Security issued by a government or a public authority	5%	95%
Corporate bonds rated from "AA-" to "AAA+"	10%	90%
Corporate bonds rated from "BBB-" to "A+"	15%	85%
Security listed on a securities exchange	30%	70%

Example

Risk adjusted value of collateral in form of cash = \$500

Value of asset = \$600

The insurer would need to compute counterparty default risk requirement on the cash collateral. The remaining \$100 of the asset shall be risk-charged accordingly.

Guarantees

4. Insurers are only allowed to take credit for guarantees, provided that the guarantees are
 - Direct;
 - Explicit;
 - Irrevocable;
 - Unconditional; and
 - Legally enforceable for the remaining term to maturity of the asset.
5. Insurer may use the credit rating of the credit rating of the third party guarantor when determining the stresses to be applied to the asset under credit spread risk sub-module and counterparty default risk sub-module.
6. Where the guarantee does not cover the full value of the asset, the risk requirements on the unprotected portion shall be determined using the credit rating of the original counterparty.

Appendix 9

TREATMENT OF STRUCTURED PRODUCTS AND DERIVATIVES⁸³Instructions and Clarifications

1. Structured Products refer to investments that provide exposure to an underlying reference portfolio of assets or risks. Such risks can be in the form of any security, index, currency etc. This typically takes the form of a tranche exposure and includes credit-related securitisation exposures and insurance linked securities.

Examples of these include Residential Mortgage-Backed Securities, Asset-Backed Securities and catastrophe bonds.

2. Counterparty default risk requirement would be applicable and would be computed based on the credit rating of the product offeror. Insurers are to apply the counterparty default risk charge to the market value of each structured product.
3. In addition, as structured product can be decomposed into different equivalent bundles of cash and derivative holdings, in calculating the market-related risk requirements, the insurers could either:
 - a) Adopt look-through approach and applying the relevant risk module. One common risk associated with structured products is a relative lack of liquidity due to the highly customized nature of the investment. To account for volatility and illiquidity risk of structured product, we propose to then apply a 50% premium on the derived market risk requirement; or
 - b) Apply a fixed 50% risk charge on the entire marked-to-market value of the investment.
4. There have been recent updates from Basel 3 on treatment of structured products and MAS is currently further reviewing the approach for RBC 2 and will update the market-related risk requirement of structured products described in (3), where appropriate.
5. The following approach⁸⁴ is to be taken for derivatives:
 - a) An insurer should calculate its market risk capital requirement by:

⁸³ MAS is currently reviewing the treatment of structured products together with the treatment of infrastructure investments and would consult the industry in due course this year.

⁸⁴ MAS will monitor developments e.g. Basel 3, and may fine-tune the approach for insurers if deemed appropriate.

- i. identifying the options and the associated underlying financial instruments or commodities;
- ii. calculating the market risk capital requirement for each combination of a long put and a long outright position in the associated underlying financial instrument or commodity, or of a long call and a short outright position in the associated underlying financial instrument or commodity, by –
 1. multiplying the market value of the outright position by the sum of the applicable risk charges; and
 2. subtracting the amount the option is in the money (if any) bounded at zero.
- b) The above approach can be taken only if the insurer (i) does not write options or (ii) where it writes options, all its written options are hedged by perfectly matched long positions in exactly the same options.
- c) Insurers are expected to provide and maintain sufficient evidence to demonstrate that the proposed allocation of the market risk exposure of the Structured Product into the relevant risk charge modules is justifiable and reasonable.
- d) Insurers should consult MAS should there be any uncertainty on the capital treatment for its structured products or derivatives.

Examples of derivatives risk requirements⁸⁵:

For clarity, the counterparty default risk requirement will still apply for all derivatives.

i. Equity Derivatives

An insurer should convert its equity derivative instruments into notional positions in the relevant underlying equity instruments and use the current market value of the underlying instruments to calculate its market risk capital requirement for equity position risk.

⁸⁵ Aligned to the Simplified Approach method under MAS637

Examples of equity derivatives and treatment:

- **Convertibles:** To be treated as notional position in the equity to which it converts, and
 - add any loss if insurer converts to equity or
 - deduct any profits if insurer converts to equity.
- **Futures, Forwards on a Single Equity:** To be treated as notional position in that equity.

- **Equity Options:**

Insurer shall calculate its market risk capital requirement for options by –

1. Identifying the options and the associated underlying financial instruments;
2. Calculating the market risk capital requirement for combination of long put and long outright position in underlying instruments by -

Risk requirement = Market value of the outright multiplied by equity risk charge less the amount that the option is in-the-money;

3. Calculating the market risk capital requirement for each long call or long put by -

Risk requirement = (a) Market value of underlying instruments multiplied by equity risk charge, or (b) market value of option, whichever is lower;

4. Summing the market risk capital requirements determined in (2) and (3) above.

- **Equity swaps:** Where the insurer is receiving amount based on change in value of a single equity or equity index, and paying amount based on change in value of another equity or equity index, as notional long position in the former and a notional short position in the latter.

ii. Interest Rate Derivatives

An insurer should convert its interest rate-related derivatives into notional positions in the relevant underlying instruments, and use the current market value of the

principal amount of the underlying instruments to calculate its interest rate mismatch risk requirement.

An insurer should convert its credit derivatives into notional positions in the relevant reference obligations, and use the current market value of the principal amount of the reference obligations to calculate its interest rate mismatch risk requirement.

- **Interest Rate Swap**

If insurer receives fixed and pays floating this will be treated as:

1. notional short position in a government debt with coupon equal to floating rate and maturity equal to next reset date, plus
2. notional long position in government debt with coupon equal to fixed rate of swap and maturity equal to maturity of swap.

iii. Credit Derivatives

Credit derivatives which are part of the insurer's risk mitigation policy should not be subject to a capital requirement for spread risk, as long as the insurer holds either

- the instruments underlying the credit derivative, or
- another exposure with respect to which the basis risk between that exposure and the instruments underlying the credit derivative is not material⁸⁶ in any circumstances.

Otherwise, the capital treatment is founded on the substitution approach, whereby the protected portion of a counterparty exposure is assigned the capital charge of the guarantor or protection provider, while the uncovered portion retains capital charge of the insurer.

iv. Foreign Currency Derivatives

Foreign exchange forwards/futures contract: An insurer should treat a foreign exchange forward, futures contract as two notional currency positions:

- (a) A long notional position in the currency which the insurer has contracted to buy; and

⁸⁶ Basis risk of less than 10%

(b) A short notional position in the currency which the insurer has contracted to sell,

Where each notional position has a value equal to the present value of the amount of each currency to be exchanged in the case of a forward or futures contract.

Appendix 10

REQUIREMENTS FOR RECOGNITION OF LETTER OF CREDIT

Eligible Issuers	<p>An “eligible protection provider” means a guarantor or protection seller which is:</p> <ul style="list-style-type: none"> (a) a central government, a central bank, the Bank for International Settlements, the International Monetary Fund, the European Central Bank or the European Community; (b) a Multilateral Development Bank (“MDB”); (c) a public sector entity (“PSE”); (d) a banking institution; or (e) in the case where the credit protection is – <ul style="list-style-type: none"> (i) not provided for a securitisation exposure, any other entity with an external credit assessment by a recognised credit rating agency; or (ii) provided for a securitisation exposure, any other entity which has a Counterparty Risk Class A or B credit rating as set out in Table 17 of the Sixth Schedule of the Insurance (Valuation and Capital) Regulations 2004 at the time the credit protection was provided, and a Counterparty Risk Class C credit rating or better as set out in Table 17 of the Sixth Schedule of the Insurance (Valuation and Capital) Regulations 2004 during the period of recognition of the LC. <p><i>Note: The definition in (a), (b), (c) and (d) will follow those in MAS 637</i></p>
Recognition of LC	<p>An insurer may recognise the use of an LC only if –</p> <ul style="list-style-type: none"> (a) all documentation relating to the LC is binding on all relevant parties and legally enforceable in all relevant jurisdictions; (b) the insurer complies with the requirements and meets the guidelines set out in the Criteria for Recognition of Guarantees below, as applicable; and

	(c) the insurer complies with the public disclosure requirements in Notice 124
Use of Multiple Risk Mitigation Methods	<p>The reduction in the reinsurance adjustment, where applicable, shall not exceed the notional amount of credit protection.</p> <p>Where an insurer uses multiple risk mitigation methods for a single exposure (e.g. the exposure is partially covered by both collateral and guarantee), the insurer shall sub-divide the exposure into portions covered by each risk mitigation method (e.g. portion covered by collateral, portion covered by the LC) and shall calculate the exposure amount of each portion separately. An insurer shall apply the same approach when recognising eligible credit protection by a single protection provider where the eligible credit protection has differing maturities.</p>
Inadequate Compliance with MAS' Requirements	If MAS is not satisfied that the requirements in the section on Recognition of LC above has been complied with, or with the effectiveness of the LC in mitigating the credit risk exposure of the insurer, MAS may take certain actions, including disallowing the insurer from fully recognising the effects of the LC.
Criteria for Recognition of Guarantees	<p>(a) The guarantee is an explicitly documented obligation assumed by the guarantor</p> <p>(b) The guarantee represents a direct claim on the guarantor</p> <p>(c) The guarantee is explicitly referenced to a specific coverage so that the extent of the credit protection cover is clearly defined and incontrovertible</p> <p>(d) Other than in the event of non-payment by the ceding insurer in respect of the guarantee if applicable, there is an irrevocable obligation on the part of the guarantor to pay out a pre-determined amount upon the occurrence of a credit event, as defined under the guarantee</p> <p>(e) The guarantee does not contain any clause, the fulfilment of which is outside the direct control of the ceding insurer, that</p> <p style="padding-left: 40px;">(i) Would allow the guarantor to unilaterally cancel the guarantee;</p>

	<p>(ii) Would increase the effective cost of the guarantee as a result of deteriorating credit quality of the underlying exposure;</p> <p>(iii) Could prevent the guarantor from being obliged to pay out in a timely manner in the event that the underlying obligor fails to make any payment due</p> <p>(iv) could allow the maturity of the guarantee agreed ex-ante to be reduced ex-post by the guarantor</p> <p>(f) the ceding insurer is able in a timely manner to pursue the guarantor for any monies outstanding under the documentation governing the transaction on the default of, or non-payment by, the underlying obligor, and has the right to receive such payments from the guarantor without first having to take legal actions to pursue the obligor for payment</p> <p>(g) the guarantee covers all types of payments that the underlying obligor is expected to make under the documentation governing the transaction</p> <p>(h) the term of the guarantee should be at least one year</p> <p>(i) the guarantee is renewed at least 90 days prior to expiration, otherwise the guarantee shall no longer be recognised in the 90 days immediately prior to the expiration of the guarantee</p>
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Appendix 11**MINIMUM REQUIREMENTS FOR PAID-UP ORDINARY SHARES**

A paid-up ordinary share⁸⁷ of the insurer shall not qualify for inclusion as CET1 Capital unless –

- (a) the ordinary share represents the most subordinated claim in liquidation;
- (b) the entitlement of ordinary shareholders to a claim on the residual assets is proportional to their share of issued share capital, after all senior claims have been repaid in liquidation. In this regard, the claims of such holders are unlimited and variable (i.e. not fixed or capped);
- (c) the amount paid-up by ordinary shareholders is perpetual and is not repaid outside of liquidation. This excludes discretionary repurchases by the insurer or other means of reducing capital in a discretionary manner that is allowable under written law;
- (d) the insurer does not create an expectation at issuance that the ordinary shares will be bought back, redeemed or cancelled, nor do the contractual terms provide any feature that might give rise to such an expectation;
- (e) distributions in respect of ordinary shares (“distributions”) are only paid by the insurer to the extent that the insurer has profits distributable under written law. The level of distributions is not tied or linked to the amount paid-up at issuance, and is not subject to a contractual cap, except to the extent that the insurer is unable to pay distributions that exceed the level of profits distributable under written law;
- (f) there are no circumstances under which distributions are obligatory and the non-payment of distributions is not an event of default;
- (g) distributions are only paid after all legal and contractual obligations have been met, and after payments on AT1 capital instruments and Tier 2 capital instruments have been made. In this regard, there are no preferential distributions, including in respect of other CET1 capital;

⁸⁷ In the case where the insurer issues non-voting ordinary shares as part of CET1 Capital, the non-voting ordinary shares shall be identical to the voting ordinary shares of the insurer in all respects, except the absence of voting rights.

- (h) the ordinary share takes the first and proportionately greatest share of any losses as they occur⁸⁸. In this regard, it absorbs losses on a going concern basis proportionately and *pari passu* with all other CET1 capital instruments;
- (i) the amount paid-up by ordinary shareholders is recognised as equity and not a liability, for the purposes of determining balance sheet insolvency;
- (j) the amount paid-up by ordinary shareholders is classified as equity under the Accounting Standards;
- (k) the ordinary share is directly issued and fully paid-up in cash, and purchase of the ordinary share is not directly or indirectly funded by the insurer;
- (l) the amount paid-up by ordinary shareholders is not secured or covered by a guarantee of the insurer or any of its related corporations or other affiliates. In addition, the ordinary share is not subject to any other arrangement that legally or economically enhances the seniority of the claim;
- (m) the ordinary share is issued with the approval of the ordinary shareholders. The approval is either given directly by the ordinary shareholders or, if permitted by written law, given by the board of the insurer or by other persons duly authorised by the ordinary shareholders; and
- (n) the ordinary share is clearly and separately disclosed on the insurer's balance sheet.

⁸⁸ For the avoidance of doubt, in cases where capital instruments have a permanent write-down feature, this criterion is still deemed to be met by ordinary shares.

Appendix 12**MINIMUM REQUIREMENTS FOR AT1 CAPITAL INSTRUMENTS**

A capital instrument of the insurer shall not qualify for inclusion as AT1 Capital unless –

- (a) the instrument is issued and fully paid-up in cash, whereby only the net proceeds received from the issuance of instruments shall be included as financial resources of the insurer;
- (b) the holder of the instrument has a priority of claim, in respect of the principal and interest of the instrument in the event of a winding up of the insurer, which is lower than that of policy owners, other creditors of the insurer and holders of qualifying Tier 2 instruments, except where such persons rank equally with, or behind the holder of the instrument;
- (c) the paid-up amount is not secured or covered by a guarantee of the insurer or any of its related corporations or other affiliates, or any other arrangement, that legally or economically enhances the priority of the claim of any holder of the instrument vis-a-vis the persons set out in sub-paragraph (b);
- (d) the holder of the instrument waives its right, if any, to set off any amounts he owes the insurer against any subordinated amount owed to him due to the instrument and commits to return any set-off amounts or benefits received to the liquidator;
- (e) the subordination provisions of the instrument are governed by the laws of Singapore. Where the capital instrument is to be subject to the laws of a jurisdiction other than Singapore, the insurer shall satisfy itself that all the relevant conditions specified in this paragraph are met under the laws of that jurisdiction;
- (f) the principal is perpetual. In this regard, there shall be no maturity date, and there shall be no step-ups or other provisions that mandate or create an incentive for the insurer to redeem the capital instrument⁸⁹;

⁸⁹ For example, the following shall be considered as an incentive to redeem:

- (a) a call option combined with an increase in the credit spread of the capital instrument if the call option is not exercised;
- (b) a call option combined with a requirement or an investor option to convert the capital instrument into ordinary shares if the call is not exercised; or

- (g) the capital instrument is callable at the option of the insurer only after a minimum of five years from the issue date⁹⁰, subject to the following requirements -
 - (i) A call option may be exercised only with the prior approval of MAS
 - (ii) The insurer shall not create an expectation that the call option will be exercised⁹¹; and
 - (iii) The insurer shall not exercise a call option unless -
 - (A) The instrument is replaced by the insurer with capital of the same or better quality, and the replacement of this capital is done at conditions which are sustainable for the income capacity of the insurer⁹²; or
 - (B) The insurer demonstrates that its capital position is well above the minimum requirements after the call option is exercised
- (h) any repayment of principal (e.g. through repurchases or redemptions) is done only with the prior approval of MAS. The insurer shall not assume or create expectations that approval will be given by MAS. Without prejudice to any other matter that MAS may consider relevant, MAS shall, in determining whether to grant its approval, consider whether the insurer's capital position is likely to remain adequate after redemption;
- (i) With regard to the dividend or coupon on the instrument,

(c) a call option combined with a change in reference rate where the credit spread over the second reference rate is greater than the initial payment rate less the swap rate (i.e. the fixed rate paid to the call date to receive the second reference rate).

For avoidance of doubt, a conversion from a fixed rate to a floating rate or vice versa in combination with a call option without any increase in credit spread shall not in itself be deemed an incentive to redeem. The insurer shall, however, not do anything to create an expectation that the call will be exercised.

⁹⁰ MAS is not likely to grant approval for redemption within the first five years from the issue date except where—

- (a) there is a change in tax status of the capital instrument due to changes in applicable tax laws of the country or territory in which the capital instrument was issued; or
- (b) there is a change relating to the recognition of the capital instrument as an AT1 capital instrument.

MAS shall, in determining whether to grant approval, consider whether the insurer was in a position to anticipate the event at issuance.

⁹¹ For example, MAS is not likely to grant approval for redemption where an insurer calls a capital instrument and replaces it with another capital instrument that is more costly (e.g. with a higher credit spread).

⁹² Replacement issues can be concurrent with, but not after the capital instrument is called.

- (i) The insurer has full discretion at all times to cancel distributions or payments⁹³;
 - (ii) any cancellation of dividend or coupon is not an event of default;
 - (iii) the insurer has full access to cancelled payments to meet obligations as they fall due; and
 - (iv) any cancellation of dividend or coupon does not impose restrictions on the insurer, except in relation to distributions to ordinary shareholders
- (j) any dividend or coupon to be paid under the instrument is only paid to the extent that the insurer has profits distributable under any written law, determined from the latest statements of account lodged with MAS in accordance with section 36 of the Act or such other subsequent audited statements of account provided to the MAS;
- (k) the instrument does not have a credit sensitive dividend feature. In this regard, the capital instrument shall not have a dividend or coupon that is reset periodically, based in whole or in part on the credit standing of the insurer or any insurance group entity;
- (l) the instrument does not contribute to liabilities exceeding assets, if such a balance sheet test forms part of any national insolvency law governing the provisions of the instrument;
- (m) where the instrument is classified as a liability under the Accounting Standards, it shall have principal loss absorption features⁹⁴ through –

⁹³ In this regard, “dividend pushers” are prohibited. A capital instrument with a dividend pusher obliges the insurer to make a dividend or coupon payment on the instrument, if it has made a payment on another (typically more junior) capital instrument or share. This obligation is inconsistent with the requirement for the insurer to have full discretion at all times to cancel distributions or payments.

Furthermore, the cancellation of distributions or payments means that these payments are extinguished; it does not permit features that require the insurer to make distributions or payments in kind. For avoidance of doubt, “dividend stoppers” are not prohibited, provided that the insurer retains full discretion at all times to cancel distributions or payments. A capital instrument with a dividend stopper stops the insurer from making a dividend on its ordinary shares or other AT1 capital instruments if a dividend or coupon payment is not paid on its AT1 capital instruments.

⁹⁴ The principal loss absorption need not be triggered if the insurer is able to maintain a CET1 capital of 65% or more via other means (such as but not limited to capital injection).

- (i) a provision under which it converts to ordinary shares if the CET1 Capital of the insurer falls below 65% of the total risk requirements (excluding participating funds); or
- (ii) a write-down mechanism that allocates losses to the capital instrument if the CET1 capital of the insurer falls below 65% of the total risk requirements (excluding participating funds). The write-down shall have the following effects:
 - (A) it reduces the claim of the instrument in liquidation of the insurer;
 - (B) it reduces the amount to be repaid when a call option is exercised; and
 - (C) it partially or fully reduces dividend or coupon payments on the instrument;

Under both sub-paragraphs (i) and (ii) above, the conversion or write-down shall generate CET1 Capital.

In addition, the aggregate amount to be converted or written down⁹⁵ for all such instruments shall be at least the amount needed to immediately return the insurer's CET1 Capital to 65% of the total risk requirements (excluding participating funds) or, if this is not possible, the full principal value of the instruments;

- (n) where an insurer issues the instrument in a foreign currency, the instrument shall be revalued periodically (at least monthly) in terms of Singapore dollars at the prevailing exchange rates. Where the insurer intends to use a swap to hedge the foreign exchange exposure arising from the foreign currency instrument, it shall consult MAS on the capital treatment applicable to the hedge prior to such use;
- (o) neither the insurer nor any of its insurance group entities or associates can have purchased the instrument, nor can the insurer have directly or indirectly funded the purchase of capital instrument;
- (p) the instrument does not have any feature that hinders recapitalisation, such as provisions that require the issuer to compensate investors if a new instrument is issued at a lower price during a specified time frame⁹⁶;

⁹⁵ The instrument cannot be written back up even if there are profits in the future.

⁹⁶ Where there is a dividend stopper within the terms and conditions of the AT1 capital instrument, such a feature shall not hinder the recapitalisation of the insurer. For example, a dividend stopper on an AT1 capital

- (q) if the instrument is not issued out of an operating entity or the holding company of the insurer (e.g. issued out of a special purpose entity (“SPE”)), the proceeds from the issuance of the instrument shall be immediately available without limitation to an operating entity or the holding company of the insurer in a form which meets or exceeds all of the other requirements set out in this paragraph, for inclusion in AT1 Capital;
- (r) the main features of the instruments, are disclosed accurately and in a manner that is easily understood by an investor;
- (s) the agreement governing the issuance of the instrument cannot be amended or varied without the prior approval of MAS where such proposed changes could impact its eligibility as AT1 Capital.

instrument shall not (a) attempt to stop payment on another capital instrument where such payments are not fully discretionary; (b) prevent distributions to ordinary shareholders for a period that extends beyond the point in time that dividend or coupon payments on the AT1 capital instrument are resumed; or (c) impede the normal operation of the insurer or any restructuring activity such as acquisitions or disposals.

Appendix 13**MINIMUM REQUIREMENTS FOR TIER 2 CAPITAL INSTRUMENTS**

A capital instrument of the insurer shall not qualify for inclusion as Tier 2 Capital unless—

- (a) the instrument is issued and fully paid-up in cash, whereby only the net proceeds received from the issuance of instruments shall be included as financial resources of the insurer;
- (b) the holder of the instrument has a priority of claim in respect of the principal and interest of the instrument, in the event of a winding up of the insurer, which is lower than that of policy owners and other creditors of the insurer, except where such persons rank equally with, or behind, the holder of the instrument ;
- (c) The paid-up amount is not secured or covered by a guarantee of the insurer or any of its related corporations or other affiliates, or any other arrangement, that legally or economically enhances the priority of the claim of any holder of the instrument vis-a-vis the persons set out in sub-paragraph (b);
- (d) the holder of the instrument waives its right, if any, to set off any amounts he owes the insurer against any subordinated amount owed to him due to the instrument and commits to return any set-off amounts or benefits received to the liquidator;
- (e) the subordination provisions of the instrument are governed by the laws of Singapore. Where the capital instrument is to be subject to the laws of a jurisdiction other than Singapore, the insurer shall satisfy itself that all the relevant conditions specified in this paragraph are met under the laws of that jurisdiction
- (f) with regard to the maturity of the capital instrument:
 - (i) the instrument has a minimum original maturity of at least 5 years. Where the agreement governing the issuance of the capital instrument provides for the loan to be drawn down in a series of tranches, the minimum original maturity for each tranche shall be 5 years from the date of its draw-down;
 - (ii) recognition of the instrument in Tier 2 Capital in its final five years to maturity is amortised on a straight-line basis by 20% per annum in accordance with the table immediately below. Where the capital instrument is repayable in separate tranches, each tranche shall be amortised individually, as if it were a separate loan; and

Table 1: Amortisation Schedule for a Tier 2 capital instrument

Years to maturity (x)	Amortised amount eligible to be included in Tier 2 Capital
$x > 4$	100%
$3 < x \leq 4$	80%
$2 < x \leq 3$	60%
$1 < x \leq 2$	40%
$x \leq 1$	20%

- (iii) there are no step-ups or other provisions that mandate or create an incentive for the insurer to redeem the capital instrument⁸⁹.
- (g) the capital instrument is callable at the option of the insurer only after a minimum of five years from the issue date⁹⁷, subject to the following requirements -
- (i) A call option may be exercised only with the prior approval of MAS;
 - (ii) The insurer shall not create an expectation that the call option will be exercised^{91, 98};
 - (iii) The insurer shall not exercise a call option unless -
 - (A) The instrument is replaced by the insurer with capital of the same or better quality, and the replacement of this capital is done at conditions which are sustainable for the income capacity of the insurer; or
 - (B) The insurer demonstrates that its capital position is well above the minimum capital requirements after the call option is exercised

⁹⁷ MAS is not likely to grant approval for redemption within the first five years from the issue date except where—

- (a) there is a change in tax status of the capital instrument due to changes in applicable tax laws of the country or territory in which the capital instrument was issued; or
- (b) there is a change relating to the recognition of the capital instrument as capital for calculating Total CAR, and provided that the requirements set out in this sub-paragraph are met. MAS shall, in determining whether to grant approval, consider whether the insurer was in a position to anticipate the event at issuance.

⁹⁸ Where this requirement is met, an option to call the capital instrument after five years but prior to the start of the amortisation period will not be deemed an incentive to redeem.

- (h) the holder of the capital instrument has no rights to accelerate the repayment of future scheduled payments (either coupon or principal), except in a bankruptcy or liquidation of the insurer;
- (i) the instrument does not have a credit sensitive dividend feature. In this regard, the capital instrument shall not have a dividend or coupon that is reset periodically, based in whole or in part on the credit standing of the insurer or any insurance group entity;
- (j) where the insurer issues the instrument in a foreign currency, the instrument shall be revalued periodically (at least monthly) in terms of Singapore dollars at the prevailing exchange rates. Where the insurer intends to use a swap to hedge the foreign exchange exposure arising from the foreign currency instrument, it shall consult MAS on the capital treatment applicable to the hedge prior to such use;
- (k) neither the insurer nor any of its insurance group entities or associates can have purchased the instrument, nor can the insurer have directly or indirectly funded the purchase of capital instrument;
- (l) if the instrument is not issued out of an operating entity or the holding company of the insurer (e.g. issued out of a SPE), the proceeds from the issuance of the instrument shall be immediately available without limitation to an operating entity or the holding company of the insurer in a form which meets or exceeds all of the other requirements set out in this paragraph, for inclusion in Tier 2 Capital;
- (m) the main features of the instruments, are disclosed accurately and in a manner that is easily understood by an investor;
- (n) the agreement governing the issuance of the instrument cannot be amended or varied without the prior approval of MAS where such proposed changes could impact its eligibility as Tier 2 Capital.

Appendix 14

SUBMISSION REQUIREMENTS FOR AN INSURER INTENDING TO ISSUE OR RECOGNISE A CAPITAL INSTRUMENT AS CET1, AT1 OR TIER 2 CAPITAL

The insurer shall -

- (a) consult MAS well in advance to allow adequate time for review if the capital instrument has additional features which are not explicitly addressed in **Appendix 11** for paid-up ordinary share as CET1 Capital, **Appendix 12** for AT1 Capital, or **Appendix 13** for Tier 2 Capital; and
- (b) submit the following documents to MAS before including any issuance as CET1 Capital, AT1 Capital or Tier 2 Capital:
 - (i) a declaration signed by the Chief Executive of the insurer confirming –
 - (A) that the insurer is responsible for complying with the requirements for inclusion of the issuance of the paid-up ordinary share as CET1 Capital, issuance of the AT1 capital instrument as AT1 Capital, or the issuance of the Tier 2 capital instrument as Tier 2 Capital;
 - (B) that all the requirements for the inclusion of the issuance of the paid-up ordinary share capital instrument, AT1 capital instrument or Tier 2 capital instrument set out *[in the relevant regulations/notices]* have been met;
 - (C) the expected date on which the issuance would be included as CET1 Capital, AT1 Capital or Tier 2 Capital; and
 - (D) that the insurer is aware that MAS may take such necessary action against the insurer, including requiring the exclusion of the issuance for inclusion as CET1 Capital, AT1 Capital or as Tier 2 Capital, if the issuance does not, or subsequently does not, comply with the requirements set out *[in the relevant regulations/notices]*;
 - (ii) all the executed agreements and offering documents governing the issuance of the paid-up ordinary share capital instrument, AT1 capital instrument or Tier 2 capital instrument;
 - (iii) all external legal opinions obtained in respect of the issuance of the paid-up ordinary share capital instrument, AT1 capital instrument or the Tier 2 capital instrument stating that the requirements in **Appendix 11**, **Appendix 12** and **Appendix 13** (where applicable) have been met;
 - (iv) a memorandum of compliance stating how the issuance complies with each of the requirements set out in **Appendix 11**, **Appendix 12** and **Appendix 13** (where applicable) and identifying the relevant portions of the agreements

and offering documents governing the issuance of the paid-up ordinary share capital instrument, AT1 capital instrument or Tier 2 capital instrument which address each requirement;

- (v) where the agreements and offering documents governing the issuance of the paid-up ordinary share capital instrument, AT1 capital instrument or Tier 2 capital instrument are governed by the laws of a jurisdiction other than Singapore, a written external legal opinion from an advocate and solicitor qualified to practise Singapore law, that he has reviewed all the agreements and offering documents governing the issuance, including any legal opinion from foreign law practitioners provided pursuant to paragraph (iii) and the memorandum of compliance, and confirms that the memorandum of compliance read together with such agreements, offering documents, legal opinions and any letter of undertaking provided by the insurer or any insurance group entity address the requirements of **Appendix 11, Appendix 12 or Appendix 13**, as the case may be.

For the purpose of paragraph (iii), the written external legal opinion shall be reasonably unqualified, in particular with respect to the prohibition on provisions which mandate or create incentives for the redemption of the instrument, and other requirements relating to loss absorption, priority of claims, waiver of set-off amounts or benefits and subordination.

Appendix 15**DIRECT LIFE INSURERS THAT PROVIDED DATA FOR
THE CALIBRATION OF MA AND IP FOR QIS 2**

1. AIA Singapore Pte. Ltd.
2. Aviva Ltd
3. AXA Life Insurance Singapore Private Limited
4. Etiqa Insurance Pte. Ltd.
5. The Great Eastern Life Assurance Company Limited
6. HSBC Insurance (Singapore) Pte. Ltd.
7. Life Insurance Corporation (Singapore) Pte. Ltd.
8. Manulife Singapore Pte. Ltd.
9. NTUC Income Insurance Co-operative Limited
10. Prudential Assurance Company Singapore (Pte) Limited
11. Tokio Marine Life Insurance Singapore Ltd.
12. Transamerica Life (Bermuda) Ltd. (Singapore Branch)

Appendix 16

ELIGIBILITY CRITERIA TO BE MET FOR APPLYING MATCHING ADJUSTMENT

The eligibility criteria for MA was presented in Appendix 12 of the technical specifications for the 2018 impact study. Updates to the eligibility criteria are shown as red underlined text. For avoidance of doubt, the requirements below apply to the liabilities for guaranteed benefits and the assets backing the liabilities for guaranteed benefits.

Area	Finalised Conditions to be Met
Eligible Assets⁹⁹	<p>The following assets are eligible:</p> <ul style="list-style-type: none"> • SGS or SGD corporate bonds of investment grade quality¹⁰⁰; • US treasury securities or USD corporate bonds of investment grade quality; and • Cash denominated in SGD or USD. <p>USD Treasury Securities or USD corporate bonds can be used to back SGD liabilities, subject to the insurer putting in place a suitable currency swap to convert the resulting USD payments to SGD cash flows.</p> <p>In the absence of a currency swap, a 12% haircut¹⁰¹ in cash flows would be imposed in the assessment of the cash flow mismatch test below.</p>
	<p>Eligible assets should have only fixed cash-flows (in terms of timing and currency). <u>Fixed cash flows refers to cash flows that would not vary from that specified by the contractual agreement of the instrument. Instruments with cash flows that</u></p>

⁹⁹ Infrastructure debt and structured products can be eligible if they can meet all the conditions for eligible assets. For bonds without a rating from a recognised ECAI (and this may include private debt), such assets would not be considered eligible unless the insurer has an internal rating model or process which can meet the criteria set out in Appendix 5. For avoidance of doubt, the eligibility of infrastructure debt and structured products which are not rated by recognised ECAI for MA will be considered holistically under MAS' current review of the capital treatment for infrastructure investments and structured products.

¹⁰⁰ SGD debt securities issued by Singapore Statutory Board are also allowed to be recognised as an eligible asset, and for the purposes of the MA, be treated as having a "AAA" credit rating.

¹⁰¹ Consistent with the foreign currency mismatch charge proposed under RBC 2.

Area	Finalised Conditions to be Met
	<p><u>vary in accordance to interest rate changes would not meet the criteria of fixed cash flows.</u></p> <p>For callable bonds, only cash flows before 1st call are recognised in the cash flow matching criteria. <u>Bonds with put options are not eligible.</u></p> <p>Eligible assets are to be explicitly identified and managed separately from the other assets in the Insurance fund, to ensure that they are not exposed to the risk of forced sale to support other liabilities.</p>
Eligible products	<p>Products denominated in SGD or USD will be eligible for the MA.</p> <p>Predictability test to be applied quarterly to ensure liabilities remain eligible.</p> <p>Flexibility is provided to structure MA portfolios according to specific investment pools. Insurers can define assets and liabilities in each investment pool. SGD and USD denominated products may be included into an MA portfolio.</p> <p>For clarity, ILPs are excluded from the scope of the MA.</p> <p>Predictability will be evaluated based on the aggregate change in the liabilities of the MA portfolio, measured against future cash outflows [i.e. Change in Liabilities/Present Value of Benefits and Expenses], to avoid distortion by small or negative liabilities in response to the following shocks:</p> <ul style="list-style-type: none"> (a) Mortality; (b) Longevity; (c) Disability; (d) Dread Disease; (e) Other Insured Events; and (f) Lapse (excluding mass lapse event) <p>The liabilities for non-participating products are the sum of the liabilities corresponding to the products, before the</p>

Area	Finalised Conditions to be Met
	<p>application of the PAD, based on risk-free rates, and is allowed to be negative.</p> <p>The liabilities for participating products are based on guaranteed benefits i.e. the sum of the minimum condition liabilities, before the application of the PAD, based on risk-free rates, and is allowed to be negative.</p> <p>The magnitude of the shocks to be applied shall be the same as the corresponding C1 shocks. The same correlation matrix used to determine the diversified C1 requirements for life business is to be used to determine the net increase in liabilities.</p> <p>To qualify for the MA, the MA portfolio as a whole should meet the following thresholds:</p> <p>Change in Liabilities/ Present Value of Benefits and Expenses $\leq 15\%$ for single premium and fully paid-up policies; or $\leq 10\%$ for others</p> <p>Note: The threshold of 15% is only allowed for MA portfolios consisting entirely of single premium and/or fully paid-up policies.</p> <p>The liabilities for the eligible products should be net of reinsurance ceded.</p>
<p>Constraints on extent of cash flow mismatching</p>	<p>Cash flow matching to be required only up to the LLP (e.g. which is 20 years for SGD) following each valuation date.</p> <p>Excess cash flows from the matching assets over liabilities, <u>and excess premium income</u> can be rolled forward (i.e. reallocated) to meet shortfalls in later years but the yield of the MA portfolio used to determine the MA will be adjusted accordingly.</p> <p>Surplus rolled forward can earn interest at the corresponding risk-free forward rates.</p>

Area	Finalised Conditions to be Met
	<p>An example has been included in Appendix 17 to illustrate how the yields should be adjusted¹⁰² due to the reallocation of excess cash flows to subsequent years.</p> <p>The impact of excess cash flow reallocation is taken into account in the calculation of MA in the MA Workbook.</p> <p><u>As a safeguard, the revised MA arising from the reallocation cannot be higher than the original MA.</u></p> <p>The maximum cash flow shortfall of 15% in aggregate is retained.</p> <p><u>Where the insurer has relied on the reallocations of excess asset cash flows and excess premium income to meet the cash flow matching criteria specified above, the MA calculation will be adjusted downwards to reflect the risk that these cash flows could only be invested in eligible assets that earn less than the full spread of the MA portfolio. This adjustment is done by recognising the excess asset cash flows and excess premium income that are reallocated, as a notional asset class that earns less than the full spread of the assets in the MA portfolio. For the parallel run, it is assumed that the excess asset cash flows and excess premium income that are reallocated will only earn 75% of the spread in the MA portfolio.</u></p>
Other Requirements	<p>For a particular MA portfolio, the MA is determined as the average yield of the assets backing the liabilities for guaranteed benefits over the average risk-free liability discount rate, less the spread for default and downgrade.</p>

¹⁰² The key risk is that excess cash flows in earlier years may not be available to meet shortfalls in later years. This can happen for example, if the excess cash flows were not maintained in cash but were instead invested in instruments such as corporate bonds. This may then require such bonds be liquidated at some point in the future to meet the expected cash flow shortfalls (or part of it), which exposes the insurer to market risk or credit spread fluctuations. The adjustment to the yield of the MA portfolio is then made to reflect this risk.

Area	Finalised Conditions to be Met
	<p>MA will only be applied in full up to the LLP¹⁰³. <u>Additional options on the treatment of the MA after the LLP will be investigated during the parallel run for year ended 31 December 2018. These are set out in Section 7.</u></p> <p>Insurers will compute the MA on a quarterly basis using the workbook provided.</p> <p>The spread for BBB assets will be constrained to the highest of the calculated assets for AAA, AA and A rated assets.</p> <p><i>(*This condition has been removed for the parallel run)</i></p> <p>No “cherry picking” - insurers that choose to apply the MA to a portfolio of eligible products will not be allowed to revert to the approach that does not include the MA:</p> <p>Where an insurer that applies the MA is no longer able to comply with the conditions, it should take the necessary steps to restore compliance within a period of three months. Beyond that period, it shall cease applying the MA and will only be allowed to apply the MA again after a period of 24 months.</p> <p>Please note that once the MA ceases to apply to a particular product, the IP would still be applicable for if this product falls within the scope of IP.</p>

¹⁰³ This limitation is put in place to prevent insurers from experiencing an increase in financial resources if spreads widen and vice-versa, due to cash flow matching being required only up to the LLP.

Area	Finalised Conditions to be Met
	<p><u>For the parallel run, the MA will be floored at the level of IP¹⁰⁴ that would have been applicable to the MA portfolio.</u></p> <p><u>Where the floor is operational (i.e. when the unfloored MA is lower than the corresponding IP), the ability of the MA portfolio to mitigate credit spread widening is reduced¹⁰⁵. Hence the modified MA (i.e. MA') that is used to determine the C2 credit spread risk requirement will be reduced by the difference between the unfloored MA and the corresponding IP, subject to MA' being non-negative.</u></p> <p><u>The flooring of the MA has been built into the MA Workbook.</u></p>

¹⁰⁴ i.e. based on the strategic asset allocation of the MA portfolio. For the purpose of the parallel run, the IP can be calculated based on the current asset allocation of the MA portfolio.

¹⁰⁵ Once the floor is operational, the liabilities in the MA portfolio will no longer change with further credit spread movements.

Appendix 17

EXAMPLE OF ROLLOVER OF EXCESS CASH FLOWS TO LATER YEARS AND IMPACT TO MA PORTFOLIO YIELD

In the first example below, there is an excess cash flow in year 1 of \$26. The second example allows for this excess to be reallocated to meet future cash flow shortfalls of 30 from years 6 - 10. Costs of default and downgrade are ignored in this example. Excess premium income from liability cash flows can be reallocated to meet future shortfalls, though not shown here. The reallocated excess cash flow will further result in a reduction in MA to reflect the risk that excess cash flows could only be invested in eligible assets that earn less than the full spread of the MA portfolio, but not shown here for simplicity.

Note that the total asset cash flows (1,276) is less than liability cash flows (1,280), but the excess cash flow at time 1 has been rolled forward with interest (assumed here to be 2%) to meet future cash flow shortfalls. The details of how excess cash flows can be utilised to meet future cash flow shortfalls have been built in the MA Workbook.

Example 1: No rolling forward of Excess

		Cash Flow											Total
	Yield	Value	1	2	3	4	5	6	7	8	9	10	
Asset Cash Flow	3.74%	-1,000	76	50	50	50	100	190	190	190	190	190	1,276
Liability Cash Flow	2.24%	-1,100	50	50	50	50	100	195	195	195	195	200	1,280
Cash Flow Shortfall			0	0	0	0	0	5	5	5	5	10	30
Excess Cash Flow			26	0	0	0	0	-5	-5	-5	-5	-10	

Example 2: Allow rolling forward of Excess

		Cash Flow											Total
	Yield	Value	1	2	3	4	5	6	7	8	9	10	
Asset Cash Flow	3.74%	-1,000	76	50	50	50	100	190	190	190	190	190	1,276
Adj Asset Cash Flow	3.70%	-1,000	50	50	50	50	100	195	195	195	195	200	1,280
Liability Cash Flow	2.24%	-1,100	50	50	50	50	100	195	195	195	195	200	1,280
Cash Flow Shortfall			0	0	0	0	0	0	0	0	0	0	
Accumulated excess cash flow			26.00	26.52	27.05	27.59	28.14	23.71	19.18	14.56	9.86	0.05	
MA	1.46% = Adjusted Asset Yield (3.70%) - Liability Yield (2.24%)												

Excess cash flow at time 1 accumulated with
1,280 interest

Appendix 18

METHODOLOGY FOR DETERMINING COSTS OF DEFAULT AND DOWNGRADE

Cost of Default

For a given bond price, tenure and credit rating,

$$Price @ YTM = \sum_1^n DiscFactor(t)CashFlow(t)$$

$$Price @ AdjYTM = \sum_1^n DiscFactor(t)ProbPayout(t)CashFlow(t)$$

$$ProbPayout(t) = \sum Prob(t, Credit Rating) over all non - default rating$$

Prob(t, Credit Rating) = probability of being in Credit Rating at time t.

Prob(t, Credit Rating) is built up recursively from time 1 to t, using conditional probabilities derived from ratings transition matrix.

- (a) CashFlow(t) = Coupon at time (t)
- (b) Cashflow(n) = Proceed at time of maturity
- (c) ProbPayout(t) = Probability of payout at time(t), given the current credit rating and loss given default of x%. Using a ratings transition matrix, it is possible to determine the probability that the bond will not default in every future year up to maturity.
- (d) YTM = Current yield to maturity of bond
- (e) AdjYTM = Adjusted yield to maturity after taking into account the probability of payout in future years. Due to defaults, AdjYTM < YTM
- (f) *Cost of Default = YTM - AdjYTM*

The cost of default can be determined based on representative maturities, coupons, and yield observed in the market.

A 20% loading is applied to account for unexpected defaults beyond that observed historically

Cost of Downgrade

The cost of downgrade is determined as the present value of the probability weighted average increase in spreads arising from the investment grade bond being downgraded to below investment grade in future years.

Appendix 19

FRAMEWORK FOR IP

Updates have been made to the framework for IP from the 2018 impact study, and are shown as red underlined text.

Please refer to **Appendix 20** for more information on how the k-factor is determined.

Eligibility	<p>For direct life business, all SGD- and USD- denominated products classified as Whole Life, Endowment, or Annuity in Form 14 are eligible. ILPs are not eligible.</p> <p>For life reinsurance business, the IP should only be applied to reinsurance arrangements that exhibit similar characteristics as the direct life insurance products (e.g. Whole Life, Endowment and Annuity Products) that qualify for IP (see Note 3 of paragraph 6.3).</p>
Illiquidity Premium ("IP")	To be specified as 50% of the Reference Spread , subject to a possible cap.
Determination of Reference Spread	<p>The Reference Spread ("RS") will be determined based on the average credit spread of a notional Reference Portfolio of assets. It consists of the spread from the Reference Portfolio less costs associated with credit risks i.e. cost of default, and floored at zero.</p> <p>The cost of default is consistent with those used in the calibration of the MA.</p> <p>RS = Average Corporate Spread from Reference Portfolio, adjusted for Cost of Default</p> <p>The Reference Portfolio is determined based on the holding pattern of investment grade bonds held by industry. To smooth the yearly fluctuations, the Reference Portfolio may take into account bond compositions over the past years. The use of a shorter period would give more weight to recent economic environment, whilst a longer period would produce a more stable IP.</p> <p>The Reference Portfolio can be updated at appropriate frequency¹⁰⁶, to ensure that it remains relevant. The frequency</p>

¹⁰⁶ At a start, MAS expects to review the Reference Portfolio at least annually, and if there are material changes, MAS will update the Reference Portfolio and the Reference Spread accordingly.

	chosen should balance the objectives of risk responsiveness and the effort required to update the Reference Portfolio .
Impact of IP on Valuation Framework	<p>IP will be the spread added to the valuation discount rate.</p> <p>The IP will apply uniformly in full up to the LLP. <u>Additional options on the treatment of the IP after the LLP will be investigated during the parallel run for year ended 31 December 2018. These are set out in Section 7.</u></p> <p>The IP will not be applicable to products where the MA is applied.</p>

Appendix 20**CALIBRATION OF THE IP AND DERIVATION OF THE FUND LEVEL IP**

1 To make the calibration of IP more meaningful, MAS collected data from life insurers listed in **Appendix 15**, which were offering participating and non-participating products, in June 2016. Information was collected, amongst others, on the yields on existing corporate bonds, which were of investment grade and above (including bonds issued by multilateral agencies and Singapore statutory boards) denominated in SGD and USD.

2 The Reference Portfolio was based on the collective portfolio of bonds which were of investment grade and above, held at the industry level, as provided by the insurers listed in **Appendix 15**.

3 The IP for the Reference Portfolio was determined as k% of the Reference Spread. The Reference Spread is the average credit spread (over the corresponding yield of government securities of a matching duration) of the Reference Portfolio after deducting the spread for default¹⁰⁷, and floored at zero. Haircuts were subsequently applied to account for the following:

- (a) Basis risk arising from the difference between the actual compositions of investment grade bonds held by any insurer and the Reference Portfolio; and
- (b) Allowance for a higher level of liquidity in products eligible for the IP (as compared to MA).

4 For the purpose of the parallel run, **the k-factor is 50%.**

5 **The Reference Spread for corporate bonds held in the participating and non-participating funds combined was determined to be 110 bps.**

6 **The IP for the Reference Portfolio is hence $50\% * 110 = 55$ bps.**

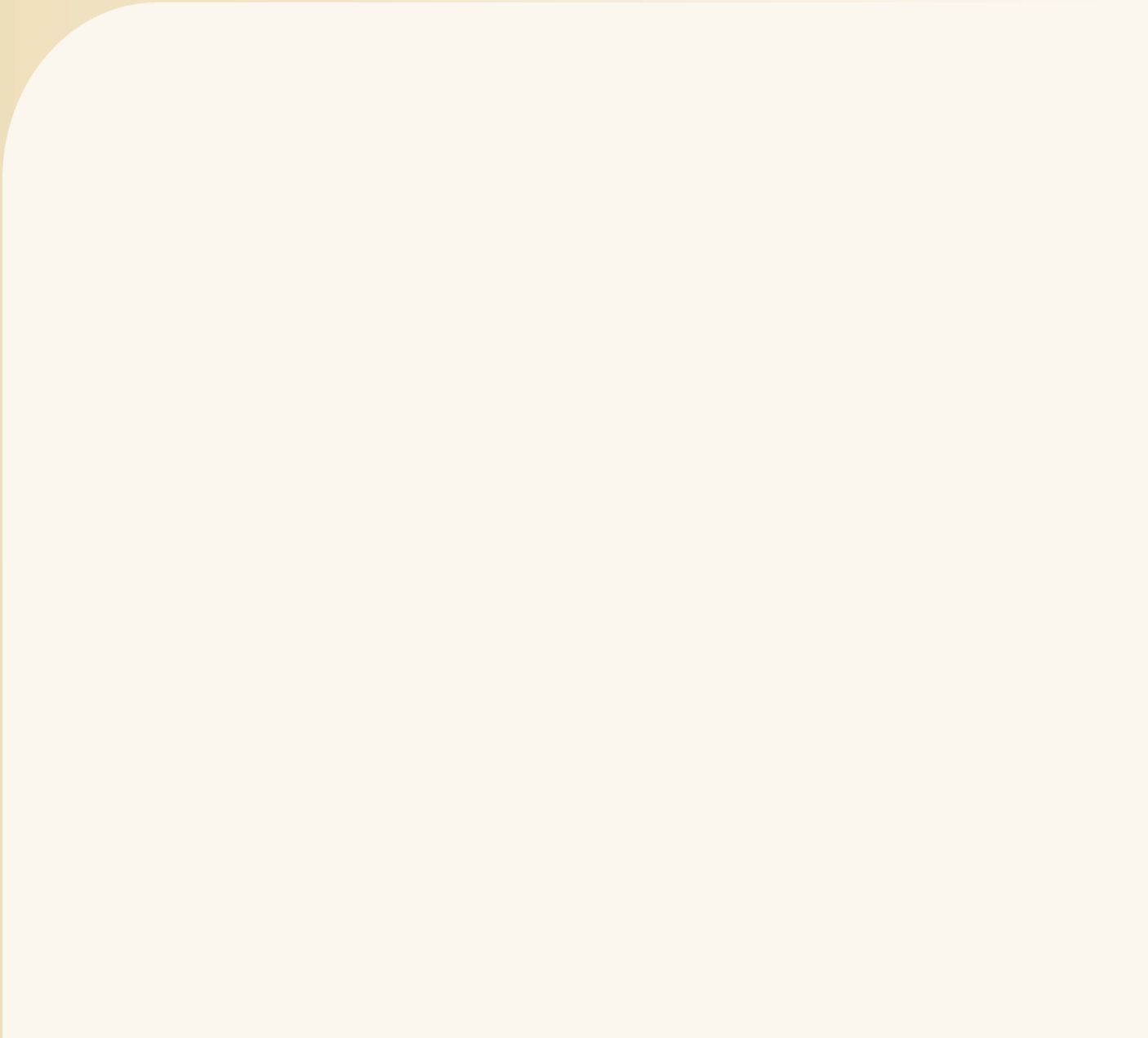
7 The final fund level IP to be applied by insurer should be calculated by the insurer based on the SAA extracted from the latest board-approved investment policy. The following example illustrates how the fund level IP is determined up to the LLP.

¹⁰⁷ The spread for default is the same with that used in MA.

	Participating Fund		Non-Par Fund	
	SAA (%)	Spread (%)	SAA (%)	Spread (%)
Corporate Bonds	40%	0.55%	60%	0.55%
Government Bonds	25%	0%	25%	0%
Equities	20%	0%	10%	0%
Property	5%	0%	0%	0%
Policy Loan	5%	0%	0%	0%
Cash and deposits	5%	0%	5%	0%
Fund Level IP (Weighted Average)	100%	0.22%	100	0.33%

8 Where the SAA is differentiated by product segment or product line, the IP may vary by product segment or product line. In such cases, the IP is determined in a similar manner to the above example, but at the product segment or product line level instead of the fund level.

9 From the example above, the fund level IPs are 22 bps and 33 bps for the participating fund and non-participating fund respectively. The fund level IPs are to be added to the spot risk-free discount rates up to the LLP in valuing the liabilities for guaranteed benefits for eligible products. The treatment of the IP after the LLP is specified in Section 7.



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