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PART A: OVERVIEW

1. Introduction

1.1. Due to the importance of stress testing as a risk management tool, licensed institutions are required to explore, design and develop a stress test process that would be most appropriate and effective for their business environment and profile. The stress test process should commensurate with the nature, complexity and sophistication of the licensed institutions' business activities.

1.2. This Guideline of Stress Testing for Takaful Operators, hereinafter referred to as the Guideline, sets out the Bank's expectations on licensed institution's stress test process to ensure that it is implemented effectively. The Bank, as part of its regular surveillance activity, will evaluate the licensed institutions stress test process for the appropriateness of the methodologies adopted and the effectiveness of board and management oversight.

1.3. This Guideline also sets out the minimum requirements that the licensed institution needs to observe for the purpose of reporting to the Bank. This minimum requirement is spelt out in Part 3 of this Guidelines.

1.4. The following licensed institutions are required to observe the requirements of this Guidelines:

- (a) Licensed Takaful Operators;
- (b) Licensed Retakaful Operators.

2. The Role of Stress Test

2.1 Stress testing is a standard risk management tool that can be used to identify potential threats due to **exceptional but adverse plausible events**¹ to a licensed institution's financial condition. The International Association of Insurance Supervisors in their "Guidance Paper for Stress Testing by Insurers" issued in

October 2003, specifically mentioned that stress testing is a fundamental element of an insurer's overall risk management framework and capital adequacy determination.

2.2 The results of stress testing should be incorporated into the licensed institution's capital management plan. Specifically, it should be used to determine:

- (a) The extent by which capital will be eroded by the threats identified and the impact on the licensed institution's financial health; and
- (b) The actions that will be required to mitigate the threats identified.

2.3 Stress tests can also be used to assess the effect of tail events beyond the level of confidence assumed in statistical models. This is because in times of stress there is less predictability in the behaviour of risk factors, breakdown of correlations, sudden illiquidity in the markets, rapid price movements and the speedy spread of shocks to other markets and economies.

2.4 For licensed institutions conducting dynamic solvency testing (DST), stress testing can be used as a complementary tool in evaluating the future financial resilience of the licensed institution. Whilst DST is used to ascertain the medium to long term viability of licensed institution under various plausible scenarios, stress testing can be used to evaluate the financial position of licensed institution under short-term adverse shock scenarios.

3. Key features of Stress Test Process

3.1 As mentioned, stress testing should be used to identify potential threats due to **exceptional but adverse plausible events**. Exceptional events identified would have to be events that rarely occurs but will have a large magnitude or impact on the portfolio to be stress tested. For these events to be plausible, these events must be reasonably foreseeable, i.e. their occurrence is not too remote a possibility.

¹ Please refer to Appendices 1 and 2 for example of such events

3.2 The stress test process shall be designed to be rigorous and forward looking. The methodologies adopted must be adaptable quickly and efficiently to the changing environment of the licensed institutions.

3.3 The stress test should also be comprehensive so as to capture the breadth and scale of different businesses undertaken by the licensed institutions. Therefore, stress test should reflect the significant activities² undertaken by licensed institutions.

3.4 Stress test can also be used in portfolios that lack historical data. These are portfolios with insufficient data for construction of statistical models or there are tendencies for market gaps or difficulty in estimating its' non-linear relationship. Reasonable judgement and/or expert opinions can be used to determine the type and level of shocks to be stressed.

3.5 Stress tests should take into account movements in risk factors that might potentially have a significant adverse financial impact and should take into account any concentration of risks that may emerge, contagion effect and failure of hedging techniques.

PART B: APPROACH TO STRESS TEST

4. Methodologies

4.1 There are two methodologies for stress testing, namely sensitivity analysis and scenario analysis. Sensitivity analysis estimates the impact of one or more moves in a particular risk factor or a small number of closely linked risk factors such as a parallel yield curve shift. Meanwhile, scenario analysis contains simultaneous moves in a number or risk factors (e.g. equity prices & interest rates). Further description and examples of these two analyses are given in **Appendix 1**.

² Significant activities could include any significant line of business, unit or process.

4.2 Licensed institution may use any or a combination of these two approaches in conducting its stress test. In general, licensed institution should use the method that is most suitable for its business, purpose and situation.

5. Basic Consideration

5.1 Licensed Institutions should define the coverage of the stress tests process. This should essentially include the full range of material risks at both business unit level and aggregated group basis.

5.2 Licensed institutions should take reasonable steps to identify the appropriate risk factors that will have a significant effect on their financial condition from the following major risk categories:

- 5.2.1 Market Risk;
- 5.2.2 Liquidity Risk;
- 5.2.3 Credit Risk;
- 5.2.4 Insurance Risk;
- 5.2.5 Operational Risk; and
- 5.2.6 Group Risk.

5.3 Examples of the risk factors in the major risk categories are given in **Appendix 2**.

5.4 The stress tests should also reflect the specific risk characteristics of the licensed institutions including taking into consideration events such as mergers or strategic acquisitions.

6. Frequency

6.1 Licensed institution should take into account the nature of risks that it is exposed to and the possible impact on financial resources arising from the risk, in determining the appropriate frequency of stress testing. Licensed institution may choose to run the stress tests on a daily, weekly, monthly, quarterly or yearly basis, depending on the nature of risks of the portfolio and circumstances.

6.2 Stress tests should be run regularly enough to take account of changing market conditions and the licensed institution's changing risk profile. In times of stress, stress test may need to be conducted more frequently to ensure that the fast changing risk landscape is adequately captured.

6.3 However, on the frequency for stress testing for the purpose of reporting to the Bank, please refer to Part C below.

7. Magnitude of Shock

7.1. The level of stress may be varied to assess vulnerability under different scenarios. As such, licensed institutions would need to determine the magnitude of shocks³ to be applied for the various stress scenarios.

7.2. The shocks should have some reference to, but not be bound by historical events as potential adverse events in the future may be different from what had occurred in the past. The scenarios should also have some relevance to the current events or circumstances.

7.3. The magnitude of shocks should not be so large that the exercise becomes purely hypothetical. The magnitude of the shock used should also be greater than the conservative estimate of potential losses (i.e. day to day volatility in a typical business environment) over one business cycle⁴.

8. Second Round Effects

8.1. It is also important to consider and capture the impact of the second round or spill over effect that might arise due to the original shock. The secondary effect may have a further adverse impact on the licensed institution's financial condition.

³ Historical data, judgement or expert opinion are among the options to determine the magnitude of shocks.

⁴ A pattern of alternating periods of growth (recovery) and decline (recession), characterised by changing employment, industrial productivity, insurance product cycle, amongst others.

8.2. For example, when considering the impact of a major recession, the primary effect could be poor investment performance due to a drop in asset prices, lower investment income and higher defaults by counterparties. The secondary effect for general takaful fund could be a potential increase in claims cost due to an increase in theft rates and fraudulent claims. For the family takaful fund, the secondary effect could be in the form of higher withdrawal rates and lower new business due to potential lower investment returns and lower disposable income. These secondary effects will have an adverse impact on the licensed institution's profitability.

9. Role of Board of Directors and Senior Management

9.1. The Board of Directors (the Board) and senior management of the licensed institutions should exercise effective oversight of the stress test process and ensure that the expectations set out in this guideline are met. In particular, there should be an explicit policy approved by the Board, regarding the stress test process which covers:

- (a) The methodologies and structure of the process, to ensure that these are consistent with the licensed institution's capital strength and risk profile;
- (b) The responsibilities and authorities of relevant personnel to ensure that formal lines of authority and appropriate separation of duties⁵ are established in order to maintain effective check and balance within the stress test process;
- (c) Regular and independent assessment⁶ of stress test policies to ensure its quality and effectiveness.

9.2. Senior management should be actively involved in the process of designing the stress tests program. As part of their responsibility for managing the entity-wide risk, they should take responsibility:

- (a) For the choice of stress scenarios to be examined;

⁵ In certain circumstances, separation of duties does not preclude the same individual carrying out the duties. However, sufficient oversight must be maintained to ensure any potential conflict of interest does not arise.

⁶ This can be part of an individual's company own internal process e.g. by internal audit or by those who are not involved in model development nor makes decision based on the model output.

- (b) To ensure that the IT systems can handle and conduct appropriate stress tests for the business or the group;
- (c) To ensure that risk management staff have adequate training and qualifications to be able to identify and quantify stresses that affect the entity;

9.3. The results of the stress tests should be communicated in a clear, concise and comprehensible manner to the senior management and the Board or the Risk Management Committee to enable them to understand the implications of the stress events on the licensed institution's business strategy or profile. A holistic view of the effect of the stress scenarios should be presented so that an aggregated view of the implications can be formed. Where formal aggregation is not possible, an informal assessment of the totality of entity-wide effects would still be useful. The relevant business line management should also be made aware of the results of the stress tests.

9.4. Senior management should take responsibility to draw up a suitable plan of corrective action in a timely manner. This action plan should be deliberated with and endorsed by the Board or Risk Management Committee as appropriate. The appropriateness and effectiveness of the corrective actions in addressing the identified risks should be continuously monitored.

PART C: SPECIFIC REPORTING REQUIREMENTS

10. Reporting Requirement

10.1 For the purpose of submission to the Bank, the stress test exercise should be conducted twice yearly i.e. at the sixth month into the financial year and at the end of financial year. The submission of results should be no later than 3 months after the date of the exercise. The format of submission to the Bank is given in **Appendix 3**.

10.2 At least 3 stress scenarios should be considered for the exercise at the end of the financial year and 1 scenario for the exercise carried out at mid-year. After

reviewing the results of the stress test, the Bank may from time to time require licensed institutions to run additional scenarios.

11. Minimum Scope for Reporting of Stress Test Results

11.1 For the purpose of submission to the Bank, the following minimum requirements should be observed:

- (a) A base scenario should be prepared in a manner consistent with the licensed institution's business plan over the projection period.
- (b) The projection time horizon is for a minimum period of one year. The stress events can occur at anytime within that one year period.
- (c) All material risks run by the licensed institution must be included. At the minimum, the licensed institution should be able to quantify the impact of stress due to market, credit and insurance risks, whilst an institution with greater modelling capabilities may wish to include the other categories of risk in their projection.
- (d) The second round or spill over effects of stress events should be taken into account, where relevant.
- (e) The magnitude of the shocks should be large enough to stress the portfolio and should be larger than a regular/cyclical variation.
- (f) Stress tests should take into consideration the latest development from the economic, political, geographical and global perspectives.
- (g) The stress event should exist for a period of time e.g. a period of sustained low interest rates **as opposed** to a one-day shock or two-week shock.
- (h) Where possible, subsidiaries and associate companies of the licensed institution should be considered in the stress test.
- (i) The scenarios selected for the stress test should be exceptional but plausible adverse scenarios.

11.2 Ultimately, licensed institutions should identify and develop scenarios to be stress tested which are appropriate to their business. The financial impact due to the shocks from the examples of risk factors as listed in **Appendix 1 and Appendix 2** may be considered.

12. Implementation Date

12.1 The effective date of this Guideline is 1 December 2008.

Appendix 1**Sensitivity and Scenario Testing****1. Sensitivity Analyses**

1.1 Sensitivity analysis can be used to evaluate the sensitiveness of licensed institution's financial condition to the risk factors tested. Some examples of sensitivity analyses that may be used are given below.

Risk factors	
Interest rate	<ul style="list-style-type: none"> - Parallel yield curve shift - Change of yield curve slope - Shift of curve and changing slope - Shocks to swap spreads - Shocks to rates and volatilities
Equities	<ul style="list-style-type: none"> - Shocks to levels and volatilities - Shocks to levels only - Shocks to volatilities only
Exchange rates	<ul style="list-style-type: none"> - Shocks to levels only - Shocks to levels and volatilities
Credit	<ul style="list-style-type: none"> - Shocks to credit spreads
Commodities	<ul style="list-style-type: none"> - Shocks to levels and volatilities
Emerging markets	<ul style="list-style-type: none"> - Parallel yield curve shift - Shocks to interest rates and volatilities
Others	<ul style="list-style-type: none"> - Shocks to various volatilities
Insurance	<ul style="list-style-type: none"> - Shocks to mortality/ morbidity rates - Shocks to loss ratios - Significant increase in new business causing high new business strain - Significant change in valuation/ reserving basis

2. Scenario Analyses

2.1 A scenario stress test can be based on a significant market event experienced in the past (a historical scenario) such as a stock market crash or a plausible event that has not yet happened (hypothetical scenario).

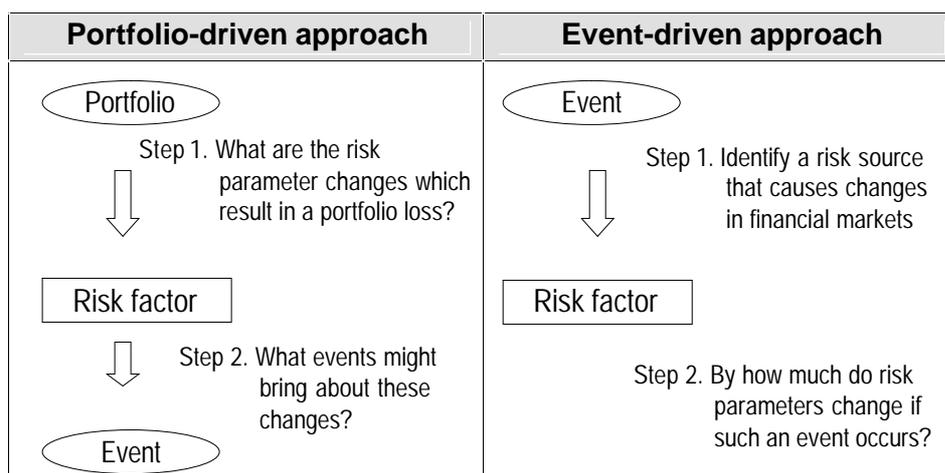
2.2 Historical scenarios are reconstruction of historical events and involves less judgement as it reflects actual stress conditions. However, historical scenarios are

backward looking, may not be the worst that can happen and may lose relevance over time due to market and structural changes.

2.3 Hypothetical scenarios require simulating shocks to events that have not yet happened or have no historical precedent. This can be more relevant, flexible and forward looking but involves more judgement and management support.

2.4 In scenario analysis, the source of the shock or stress event is well defined, as are the financial risk parameters that are affected by the shock. Sensitivity analysis while specifying the financial risk parameters, need not identify the source of the shock.

2.5 Scenario analysis can be on a portfolio-driven approach or event-driven approach⁷. In the portfolio-driven approach, vulnerabilities in the portfolio are identified and plausible scenarios are then formulated under which these vulnerabilities are stressed. In event-driven scenarios, the scenario is formulated based on plausible events and how these events might affect the relevant risk factors in the licensed institution's portfolio. The scenarios may also be tailored to incorporate recent news or developments.



⁷ Adopted from 'Stress Testing at Major Financial Institutions: Survey Results and Practices, Committee on the Global Financial System (January 2005)'.

2.6 Examples of scenario analyses that may be used⁸ are given below.

Common Stress Test Scenarios		
Category	Historical	Hypothetical
Equities	<ul style="list-style-type: none"> - Black Monday 1987 - Asian financial crisis 1997 - Bursting of IT bubble 2000 - Terrorist attacks 2001 - Historical equity market decline 	<ul style="list-style-type: none"> - Hypothetical stock market crashes - New Economy scenarios - Risk arbitrage market boom - Equity exotics stress - Geopolitical unrest - Terrorist attack - Global economic outlook
Interest Rate Products	<ul style="list-style-type: none"> - Historical interest rate increases and decreases - Bond market sell-off 1994, 2003 - Asian financial crisis 1997 - LTCM 1998 - Russian devaluation 1998 - Japan 1998 (termination of Japanese MOF Bond Purchase operation) - Terrorist attacks 2001 	<ul style="list-style-type: none"> - Global tightening (<i>focusing on increasing of short term and long term interest rate</i>) - US tightening - Differential shocks to short rates - Spike in repo rates - Yield curve twist - US economic outlook - Global economic outlook - Increase in inflation expectations - China - Japanese monetary outlook
Credit	<ul style="list-style-type: none"> - Russian devaluation and default 1998 - Asian financial crisis 1997 - Terrorist attack 2001 	<ul style="list-style-type: none"> - Widening spread - Emerging market economic outlook - Euro area economic outlook - Global economic outlook - Natural disaster - China change in currency arrangement - US government sponsored enterprises - Terrorist attack
Others	<ul style="list-style-type: none"> - Gulf war 1990 - Iraq war 2003 	<ul style="list-style-type: none"> - Volatility disruption - Bank funding - Global economy
Insurance	<ul style="list-style-type: none"> - 1918 Influenza Pandemic - Equitable Life 2000 - HIH 2001 - Terrorist attack 2001 - Tsunami 2004 	<ul style="list-style-type: none"> - Pandemic (such as Bird Flu, SARS etc) - Major natural disaster - Terrorist attack
Operational	<ul style="list-style-type: none"> - Confederation Life 1993 - Kidder, Peabody & Co 1994 - Barings Bank 1995 	<ul style="list-style-type: none"> - Denial of reinsurance cover due to error in reinsurance contract wording - Mis-pricing of risk encouraged by lack of check and balance in underwriting department

⁸ Based on surveys conducted by the Committee on the Global Financial System on major financial institutions

Appendix 2**Major Categories of Risks and Risk Factors****1. Stress Testing for Market Risk**

1.1 Market risk arises from financial losses as a result of the reduction in the market value of assets due to exposure to equity, interest rate, property, commodity and currency risks, as well as the risk of financial losses arising from non-parallel movement between the value of liabilities and the value of assets backing the liabilities due to movements in interest rate (interest rate mismatching risks).

1.2 The following risk factors, while not exhaustive, should be considered when developing scenarios involving market risk:

- a) Reduction in value of assets;
E.g. the impact of price shift in assets on entire portfolio

- b) Lower than expected investment income;
E.g. drop in dividend and rental income

- c) Movement in interest rates and the effect on the value of assets;
E.g. Parallel shifts in the yield curve, yield curve twists

- d) The extent of any mismatch of assets and liabilities, including reinvestment risk; E.g. the relative impact on the value of assets and liabilities due to change in level of interest rate

- e) A dramatic change in the spread between non-sovereign and sovereign rates;
E.g. widening of spread between private debt securities and government bonds

- f) Inadequate valuation of assets;
E.g. use of inappropriate valuation methodology considering the nature of assets
- g) Currency devaluation and its direct impact on the portfolio.
E.g. the relative impact on the value of assets and liabilities due to exchange rate changes
- h) The extent to which market moves could have non-linear effects on values. E.g. derivatives

1.3 Some guidance on stress testing for market risk

- **Market Risk - Stress Testing on Movement in Interest Rate**

The shocks to interest rates are applied to ascertain the impact of these shocks to licensed institution's assets and liabilities value. The size and type of the shock can be based on historical experience or hypothetical scenario. The following are approaches that can be adopted for stress testing of interest rate risk:

- **Parallel shifts in the yield curve** - stress the extreme movement in interest across the maturity spectrum, for example, a 200 or 300 basis-point (bp) shift in the interest rates.
- **Yield curve twists** - identify the impact of changes in the shape of the yield curve such as when the yield curve steepens, flattens, or inverts.
- **Credit spreads** - measure the impact of changing credit spread on the licensed institutions' portfolio. The movement in credit spread can be determined based on ratings, sectors the issuer operates in and/or by tenure.

- **Market Risk - Stress Testing on Movement in Equity Prices**

Movement in equity prices or market indices may have adverse impact on the licensed institution's financial condition. Risk for equities is divided into general risk and specific risk: General risk relates to the risk of changes in the value of equity as a result of movements in the equity market as a

whole whereas specific risk refers to the risk from the individual equity issuer.

- General risk relates to the risk of changes in the value of equity as a result of movements in the equity market as a whole. More commonly, stress tests are conducted for general market risk, e.g. during Asian financial crisis where KLCI dropped by 45%.
- Specific risk refers to the risk from the individual equity issuer. Stress test for specific risk would have to be applied to the holding of the equity of individual issuer. Such a stress-test would primarily be relevant in cases where the licensed institution holds a highly concentrated trading portfolio of equities.

In stress testing for risk in equity investments, licensed institution should be able to at least stress test the general risk on the portfolio. The prices of individual equities may be shocked as well, either separately or simultaneously. The beta of individual stock to the market index can also be used to simulate the movement in prices of individual stocks. However, licensed institutions need to be aware that correlation between individual stocks and the market index may breakdown in times of stress.

2. Stress Testing for Credit Risk

2.1 Credit risk arises from losses due to counterparty's inability or unwillingness to fully meet its contractual financial obligations. A licensed institution is exposed to this risk from its financial transactions with counterparties such as debtors, borrowers, brokers, policyholders, retakaful operators and guarantors.

2.2 The following risk factors, while not exhaustive, should be considered when developing scenarios involving credit risk:-

- a) Deterioration in retakaful operators' credit worthiness

E.g. Impact of downgrade in credit rating of the retakaful operators on the amount of capital needed. Concentration of exposure to a single reinsurer should also be considered.

- b) Deterioration in credit worthiness of other counterparties and intermediaries

E.g. A decrease in credit rating would reduce the value of the asset and increase the probability of default.

- c) Default by retakaful operators and debtors

E.g. Impact of potential actual default by retakaful operators on both recoveries due and also future recoveries

- d) Deterioration in the extent and quality of collateral

E.g drop in the market value of the collateral

- e) Defaults by parties in respect of whom guarantees have been given by the takaful operator

E.g. default by subsidiaries when guarantees have been given to meet liabilities of subsidiaries

- f) Greater losses from bad debts than anticipated

E.g. recoveries given default is lower than anticipated

2.3 Some guidance on stress testing for credit risk:

- **Credit Risk- Stress Testing on Loans/Corporate Debt**

In the loan book, different approaches may be adopted for rated loans and non-rated loans. For:

- **Rated Loans** - the various studies published by rating agencies on rating transition probabilities and loss given default under stress conditions can be leveraged upon as inputs into a credit risk model.
- **Non-rated loans portfolio** - either a bottom up approach or a top-down approach may be considered, depending on size of the portfolio and also the size of individual loans.

A bottom up approach involves an individual assessment of each loan in the portfolio for the impact of risk factors on each obligor's creditworthiness. The identified risk factor can be specific to the obligor (eg transaction) or pool of obligors (eg industry, sector, macroeconomics). E.g. In a scenario of an upsurge in oil/diesel price coupled with a hike in interest rate, it will contribute to an increase in operating cost of a transport company. Should the demand for transport and revenue remain the same, the company's profitability will drop thus impairing the obligor's cash flow, repayment capacity and increasing its probability of default.

A voluminous and homogenous portfolio suggests that a top down approach is more appropriate, which involves taking a 'portfolio view' of credit losses.

Licensed institution with a scoring system for loans can examine the impact of a reduction of its score across each of these loans and can then recalculate its typical risk assessment in that situation. Similarly, licensed institution with credit rating systems can consider a ratings migration of the loans exposure.

Licensed institution can also downgrade across-the-board all loans in the portfolio. For example, the non-performing loan (NPL) ratio of the portfolio can be stressed to reflect the downgrade. Inputs for the level of NPL can be based on institution's historical experience and also the banking sector's NPL during stress period.

Licensed institutions can also increase the loss given default by reducing the re-sale value of the collateral, say property, pledged by obligors to the licensed institution. In a stress test, licensed institutions should consider the illiquid nature of lower-quality assets or collateral.

▪ **Credit Risk – Stress Testing on Debtors Receivables or Retakaful Recoveries**

For receivables and recoveries, licensed institutions could stress the flow rate⁹ from “aging buckets” to evaluate the impact of credit risk on the institution’s portfolio. For example, licensed institutions could stress the flow rate from the “aging bucket” with accounts that are 1-2 months in arrears to the next “aging bucket” in which accounts are 2-3 months in arrears, so on and so forth. Under stress scenarios, higher flow rates are expected as more borrowers defer or default on payment. Then, based on the loss experience of each bucket, the licensed institution can estimate its total losses. For retakaful operators, the credit rating (and also negative outlooks on ratings) should be taken into account in evaluating the expected losses.

Due consideration should also be given to the probability of retakaful counterparties defaulting on their obligation in providing cover stipulated in the original arrangements.

3. Stress Testing for Insurance Risk

3.1 Insurance risk refers to the inherent uncertainties as to the occurrence, amount and timing of insurance liabilities and can be separated into:

- (i) Product design, pricing and underwriting risk, which is the risk of costs and liabilities assumed in respect of a product line exceed the expectation in pricing the product line due to inappropriate underwriting strategy or unexpected losses arising even when an appropriate underwriting strategy is adopted; and
- (ii) Liability risk, which is the risk of under-estimation of liabilities and inadequate provisions to meet obligations to policyholders.

3.2 The following risk factors, while not exhaustive, should be considered when developing scenarios involving insurance risk:-

- a) Increase in claims costs
E.g. Higher frequency and size of large claims for general business and a deterioration in mortality/ morbidity/ survival rates for life insurer
- b) Increase in expenses (including inflation)
E.g. Effect of increase in both fixed and renewal expenses
- c) Variations in persistency
E.g. Significant drop in renewals, lower lapses experienced on lapse supported products, drastic early terminations for interest sensitive products which would lead to forgone future interest income
- d) Variation in underwriting procedures
E.g. Underwriting not carried out according to assumptions made in pricing, over lenient acceptance of risks
- e) Change in volume of underwriting portfolio
E.g. A rapid increase or decline in the volume of business can have significant impact on pricing, particularly on the expense assumptions and new business strain
- f) Revision in retakaful rates
E.g. Increase in retakaful rates, which cannot be factored in current premiums
- g) Adverse selection in the exercise of policy guarantees and options
E.g. Response to options allowed for in the product is to the detriment of the takaful operator
- h) Decrease in investment earnings
E.g. lower % of investment income than assumed

⁹ Percentage of the loan that would move to the next aging bucket on a month-to-month basis

- i) Other uncertainty in the assumptions used in pricing and reserving
E.g. lengthening of tail of claims and latent claims

3.3 Some guidance on stress testing for insurance risk:

- **Insurance Risk – Stress Testing on Underwriting Assumptions**

The stress applied to the underwriting assumptions are used to ascertain the impact of potential adverse deviation of outcome from the expected outcome. The level used for stress testing the projected outcome against the assumptions used in pricing (such as claims cost, expenses, volume of business, persistency rate, investment earnings rate) should be based on institution's own past adverse experience or relevant industry data, with some due regard to expected operating environment.

The adverse deviations of outcome may sometimes result in a change in basis used for calculation of technical provision. Therefore, the financial impact of any deterioration in technical provision should also be captured in the stress test

- **Insurance Risk – Stress Testing on Catastrophe/ Accumulation Risk**

Stress testing on catastrophe and accumulation risk is used to evaluate the impact of a single large loss event on the licensed institution's financial condition. The type of loss event that should be adopted for stress test should take into account institution's exposure to a particular geographical area/ class or subclasses of business/ group of policyholders. The financial impact will depend on the effectiveness of the retakaful arrangements in mitigating the losses that may arise from the loss event.

4. Stress Testing for Liquidity Risk

4.1 Liquidity risk arises from an institution's inability to realise assets or otherwise obtain the necessary funds, to meet its on- and off-balance sheet obligations as they fall due, without incurring unacceptable losses or cost.

4.2 The following risk factors, while not exhaustive, should be considered when developing scenarios for liquidity risk:

- a) Mismatch between expected asset and liability cash flows
E.g. lower than expected investment income to meet claims necessitate in unexpected realization of assets
- b) Market conditions that encourage the wide spread exercise of embedded options against the takaful operator
E.g. the fall in asset prices causing embedded capital guarantees to be “in the money”
- c) A significant and adverse change in the rate of surrenders
E.g. significant increase in surrender rates can cause a significant increase in cash outflow coupled with a significant drop in expected future premium income (for renewal products)
- d) A significant and unexpected outflow of funds needed to meet claims or other liabilities
E.g. sharp increase in claims liabilities due to accumulations or catastrophic events
- e) Uncertainty in the level of new business growth
E.g. High business growth has the effect of increasing cash outlays for policy acquisition expenses and lower than expected new business growth will cause the insurer to utilize assets to meet policy claims

5. Stress Testing for Operational Risk

5.1 Operational risk arises from problems in the performance of business functions or processes leading to financial losses. Exposure to this risk could be due to deficiencies or breakdowns in internal controls or processes, technology failures, human errors or dishonesty and natural catastrophes.

5.2 The following risk factors, while not exhaustive, should be considered when developing scenarios for operational risk:

- a) an error in key processes
E.g. the impact of an error in pricing or reserving
- b) increasing fraudulent activity
E.g. the impact of fraud on takaful claims
- c) the adequacy of the takaful operators' business continuity management (BCM) plan
E.g. the impact of a catastrophe scenario on the insurer's day-to-day operations
- d) the adequacy of takaful operators' disaster recovery plan (DRP)
E.g. the potential failure of back-up systems or failure in the efficiency and effectiveness of off-site back-up facilities
- e) the reputational risks to which the takaful operator may be exposed
E.g. the impact on the insurer if its brand is damaged, resulting in loss of confidence in the takaful operator and high surrender rates
- f) the impact of legal risks
E.g. the risk that policy wording may be interpreted more broadly than intended
- g) the failure of general personnel management controls or inadequate controls put in place
E.g. the impact of an underwriter exceeding authority limits
- h) the marketing and distribution risks to which the insurer may be exposed
E.g. the risk of over-dependency on certain distribution channels for business

- i) the technological risks to which the insurer may be exposed
E.g. the impact of a widespread virus attack
- j) the possible impact of any outsourcing difficulties
E.g. default of service providers before rendering full service after full payment has been made

6. Stress Testing for Group Risk

6.1 The membership of a takaful operator in a group can be a potential source of strength to the takaful operator, but it can also pose risks, particularly as a result of contagion.

6.2 The following risk factors, while not exhaustive, should be considered when developing scenarios for group risk:

- a) the effect on the licensed institution of a high degree of dependence on group resources to support the insurer's operations;
E.g. through intra-group outsourcing, financial support by parents
- b) the effect on the licensed institution of an impaired parent, subsidiary or affiliate within the group or downgrade in rating of the group;
E.g. reputational issues, the impact on funding sources available, such as lines of credit, intra-group funding or access to external capital
- c) the potential diversion of management time to group issues;
- d) the pressure on the takaful operator to financially support other group members;
E.g. reallocation of group overheads towards the licensed entity or purchase financial instruments issued by other group members
- e) the pressure on the takaful operator to comply with group requirements rather than the firm's own strategy;
E.g. constraints put in place with respect to investment mix

Appendix 3**Reporting of Stress Test Results to Bank Negara Malaysia**

It is expected that licensed institutions will conduct several different stress tests in terms of scenarios, frequency and coverage. However, the reporting to Bank Negara Malaysia shall be based on the minimum requirements detailed in Part 3 of this Guideline. Licensed institutions are required to submit the stress test results to Jabatan Penyeliaan Insurans dan Takaful. The submission should cover the following:

1. Coverage

A description of the coverage should also be given.

(Refer to Part 2: Approach to stress test by licensed institutions)

2. Conditions Prevailing and Assumptions Used Over the Stress Test Time Horizon

Licensed institutions are required to describe the event as well as give details of the conditions prevailing in each scenario (including the base scenario) such as the level of GDP, new business growth rate for the industry, interest rates, equity market, concentration of risks, type of loss events etc. Licensed institutions should also include any other significant assumptions used in the stress tests.

3. Results of Latest Stress Test

The submission format of the stress test is given at the end of this Appendix. The format shall be used for the exercise carried out at the end of the financial year.

For the exercise in the mid-year of the financial year, only the 'Simplified Balance Sheet' and the 'Simplified Capital Adequacy Ratio' sheets are required to be submitted. The number of scenarios shall also be adjusted according to the requirements in Part 3 of the guidelines.

4. Assessment of Vulnerability

Other than reporting the quantitative results of the stress test, licensed institutions are also required to provide an assessment of the vulnerability of its institution,

identifying the main vulnerable areas and the main risk factor that affects each of these areas. A sufficient level of detail (or granularity) should be given in the assessment in order to provide a meaningful understanding of the vulnerable areas (e.g. business line, geographical sectors, economic sectors or sub-sectors, market segments, borrower groups etc) and the causes of stress losses.

5. Minutes of Board and Risk Management Committee Meetings

Extracts of minutes of the above meetings pertaining to the discussion, which should include the proposed **action plans** to overcome the vulnerabilities, on the results of the stress tests should be attached.

6. Certification of Submission

Submissions should be certified by the Chief Executive Officer.

Stress Test Submissions - General Takaful Fund

Projection To:

Simplified Revenue Account

Item	As reported for the 12 months prior to latest quarter	Projections			
		Base Scenario	Scenario 1	Scenario 2	Scenario 3
A Gross Contribution Income					
B Less: Retakaful Ceded					
C Net Contribution (A-B)					
D Add/ Less: Change in Provision of Unearned Contribution Reserve					
E Earned Contribution (C+D)					
F Investment Income					
G Other Income					
H Total Income (E+F+G)					
I Net Claims Incurred					
J Net Commission					
K Management Expenses/ Wakalah fee for management expenses					
L Provision for doubtful debts/ bad debts					
M Other Outgo					
N Total Outgo (I+J+K+L+M)					
Surplus/ Deficit Arising (H-N)					

Stress Test Submissions - General Takaful Fund

Projection To:

Simplified Balance Sheet

Item	As reported in previous quarter	Projections			
		Base Scenario	Scenario 1	Scenario 2	Scenario 3
Assets					
A Cash and deposits					
B Land and buildings					
C Islamic debt securities					
D Financing					
E Equity					
F Fixed Assets					
G Other Assets					
H Less: Non- Authorised Assets					
I Total Assets (A+B+C+D+E+F+G-H)					
Liabilities					
J Claims Liabilities					
K Contributions' Liabilities					
L Other Liabilities					
M Total Liabilities (J+K+L)					
Surplus/ Deficit (I-M)					

Stress Test Submissions- Family Takaful Funds

Takaful Fund: Group Family Takaful Account (GFTA)/ Participants' Special Account (PSA)

Projection To:

Simplified Revenue Account

Item	As reported for the 12 months prior to latest quarter	Projections			
		Base Scenario	Scenario 1	Scenario 2	Scenario 3
A Net Contribution					
B Investment Income					
C Other Income					
D Total Income (A+B+C)					
E Net Certificate Benefits					
F Net Commission					
G Management Expenses/ Wakalah Fees for Management Expenses					
H Increase in Certificate Liabilities					
I Provision for doubtful debts/ bad debts					
J Other Outgo					
K Total Outgo (E+F+G+H+I+J)					
Surplus/ Deficit Arising (D-K)					

Stress Test Submissions- Family Takaful Funds

Takaful Fund: Group Family Takaful Account (GFTA)/ Participants' Special Account (PSA)

Projection To:

Simplified Balance Sheet

Item	As reported in previous quarter	Projections			
		Base Scenario	Scenario 1	Scenario 2	Scenario 3
Assets					
A Cash and deposits					
B Land and buildings					
C Islamic debt securities					
D Financing					
E Equity					
F Fixed Assets					
G Other Assets					
H Less: Non-Authorised Assets					
I Total Assets (A+B+C+D+E+F+G-H)					
Liabilities					
J Net Certificate Liabilities					
K Other Liabilities					
L Total Liabilities (J+K)					
Surplus/ Deficit (I-L)					

Stress Test Submissions – Shareholders’ Funds

Projection To:

Simplified Solvency Margin Ratio

Item	As reported in previous quarter	Projections			
		Base Scenario	Scenario 1	Scenario 2	Scenario 3
A Share Capital					
B Retained Profits / (Loss)					
C Less: Other Liabilities					
D Shareholders’ Fund (A+B-C)					
E Less: Qard Hassan to Takaful Funds					
F Surplus / (Deficit) (D-E)					