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## Supplementary notes to the Swiss Association of Actuaries guidelines on the assignment of adequate technical life reserves pursuant to FINMA circular 2008/43 “Life insurance reserves”

### Management summary

The financial security of a life insurance company is based on the two pillars of the Swiss Solvency Test and adequate actuarial reserves within the statutory balance sheet pursuant to the Code of Obligations. Whilst the Swiss Solvency Test determines the value of the liabilities at close-to-market value and the capital requirements based on a short-term market-consistent view, adequate reserves within the balance sheet pursuant to the Code of Obligations are based on a long-term view taking account of the statutory valuation of the investments. Both methods have their strengths and weaknesses, but they complement each other and it is important to clearly distinguish between the two different views.

In order to determine adequate technical reserves for the Swiss life insurance business within the balance sheet according to the Code of Obligations, the Swiss Association of Actuaries has issued a guideline that is binding for actuaries that are responsible for evaluating these reserves. The guideline includes general principles to be complied with when evaluating adequate reserves as well as a minimum requirements test that must be fulfilled. Safeguards have been integrated at various points in the decisive principles and parameters for the minimum requirements test, which should ensure adequate reserves in most cases. However, the actuary is obliged to perform checks according to all of the guideline’s criteria, regardless of the minimum requirements test, in order to take the specific portfolio conditions into adequate consideration.

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## 1 Introduction

The Swiss Association of Actuaries (SAA) has issued a “Guideline on the assignment of adequate reserves for life insurance” in addition to and in order to specify circular 2008/43 “Life insurance reserves” issued by the Swiss Financial Market Supervisory Authority (FINMA). The first part of this guideline contains general principles, such as how to check whether the reserves are adequate, while the second part defines a so-called minimum requirements test for products, which identifies reserves that are definitely inadequate. The guideline deals with “simple” products (e.g. mixed insurances, death risk insurances), while the issue of a subsequent separate detailed guideline is planned for “complex” products (e.g. variable annuities).

The guideline deals with the technical reserves in the statutory balance sheet under the Code of Obligations, for which various regulations exist in supervisory law (incl. the FINMA circular) and in the Code of Obligations, which were to be taken into account as pre-existing framework conditions.

As a supplement to the guideline, this document provides notes on how the issue of reviewing reserves is to be classified in the supervisory and reporting environment and how the minimum requirements test was developed and how and where safeguards were built into this test.

## 2 Classification under overall supervisory law

In accordance with the Federal Law on Insurance Supervision (VAG), a life insurance company essentially has to fulfil the following requirements:

- Art. 9 VAG, equity: the insurance company must have sufficient free and unencumbered equity with respect to its overall business activities (solvency margin).
- Art. 16 VAG, actuarial reserves: the insurance company is obliged to establish adequate actuarial reserves for the overall business activity.
- Art. 17 VAG, tied assets: the insurance company must secure claims from insurance contracts by means of tied assets.

The provisions regarding financial security, equity and reserves are then specified in the Supervision Ordinance (AVO) as follows:

- Art. 21 AVO, financial security: the financial security is determined based on solvency and the actuarial reserves.

- Art. 22 AVO, methods for determining solvency: the solvency of the insurance company is assessed using two methods:
  - a. Solvency I: determination of the required equity based on the volume of business (required solvency margin) and the allowable equity (available solvency margin);
  - b. Swiss Solvency Test (SST): determination of the required equity based on the risks to which the insurance company is exposed (target capital) and the allowable equity (risk-bearing capital).
 Both methods must be applied independently of each other.
- Art. 54 AVO: the insurance company provides evidence of adequate actuarial reserves. These are comprised of:
  - a. the actuarial reserves to cover expected liabilities;
  - b. the equalisation reserves to compensate for business volatility, taking account of the diversification, size and structure of the insurance portfolio.

This means that the financial security of an insurance company is predominantly achieved by fulfilling the Swiss Solvency Test (SST) and by holding adequate actuarial reserves which must be secured in separate tied assets. These two instruments complement one another and must be fulfilled independently. Further details regarding the connections and differences between the SST and adequate reserves in a statutory balance sheet under the Code of Obligations are provided below, together with how they complement each other.

### 3 Swiss Solvency Test and adequate reserves in balance sheets under the Code of Obligations

#### 3.1 Valuation differences between the SST and balance sheets under the Code of Obligations

The key points of the “framework” of the Swiss Solvency Test are described as follows in Art. 41 of the Supervision Ordinance:

1. The target capital is equal to the risk-bearing capital that must be available at the start of the year in order to ensure that the average of the possible values of the risk-bearing capital **at the end of the year**, which are below a specific threshold (value at risk) (expected shortfall according to Appendix 2 of the AVO), is greater than or equal to the minimum amount according to section 4.
2. The risk-bearing capital is the difference between the **close-to-market value** of the investments and the discounted best estimate of the actuarial liabilities.
3. The threshold value of the risk-bearing capital is the value that the risk-bearing capital will only fail to reach with a certain **probability of occurrence**. ...
4. The minimum amount is the capital costs for the risk-bearing capital to be provided for the duration of the actuarial liability transactions.

**This means that the SST is based on a “market value balance sheet” (or at least a “close-to-market-value” balance sheet) and measures the risks that may arise within one year with a certain probability of occurrence. The SST therefore has a “short-term risk outlook”.**

In contrast, the actuarial reserves are included in the statutory balance sheet according to the Code of Obligations (OR), whereby the Federal Council may issue deviating provisions according to Article 26, section 3 of the VAG:

1. ...
2. ...
3. Provided that transparency is maintained, the Federal Council may specify regulations that differ from the OR on the valuation of assets and liabilities and the structure of the financial statements for insurance companies.

In accordance with the Code of Obligations, the following provisions apply for assets (especially investments):

Art. 960a, in general:

1. On initial entry, assets must be valued at most at the acquisition or production costs.
2. In a subsequent valuation, assets may not be valued higher than the acquisition or production costs. The provisions for individual types of assets remain reserved.
3. The use- or age-related loss in value must be depreciated, while other losses in value must be accounted for by value adjustments. Depreciation and value adjustments must be performed according to the generally accepted accounting principles. They must be directly or indirectly deducted from the relevant assets as a charge to the income statement and may not be accounted for under liabilities.
4. Additional depreciation and value adjustments may be performed for replacement purposes and to ensure the sustainable development of the company. For the same purposes, the cancellation of depreciation and valuation adjustments that are no longer justified may be dispensed with.

Art. 960b, assets with observable market prices:

1. In a subsequent valuation, assets with an exchange price or another observable market price in an active market may be valued at the price or the market price on the reporting date, even if this is over the nominal value or the cost value. Parties that exercise this right must value all corresponding balance sheet asset items with an observable market price at the price or market price on the reporting date. Reference to this valuation must be made in the notes. The total value of the corresponding assets must be disclosed separately for securities and other assets with an observable market price.
2. If assets are valued at the exchange price or market price on the reporting date, a value adjustment charged to the income statement may be established in order to take account of the fluctuations in the price development. However, these kinds of value adjustments are not permitted if this would result in a fall below both the cost value as well as the lower exchange value, if applicable. The equalisation reserve amount must be reported separately in the balance sheet or the notes.

For example, in Art. 110 AVO, the Federal Council issued the following provision deviating from the OR with respect to the valuation of investments in an insurer's balance sheet:

1. Domestic insurance companies may report fixed-interest securities that are payable in a fixed currency and are repayable, or can be amortised, at a date specified in advance at a value that does not exceed the value determined according to the scientific or linear amortised cost method in accordance with Article 89. ...
2. ...

In summary, this means the following for an insurer's most important investment categories:

### Investment properties

The book value is equal to the cost value less depreciation (plus the cost value of any value-enhancing investments made). Insurance companies therefore often use the maximum depreciation allowable on investment properties under tax law.

This means that the book yields for investment properties in a balance sheet under the Code of Obligations depend heavily on the investment property's acquisition date. For example, if the company purchased the investment property at a price of 100 many years ago and if this had a net income of 5 at the time (rental income less maintenance costs, etc.), the company's book yield would initially have been 5%. If we assume that the net income is currently still 5, as higher maintenance costs have been compensated for by higher rental income, the company still achieves a book yield of 5% if it has not depreciated the real estate, or a (potentially significantly) higher book yield if it has depreciated the real estate. If we assume that, due to the low interest rate environment, the investor is satisfied with a real estate yield of only 3%, the real estate would naturally amount to much more than 100, i.e. the market value of the real estate would be 167 ( $5 / 167 = 3\%$ ), which is much higher than the book value.

#### Listed shares and investment funds

The book value may not be higher than the market value, whereby insurance companies often also value shares and investment funds according to the lowest value principle (book value is equal to the lower of the cost value and the current market value) or add reserves to the equalisation reserves that correspond to the market value.

#### Mortgages and other unlisted securities (without fixed interest)

The book value may not be higher than the cost value, which generally (e.g. for mortgages) corresponds to the nominal value of the debt.

#### Fixed-interest securities

The book value may not be higher than the value determined using the scientific or linear amortised cost method.

In the amortised cost method, the book value is updated from the purchase price of the security through to the redemption value using either the linear or "scientific" (taking account of the compound interest effect) method. Intermediate changes to the market interest rates have no effect on the book value. For example, if you purchase a bond with a nominal value (redemption value) of 100 and an annual coupon of 3 at a purchase price of 100, the book value of this bond will be 100 until maturity and this will result in an annual booked amount of 3 or a book yield of 3%.

If, for example, we compare the book value (BV) and market value (MV) of a zero bond with an annual yield of 3%, and if we assume that the current market yield on purchasing the bond was 3% and this fell to 1% after five years, this would result in the following:

Year	BV start of year	BV end of year	Posted income	Posted yield	MV start of year	MV end of year	Market value income	Market value yield
1	100 000	103 000	3 000	3.00%	100 000	103 000	3 000	3.00%
2	103 000	106 090	3 090	3.00%	103 000	106 090	3 090	3.00%
3	106 090	109 273	3 183	3.00%	106 090	109 273	3 183	3.00%
4	109 273	112 551	3 278	3.00%	109 273	112 551	3 278	3.00%
5	112 551	115 927	3 377	3.00%	112 551	127 869	15 318	13.61%
6	115 927	119 405	3 478	3.00%	127 869	129 148	1 279	1.00%
7	119 405	122 987	3 582	3.00%	129 148	130 439	1 291	1.00%
8	122 987	126 677	3 690	3.00%	130 439	131 744	1 304	1.00%
9	126 677	130 477	3 800	3.00%	131 744	133 061	1 317	1.00%
10	130 477	134 392	3 914	3.00%	133 061	134 392	1 331	1.00%

In this case, there is a similar effect as is the case for investment properties, where the posted yield depends on the “market yield” at the time the fixed-interest security is purchased in a balance sheet under the Code of Obligations. In contrast, in a market value balance sheet, the expected future yield corresponds to the current market yield.

**So, in contrast to the SST, the balance sheet under the Code of Obligations (and the respective adequate reserves to be established) does not include the market value for most investments, but rather book values that depend on the acquisition date so that a large part of the resulting book yield depends on the acquisition date (and therefore the “market yield” at the acquisition date).**

To ensure that the assets and liabilities sides are aligned with each other, the valuation of the liabilities side depends on the valuation of the assets side. This means that, in the balance sheet under the Code of Obligations, the liabilities side is also valued according to a type of “amortised cost method”. The following provisions are provided in the Supervision Ordinance by way of example:

- Art. 58 AVO, principle of individual calculation: the insurance company calculates the actuarial reserves separately for every contract and in accordance with a prudent prospective method.



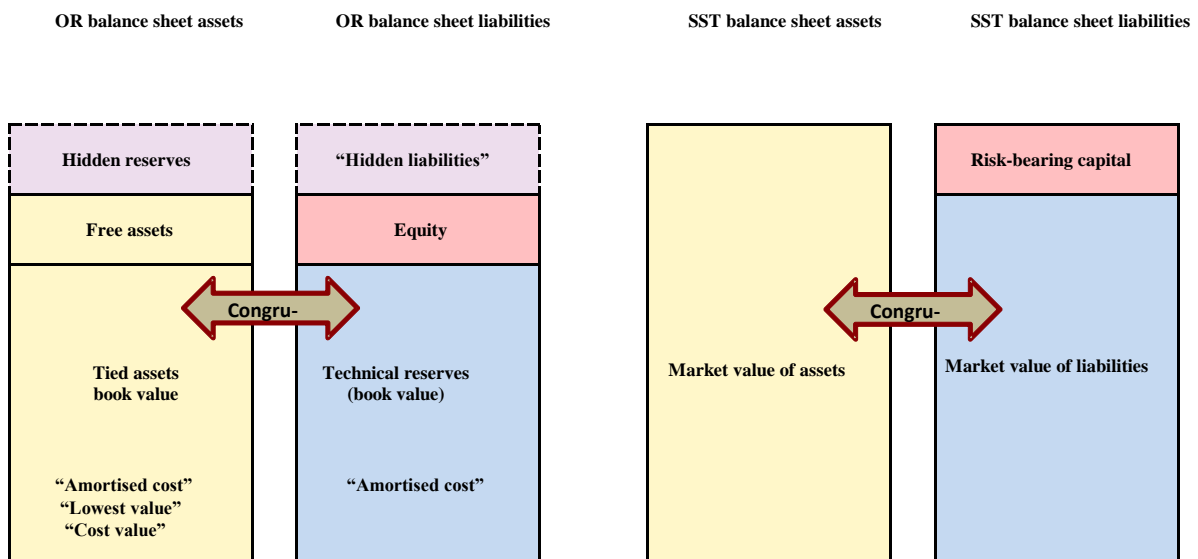
- Art. 60 AVO, interest rate for calculating the technical reserves: in order to calculate the technical reserves, the insurance company uses a technical interest rate that may not exceed the technical interest rate used for the rating classification.
- Art. 61 AVO, biometric principles for calculating the technical reserves: to calculate the technical reserves, the insurance company uses the same or more prudent biometric principles than those used for the rating classification.

This is, in fact, congruent with the bond valuations on the asset side. If the costs and biometrics (e.g. death) are disregarded, the development of a minimum reserve for a ten-year insurance with a single premium of 100,000 and a technical interest rate of 3% used for the rating classification is identical to the book value of the zero bond in the above example for the fixed-interest securities.

However, the supervisory legislation naturally also requires a review to be performed to confirm whether this technical interest rate (of 3% for example) can continue to be generated in the future or whether a corresponding book value yield can be achieved on the allocated book values of the investments:

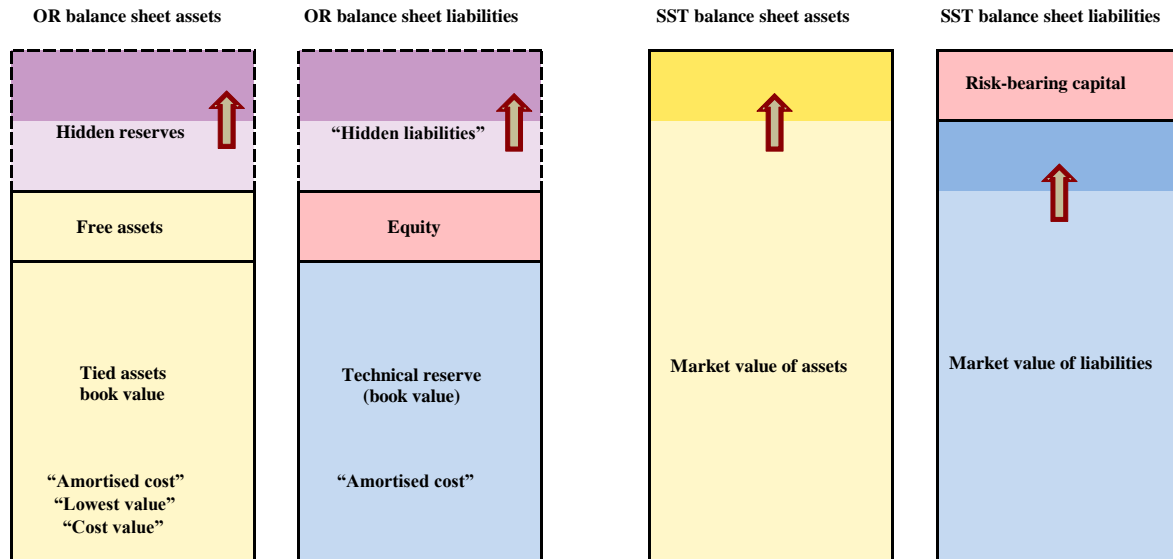
- Art. 62 AVO, reinforcement of the technical reserves: the insurance company constantly monitors the rating principles and increases the actuarial reserves as soon as they prove to be insufficient when measured based on the rating principles considered to be adequate.

The comparison between the market value balance sheet pursuant to the SST and the statutory balance sheet pursuant to the Code of Obligations and the congruence within the two balance sheets can be represented as follows:



Due to the valuation regulations, the assets in the balance sheet under the Code of Obligations generally (and especially currently with low interest rates) will contain valuation reserves or “hidden reserves”, i.e. the market value of the assets is higher than the book value of the assets. In contrast, the book value of the technical reserves in the balance sheet under the Code of Obligations may be lower than the market value of the liabilities, resulting in potential “hidden liabilities” on the liabilities side (in this case under the simplified assumption that the equity under the Code of Obligations corresponds precisely to the risk-bearing capital of the market value balance sheet), i.e. the book value of the liabilities is less than the market value of the liabilities.

Due to the valuation regulations, market changes often only lead to changes in the hidden reserves in the balance sheet under the Code of Obligations, while the actual book value of the assets remains unchanged.



If the company was fully “matched” (and no reinvestments were required), the cover (or the risk-bearing capital) in the market value balance sheet would not change and there would also be no reason to strengthen the technical reserves in the balance sheet under the Code of Obligations. If a company had only concluded single-premium policies in the mid-90s and matched these precisely with the high-interest government bonds upon conclusion, the technical reserves calculated at (for example) 3.5% would also be sufficient and would not have to be strengthened. However, if they were to sell the bonds and effectively realise the hidden reserves, they would have to strengthen the reserves, as they would obtain much less income in the future and the necessary strengthening should be very close to the profit realised from liquidating the hidden reserves.

### 3.2 Short-term view of the SST versus the long-term view of the actuarial reserves

As mentioned in Chapter 3.1, the SST measures the short-term risk, namely that the risk-bearing capital will fall below a certain limit within one year with a certain probability. In many regards, this takes place based purely on “objective” market information at the valuation date. This means, for example, that the interest rate curve at the valuation date plus its expected change within a year is decisive. In contrast, the interest rate at which a bond that matures in ten years will be reinvested is irrelevant. This advantage of “objective” close-to-market valuation with defined yields and volatilities is in contrast to the disadvantage that only a period of one year is considered and that the markets could “er”, i.e. that the future

does not unfold precisely as priced in by the markets. For example, the underlying volatility of the EURO/CHF exchange rate in the SST is 6.74% and the limit of the underlying certainty in the SST (expected shortfall at the 99% level) is reached with a decline in the exchange rate of 18%. This limit is also reached for interest rates (underlying volatility of around 53 basis points) with a fall in interest rates of around 140 basis points. In real terms and particularly observed over a longer time horizon, far greater changes have been observed in the past.

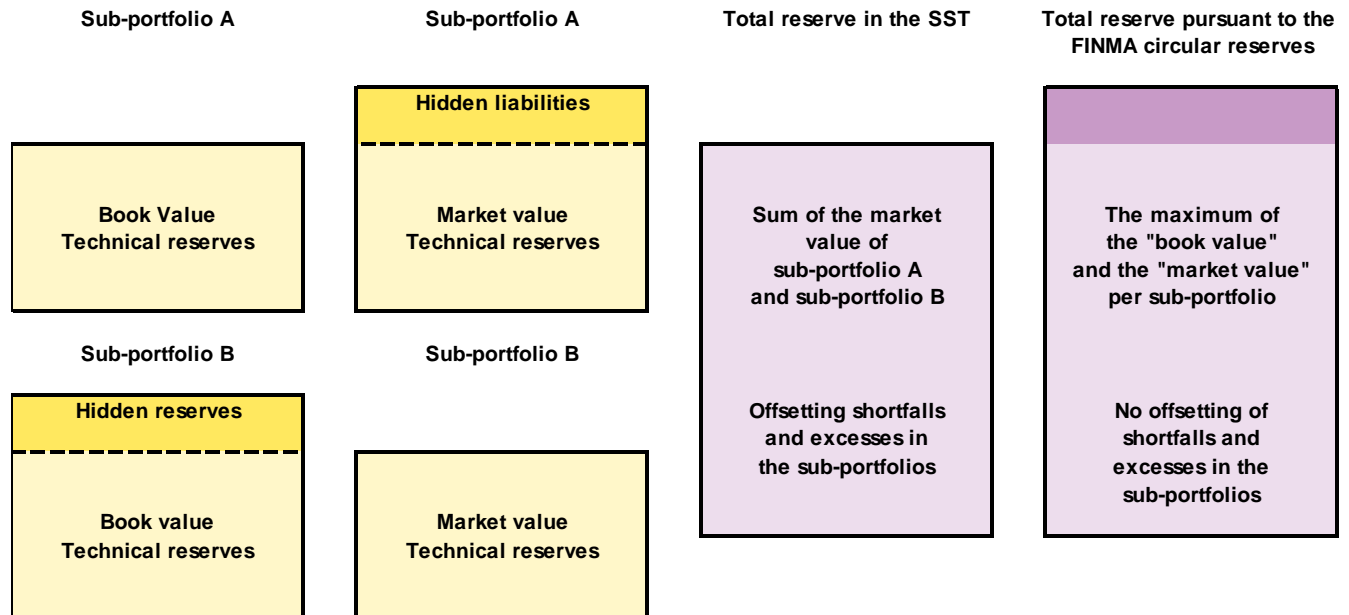
On the other hand, when reviewing the technical reserves, the company must assess whether it is in a position to meet its future long-term liabilities, which may only arise in a number of years, with its existing assets, which may need to be reinvested in the future.

**This means that the SST focuses on short-term (one-year) fluctuations, while the review of the technical reserves focuses on long-term (adverse) developments (e.g. persistently low interest rates).**

### 3.3 Different levels of measurement

In the SST market value balance sheet, a legal entity is treated as a whole. On the other hand, the FINMA circular (as well as the SAV guideline) prescribes that the reserves must be adequate at the level of the sub-portfolios (granular distribution of the products within the individual and collective insurance). So, in the SST, expected profits in a sub-portfolio (as the reserves under the Code of Obligations are higher than the reserves valued at close-to-market value) can be offset against the expected losses in another sub-portfolio (as the reserves under the Code of Obligations are lower than the reserves valued at close-to-market value). This is not permitted with respect to the regulations on reviewing the technical reserves, i.e. each sub-portfolio must have adequate reserves in and of itself. If identical requirements were applied for the “valuation interest rate” in both “worlds”, the instrument to review the technical reserves would be far stricter than the SST.

This can be represented as follows:



There is no answer to the question of whether it is better to evaluate the adequacy of reserves at the level of a legal entity or sub-portfolios from an actuarial perspective, as both methods have their advantages and disadvantages. However, in any case, less security has to be included when evaluations are performed at a lower level than at a global level, as this balancing of risks across the different portfolios is a key feature of insurance. For example, at the lowest level of a policy, a reserve is never adequate with a 100% probability, except if the calculations assumed that every customer that has concluded death risk insurance will die in the next five minutes.

**The SST must thus be fulfilled at the level of a legal entity, where profits and losses are offset against each other between sub-portfolios (e.g. assets and pensioners in collective insurance), while the actuarial reserves must be adequate at the sub-portfolio level and profits and losses cannot be offset between the sub-portfolios (for example, the assets cannot subsidise the pensioners in collective insurance).**

### 3.4 SST and adequate actuarial reserves as complementary instruments

The SST and adequate technical reserves complement each other. While the SST focuses on the short-term risks of fluctuations based on a severely fluctuating market value balance sheet, the focus of adequate reserves within a (much more stable) balance sheet under the Code of Obligations is on long-term financial viability and therefore on long-term adverse developments.

For example, if a company increases its equity component in order to achieve a higher yield in the long term (this is at least the expectation), it also accepts the risk of higher short-term fluctuations, which, according to the Swiss Solvency Test, means that it must provide much more capital for its business.

Or if, for example, a company only fulfils the SST due to very high cross-subsidisation and it therefore has a high financial risk if the relevant sub-portfolio whose profits are subsidising another loss-generating sub-portfolio is lost, then a limit is set to this in the balance sheet under the Code of Obligations by ensuring that the actuarial reserves are adequate at the level of the sub-portfolios.

From a market-consistent risk consideration, it can be said that the company is able to meet its liabilities if it can demonstrate cover of over 100% in the SST. From this perspective, it is completely irrelevant how the risk-bearing capital is displayed in the balance sheet under the Code of Obligations, i.e. in equity and/or valuation reserves (whether positive or negative) in assets or liabilities. This means that a company could fulfil the SST even if it does not establish any technical reserves. Here as well, the adequate reserves system complements the SST by setting a bottom limit for the technical reserves and by “clearly” distinguishing between equity and borrowed capital as well as increasing security for the customer, as actuarial reserves must be secured by separate tied assets and these tied assets are primarily used to satisfy customer claims in the event of bankruptcy.

Another complement is provided by the time horizon of the effects: both short-term shocks (especially on the capital markets) as well as long-term developments (persistently low interest rates, increase in life expectancy) may pose a threat to an insurance company. While the first risk occurs immediately and the SST focuses primarily on this risk, the second risk develops much more slowly and over a longer term, so there is much more time to “rectify” these adverse developments with higher reserves. According to AVO Art. 62, the supervisory authority for the insurance company may also issue authorisation to undertake the necessary strengthening systematically over a period of up to ten years, while the terms for a shortfall in the SST are much shorter.

## 4 The minimum requirements test in the SAA guideline

### 4.1 Introduction

The SAA guideline defines a so-called minimum requirements test for technical reserves as follows:

*The test presented in the following includes minimum requirements in the sense that the reserves are not adequate if the conditions are not met. The fulfilment of the requirements is a necessary criterion for the adequacy of the reserves, but it does not have to be sufficient in every case. Tests must be performed according to all criteria in this guideline, regardless of the minimum requirements test, to ensure that the specific characteristics of the portfolios are suitably considered.*

*The minimum requirements test applies for simple products. The requirements are selected so that they clearly and transparently identify possible problem areas and so that the fulfilment of the tests generally leads to adequate reserves.*

This means that the minimum requirements test is a “negative test”, i.e. the reserves are inadequate if the test is not fulfilled. However, it should point to adequate reserves in most cases. The reason for this “negative formulation” is that the test had to be kept relatively simple, while still being able to “fit” most insurance portfolios and most sub-portfolios. However, it is also possible that the fulfilment of the test will not result in adequate reserves in some special portfolios. The actuary should also deal with all risks in the insurance portfolio that they are evaluating in detail and not just mechanically perform a minimum requirements test.

The minimum requirements test also only affects simple products (such as mixed insurances, pension insurances, death risk insurances) and not complex products (such as variable annuities). The reason for this is that, while preparing the guideline, it was noticed that these complex products are much less homogenous than the simple products and that the determination of adequate reserves for these products is also much more complex. These products are only mentioned briefly in this guideline, but the preparation of a separate guideline is planned.

### 4.2 The three scenarios in the minimum requirements test

The minimum requirements test consists of three scenarios that must be passed independently:

1. Yield and longevity scenario
2. Biometrics and costs scenario
3. Customer behaviour scenario

In each scenario, a set of parameters is adversely deflected, i.e. safety loadings (or safety markdowns) are included in the best estimates for these parameters, while the best estimates are used for the remaining parameters. This parameter set is then used to calculate the reserve required for each sub-portfolio. If this required reserve is higher than the sum of the reserves for this sub-portfolio calculated for each individual contract, then these reserves must be increased.

Instead of creating one scenario in which all parameters are simultaneously adversely deflected, the working group decided to prepare separate and independent scenarios and perform relatively severe deflections in each of the individual scenarios. In particular, this also enables a better review for portfolios for which the interest rate risk is not the main risk.

#### 4.2.1 Yield and longevity scenario

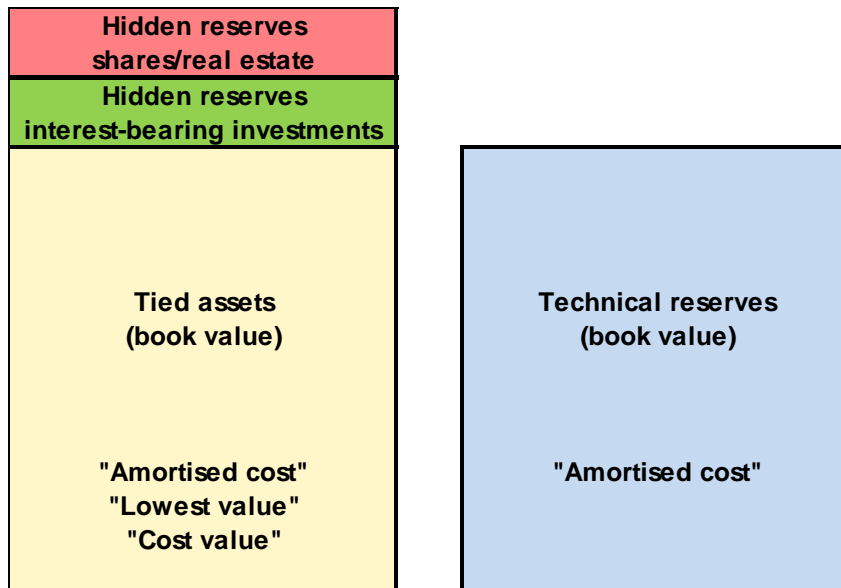
This scenario, which is probably the most important, adversely deflects the yield and longevity parameters. This scenario is based on the assumption that a long-term low-interest-rate scenario is connected with a larger than expected increase in life expectancy.

The **yield expectation** is dealt with as specified below, whereby FINMA circular 2008/43 prescribes the following:

*The assumptions and methods used to establish the reserves must be defined so that the permanent fulfilment of the obligations from the insurance contracts is ensured. The reserves must be at least calculated so that it is possible to cover any arising benefit obligations **with an appropriate investment portfolio in the amount of the reserves** with a sufficient degree of security.*

An appropriate investment portfolio was clearly defined in the SAA guideline as the existing investments of the tied assets, in which the tied assets must at least be managed separately according to the individual and collective insurance business. The book value of the technical reserves is then compared to the book values of investments of the corresponding tied assets in exactly the same amount, whereby the total investments are “scaled” to match the technical reserve amount.





This means that the investment income of these assets with a book value that is identical to the technical reserves must equal the technical interest yield for the technical reserves.

**This rule already includes a safeguard, as the capital income on the free assets, which counterbalance the equity, may not be included in the review.**

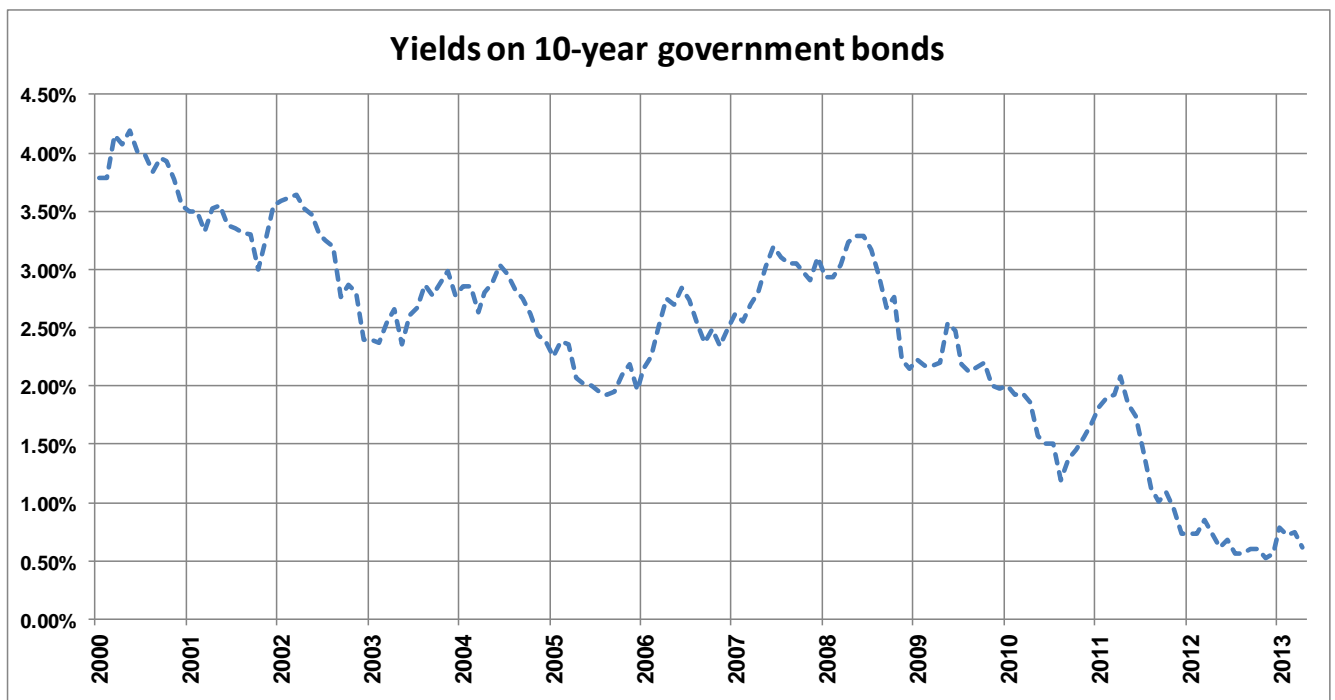
In contrast, in some countries it just has to be shown that the entire capital income can cover the entire technical interest yield.

This portfolio is then liquidated and the free cash flow, which is not required for payment to customers, is reinvested. As a result, based on the valuation of these investments under the Code of Obligations, various asset categories have much more security regarding the income of the existing portfolio than regarding the yield of future reinvestments.

A second buffer was also already included in the model at the start. While the valuation reserves on the interest-bearing investments, which predominantly arise as a result of the amortised cost valuation (amortised cost method) connected with low interest rates, are automatically liquidated over time, this is not the case for shares and real estate. If these are recoverable, they flow into the income statement as realised capital gains in the event of the gradual liquidation of these investments (with the cancellation of the portfolio), thereby increasing the investment income. However, the working group decided that the realisation of these hidden reserves could not be taken into account for the minimum requirements test in order to consider the risk of any drop in the market value of the real estate and shares.

**Not considering realisations of hidden reserves for shares (and investment funds) and real estate is another safeguard.**

A low interest rate scenario then forms the basis for future yield assumptions for each investment category, for which it is assumed that the yields rise by a maximum of 50 basis points compared to the level on the valuation date. For example, this means that, based on the level at the end of 2012, the 10-year swap rate, which was 0.98% on this effective date, will never again rise over 1.48%. If the spread on government bonds remains constant, this would mean that the yields on 10-year government bonds would never again rise over 1.03%. The historic performance shows that this has only been the case in the past 1.5 years.



**The use of a permanently low interest rate scenario, which assumes that interest rates will never again increase by more than 50 basis points, is another considerable safeguard.**

The following safeguards are included in the individual investment categories:

### Shares (incl. investment funds) and alternative investments

The company must first estimate the yields they expect on shares after any hedging costs. Only 75% of this best estimate may then be used for the minimum requirements test (for example, if the company estimates 5.0%, only 3.75% may be used in the minimum requirements test). An additional upper limit of 4% has also been added. This yield assumption relates to the market value of the shares and is then accordingly converted to the book values in order to obtain the book value yields. This is the category with the greatest uncertainty about the future (long-term) income, which is why it also has the largest safety markdown.

### Investment properties

In the minimum requirements test, 90% of the expected payment flow from rents less administration, maintenance and repair costs, etc. divided by the book value of the investment properties is used as the expected yield. The resulting book value yield may not exceed 3.5% of the market values (converted to book values). The definition of these expected payment flows are identical to those received in an investment property valuation using the discounted cash flow method. These cash flows are generally relatively secure, while the 10% discount takes into account that higher than expected vacancy costs may arise or that unexpected renovation work may be required. As the expected cash flows divided by the book values are used strictly for yield assumption and realisation of hidden reserves is not considered, the market value of these investment properties is also completely irrelevant (with the exception of the absolute restriction of 3.5% of the market value), i.e. an overvaluation of the real estate ("real estate bubble") does not change the assumption about future yields.

### Bonds

As mentioned above, the expected book yield for the existing portfolio of bonds is known based on the valuation using the amortised cost method (coupons, appreciation/depreciation and repayments are known). The only risk is that the bond issuer may become insolvent. This is taken into account by adding a discount to the amortised cost yield of the bonds in CHF depending on the rating of the individual bonds.

The same yield vector that is used for the portfolio in CHF is also used for the portfolio of bonds in foreign currencies, i.e. it is assumed that the foreign currency risks are fully hedged or that no additional value is created by the inclusion of currency risks.

Reinvestments are based on the above-mentioned low-interest-rate scenario. The returns on the swap curve were as follows on 31.12.2012:

Investment period in years n	Yield (basis,n)
1	0.26%
2	0.07%
3	0.11%
4	0.22%
5	0.34%
6	0.48%
7	0.61%
8	0.74%
9	0.87%
10	0.98%

Investment period in years n	Yield (basis,n)
11	1.07%
12	1.14%
13	1.21%
14	1.28%
15	1.34%
16	1.39%
17	1.45%
18	1.51%
19	1.56%
20	1.61%

Investment period in years n	Yield (basis,n)
21	1.66%
22	1.71%
23	1.75%
24	1.80%
25	1.84%
26	1.88%
27	1.92%
28	1.95%
29	1.99%
30	2.02%

For example, the expected yield for an investment period of 10 years develops as follows in the future based on this swap curve:

Investment in x years	Best estimate yield (x,10)	Yield (x,10) for yield scenario
1	1.15%	1.15%
2	1.36%	1.36%
3	1.54%	1.48%
4	1.71%	1.48%
5	1.84%	1.48%
6	1.94%	1.48%
7	2.04%	1.48%
8	2.13%	1.48%
9	2.19%	1.48%
10	2.24%	1.48%

If the company has funds to reinvest in 10 years, it could, purely theoretically, already currently secure the reinvestment yield of 2.24% in 10 years by borrowing funds for 10 years (borrowing funds and paying interest of 0.98%) and using this to purchase a 20-year investment with a yield of 1.61% and then, in 10 years, using its money to be reinvested to repay the debt. This "market-consistent" view obviously only works if we do not consider the costs and if the company has a rating good enough to obtain the funds at swap conditions. Otherwise, this "leverage" would result in completely different risks in the balance sheet.

So the yield scenario is not based on this “market-consistent” expected reinvestment yield, rather it is assumed that this can rise to a maximum of 1.48% Furthermore, a further safeguard is included by assuming that the reinvestment yield will never exceed 2.50% (if interest rates on a valuation date should ever be higher than on 31.12.2012).

### Mortgages

The approach for mortgages is the same as for bonds. As variable mortgages are now almost insignificant, the interest payments from the existing portfolio are known and the only risk is that the mortgagors become insolvent and that any debt recovery is not sufficient to offset the debt and the accrued interest. It must be noted that the provisions on mortgage lending for insurers are much stricter than for banks. For example, mortgages can only be considered in tied assets up to a maximum lending limit of 2/3 of the market value. This may be raised to 80% for residential houses (houses with a residential ratio of at least 70%), if amortisations are agreed for the ratio over 2/3 of the market value (this option is not available for commercial buildings). This maximum lending limit of 2/3 or 80% may only (up to a maximum of 100% of the market value) be exceeded if additional contributions are fully covered by pledged insurance policies whose surrender value cannot undergo any negative value fluctuations. Due to these extremely strict provisions, there have been virtually no write-downs on mortgages by insurers in the past, while higher defaults are also not expected assuming persistently low interest rates. Nevertheless, a safety margin of 7% is deducted from the income of the existing portfolio.

The reinvestment process is the same as that for bonds, i.e. the yield pursuant to the swap increases by a maximum of 0.5%, while a surcharge of 80 basis points is added for mortgage yields compared to the swap rate. For example, this means that based on the interest rate curve on 31.12.2012 a five-year fixed mortgage will never again cost more than 1.64%.

### Money market

The same process used for bonds once again applies here, while the absolute upper limit for the reinvestment yield is 1.50% rather than 2.50%.

**This means that a safeguard is included in the yield assumptions of the individual investment categories by discounting the best estimates.**

The yields of these individual investment categories are then cumulated based on their weighting in the investment distribution, any swaptions are included and the expected asset

management costs are deducted. This provides the yield vector for the valuation of the technical reserves in this scenario. This yield vector can then also be converted into a suitable fixed interest rate.

Ultimately, in addition to the adverse deflection of the yield assumptions, this scenario also includes the adverse deflection of the assumption regarding the **mortality of pensioners and the reduced mortality of pensioners** (increased longevity), whereby half of the safety margin included in the biometrics and costs scenario is used in this scenario.

Originally the working group intended to maintain a strict separation between the yield assumptions and the remaining assumptions, i.e. the various parameter groups were not to be mixed together. This would be particularly advantageous in communication. For example, direct statements could be made on the yield required in the future in order to fulfil the liabilities, assuming that everything else continues as expected. However, when combining scenarios, the necessary yield always has to be evaluated under the “proviso” of the safeguards included in the remaining principles. In some cases, a reservation, despite higher yield assumptions or a smaller safety margin in the yield assumptions, in a combined scenario is safer than a reservation with lower yield assumptions, as more safety is included in the remaining parameters. “At first glance” it is almost impossible to determine which of the two versions is safer. On the other hand, there are obviously also scenarios where both yield and biometrics head in the “wrong direction” together and these combined risks are covered more effectively by a combined scenario. In the consultation on this guideline, it was suggested that combined scenarios be used, which is why the working group decided to supplement the yield scenario with the most dangerous development on the biometrics side, i.e. a larger than expected increase in the life expectancy of pensioners. However, the best estimates without safety margins continue to be used for the remaining assumptions for biometrics and costs and customer behaviour. In the opinion of the working group, it makes more sense to “stress” the individual parameter groups in independent scenarios relatively vigorously than to include weaker deflections in a combined scenario. In a combined scenario, particular attention also has to be paid to ensuring that reserves for which a relatively large number of parameters are required do not “explode” if it is assumed that each individual parameter will head in the wrong direction in the future.

As mentioned above, the longevity of pensioners is one of the most important parameters apart from the yield parameter, which is why it is also deflected in this scenario. However, the scenario in which the longevity of pensioners increases by more than expected (i.e. the mortality decreases) makes it relatively unlikely that the second highest biometric risk, namely mortality for endowment insurances (where higher mortality results in a greater loss for the insurer), increases at the same time, which is why this is not deflected in this scenario.

#### 4.2.2 Biometrics and costs scenario

This scenario adversely deflects all biometric parameters and cost parameters as well as the pension exercise option in the collective insurance. The deflection is performed so that there is a 95% probability that the deflection will not be exceeded based on the given coefficients

of variation. This means that this scenario cumulatively covers the simultaneous deterioration of the biometric principles (longer life expectancy, more deaths for the endowment insurances, more newly disabled individuals, less reactivations of disabled persons), higher than expected costs and more individuals drawing pensions rather than capital in the collective insurance. In particular, this also reviews whether the reserves are adequate for risk insurances that are not sensitive to interest rates.

The coefficients of variation were initially transferred from the standard model of the SST and then adjusted based on internal investigations at individual companies and based on a qualitative estimation. In particular, the coefficient for costs was reduced compared to the parameters of the SST standard model, while the coefficients for the probabilities of withdrawal of disabled persons and for exercising the pension option in collective insurance were increased. An increase means that more fluctuations are expected and that a greater safety margin is required.

#### 4.2.3 Customer behaviour scenario

This scenario deflects the cancellation probabilities, while the best estimates are used for the remaining parameters. The security level of 95% is again used, in which the coefficient of variation in the individual insurance is lower compared to the standard SST model and identical in the collective insurance.

In the case of cancellations, it is not initially clear whether more or fewer cancellations are more damaging for the company. In general, for profitable products, it is worse for the company if more persons cancel, while it is worse for the company if unprofitable products (that already have to be strengthened) are not cancelled. As products with entirely different profitability may be included in the individual sub-portfolios and the best estimate for the cancellation probability can differ considerably, two calculations are performed for this scenario, once with 24.75% (individual insurance) and 41.25% (collective insurance) higher cancellations and once with a fall in cancellations by the same respective amounts. The higher of the two results is then used as the scenario result for each sub-portfolio.