**VM-21: Requirements for Principle-Based Reserves for Variable Annuities**

### Section 6: Additional Standard Projection Requirements

A. Overview

1. Application to Determine Reserves

a. The additional standard projection amount shall be determined in aggregate for all contracts falling under the scope of these requirements, excluding those contracts to which the Alternative Methodology is applied, by applying one of the two standard projection methods outlined in Section 6.B.2. The two methods are the Company Specific Market Path (CSMP) method and the Conditional Tail Expectation with Prescribed Assumptions (CTEPA) method.

b. The additional standard projection amount shall be calculated based on the scenario reserve, as discussed in Section 4.B, with certain prescribed assumptions replacing the company prudent estimate assumptions. As is the case in the projection of a scenario in the calculation of the stochastic reserve, the scenario reserves used to calculate the additional standard projection amount are based on an analysis of asset and liability cash flows produced along certain equity and interest rate scenario paths.

2. Inforce Used in the Standard Projection

If the Stochastic reserve is determined by the use of a model office, which is a grouping of contracts into representative cells, the model office shall be replaced with a seriatim in force prior to the projection needed to calculate the additional standard projection amount if the CSMP method described in Section 6.B.2.a. is used. If the company elects to calculate the additional standard projection amount using the CTEPA method described in Section 6.B.2.

b., it may continue to use the same model office grouping of contracts used to determine the stochastic reserve, provided that, on an annual basis, it can be demonstrated that using such a grouped inforce does not materially reduce the additional standard projection amount that would result from using a seriatim inforce.



B. Additional Standard Projection Amount - Application of the Standard Projection Method

1. General

Where not inconsistent with the guidance given here, the process and methods used to determine the Additional Standard Projection Amount under the Standard Projection Method shall be the same as required in the calculation of the stochastic reserve as described in Section 2 of these requirements. Any additional assumptions needed to determine the additional standard projection amount shall be explicitly documented.

2. Standard Projection Method

The company shall determine the Weighted prescribed amount by following either the Company-Specific Market Path (CSMP) Method or the CTE with Prescribed Assumptions (CTEPA) Method below. A company may not change the method used from one valuation to the next without approval of the domiciliary commissioner.

CSMP Method:

i. Calculate the scenario reserve, as defined in VM-01 and discussed further in Section 4.B, for each of the prescribed market paths outlined in Section 6.B.5 using the same method and assumptions as those that the company uses to calculate scenario reserves for purposes of determining the CTE70(adjusted) [[1]](#footnote-2), as outlined in Section 9.C. These scenario reserves shall collectively be referred to as Company Standard Projection Set;

ii. Recalculate all of the scenario reserves in the Company Standard Projection Set using the same method as that outlined in step (a) above, but substituting the assumptions prescribed by Section 6.C. and using the modeled inforce prescribed by Section 6.A.2. These recalculated scenario reserves shall collectively be referred to as Prescribed Standard Projection Set;

iii. Identify the path from the Company Standard Projection Set such that the scenario reserve is closest to the CTE70 (adjusted), designated the Path A. This scenario reserve shall be referred to as Company Amount A;

iv. Identify the following four market paths:

- two paths with the same starting interest rate as the Path A but equity shocks +/- 5% from that of Path A.

- two paths with the same equity fund returns as Path A but the next higher and next lower interest rate shocks

From the four paths, identify the path whose reserve value is:

* If Company Amount A is lower than CTE70 (adjusted), the smallest reserve value that is greater than CTE70 (adjusted);
* If Company Amount A is greater that CTE70 (adjusted), the greatest reserve value that is less than CTE70 (adjusted).

This will be Path B, and the scenario reserve shall be referred to as Company Amount B;

v. Identify the scenario reserve in the Prescribed Standard Projection Set that are derived from t Paths A and B. These scenario reserves in the Prescribed Standard Projection Set shall be referred to as Prescribed Amount A and Prescribed Amount B, respectively;

vi. Calculate the Weighted Prescribed Projection Amount as:

Weighted Prescribed Projection Amount

=Prescribed Amt. A + (CTE70 (adjusted) − Company Amt. A)

×

b. CTEPA Method:

Calculate the Weighted Prescribed Projection Amount as the CTE70 (adjusted) using the same method as that outlined in Section 9.C. (or the stochastic reserves following Section 4.A.4.a. for a company that does not have a CDHS) but substituting the assumptions prescribed by Section 6.C. The calculation of this Weighted Prescribed Projection Amount also requires that the scenario reserve for any given scenario be equal to or in excess of the cash surrender value in aggregate on the valuation date for the group of contracts modeled in the projection,.

Once the Weighted Prescribed Amount is determined by one of the two methodologies above, then the company shall:

c. Reduce the Weighted Prescribed Projection Amount by the Company’s CTE70 (adjusted). The difference shall be referred to as the Unbuffered Additional Standard Projection Amount;

d. Reduce the Unbuffered Additional Standard Projection Amount by an amount equal to the difference between i. and ii., where i. and ii. are calculated in the following manner:

i. Recalculate a CTE70 (adjusted), but without requiring the scenario reserve for any given scenario to be equal to or in excess of the cash surrender value in aggregate on the valuation date for the group of contracts modeled in the projection;

ii. Calculate a CTE65 (adjusted) in the same manner as the modified CTE70 (adjusted) outlined above in 6.B.2.b.1), with the sole exception that the quantity shall be calculated as the numerical average of the 35 percent largest values of the scenario greatest present values.

e. The Additional Standard Projection Amount shall subsequently be the larger of the quantity calculated in step (d) and zero.

3. Modeled Reinsurance

a. Cash flows associated with reinsurance shall be projected in the same manner as that used in the calculation of the scenario reserve as described in Section 3 of these requirements.

4. Modeled Hedges

Cash flows associated with hedging shall be projected in the same manner as that used in the calculation of the CTE70 (adjusted) as discussed in Section 9.C.

5. Market Paths for CSMP Method

If the company elects the CSMP method described in Section 6.B.2.a., the Additional Standard Projection Amount shall be determined from the scenario reserve calculated for the prescribed market paths defined below. Each prescribed market path shall be defined by an initial equity fund stress and an initial interest rate stress, after which both equity fund returns and interest rates steadily recover.

All combinations of prescribed equity fund return scenarios and interest rate scenarios shall be considered prescribed Standard Projection market paths. Accordingly, each company shall calculate scenario greatest present values for a minimum of 40 market paths.

a. Equity Fund Returns. Eight equity fund return market paths shall be used. These scenarios differ only in the prescribed gross return in the first projection year.

The eight prescribed gross returns for equity funds in the first projection year shall be negative 25% to positive 10%, at 5% intervals. These gross returns shall be projected to occur linearly over the full projection year. After the first projection year, all prescribed equity fund return market paths shall assume total gross returns of 3.0% per annum.

If the eight prescribed equity fund market paths are insufficient for a company to calculate the Additional Standard Projection Amount via steps (i) to (vi) outlined in Section 6.B.2.a., then the company shall include additional equity fund market paths that increase or decrease the prescribed gross returns in the first projection year by 5% increments at a time.

b. Interest Rates. Five interest rate market paths shall be used. These market paths differ only in the prescribed U.S. Treasury rates in the first projection year.

The five prescribed interest rate market paths shall be generated using the mean interest rate path embedded within the prescribed interest rate scenario generator, using the prescribed parameters, described in Section 7.B. The mean interest rate path is the single market path generated if all random variables in the prescribed interest rate scenario generator were set to zero across all time periods.

The five prescribed interest rate market paths shall differ in the starting U.S. Treasury rates used to generate the mean interest rate path. Specifically, the following five sets of starting U.S. Treasury rates shall be used:

(i) The actual U.S. Treasury rates as of the valuation date;

(ii) The actual U.S. Treasury rates as of the valuation date, reduced at each point on the term structure by 25% of the difference between the U.S. Treasury rate as of the valuation date and 0.01%;

(iii) The actual U.S. Treasury rates as of the valuation date, reduced at each point on the term structure by 50% of the difference between the U.S. Treasury rate as of the valuation date and 0.01%;

(iv) The actual U.S. Treasury rates as of the valuation date, reduced at each point on the term structure by 75% of the difference between the U.S. Treasury rate as of the valuation date and 0.01%;

(v) The actual U.S. Treasury rates as of the valuation date, increased at each point on the term structure by 25% of the difference between the U.S. Treasury rate as of the valuation date and 0.01%.

If the five prescribed interest rate market paths are insufficient for a company to calculate the Additional Standard Projection Amount via steps (i) to (vi) outlined in Section 6.B.2.a., then the company shall include additional interest rate market paths that increase or decrease the prescribed starting U.S. Treasury rates at each point on the term structure by increments equal to 25% of the difference between the U.S. Treasury rate as of the valuation date and 0.01%. The lowest interest rate to be used in this analysis is 0.01%.

For projecting swap rates along the prescribed interest rate market paths, companies shall assume that the swap-to-Treasury spread term structure in effect as of the valuation date persists throughout each market path. Floor rates at 0.01%

c. Indices and Returns That Are Not Scenario-Specific. The following market indicators and fund returns are constructed in a consistent manner across all prescribed market paths:

|  |  |
| --- | --- |
| Returns & indicators | All projection years |



|  |  |
| --- | --- |
| Bond fund returns | Equal to the 5-year trailing average of the 5-year U.S. Treasury rate, plus an earned spread of 100 bps per annum.  In the first projection year, additionally adjust the projected return by an amount equal to 20% of the prescribed gross equity fund return – with the same directionality, reflected in a linear fashion over the full projection year |
| Money market fund returns | Follow the three-month U.S. Treasury rate projected in the prescribed scenario |
| Balanced fund returns | Reflect the equity and bond allocations as of the valuation date and any expected asset rebalancing in the projection consistent with fund operations |
| General account reinvestment rate | Consistent with the manner in which general account assets – including Starting Assets, reinvestment assets, and Additional Invested Assets as defined in Section 3.B.4 – are reflected via the method outlined in Section 3.D.4, including the requirement in Section 3.D.4.g for fixed income assets |
| Fixed account returns | At the option of the actuary, either (i) follow the company’s documented crediting practices; or (ii) equal to the larger of the contract’s minimum guaranteed crediting rate and the general account earned rate less 200 bps.  For reinsurers that do not have visibility into the direct writer’s general account earned rate, the actuary shall project the direct writer’s general account earned rate as the 5-year trailing average of the 5-year U.S. Treasury rate, plus an earned spread of 100 bps per annum |
| Implied and realized volatility | Follow the forward volatilities implied by the implied volatility term structure in effect as of the valuation date |
| Foreign exchange rates | Follow the exchange rates implied by spot exchange rates as of the valuation date and the relevant interest rate term structures |

The actuary shall document in the Required Memorandum the data sources used to obtain the implied volatility term structure and spot exchange rates in effect as of the valuation date, as well as any extrapolation methods used.

C. Assumptions

1. Assignment of Guaranteed Benefit Type

Assumptions shall be set for each contract in accordance with the contract’s guaranteed benefit type as defined in VM-01.

Certain VAGLB products have features that can be described by multiple types of guaranteed benefits. If the VAGLB can be described by more than one of the definitions in VM-01 – e.g., GMWBs with both lifetime and non-lifetime withdrawal options, for the purpose of determining the Additional Standard Projection Amount, the actuary shall set assumptions for the VAGLB according to the definition that produces the greatest Additional Standard Projection Amount.

For instance, if a VAGLB has both lifetime GMWB and non-lifetime GMWB features, assumptions for all contracts with such a VAGLB shall be set as if the VAGLB were only a lifetime GMWB and did not contain any of the non-lifetime GMWB features if such assumptions produce a higher Additional Standard Projection Amount. If the reverse is true, assumptions for all contracts with such a VAGLB shall be set as if the VAGLB were only a non-lifetime GMWBs and did not contain any of the lifetime GMWB features.

2. Maintenance Expenses

Maintenance expense assumptions shall be determined as the sum of a. plus b. if the company is responsible for the administration, or c. if the company is not responsible for the administration::

a) Each policy for which the company is responsible for administration incurs an annual expense equal to $100 in the first projection year, increased by an assumed annual inflation rate of 2.0% for subsequent projection years;

b.) 7 basis points of the projected Account Value for each year in the projection.

c) Each policy for which the company is not responsible for administration – e.g., if the policy were assumed by the company in a reinsurance transaction in which only the risks associated with a guaranteed benefit rider were transferred – incurs an annual expense equal to $35 in the first projection year and increased in future projection years by an assumed annual inflation rate of 2.0%.

3. Guarantee Actuarial Present Value

The Guarantee Actuarial Present Value (“GAPV”) represents the actuarial present value of the lump sum or income payments associated with a guaranteed benefit rider. For the purpose of calculating the GAPV, such payments shall include the portion that is paid out of the contract holder’s Account Value.

The GAPV shall be calculated in the following manner:

a) If a guaranteed benefit is exercisable immediately, then the GAPV shall be determined assuming immediate or continued exercise of that benefit unless otherwise specified in a subsequent sub-section of 6.B.6.

b) If a guaranteed benefit is not exercisable immediately (e.g., because of minimum age or policy year requirements), then the GAPV shall be determined assuming exercise of the guaranteed benefit at the earliest possible time unless otherwise specified in a subsequent subsection of Section 6.B.6.

c) Determination of the GAPV of a guaranteed benefit that is exercisable or payable at a future projection interval shall take account of any guaranteed growth in the basis for the guarantee (e.g., where the basis grows according to an index or an interest rate), as well as survival to the date of exercise using the mortality table specified in Section 6.B.6.c.viii.

d) Once a GMWB is exercised, the contract holder shall be assumed to withdraw in each subsequent policy year an amount equal to 100% of the GMWB’s guaranteed maximum annual withdrawal amount in that policy year.

e) If Account Value growth is required to determine projected benefits or product features, then the Account Value growth shall be assumed to be 0% net of all fees chargeable to the Account Value.

f) If a market index is required to determine projected benefits or product features, then the required index shall be assumed to remain constant at its value during the projection interval.

g) The GAPV for a GMDB that terminates at a certain age or in a certain policy year shall be calculated as if the GMDB does not terminate.

h) The mortality assumption used shall follow the 2012 IAM Basic Mortality Table, improved to December 31, 2017 using Projection Scale G2 but not applying any additional mortality improvement in the projection.

**Guidance Note:** Projecting mortality to a specific date rather than the valuation date in the above step is a practical expedient to streamline calculations. This date should be considered an experience assumption to be periodically reviewed and updated as LATF reviews and updates the assumptions used in the Standard Projection.

i) The discount rate used shall be the 10-year U.S. Treasury bond rate on the valuation date unless otherwise specified in a subsequent sub-section of Section 6.B.6.

j) For hybrid GMIBs, two types of GAPVs shall be calculated: the Annuitization GAPV and the Withdrawal GAPV. The Annuitization GAPV is determined as if the hybrid GMIB were a traditional GMIB such that the only benefit payments used in the GAPV calculation are from annuitization. The Withdrawal GAPV is determined as if the hybrid GMIB were a lifetime GMWB with the same guaranteed benefit growth features and, at each contract holder age, a guaranteed maximum withdrawal amount equal to the partial withdrawal amount below which partial withdrawals reduce the benefit by the same dollar amount as the partial withdrawal amount and above which partial withdrawals reduce the benefit by the same proportion that the withdrawal reduces the Account Value.

4. Partial Withdrawals

Partial withdrawals required contractually or previously elected (e.g., a contract operating under an automatic withdrawal provision, or that has voluntarily enrolled in an automatic withdrawal program, on the valuation date) are to be deducted from the Account Value in each projection interval consistent with the projection frequency used, as described in Section 6.D.,However, if a GMWB or hybrid GMIB contract’s automatic withdrawals results in partial withdrawal amounts in excess of the GMWB’s guaranteed maximum annual withdrawal amount or the maximum amount above which withdrawals reduce the GMIB basis by the same dollar amount as the withdrawal amount (the “dollar-for-dollar maximum withdrawal amount”), such automatic withdrawals shall be revised such that they equal the GMWB’s guaranteed maximum annual withdrawal amount or the GMIB’s dollar-for-dollar maximum withdrawal amount.

Depending on the guaranteed benefit type, other partial withdrawals shall be projected as follows but shall not exceed the free partial withdrawal amount above which surrender charges are incurred:

a) For contracts that do not have VAGLBs but that have GMDBs that offer guaranteed growth (i.e., benefit growth that does not depend on the performance of the Account Value) in the benefit basis, the partial withdrawal amount each year shall equal 2.0% of the Account Value.

b) For contracts that do not have VAGLBs but that have GMDBs that do not offer guaranteed growth in the benefit basis, the partial withdrawal amount each year shall equal 3.5% of the Account Value.

c) For contracts with (1) traditional GMIBs that do not offer guaranteed growth in the benefit basis or (2) GMABs, the partial withdrawal amount each year shall equal to 2.0% of the Account Value.

d) For contracts with traditional GMIBs that offer guaranteed growth in the benefit basis, the partial withdrawal amount each year shall equal 1.5% of the Account Value.

e) For contracts with GMWBs and Account Values of zero, the partial withdrawal amount shall be the guaranteed maximum annual withdrawal amount.

f) For contracts with Lifetime GMWBs or hybrid GMIBs that, in the policy year immediately preceding that during the valuation date, withdrew a non-zero amount not in excess of the GMWB’s guaranteed annual withdrawal amount or the GMIB’s dollar-for-dollar maximum withdrawal amount, the partial withdrawal amount shall be 90% of the guaranteed annual withdrawal amount or the GMIB’s dollar-for-dollar maximum withdrawal amount each year until the contract Account Value reaches zero.

g) For other contracts with Lifetime GMWBs or hybrid GMIBs, no partial withdrawals shall be projected until the projection interval (the “initial withdrawal period”) determined using the “withdrawal delay cohort method” as described in Section 6.C.5.. During the initial withdrawal period and thereafter, the partial withdrawal amount shall be 90% of the GMWB’s guaranteed annual withdrawal amount or the GMIB’s dollar-for-dollar maximum withdrawal amount each year until the contract Account Value reaches zero.

h) For contracts with Non-lifetime GMWBs that, in the policy year immediately preceding that during the valuation date, withdrew a non-zero amount not in excess of the GMWB’s guaranteed annual withdrawal amount, the partial withdrawal amount shall be 70% of the GMWB’s guaranteed annual withdrawal amount each year until the contract Account Value reaches zero.

i) For other contracts with Non-lifetime GMWBs, no partial withdrawals shall be projected until the projection interval (the “initial withdrawal period”) determined using the “withdrawal delay cohort method” as described in Section 6.C.5.. During the initial withdrawal period and thereafter, the partial withdrawal amount shall be 70% of the guaranteed annual withdrawal amount each year until the contract Account Value reaches zero.

j. There may be benefits not described above. The company shall determine the defined benefit type with the most similar benefits and risk profile as the company’s benefit. The choice of benefit type proxy shall be documented in the VA Report.

k. There may be instances where the company has certain data limitations, e.g., with respect to policies that are not enrolled in an automatic withdrawal program but have exercised a non-excess withdrawal in the policy year immediately preceding the valuation date (Section 6.C.4.f. and h.).  The company may employ a proxy method and provide an explanation of the appropriateness and adequacy of the resulting reserve.

5. Withdrawal Delay Cohort Method

To model the initial withdrawal for certain GMWBs and hybrid GMIBs as discussed in Section 6.C.4.g., the actuary shall adopt a modeling approach whereby a contract is split into several copies (referred to as “cohorts”), each of which is subsequently modeled as a separate contract with a different initial withdrawal period. The contract Account Value, bases for guaranteed benefits, and other applicable characteristics shall be allocated across the cohorts based on different weights that are determined using the method discussed below in this section.

For example, assume that the method discussed below results in the creation of two cohorts: the first, weighted 70%, has an initial withdrawal period of two years after the valuation date, and the second, weighted 30%, has an initial withdrawal period of ten years after the valuation date. The contract shall therefore be split into two copies; the first copy shall have Account Value and guaranteed benefit bases equal to 70% of those of the original contract and the second copy shall have Account Value and guaranteed benefit bases equal to 30% of those of the original contract. The first copy shall be projected to begin withdrawing in two years, while the second shall be projected to begin withdrawing in ten years. The cash flows from both copies shall thereafter be aggregated to yield the final cash flows of the overall contract.

The following steps shall be used to construct the cohorts and determine the weights attributed to each cohort. These steps shall be conducted for each issue age for each GMWB and hybrid GMIB product that the company possesses in the modeled inforce.

a) Calculate the GMWB GAPV or the Withdrawal GAPV (for hybrid GMIBs) for each potential age of initiating withdrawals (“initial withdrawal age”) until the end of the projection period or the contract holder reaches age 120 if sooner. In each of these GAPV calculations:

i) The calculation shall ignore the instructions of Section 6.B.6.c.iv and instead assume that the contract holder takes no partial withdrawals until the initial withdrawal age;

ii) The calculation shall ignore the instructions of Section 6.B.6.c.ix and instead use a discount rate assuming a 10-year U.S. Treasury bond rate of 3.0%;

iii) The GAPV for each initial withdrawal age shall be expressed in present value terms taking into account survival from issue to the initial withdrawal age, as well as time value of money during that period. For instance, if the issue age is 55, then the GAPV for an initial withdrawal age of 60 shall take into account survival of the annuitant or owner to age 60 using the mortality table specified in Section 6.C.3.h. as well as the time value of money from age 55 to age 60.

b) Raise each of the GAPV to the second power and multiply all of the resultant GAPV2 values corresponding to initial withdrawal ages below 60 by 50%.

c) For tax-qualified GMWB policies, scale each of the adjusted GAPV2 values by a single multiplier such that the sum of the scaled GAPV2 values equals 0.95.

d) For non-qualified GMWB policies, scale each of the adjusted GAPV2 values by a single multiplier such that the sum of the scaled GAPV2 values equals 0.80.

e) For tax-qualified hybrid GMIB policies, scale each of the adjusted GAPV2 values by a single multiplier such that the sum of the scaled GAPV2 values equals 0.85.

f) For non-qualified hybrid GMIB policies, scale each of the adjusted GAPV2 values by a single multiplier such that the sum of the scaled GAPV2 values equals 0.60.

g) For contracts that offer guaranteed growth in the benefit basis or one-time bonuses to the benefit basis, add the following to the adjusted and scaled GAPV2 values corresponding to the initial withdrawal age that occurs immediately after the termination of the guaranteed growth or the one-time bonus. If there is more than one such initial withdrawal age, the addition shall be made to the initial withdrawal age with the higher GAPV.

h) Scale the remainder of the adjusted and scaled GAPV2 values at all future initial withdrawal ages such that the sum of the revised GAPV2 values equals 0.95 for tax-qualified GMWB policies, 0.80 for non-qualified GMWB policies, 0.85 for tax-qualified hybrid GMIB policies, and 0.60 for non-qualified hybrid GMIB policies.

i) For tax-qualified policies, add the following to the revised GAPV2 corresponding to an initial withdrawal age of 71.

j) Scale the remainder of the revised GAPV2 values at all future initial withdrawal ages such that the sum of the revised GAPV2 values equals 0.95 for tax-qualified GMWB policies and 0.85 for tax-qualified hybrid GMIB policies again.

k) For ease of calculation, the company may discard certain certain withdrawal ages and use others as representative. For example, for odd-numbered issue ages, discard the initial withdrawal ages that are odd-numbered, and for even-numbered issue ages, discard initial withdrawal ages that are even-numbered. One cohort shall subsequently be constructed for each of the remaining initial withdrawal ages.

l) The weight assigned to each of the cohorts constructed in Section 6.C.5. shall equal the revised GAPV2 value of the corresponding initial withdrawal age less the revised GAPV2 value of the initial withdrawal age in the preceding cohort .

m) Construct a final cohort that is modeled not to take a partial withdrawal in the contract lifetime. This final cohort (“never withdrawal cohort”) shall be assigned a weight of 0.05 for tax-qualified policies and 0.20 for non-qualified policies, .15 for tax-qualified hybrid GMIB policies, and .40 for non-qualified hybrid GMIB policies.

The instructions in Section 6.C.5. are meant to improve computational tractability for companies that have large inforce portfolios; accordingly, companies may also elect not to discard any initial withdrawal ages in constructing the withdrawal cohorts. Additionally, if necessary to avoid unmanageable computational intensity, companies may – with disclosure of decision to do so – discard more initial withdrawal ages in constructing withdrawal cohorts, or assign only a small number of withdrawal cohorts to each contract via random sampling.

The cohorts and their associated weights as determined in Section 6.C.5.a. through Section 6.C.5.k. are for a contract with attained age equal to its issue age. Because the discount rate used in this determination is fixed, these calculations only need to be performed once for a given set of contracts with a certain issue age, guaranteed benefit product, and tax status.

For a contract with a contract holder attained age exceeding its issue age and that must still follow the Withdrawal Delay Cohort Method, cohorts with initial withdrawal ages less than the attained age on the valuation date shall be discarded. The remaining cohorts shall be scaled such that the sum of their re-scaled weights equals 1. For example, for a sample contract with issue age 58 and attained age 64 on the valuation date, the cohorts with initial withdrawal ages less than 64 should be discarded, and the weights of all remaining cohorts shall be re-scaled by dividing by the difference between 1 and the weight of the original cohort with initial withdrawal age of 64.

6. Full Surrenders.

The full surrender rate for all contracts shall be calculated based on the Standard Table for Full Surrenders as detailed below in Table I. The Standard Table for Full Surrender prescribes different full surrender rates depending on the contract’s policy year and the in-the-moneyness (“ITM”) of the contract’s guaranteed benefit.

The ITM of a contract’s guaranteed benefit shall be calculated based on the ratio of the guaranteed benefit’s GAPV to the contract’s account value. Depending on the guaranteed benefit type, the ratio shall be adjusted via the following calculations:

a) For GMDBs, the ITM shall be calculated as 75% of the ratio between the GMDB GAPV and the contract account value.

b) For GMABs, the ITM shall be calculated as 150% of the ratio between the GMAB GAPV and the contract account value.

c) For traditional GMIBs and all GMWBs, the ITM shall be calculated as 100% of the ratio between the GMIB or GMWB GAPV, calculated as described in Section 6.C.3., and the contract account value.

d) For hybrid GMIBs, the ITM shall be calculated as 100% of the ratio between

i) the larger of its Annuitization GAPV and its Withdrawal GAPV, calculated as described in Section 6.C.3. and Section 6.C.5., and

ii) the contract account value.

Table I – Standard Table for Full Surrender

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  | | |
|  |  |  | | |
|  |  |  | | |
|  | ITM | In surrender charge period, or in policy years 1-3 for contracts without surrender charges | First policy year after the surrender charge period | ITMSubsequent policy years, or in policy years 4 and onwards for contracts without surrender charges |
|  | Under 50% | 4.0% | 25.0% | 15.0% |
|  | 50-75% | 3.0% | 18.0% | 10.0% |
|  | 75-100% | 2.5% | 12.0% | 7.0% |
|  | 100-125% | 2.5% | 8.0% | 4.5% |
|  | 125-150% | 2.5% | 6.0% | 3.0% |
|  | 150-175% | 2.5% | 5.0% | 2.5% |
|  | 175-200% | 2.5% | 4.5% | 2.0% |
|  | Over 200% | 2.5% | 4.0% | 2.0% |

For contracts that have both a VAGLB and a GMDB, the full surrender rate projected shall be the lower of the full surrender rate obtained from the Standard Table for Full Surrender using the GMDB’s ITM and that using the VAGLB’s ITM.

For GMAB contracts the full surrender rate of the remaining contract shall be modeled in accordance with that prescribed for any remaining benefits in the contract, except that for a contract with no other living benefits, the projected full surrender rate shall be 50% in the policy year immediately following the maturity of the guaranteed benefit.

At each projection interval, for GMWB or hybrid GMIB contracts that have taken a withdrawal not in excess of the GMWB’s guaranteed maximum annual withdrawal amount or the GMIB’s dollar-for-dollar maximum withdrawal amount as of the valuation date or in a prior projection interval, the full surrender rate obtained from the Standard Table for Full Surrender shall be multiplied by 60%.

For contracts with no minimum guaranteed benefits, ITM is 0% and the row in the table for ITM < 50% would apply.

Notwithstanding all of the instructions above, the full surrender rate for a GMWB contract shall be 0% if the account value is zero.

7. Annuitizations

The annuitization rate for contracts that do not have a GMIB shall be 0% at all projection intervals. For GMIB contracts, the annuitization rate shall be synonymous with the benefit exercise rate. As such, the annuitization rate is 0% in projection intervals during which the GMIB is not exercisable.

The annual annuitization rate for a traditional GMIB contract that is immediately exercisable in the projection interval and that has an account value greater than zero, shall follow the Standard Table for Traditional GMIB Annuitization as detailed below in Table II. The Standard Table for Annuitization prescribes different annuitization rates depending on whether the contract is in the first policy year in which the GMIB is exercisable or in a subsequent policy year.

|  |  |  |
| --- | --- | --- |
| Table II. Standard Table for Traditional GMIB Annuitization | | |
| Annuitization GAPV | First year of exercisability | Subsequent years |
| 0-100% of Account Value | 0.0% | 0.0% |
| 100-125% of Account Value | 5.0% | 2.5% |
| 125-150% of Account Value | 10.0% | 5.0% |
| 150-175% of Account Value | 15.0% | 7.5% |
| 175-200% of Account Value | 20.0% | 10.0% |
| 200%+ of Account Value | 25.0% | 12.5% |

The annual annuitization rate for a hybrid GMIB contract that is immediately exercisable in the projection interval and that has an Account Value greater than zero shall be determined via the following steps:

a) If the GMIB’s Withdrawal GAPV exceeds its Annuitization GAPV, the GMIB’s Annuitization GAPV exceeds the contract’s account value, and the contract is not in the last three years in which the GMIB is exercisable, then the annual annuitization rate shall be 0.25%.

b) If the GMIB’s Annuitization GAPV exceeds or equals its Withdrawal GAPV, and the contract is not in the last three years in which the GMIB is exercisable, then the annual annuitization rate shall follow the Standard Table A for Hybrid GMIB Annuitization as detailed below in Table III.

c) If the contract is in the last three years in which the GMIB is exercisable, then the annual annuitization rate shall follow the Standard Table B for Hybrid GMIB Annuitization as detailed below in Table IV.

d) Otherwise, the annual annuitization rate shall be zero.

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| Table III. Standard Table A for Hybrid GMIB Annuitization | |
| Annuitization GAPV | Annual annuitization rate |
| 0-100% of Account Value | 0.0% |
| 100-125% of Account Value | 0.5% |
| 125-150% of Account Value | 1.0% |
| 150-175% of Account Value | 1.5% |
| 175-200% of Account Value | 2.0% |
| 200%+ of Account Value | 2.5% |

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| Table IV. Standard Table B for Hybrid GMIB Annuitization | |
| Annuitization GAPV | Annual annuitization rate |
| 0-100% of Account Value | 0.0% |
| 100-125% of Account Value | 5.0% |
| 125-150% of Account Value | 10.0% |
| 150-175% of Account Value | 15.0% |
| 175-200% of Account Value | 20.0% |
| 200-225% of Account Value | 25.0% |
| 225-250% of Account Value | 30.0% |
| 250%+ of Account Value | 35.0% |

If during any projection interval, the GAPV of another guarantee on the contract – e.g., a GMDB – exceeds the Annuitization GAPV, the annual annuitization rate in that projection interval shall be further adjusted to equal 50% of the annual annuitization rate determined via the calculations detailed above, but not to exceed 12.5%. For these calculations, the Annuitization GAPV and Withdrawal GAPV shall follow the definition described in Section 6.C.3..

The annuitization rate for all GMIB contracts shall be 100% immediately after the Account Value reaches zero. As discussed in Section 6.C.10., contractual features that terminate the GMIB upon account value depletion shall be voided such that the account value depletion event does not terminate the GMIB.

8. Account transfers and future deposits

No transfers between funds shall be assumed in the projection unless required by the contract (e.g., transfers from a dollar cost averaging fund or contractual rights given to the insurer to implement a contractually specified portfolio insurance management strategy or a contract operating under an automatic re-balancing option). When transfers must be modeled, to the extent not inconsistent with contract language, the allocation of transfers to funds must be in proportion to the contract’s current allocation to funds.

No future deposits to account value shall be assumed unless required by the terms of the contract to prevent contract or guaranteed benefit lapse, in which case they must be modeled. When future deposits must be modeled, to the extent not inconsistent with contract language, the allocation of the deposit to funds must be in proportion to the contract’s current allocation to such funds.

9. Mortality

The mortality rate for a contract holder with age x in year (2012 + n) shall be calculated using the following formula, where qx denotes mortality from the 2012 IAM Basic Mortality Table and G2x denotes mortality improvement from Projection Scale G2:

10. Account Value Depletions

The following assumptions shall be used when a contract’s Account Value reaches zero:

a) If the contract has a GMWB, the contract shall take partial withdrawals that equal in amount each year to the guaranteed maximum annual withdrawal amount.

b) If the contract has a GMIB, the contract shall annuitize immediately. If the GMIB contractually terminates upon account value depletion, such termination provision is assumed to be voided in order to approximate the contract holder’s electing to annuitize immediately before the depletion of the account value.

c) If the contract has any other guaranteed benefits, including a GMDB, the contract shall remain in-force. If the guaranteed benefits contractually terminate upon account value depletion, such termination provisions are assumed to be voided in order to approximate the contract holder’s retaining adequate Account Value to maintain the guaranteed benefits in-force. At the option of the actuary, fees associated with the contract and guaranteed benefits may continue to be charged and modeled as collected even if the account value has reached zero.

11. Other Voluntary Contract Terminations.

For contracts that have other elective provisions that allow a contract holder to terminate the contract voluntarily, the termination rate shall be calculated based on the Standard Table for Full Surrenders as detailed above in Table I with the following adjustments:

a) If the contract holder is not yet eligible to terminate the contract under the elective provisions, the termination rate shall be zero.

b) After the contract holder becomes eligible to terminate the contract under the elective provisions, the termination rate shall be determined using the “Subsequent years” column of Table I.

c) In using Table I, the ITM of a contract’s guaranteed benefit shall be calculated based on the ratio of the guaranteed benefit’s GAPV to the termination value of the contract. The termination value of the contract shall be calculated as the GAPV of the payment stream that the contract holder is entitled to receive upon termination of the contract; if the contract holder has multiple options for the payment stream, the termination value shall be the highest GAPV of these options.

d) For GMWB or hybrid GMIB contracts that have taken a withdrawal not in excess of the GMWB’s guaranteed maximum annual withdrawal amount or the GMIB’s dollar-for-dollar maximum withdrawal amount as of the valuation date or in a prior projection interval, the termination rate obtained from Table I shall be additionally multiplied by 60%.

For calculating the ITM of a hybrid GMIB, the guaranteed benefit’s GAPV shall be the larger of the Annuitization GAPV or the Withdrawal GAPV.

D. Projection frequency

The projection used to determine the greatest present value amount required under Section 6.B.2.b.ii shall be calculated using an annual or more frequent time step, such as quarterly. For time steps more frequent than annual, assets supporting account values at the start of a year may be retained in such funds until year-end (i.e., margin earned during the year will earn the fund rates instead of the DR until year end) or removed after each time step. However, the same approach shall be applied for all years. Similarly, projected benefits, lapses, elections and other contract-holder activity can be assumed to occur annually or at the end of each time step, but the approach shall be consistent for all years.



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1. Throughout this Section 6, references to CTE70 (adjusted) shall also mean the Stochastic Reserve for a company that does not have a CDHS as discussed in Section 4.A.4.a. when appropriate. [↑](#footnote-ref-2)