Internal Credit Risk Modelling Policy

## Chapter X: IRB Model Development and Maintenance Policy for Residential Mortgage Portfolios

\*\*1. Introduction and Scope\*\*

This chapter outlines the Bank's internal policy for the development, maintenance, validation, and use of Internal Ratings-Based (IRB) models specifically for its residential mortgage portfolios within the European Union. Its purpose is to ensure compliance with the regulatory framework governing IRB approaches, foster robust risk management practices, and promote consistency and accuracy in capital requirements calculations.

This policy incorporates the requirements and guidance set forth in:  
\* Regulation (EU) No 575/2013 (Capital Requirements Regulation – CRR), as amended by CRR2 and CRR3.  
\* Directive 2013/36/EU (Capital Requirements Directive – CRD).  
\* Commission Delegated Regulation (EU) No 2022/439 (RTS on IRB Assessment Methodology).  
\* Commission Delegated Regulation (EU) No 529/2014 (RTS on Materiality of Extensions and Changes of the IRB Approach).  
\* ECB Guide to Internal Models (ECB Guide), latest consolidated version (July 2025).  
\* EBA Guidelines on PD estimation, LGD estimation and the treatment of defaulted exposures (EBA GL on PD/LGD, EBA/GL/2017/16).  
\* EBA Guidelines on the application of the definition of default under Article 178 of Regulation (EU) No 575/2013 (EBA GL on DoD, EBA/GL/2016/07).  
\* ECB Regulation (EU) 2018/1845 on the exercise of the discretion under Article 178(2)(d) in relation to the materiality threshold (ECB Regulation on materiality threshold).  
\* Commission Delegated Regulation (EU) 2021/930 (RTS on Nature, Severity and Duration of an Economic Downturn).

\*\*2. Governance and Documentation\*\*

\*\*2.1. Overarching Principles for Internal Models\*\*  
The Bank shall adhere to the "Overarching principles for internal models" as articulated in the ECB Guide (ECB Guide, p. 7). This encompasses the establishment of binding group-wide principles for the entire model lifecycle, comprehensive documentation, and a robust model risk management framework.

\*\*2.2. Model Documentation Standards\*\*  
All IRB models, including those for residential mortgage portfolios, and their associated processes shall be meticulously documented. This documentation must be sufficiently detailed to enable a qualified third party to independently comprehend the methodology, underlying assumptions, inherent limitations, and operational use of the model, as well as to replicate its development and implementation (ECB Guide, para 4). This includes, but is not limited to, technical specifications, data sourcing and processing, instructions for model users, and performance/validation reports.

\*\*2.3. Model Register\*\*  
A central, comprehensive register of all internal models shall be maintained. For each model, this register shall include the model owner(s), defined range of application, materiality classification, supervisory approval date, any applicable restrictions on its use, identified key model weaknesses, a record of main changes applied, and versioning information (ECB Guide, para 6). For credit risk models, this aligns with the requirements of Article 32 of Commission Delegated Regulation (EU) No 2022/439.

\*\*2.4. Model Risk Management Framework\*\*  
The Bank shall implement and maintain an effective model risk management framework designed to identify, understand, and manage model risk across the entire group (ECB Guide, para 12). This framework shall incorporate:  
\* A written model risk management policy defining what constitutes a model, the Bank's interpretation of model risk (as defined in CRD Article 3(1)(11)), and a description of the framework's components (e.g., model governance, risk control function, validation function, internal audit).  
\* Guidelines for the identification and mitigation of measurement uncertainty and model deficiencies, prioritised by materiality.  
\* Methodologies for the qualitative and/or quantitative assessment and measurement of model risk.  
\* Clearly defined roles and responsibilities for all stakeholders involved in the model risk management framework, ensuring appropriate skills, capabilities, and expertise are maintained through training programmes.  
\* A regular complexity assessment for each internal model, with ML-based models generally classified as more complex (ECB Guide, para 13, 33-34).

\*\*2.5. Management Body and Senior Management Responsibilities\*\*  
The roles and responsibilities of the Management Body and Senior Management in relation to internal models shall be clearly defined and documented (ECB Guide, para 14-17). This includes, but is not limited to:  
\* Approval of all material aspects of the rating and estimation processes (CRR Article 189(1)).  
\* Oversight and approval of the IRB approach roll-out plan (ECB Guide, para 8-10).  
\* Ensuring adequate skills, capabilities, and expertise across all relevant stakeholder groups (ECB Guide, para 12(h)).  
\* Receiving regular management reports on model performance and validation outcomes (ECB Guide, para 32-36).

\*\*3. Data Management and Quality\*\*

\*\*3.1. Data Governance\*\*  
The Bank shall implement sound data governance practices for all data inputs to internal models, consistent with Chapter 3.2 of the ECB Guide on effective risk data aggregation and risk reporting (ECB Guide, para 9). This includes robust organisational measures for data management and security throughout the data lifecycle, aligned with the Digital Operational Resilience Act (DORA) and BCBS 239.

\*\*3.2. Data Quality Management Framework\*\*  
A formalised and effective data quality management framework shall be established and implemented, applicable to all IRB-related data used for residential mortgage portfolios, including internal, external, and pooled data (ECB Guide, para 130). This framework shall explicitly define and monitor data quality across the following dimensions (ECB Guide, para 137):  
\* \*\*Completeness:\*\* All required values are present.  
\* \*\*Accuracy:\*\* Data is substantively error-free.  
\* \*\*Consistency:\*\* Data matches across the Bank's different data sources.  
\* \*\*Timeliness:\*\* Data values are up-to-date.  
\* \*\*Uniqueness:\*\* Aggregate data is free from duplication.  
\* \*\*Validity:\*\* Data adheres to an adequate and rigorous classification system.  
\* \*\*Availability/Accessibility:\*\* Data is available to relevant stakeholders.  
\* \*\*Traceability:\*\* Data history, processing, and location can be easily traced.  
The framework shall include consistent criteria and systematic metrics for assessing compliance with these standards, supported by sufficient data quality controls across the entire IRB data chain (ECB Guide, para 139-140).

\*\*3.3. Data Vetting and Representativeness\*\*  
A robust process for vetting all data inputs into the models shall be in place, encompassing an assessment of data accuracy, completeness, and appropriateness (CRR Article 174(b); ECB Guide, para 130).  
\* \*\*General Representativeness:\*\* The Bank shall maintain sound policies, processes, and methods for assessing the representativeness of data used in both model development and calibration (EBA GL on PD/LGD, para 17). This assessment shall consider the model's scope, definition of default, distribution of relevant risk drivers, and lending/recovery policies (EBA GL on PD/LGD, para 21, 28).  
\* \*\*Model Development Data:\*\* Data used for model development must be highly representative of the application portfolio to ensure effective risk differentiation. For residential mortgages, this includes analyzing the distribution of risk drivers such as region, property type, LTV, and obligor-specific characteristics. Material differences in key risk characteristics between the development data sample and the application portfolio shall be avoided (EBA GL on PD/LGD, para 20, 25).  
\* \*\*Calibration Data:\*\* Data used for calibration (e.g., historical default rates, LGDs) must strictly reflect the requirements of CRR Article 178 DoD (EBA GL on PD/LGD, para 30). Where insufficient representativeness is identified in calibration data, this shall trigger the introduction of appropriate adjustments and an increased Margin of Conservatism (MoC), rather than data exclusion (EBA GL on PD/LGD, para 34).

\*\*3.4. IT Systems and Infrastructure\*\*  
The Bank shall deploy and maintain sound and robust IT infrastructures that effectively support its rating systems (ECB Guide, para 116). This includes comprehensive documentation and an updated register of all current and past versions of the model's data flow, relevant data sources, IT systems, databases, and audit trails for critical systems (ECB Guide, para 120).

\*\*3.5. External and Pooled Data\*\*  
When utilizing external or pooled data for residential mortgage portfolios:  
\* The Bank must obtain sufficient information from data providers to assess the representativeness of such data to its own portfolios and processes (EBA GL on PD/LGD, para 19).  
\* A thorough understanding of data sources and processing operations performed by the data provider is required (ECB Guide, para 188).  
\* The data must be representative of the Bank's actual obligors or facilities (CRR Article 174(c); ECB Guide, para 186). Any deviations must be justified quantitatively and/or qualitatively, demonstrating that the benefits outweigh drawbacks and that parameter estimates are not biased (ECB Guide, para 187).  
\* Processes must be in place to identify common obligors across different data sources to avoid bias or double-counting in default rate calculations (ECB Guide, para 185).  
\* The definition of default applied to external or pooled data must be consistent with the Bank's internal DoD, with appropriate adjustments made if broad equivalence is not achieved (CRR Article 178(4); EGIM, para 174; EBA GL on DoD, Chap 6).

\*\*4. Definition of Default (DoD)\*\*

\*\*4.1. Consistency and Scope of Application\*\*  
The Bank's DoD shall be applied consistently across all exposures of an obligor to the institution, its parent undertaking, or any of its subsidiaries, ensuring a holistic view of the obligor's financial health (CRR Article 178(1); ECB Guide, para 148). For residential mortgage portfolios, this implies that a default event on any material credit obligation to the group would trigger default status for the obligor's mortgage exposures.

\*\*4.2. Days Past Due (DPD) Criterion\*\*  
\* \*\*Trigger:\*\* An obligor shall be considered in default if they are more than 90 consecutive days past due on any material credit obligation (CRR Article 178(1)(b)).  
\* \*\*Materiality Thresholds:\*\* A credit obligation past due is material if it (ECB Regulation on materiality threshold; ECB Guide, para 147):  
 \* Exceeds €100 for retail exposures (which includes residential mortgages); and  
 \* Represents more than 1% of the total amount of all on-balance sheet exposures to that obligor for the credit institution, the parent undertaking, or any of its subsidiaries, excluding equity exposures.  
\* \*\*Calculation:\*\* The DPD count shall be precise, driven by the exact number of days material past due amounts are present, and not by proxies such as "months in arrears" (ECB Guide, para 154). Currency conversions for materiality assessment shall be performed daily using quoted exchange rates (ECB Guide, para 157).  
\* \*\*Technical Past Due Situations:\*\* Situations where default recognition results from purely technical issues (e.g., system delays in applying moratoriums, retroactive legal changes) may be treated as technical past due, not defaults, provided specific conditions are met and documented (EBA GL on DoD, para 23; ECB Guide, para 161).

\*\*4.3. Unlikeliness to Pay (UTP) Criterion\*\*  
\* \*\*Trigger:\*\* Default shall be considered to have occurred when the Bank considers that the obligor is unlikely to pay its credit obligations in full, without recourse by the institution to actions such as realising security (CRR Article 178(1)(a)).  
\* \*\*Indications of UTP:\*\* This includes, but is not limited to (CRR Article 178(3); EBA GL on DoD, para 36-40; ECB Guide, para 165-168):  
 \* Distressed restructuring of the obligor's credit obligations. The diminished financial obligation shall be calculated consistently (ECB Guide, para 166).  
 \* Sale of credit obligations due to credit-related deterioration, where the loss incurred is material.  
 \* Bankruptcy or similar insolvency proceedings.  
 \* Disappearance of an active market for a traded instrument due to financial deterioration.  
\* \*\*Additional UTP Triggers:\*\* The Bank shall define and document additional indications of UTP appropriate for residential mortgage portfolios, reflecting specificities such as significant and sustained deterioration in property value, changes in marketability of the underlying collateral, or other relevant factors affecting the obligor's current or future repayment capacity (EBA GL on DoD, para 58-59; ECB Guide, para 169). External information, where available, shall be incorporated into the default identification process (ECB Guide, para 169).

\*\*4.4. Return to Non-Defaulted Status\*\*  
\* \*\*Conditions:\*\* Reclassification to non-defaulted status is permissible only when minimum conditions, including a probation period and material payments by the obligor, are met (EBA GL on DoD, para 71-73; ECB Guide, para 170-171).  
\* \*\*Distressed Restructurings:\*\* For exposures subject to distressed restructurings, there shall be no outstanding past due credit obligations according to the post-restructuring schedule (ECB Guide, para 172(b)).  
\* \*\*Reset of Probation Period:\*\* If a new default trigger becomes applicable while a probation period is running, the probation period shall be reset (ECB Guide, para 173).

\*\*4.5. Adjustments for Changes to the Definition of Default\*\*  
Any change to the DoD requires prior approval from the competent authority (CRR Article 143(3); Commission Delegated Regulation (EU) No 529/2014, Annex I, Part II, Section 1(3); ECB Guide, para 177).  
\* \*\*Model Performance:\*\* The Bank shall demonstrate that the models maintain good risk differentiation capacities with respect to the new DoD. If not, model redevelopment, in addition to recalibration, may be necessary (ECB Guide, para 178).  
\* \*\*Data Representativeness:\*\* The new DoD shall be compared with the definitions underlying historical data in the Reference Data Set (RDS). Appropriate adjustments to granular data or aggregated metrics shall be made to achieve broad equivalence (ECB Guide, para 179).  
\* \*\*Definition of Default-Related MoC:\*\* A specific MoC related to the DoD shall be applied to cover uncertainty caused by data deficiencies or uncertainties in quantifying adjustments due to DoD changes (ECB Guide, para 180).

\*\*5. PD Model Development and Structure\*\*

\*\*5.1. Risk Differentiation\*\*  
\* \*\*Material Risk Drivers:\*\* PD estimates shall be based on material drivers of default risk (CRR Article 179(1)(a)). For residential mortgage portfolios, this includes, but is not limited to (ECB Guide, para 204(c); EBA GL on PD/LGD, para 57):  
 \* \*\*Obligor Characteristics:\*\* Credit history, income stability, employment status, debt-to-income ratio.  
 \* \*\*Transaction Characteristics:\*\* Loan-to-Value (LTV) ratio, loan seasoning, payment history (past delinquency), original and remaining maturity, interest rate type (fixed/variable).  
 \* \*\*Collateral Characteristics:\*\* Type of real estate (residential, specific sub-types), geographical region (NUTS 1, 2, or 3 classification), property valuation method, marketability of collateral.  
 \* \*\*Macroeconomic and Environmental Factors:\*\* Where relevant and material, climate-related and environmental risk drivers shall be considered (ECB Guide, para 29, 202 footnote 136).  
\* \*\*Model Complexity:\*\* The complexity of PD models shall be justified and avoid unnecessary intricacy, considering the trade-off between complexity and performance (ECB Guide, para 60).  
\* \*\*Overfitting Mitigation:\*\* For statistical models, the process of selecting models shall include assessing performance on independent out-of-sample and out-of-time datasets to limit overfitting risk (ECB Guide, para 203).  
\* \*\*Sub-Range Performance:\*\* PD models shall perform adequately in terms of risk differentiation on economically significant and material sub-ranges of application, such as distinct geographical regions, property types, or client segments within the residential mortgage portfolio (ECB Guide, para 204).  
\* \*\*Homogeneity and Heterogeneity:\*\* Grades or pools shall be defined to ensure:  
 \* \*\*Homogeneity within Grades:\*\* Obligors/facilities assigned to the same grade/pool exhibit reasonably similar default risk (EBA GL on PD/LGD, para 69; ECB Guide, para 210).  
 \* \*\*Heterogeneity across Grades:\*\* Meaningful differentiation of default risk across different grades/pools is achieved, avoiding significant overlaps in default rate distributions (ECB Guide, para 211).  
\* \*\*Grade Assignment Dynamics:\*\* The rating assignment process shall adequately anticipate and reflect risk over a longer time horizon (typically 2-3 years) and account for plausible changes in economic conditions, incorporating all relevant information (EBA GL on PD/LGD, para 66-68; ECB Guide, para 213).

\*\*5.2. Treatment of Third-Party Ratings or Scores\*\*  
Where external credit bureau scores or external ratings are used as input variables in the rating process for residential mortgages:  
\* \*\*Integration and Weighting:\*\* The Bank shall ensure that all relevant internal information regarding the obligor's creditworthiness is taken into account with sufficient weighting in the internal rating, preventing the internal rating from merely mirroring external scores (ECB Guide, para 189(d)).  
\* \*\*Understanding and Validation:\*\* The structure, nature, and key drivers of external scores/ratings must be thoroughly understood and regularly verified for appropriateness, particularly in light of any methodological changes by the third party (ECB Guide, para 189(b)).  
\* \*\*Bias and Double-Counting:\*\* The Bank shall implement processes to manage potential correlations between internal and external risk drivers to avoid bias or double-counting effects in risk parameter estimates (ECB Guide, para 189(e)).  
\* \*\*Timely Updates:\*\* Ratings incorporating third-party information shall be automatically updated when the third-party rating changes (ECB Guide, para 216).

\*\*5.3. Use of Machine Learning (ML) Techniques\*\*  
If ML techniques are employed in IRB model development for residential mortgages, the Bank shall adhere to the following principles (ECB Guide, Section 9):  
\* \*\*Governance:\*\* The Bank's governance frameworks and processes shall explicitly address risks stemming from ML-based models, including data governance, internal validation governance, and management of model changes. All three lines of defence shall be aware of ML-related challenges (ECB Guide, para 35).  
\* \*\*Skills and Expertise:\*\* Key stakeholders (development, validation, audit, users, senior management, management body) shall possess sufficient skills and expertise in ML techniques (ECB Guide, para 36).  
\* \*\*Model Changes:\*\* The change policy shall define what constitutes a change for ML-based models, clarifying implications for materiality assessment (ECB Guide, para 38-40). Initial adoption of an ML-based approach is generally a material change (ECB Guide, para 39). Dynamic ML models require robust monitoring processes to prevent automatic implementation of material changes and to recognise model drift (ECB Guide, para 41).  
\* \*\*Internal Validation:\*\* Validation policies shall explicitly account for ML techniques, challenging complexity, assessing stability/robustness (including overfitting), and utilizing out-of-sample and out-of-time data (ECB Guide, para 43(a)). Explainability techniques and tools shall be used to identify model ineffectiveness, performance deterioration, and deviations in risk estimates (ECB Guide, para 43(c)).  
\* \*\*Data Governance and Maintenance:\*\* Standards for assessing adequacy of data types, amounts, and sources for ML models (e.g., synthetic, unstructured data) shall be defined. Input data shall undergo exploratory analysis to understand formats, missing values, and potential biases (ECB Guide, para 50-51).  
\* \*\*IT Infrastructure:\*\* IT infrastructure must support complex data needs and computational demands, providing traceable solutions for model versioning and replication (ECB Guide, para 52-53).  
\* \*\*Mathematical Methodology:\*\* Methodology for ML component structure and parameter estimation must be justified, considering bias from over-/under-fitting, and hyperparameters determined based on generalisation capacity (ECB Guide, para 57). Documentation shall allow replication (ECB Guide, para 59).  
\* \*\*Complexity and Explainability:\*\* The complexity of ML models must be motivated (ECB Guide, para 60). Explainability techniques and tools are required to support the plausibility and intuitiveness of estimates, quantifying risk driver contributions at global and individual prediction levels (ECB Guide, para 62). Explanations must be robust, accurate, and actionable (ECB Guide, para 64).  
\* \*\*Use for Decision-Making:\*\* Internal policies shall explicitly define the scope, purpose, functionalities, and limitations of ML-based models in risk management, credit approval, and internal capital allocation (ECB Guide, para 68). Vigilance is required regarding added risks when adapting Pillar 1 models for other uses (ECB Guide, para 71).  
\* \*\*Human Judgement (Overrides):\*\* Override policies shall consider excessive overrides as indicators of ML model design flaws. Monitoring shall distinguish between input and output overrides, assessing the marginal contribution of human judgment (ECB Guide, para 74-75). Comprehensive documentation of overrides, including data not captured by the model, is essential (ECB Guide, para 76).

\*\*6. PD Risk Quantification\*\*

\*\*6.1. Calculation of One-Year Default Rate and Observed Average Default Rates\*\*  
\* \*\*Denominator and Numerator:\*\* For each one-year observation period, the denominator shall consist of the number of non-defaulted obligors with any credit obligation (on- or off-balance sheet) at the beginning of the period. The numerator shall include all such obligors who experienced at least one default event during that period (EBA GL on PD/LGD, para 73).  
\* \*\*Inclusion of Events:\*\* Obligors who migrated between grades/pools, rating systems, or whose credit obligations were sold, written off, repaid, or otherwise closed during the observation period, must still be included in the one-year default rate calculation. Any resulting bias shall be addressed through appropriate adjustments and MoC (EBA GL on PD/LGD, para 76; ECB Guide, para 230(f)).  
\* \*\*No Double Counting:\*\* Each defaulted obligor shall be counted only once in the numerator and denominator (EBA GL on PD/LGD, para 77; ECB Guide, para 230(b)).  
\* \*\*Observed Average Default Rate:\*\* Shall be calculated for each rating grade/pool, and for the overall model portfolio and any relevant calibration segment (EBA GL on PD/LGD, para 79). For residential mortgage portfolios (retail exposures), the observed average may be a weighted average if justified by better loss predictability from recent data; otherwise, an arithmetic average is used (EBA GL on PD/LGD, para 81; ECB Guide, para 230). The approach (overlapping vs. non-overlapping time windows) shall be justified by documented analysis of potential biases (EBA GL on PD/LGD, para 80; ECB Guide, para 232).

\*\*6.2. Long-Run Average (LRA) Default Rate\*\*  
\* \*\*Historical Observation Period:\*\* The historical observation period for calculating the LRA default rate shall be as broad as possible, covering at least the most recent 5 years, and extended if necessary, to reflect the likely range of variability of default rates. This assessment shall consider (EBA GL on PD/LGD, para 82-83; ECB Guide, para 235-236):  
 \* The variability of observed one-year default rates.  
 \* The existence, lack, or prevalence of one-year default rates relating to "bad years" as reflected by economic indicators relevant to residential mortgage portfolios (e.g., unemployment rates, house price indices, interest rate changes).  
 \* Significant changes in the economic, legal, or business environment.  
\* \*\*Adjustments:\*\* If the historical observation period is not representative, adjustments to the observed average default rate are required to estimate the LRA. Upward adjustments are necessary if bad years are under-represented; downward adjustments are permissible only under specific conditions of over-representation and significant correlation with economic indicators (EBA GL on PD/LGD, para 85; ECB Guide, para 235-236).  
\* \*\*Benchmark Comparison:\*\* The LRA default rate obtained shall be compared with a reference LRA DR (e.g., 2008-2018 period as per ECB Guide, para 237) to guide the assessment of its appropriateness. Any material differences, especially if the LRA is below the benchmark, require compelling justification (ECB Guide, para 237-238).

\*\*6.3. Calibration to the LRA Default Rate\*\*  
\* \*\*Calibration Sample:\*\* The data set used for calibration shall strike an appropriate balance between comparability with the current application portfolio (in terms of obligor and transaction characteristics) and representativeness of the likely range of variability of default rates (EBA GL on PD/LGD, para 88; ECB Guide, para 244).  
\* \*\*Override Consideration:\*\* Calibration shall be performed \*after\* taking into account any overrides applied in the assignment of obligors to grades or pools (EBA GL on PD/LGD, para 89; ECB Guide, para 247).  
\* \*\*Calibration Segments:\*\* The Bank may use calibration segments for residential mortgage portfolios where subsets of exposures exhibit significantly different risk levels (EBA GL on PD/LGD, para 97).  
\* \*\*Level of Calibration:\*\* Calibration may be performed at the grade/pool level or at the calibration segment level. If calibration is performed at one level, additional calibration tests must be provided at the complementary level to ensure robustness (EBA GL on PD/LGD, para 92; ECB Guide, para 240-242).  
\* \*\*Direct PD Estimates:\*\* If direct PD estimates (continuous rating scale) are used, the Bank shall demonstrate that the theoretical assumptions of the underlying probability model are met, ensuring good risk differentiation across the full PD range and sufficient observations (EBA GL on PD/LGD, para 96; ECB Guide, para 250). Mapping to a masterscale must be verified to avoid RWEA distortion (ECB Guide, para 251).

\*\*7. LGD Model Development and Structure\*\*

\*\*7.1. Realised LGD (RLGD)\*\*  
\* \*\*Reference Data Set (RDS):\*\* LGD estimates shall be based on the Bank's own loss and recovery experience, reflected in historical data on defaulted exposures. External data may supplement internal data, but the Bank must ensure its representativeness (EBA GL on PD/LGD, para 102, 107-109; ECB Guide, para 252). For residential mortgages, this includes comprehensive data on property valuations, collateral realization processes, and any specific recovery strategies. The RDS shall contain climate-related and environmental information where relevant and material (ECB Guide, para 252, footnote 164).  
\* \*\*Calculation of Economic Loss:\*\* RLGD is defined as the ratio of economic loss to the outstanding amount of the credit obligation at the moment of default (CRR Article 4(1)(55); EBA GL on PD/LGD, para 131). Economic loss shall be calculated as the outstanding amount at default (including principal, interest, fees, and any forgiven/written-off amounts), increased by material direct and indirect costs, and reduced by recoveries, all discounted to the moment of default (CRR Article 5(2); EBA GL on PD/LGD, para 132, 134; ECB Guide, para 261-262).  
\* \*\*Fees, Interest, and Additional Drawings:\*\*  
 \* Fees and interest capitalised before default are included in the outstanding amount at default (EBA GL on PD/LGD, para 137-138).  
 \* Additional drawings after default shall be included in the economic loss numerator. Their inclusion in the RLGD denominator depends on their treatment in conversion factors for consistency (EBA GL on PD/LGD, para 139-142; ECB Guide, para 261(a)).  
\* \*\*Discounting Rate:\*\* All recoveries, costs, and additional drawings after default shall be discounted using an annual rate composed of a primary interbank offered rate (e.g., 3-month EURIBOR) applicable at the moment of default, increased by an add-on of 5 percentage points (EBA GL on PD/LGD, para 143; ECB Guide, para 261).  
\* \*\*Costs:\*\* All material direct and indirect costs related to the recovery process, incurred before or after default, shall be included in the economic loss calculation (EBA GL on PD/LGD, para 144-146; ECB Guide, para 261).  
\* \*\*Multiple Defaults:\*\* For a single facility, if the time between returning to non-defaulted status and subsequent default is less than nine months, it shall be treated as continuously defaulted from the first default (EBA GL on PD/LGD, para 101; ECB Guide, para 263).  
\* \*\*Massive Disposals (CRR Article 500):\*\* If applicable, adjustments to LGD estimates due to massive disposals of defaulted exposures are permitted under specific conditions and within defined timelines (CRR Article 500; ECB Guide, para 264-277). Such adjustments must be justified, documented, and regularly reviewed. Foreclosed assets are generally not included in Article 500 adjustments (ECB Guide, para 268).

\*\*7.2. LGD Structure\*\*  
\* \*\*Risk Drivers:\*\* LGD estimates shall be based on material drivers of loss risk (CRR Article 179(1)(a)). For residential mortgage portfolios, this includes, but is not limited to (EBA GL on PD/LGD, para 121; ECB Guide, para 281):  
 \* \*\*Transaction-related characteristics:\*\* Type of product, collateral type (e.g., residential property, land), geographical location of collateral, LTV ratio, exposure size, seniority, seasoning, recovery procedures.  
 \* \*\*Obligor-related characteristics:\*\* Income stability, employment status, payment history, credit score.  
 \* \*\*Institution-related factors:\*\* Internal organization of recovery processes, existence of specialized recovery units.  
 \* \*\*External factors:\*\* Interest rates, legal framework (e.g., foreclosure laws), property market conditions, and climate-related and environmental risk drivers where relevant and material (ECB Guide, para 281, footnote 170).  
 \* Risk drivers shall be analyzed at an appropriate reference date, typically within a year before default, to be representative of non-defaulted exposures (EBA GL on PD/LGD, para 122; ECB Guide, para 281).  
\* \*\*Collateral Modelling:\*\*  
 \* \*\*Eligibility:\*\* Any type of collateral may be taken into account if internal requirements for collateral management, legal certainty, and valuation are generally consistent with CRR Chapter 4 (EBA GL on PD/LGD, para 124). Information on main types of collateral shall be considered as risk drivers (EBA GL on PD/LGD, para 126).  
 \* \*\*Inclusion of Effects:\*\* The approach to including collateral effects in LGD estimation shall avoid bias stemming from inappropriate treatment of cash flows or valuation. This includes taking into account potential decreases in collateral value (e.g., due to market conditions) from the point of LGD estimation to eventual recovery, but not potential increases (EBA GL on PD/LGD, para 129(g)).  
 \* \*\*Repossession of Collateral:\*\* Repossession is treated as a recovery, with an appropriate haircut applied to the repossession value to reflect potential sale price, costs, and market liquidity. These haircuts shall be estimated based on historical observations and regularly back-tested (EBA GL on PD/LGD, para 116-117; ECB Guide, para 291).  
\* \*\*Homogeneity and Heterogeneity:\*\* Facility grades or pools shall be defined to ensure sufficient homogeneity of loss characteristics within each grade/pool and meaningful heterogeneity across different grades/pools (EBA GL on PD/LGD, para 130; ECB Guide, para 284).

\*\*8. LGD Risk Quantification\*\*

\*\*8.1. Observed Average LGD\*\*  
\* \*\*Calculation:\*\* The observed average LGD shall be calculated for each facility grade/pool and at the level of the LGD model portfolio, taking into account realised LGDs only from \*closed\* recovery processes, without including any expected future recoveries (EBA GL on PD/LGD, para 154).  
\* \*\*Maximum Recovery Period:\*\* The Bank shall define a maximum period for the recovery process for each type of residential mortgage exposure, reflecting the expected time during which the vast majority of recoveries are realized. This period shall be documented and supported by observed recovery patterns (EBA GL on PD/LGD, para 156; ECB Guide, para 289).  
\* \*\*No Loss or Positive Outcome:\*\* Where the calculation of realised LGD results in a negative number (i.e., a profit), the realised LGD shall be floored at zero for the purpose of calculating the observed average LGD and the LRA LGD (EBA GL on PD/LGD, para 160; ECB Guide, para 293(b)).

\*\*8.2. Long-Run Average (LRA) LGD\*\*  
\* \*\*Calculation:\*\* The LRA LGD shall be calculated as an arithmetic average of realised LGDs over the historical observation period, weighted by the number of defaults, for each facility grade/pool (EBA GL on PD/LGD, para 149-150; ECB Guide, para 293(a)).  
\* \*\*Incomplete Recovery Processes:\*\* Relevant information from incomplete recovery processes shall be taken into account conservatively. Future costs and recoveries may be estimated within the maximum recovery period, based on observed recovery patterns. Any uncertainty related to these estimations shall be reflected in an adequate MoC (EBA GL on PD/LGD, para 153, 158-159; ECB Guide, para 290).  
\* \*\*Adjustments for Non-Representativeness:\*\* Where the data used for LGD quantification is not representative of the application portfolio, appropriate adjustments shall be made. These adjustments shall not lead to a decrease in LGD estimates (EBA GL on PD/LGD, para 164; ECB Guide, para 297).  
\* \*\*Use of External/Pooled Data:\*\* If external or pooled data are used, LRA LGDs derived from these sources shall be calculated separately and compared with those based on internal data to assess representativeness. Material differences require thorough analysis and appropriate MoC (ECB Guide, para 296).

\*\*8.3. Downturn LGD\*\*  
\* \*\*Characterisation of Downturn:\*\* The Bank shall characterise an economic downturn in accordance with Commission Delegated Regulation (EU) No 2021/930 (ECB Guide, para 298(a)).  
\* \*\*Downturn LGD Estimates:\*\* LGD estimates appropriate for an economic downturn shall be derived in accordance with the EBA Guidelines on downturn LGD (ECB Guide, para 298(b)). This typically involves:  
 \* \*\*Observed Impact:\*\* Assessing the impact of identified downturn period(s) on average realised LGDs and other loss components (ECB Guide, para 300-302).  
 \* \*\*Reference Value Comparison:\*\* Calculating a reference value (e.g., average of the two worst years with highest observed economic loss) and comparing it with the final downturn LGD estimates, at least at the calibration segment level. Material differences require scrutiny and potential quantification corrections (ECB Guide, para 304-308).  
\* \*\*Calibration Level:\*\* Downturn LGD shall not be calibrated at a more aggregate level than the LRA LGD (ECB Guide, para 299).

\*\*8.4. Estimation of ELBE and LGD in-default\*\*  
\* \*\*Reference Dates:\*\* For defaulted residential mortgage exposures, ELBE and LGD in-default shall be estimated at discrete, relevant reference dates, which are set based on observed recovery patterns (e.g., specific days after default, or dates associated with key recovery events) (EBA GL on PD/LGD, para 171-172; ECB Guide, para 309).  
\* \*\*Current Economic Circumstances (ELBE):\*\* ELBE must represent the best estimate of expected loss given current economic circumstances and exposure status (CRR Article 181(1)(h)). This can be achieved by incorporating relevant macroeconomic and credit factors as risk drivers or by adjusting the LRA LGD for defaulted exposures. No MoC shall be included in ELBE (EBA GL on PD/LGD, para 182-185; ECB Guide, para 310).  
\* \*\*LGD in-default:\*\* LGD in-default shall reflect at least downturn conditions if they are more conservative than the LRA LGD for defaulted exposures (EBA GL on PD/LGD, para 189; ECB Guide, para 311). It shall be higher than ELBE, accounting for any increased loss rate caused by possible additional unexpected losses during the recovery period (EBA GL on PD/LGD, para 190-191; ECB Guide, para 311).  
\* \*\*Relation to Credit Risk Adjustments:\*\* Accounting provisions may be used as ELBE only if the underlying model meets all CRR and EBA GL requirements for own LGD estimates, or if individually assessed provisions are used as a basis for overriding ELBE estimates after appropriate adjustments for consistency with economic loss definition (EBA GL on PD/LGD, para 186-187).

\*\*9. Conversion Factors (CCF) (if applicable to mortgages with undrawn commitments)\*\*

\*\*9.1. Commitments, Unadvised Limits, and Scope of Application\*\*  
\* \*\*Scope:\*\* The Bank shall use IRB-CCFs for undrawn revolving commitments within its residential mortgage portfolios, provided these are not subject to a 100% SA-CCF under CRR Article 166(8b) (CRR Article 151(7), (9); ECB Guide, para 312).  
\* \*\*Definition of Commitment:\*\* A commitment is any contractual arrangement to extend credit that meets the criteria laid down in CRR Article 5(10)-(11) (ECB Guide, para 313(b)).  
\* \*\*Unadvised Limits:\*\* Any credit limit above the advised limit, allowing additional drawings, may be disregarded if its availability is subject to further credit assessment including re-rating (ECB Guide, para 313(a)).

\*\*9.2. Realised CCFs\*\*  
\* \*\*Calculation:\*\* Realised CCF shall be calculated at the single facility level for each default as the ratio of the difference between the drawn amount at default and at the reference date, to the committed but undrawn amount at the reference date (CRR Article 4(1)(56), 182(1)(a); ECB Guide, para 317(a)).  
\* \*\*Consistency:\*\* The definition of exposure for CCF estimation must be identical to that used for LGD estimation, particularly concerning post-default drawings (ECB Guide, para 317(b)).

\*\*9.3. CCF Structure and Risk Quantification\*\*  
\* \*\*Risk Drivers:\*\* IRB-CCF models shall reflect transaction characteristics (e.g., product profile transformations) and the Bank's current policies and strategies regarding account and limit monitoring (CRR Article 170, 182(1a); ECB Guide, para 319).  
\* \*\*Downturn CCF:\*\* IRB-CCF estimates shall be appropriate for an economic downturn, characterised in accordance with Commission Delegated Regulation (EU) No 2021/930, by identifying periods with elevated levels of realised CCFs (ECB Guide, para 323).  
\* \*\*Region of Instability:\*\* The IRB-CCF model shall be robust against or adequately adjusted for potential effects of facilities being close to fully drawn at the reference date (CRR Article 182(1c); ECB Guide, para 324(a)).  
\* \*\*Judgmental CCFs:\*\* For immaterial exposures with scarce data, judgmental IRB-CCF values may be used, provided they are objectively conservative (e.g., a minimum value of 100% as a final estimate), justified, and regularly monitored (ECB Guide, para 324(b)).

\*\*10. Appropriate Adjustment (AA) and Margin of Conservatism (MoC)\*\*

\*\*10.1. Identification and Classification of Deficiencies\*\*  
The Bank shall identify all deficiencies related to the estimation of risk parameters that may lead to a bias in quantification or increased uncertainty not fully captured by the general estimation error. Each deficiency shall be classified into one of the following categories (EBA GL on PD/LGD, para 36-37):  
\* \*\*Category A: Identified Data and Methodological Deficiencies:\*\* E.g., missing or inaccurate default triggers, outdated rating assignments, missing/inaccurate data on risk drivers, limited representativeness of external data.  
\* \*\*Category B: Relevant Changes and Additional Uncertainty:\*\* E.g., changes to underwriting standards, risk appetite, collection/recovery policies, market/legal environment (e.g., changes in residential property market dynamics, foreclosure laws), or forward-looking expectations not yet reflected in observed data.  
\* \*\*Category C: General Estimation Error:\*\* Reflects the dispersion of the statistical estimator.

\*\*10.2. Methodology for Appropriate Adjustment (AA)\*\*  
Adequate methodologies shall be applied to correct identified biases to the extent possible, aiming to achieve the most accurate "best estimate" of the risk parameter. The impact of these methodologies (AA) can be either an increase or a decrease in the parameter value. All AA methods shall be documented, justified, and regularly monitored for adequacy (EBA GL on PD/LGD, para 38-40).

\*\*10.3. Quantification of Margin of Conservatism (MoC)\*\*  
\* \*\*Components and Aggregation:\*\* The final MoC to be added to the best estimate of the risk parameter shall be the sum of MoCs from Categories A, B, and C (EBA GL on PD/LGD, para 45). Different aggregation techniques may be used within each category (EBA GL on PD/LGD, para 44).  
\* \*\*Category A and B MoC:\*\* Quantified at least at the calibration segment level. This MoC shall account for any increased uncertainty or additional estimation error associated with appropriate adjustments, or for deficiencies not corrected by AAs (EBA GL on PD/LGD, para 43(a)).  
\* \*\*Category C MoC (General Estimation Error):\*\* Quantified at least for every calibration segment, reflecting the dispersion of the statistical estimator (EBA GL on PD/LGD, para 43(b)). For PD, this MoC shall account for statistical uncertainty/sampling error affecting the LRA estimate at grade/pool level, primarily driven by the number of observations per grade and the length of the time series (ECB Guide, para 327(a)). For LGD and CCF, it shall reflect statistical uncertainty/sampling error affecting the final estimates, driven by observations used for long-run/downturn estimates and time series length (ECB Guide, para 327(b)).  
\* \*\*Proportionality and Positivity:\*\* MoC from Category C shall be greater than zero. MoCs from Categories A and B shall be greater than or equal to zero and proportionate to the increased uncertainty caused by identified deficiencies (EBA GL on PD/LGD, para 47).  
\* \*\*Monotonicity:\*\* The Bank shall ensure monotonicity in its final risk parameter estimates while still reflecting the uncertainty at the grade or pool level (ECB Guide, para 325).

\*\*10.4. Monitoring and Remediation\*\*  
MoC levels shall be regularly monitored. The Bank shall develop and implement a plan to rectify underlying deficiencies, correct models, and reduce estimation errors within a reasonable timeframe, considering the materiality of the error and the rating system (EBA GL on PD/LGD, para 50-51).

\*\*11. Model Performance Assessment and Review\*\*

\*\*11.1. Internal Validation\*\*  
\* \*\*Independence:\*\* The internal validation function shall be effectively separated from the model development process (design, development, implementation, and monitoring) (ECB Guide, para 19-23; EBA GL on PD/LGD, para 71). For large and complex institutions, robust independence (e.g., separate units reporting to different senior management members) is expected (ECB Guide, para 20).  
\* \*\*Scope and Frequency:\*\* All internal models and estimates shall be subject to an initial validation (for new models or material changes) and subsequent annual internal validation (ECB Guide, para 18; EBA GL on PD/LGD, para 218). For material rating systems, a "full validation" shall be performed at least once every three years (ECB Guide, para 52(g)).  
\* \*\*Content of Validation:\*\* The validation process shall encompass qualitative and quantitative methods, including (ECB Guide, para 50-52; EBA GL on PD/LGD, para 218):  
 \* Back-testing of risk estimates against realised outcomes.  
 \* Analysis of discriminatory power.  
 \* Analysis of representativeness of data.  
 \* Analysis of overrides.  
 \* Stability analyses of internal ratings and risk parameters over time.  
 \* Analyses of model specifications and model design stability.  
 \* Evaluation of input data quality.  
 \* Benchmarking analyses against external data sources.  
 \* Data cleansing analyses.  
 \* Quality assurance of computer codes.  
 \* Additional qualitative assessments of assumptions, expert-based estimates, and impact of legal/macroeconomic changes.  
\* \*\*Reporting and Follow-up:\*\* Validation conclusions, findings, and recommendations, particularly regarding exceeded thresholds and identified deficiencies, shall be reported to Senior Management and the Management Body (ECB Guide, para 56). A formal process for deciding on and tracking remediation measures, with defined responsibilities and timelines, shall be in place (ECB Guide, para 57-59).

\*\*11.2. Internal Audit\*\*  
\* \*\*Independence:\*\* The internal audit function shall be independent of the processes and units reviewed, reporting directly to the Management Body (ECB Guide, para 26).  
\* \*\*Scope and Frequency:\*\* Internal models shall be subject to regular review by internal audit, at least annually (CRR Article 191; ECB Guide, para 61). This involves an annual general risk assessment to inform the audit work plan, with thorough audit assignments ("deep dives") for high-risk areas and at least every three years for other areas (ECB Guide, para 62-63).  
\* \*\*Content of Review:\*\* The review shall assess aspects such as model development, performance, use, materiality classification, data quality, integrity of the rating assignment process, and calculation of own funds requirements (ECB Guide, para 64).

\*\*11.3. Ongoing Monitoring by Credit Risk Control Unit (CRCU)\*\*  
The CRCU is responsible for ensuring the satisfactory performance of rating systems and their ongoing maintenance (ECB Guide, para 43). This includes:  
\* Performing ongoing monitoring of risk estimates and model performance (ECB Guide, para 44).  
\* Providing necessary input to the validation function.  
\* Addressing deficiencies identified by the validation function and conducting approved remediation activities.

\*\*11.4. Review of Estimates\*\*  
Estimates shall be reviewed whenever new information comes to light, and at least on an annual basis (CRR Article 179(1)(c); EBA GL on PD/LGD, para 218; ECB Guide, para 328). This framework shall include:  
\* Analysis of data representativeness (development and application portfolios).  
\* Analysis of model performance and stability over time, including discriminatory power.  
\* Analysis of the predictive power of the model, including the impact of recent data on LRA default rates and LGDs.  
\* Back-testing analysis, comparing estimates against observed outcomes for each grade/pool.  
\* Assessment of the impact of human judgment on risk differentiation capability (ECB Guide, para 333; EBA GL on PD/LGD, para 218(b)).  
\* For material statistical models, analysis of whether the inclusion of the most recent data would lead to materially different model outcomes, performed at least every three years (ECB Guide, para 331).

\*\*11.5. IT Implementation Testing\*\*  
A consistent process for testing relevant IRB systems and applications shall be in place upon first implementation and on an ongoing basis. This includes unit/component/module tests, integration tests, system tests, user acceptance testing (UAT), and regression testing. The unit responsible for testing shall be clearly identified, and results documented (ECB Guide, para 123-126). For new models or material changes, evidence of successful implementation in a live or non-live production environment is required before supervisory approval (ECB Guide, para 121-122).

\*\*12. Model Use (Use Test)\*\*

\*\*12.1. Integration into Decision-Making\*\*  
Internal ratings and default and loss estimates derived from residential mortgage models shall play an essential role in the Bank's risk management and decision-making processes, as well as in credit approval, internal capital allocation, and corporate governance functions (CRR Article 144(1)(b); ECB Guide, para 74, 76-78).  
\* \*\*Credit Approval:\*\* Internal ratings shall be incorporated into the overall credit granting, restructuring, and renewal process for residential mortgages, with related policies calibrated on rating classes or risk parameters (ECB Guide, para 74(a)(i)). Staff involved must possess sufficient knowledge of the rating systems (ECB Guide, para 74(a)(ii)).  
\* \*\*Risk Management:\*\* Internal ratings and estimates shall be used in the monitoring process for obligors and exposures, promptly providing information on credit risk development (ECB Guide, para 74(b)).  
\* \*\*Internal Capital Assessment and Allocation:\*\* Internal ratings and estimates shall play an important role in the assessment, calculation, and allocation of internal capital (CRR Article 144(1)(b); ECB Guide, para 76).  
\* \*\*Corporate Governance:\*\* Internal ratings and estimates shall be used in management reporting and portfolio credit risk monitoring procedures (CRR Article 144(1)(b); ECB Guide, para 77-78).

\*\*12.2. Human Judgement and Overrides\*\*  
\* \*\*Override Policy:\*\* The Bank shall maintain clear, documented policies and criteria for situations where human judgment may override model inputs or outputs in the rating assignment process (CRR Article 172(3); EBA GL on PD/LGD, para 203; ECB Guide, para 80, 90). Overrides shall be limited to information relevant to the obligor's creditworthiness that is not well-captured by the model (ECB Guide, para 80).  
\* \*\*Documentation:\*\* Each override instance shall be comprehensively documented, including all quantitative and qualitative information, reasons for the override, interim ratings, date of override, and personnel involved (CRR Article 172(3); EBA GL on PD/LGD, para 204; ECB Guide, para 91). For ML-based models, specific details of data not captured by the model should be included (ECB Guide, para 76).  
\* \*\*Monitoring and Impact Assessment:\*\* Overrides shall be regularly monitored and assessed for their impact on the rating model's performance and discriminatory power (CRR Article 172(3); EBA GL on PD/LGD, para 205-207; ECB Guide, para 92). Excessive numbers or inappropriate justifications for overrides shall be considered strong indicators of model weaknesses requiring remediation (ECB Guide, para 93). Personnel performing overrides shall have in-depth understanding of risk factors and utilize explainability techniques (ECB Guide, para 77).

\*\*12.3. Non-Rated and Outdated Exposures\*\*  
The Bank shall have internal policies and procedures to identify, monitor, and prudentially manage non-rated exposures and outdated ratings (e.g., ratings not updated within the 12-month period following the last rating date) (ECB Guide, para 84). This includes applying conservative measures, such as time-dependent downgrading for outdated ratings and application of the worst-performing rating grade for unrated exposures (EGIM, para 86).

\*\*12.4. IRB Shortfall or Excess Calculation\*\*  
Risk parameters are used for calculating the IRB shortfall or excess (CRR Article 159; EBA GL on PD/LGD, para 211). This calculation shall be performed at an aggregate level, separately for defaulted and non-defaulted portfolios. Rules for offsetting IRB excess against shortfall and for including IRB excess in Tier 2 capital shall be followed (EBA GL on PD/LGD, para 212-213). Partial write-offs shall not be included in the calculation of general and specific credit risk adjustments for this purpose (EBA GL on PD/LGD, para 214).

\*\*13. Model Changes and Extensions\*\*

\*\*13.1. Change Policy\*\*  
The Bank shall establish a comprehensive "change policy" for the IRB approach, outlining detailed criteria, definitions, methods, metrics, and significance levels for the materiality assessment, classification, impact assessment, notification, and documentation of all changes and extensions to residential mortgage models (Commission Delegated Regulation (EU) No 529/2014; ECB Guide, para 97-98). This policy shall ensure consistency and prevent arbitrage in classification (ECB Guide, para 100).

\*\*13.2. Materiality Assessment and Classification\*\*  
Changes and extensions shall be assessed and classified as material, ex ante non-material, or ex post non-material based on both quantitative (e.g., impact on RWEA) and qualitative criteria (ECB Guide, para 103-106). The assessment process shall involve a four-eye principle to confirm classification (ECB Guide, para 102).

\*\*13.3. Notification and Approval\*\*  
Material changes or extensions require prior supervisory approval from the competent authority (CRR Article 143(3); ECB Guide, para 96). Non-material changes require ex ante or ex post notification. The Bank shall use standardised templates provided by the ECB for notifications and applications (ECB Guide, para 99).

\*\*13.4. User Acceptance Test (UAT)\*\*  
For material changes or extensions, the Bank shall assess and document their impact on the use of parameters and ensure that related internal policies and procedures remain relevant (ECB Guide, para 108). For models with qualitative inputs, a representative sample shall be fully re-rated under the amended system, and user feedback analyzed (ECB Guide, para 109).

\*\*13.5. Re-rating Process\*\*  
Where supervisory permission is granted for a material extension or change, the Bank shall calculate its own funds requirements based on the approved change from the specified implementation date (Commission Delegated Regulation (EU) No 529/2014, Article 3(5); ECB Guide, para 111).  
\* \*\*Immediate Re-rating:\*\* For changes allowing it (e.g., behavioural scoring), re-rating shall be immediate (ECB Guide, para 113).  
\* \*\*Staggered Re-rating (Non-retail):\*\* If immediate re-rating is not possible for non-retail (e.g., due to manual input), the re-rating process must be completed within 12 months. If a material RWEA increase is expected, the simulated impact shall be applied from the first Common Reporting date after implementation (ECB Guide, para 114).

\*\*14. Third-Party Involvement (Outsourcing)\*\*

\*\*14.1. Definition and Scope\*\*  
Outsourcing refers to the involvement of third parties in any internal model-related tasks, including data provisioning, model development, validation, or audit activities (ECB Guide, para 80). This applies equally to internal outsourcing within the banking group.

\*\*14.2. Contractual Requirements\*\*  
All outsourcing arrangements shall be governed by formal and comprehensive contracts or documented agreements (e.g., Service Level Agreements for internal outsourcing). These agreements must ensure (ECB Guide, para 81):  
\* No impediment to the Bank's validation activities.  
\* Full and timely access for competent authorities to all required information.  
\* Support from the third party in response to information requests from competent authorities.  
\* Provision of relevant information to the Bank to maintain sufficient in-house knowledge (e.g., training).

\*\*14.3. In-House Knowledge and Oversight\*\*  
The Bank retains ultimate responsibility for outsourced tasks and functions and shall maintain adequate in-house knowledge and core competence (ECB Guide, para 83, 87). This includes:  
\* Full access to all relevant information regarding internal model-related topics.  
\* Receipt of regular and specific reports from the third party.  
\* The third party providing support and attending interviews with competent authorities upon request (ECB Guide, para 88).  
\* For model (re-)development or parameter (re-)calibration by third parties, the Bank must understand main model assumptions, risk estimation processes, have access to data for independent validation, and possess a specific change policy for third-party models (ECB Guide, para 89). For IRB models, this includes access to obligor information, assessment of representativeness of pooled data, and knowledge of the DoD applied to such data (ECB Guide, para 90).

\*\*14.4. Independent Monitoring of Third-Party Performance\*\*  
The Bank shall independently monitor the performance of third parties involved in internal model-related tasks, applying the same standards as for in-house activities (ECB Guide, para 91, 93). This includes automated data quality checks, analysis of historical data differences, assessment of data representativeness, and cross-checks between databases (ECB Guide, para 92).

\*\*14.5. Use of External Credit Risk Parameters/Ratings\*\*  
When external credit risk parameters are used as a component of the Bank's rating systems for residential mortgages:  
\* Internal ratings and estimates must also incorporate internal information and be adjusted for the Bank's specificities (ECB Guide, para 94(a)).  
\* The Bank must demonstrate good knowledge of the third party's work in producing estimates, including data cleansing, assumptions, methodologies, and limitations (ECB Guide, para 94(b)).  
\* Performance monitoring and clear triggers for model review are required (ECB Guide, para 94(b)).