# Margin Calculation Methodology

| Document Title | EMIR* Article | RTS** Article | Document Class |
|---|---|---|---|
| Margin Calculation Methodology | 41 | Chapter VI | Policy *approved by General Management; regularly reviewed by the Risk Committee* |

*EMIR =Regulation (EU) 648/2012; ** RTS = del. Regulation (EU) 153/2013

# Document Information

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|---|---|
| **Document Owner** | **Chief Risk Officer** |
| **Document Reviewer** | **General Management** |
| **Document Approver** | **General Management** |

**Document Review Cycle**

yearly

**Change Log**[1]

| Version | Effective Date | Change Description |
|---|---|---|
| **V3.0** | 06.06.2014 | derivatives market has been removed;<br>update of current parameters used for margin calculation (min price history, default value): anti-procyclicality margin buffer;<br>new bulk risk factors for bonds, certificates and warrants;<br>description of bulk factor determination for these product categories (look-back period, holding period and reached confidence levels);<br>outlook regarding margining for product categories for bonds, certificates and warrants |
| **V3.1** | 14.07.2014 | Update of risk factor for product category bond, Section 2.2.3 |
| **V3.2** | 01.12.2014 | Reduction of holding period from T+4 to T+3 due to introduction of settlement period T+2 |
| **V3.3** | 09.06.2015 | Inclusion of corporate bonds traded in Continuous Trading |
| **V3.4** | 18.08.2015 | Application of common bulk rate for all bonds incl. corporate bonds traded in Continuous Trading |
| **V3.5** | 21.12.2016 | Integration of 2016 bulk factor review, reduction of holding periods for Bonds and Certificates (now t+5 and t+3); |
| **V3.6** | 27.11.2018 | Annual review |
| **V3.7** | 06.12.2019 | Annual review<br>Minor editorial changes<br>Changes related to ESMA's Guidelines on Anti-Procyclicality Margin Measures for Central Counterparties in Chapter 2.1.5 |

[1] The change log is only kept for finally valid versions; CCP.A internal coordination in the creation or change process are not contained.

| | | |
|---|---|---|
| **V3.8** | 29.06.2020 | Minor changes related to daily schedule in new clearing system in Chapter 3.1 |
| **V3.9** | 21.10.2021 | New layout, minor editorial changes |
| **V4.0** | 13.10.2022 | Annual review, no changes |

# Contents

# 1. Introduction

According to EMIR Art. 41 CCP.A calculates initial margins to cover its credit exposure arising from market movements, mainly contributing to market risk and more general counterparty credit risk of the clearing of CCP.A towards its Members.

This document describes the methodology, process, parameters of the margin calculation for all cleared instruments ("CCP.A-eligible instruments") traded on Vienna Stock Exchange markets.

For all cash market instruments (equities, bonds, structured products) CCP.A applies the same “risk based margining” algorithm, but with different parameters.

Chapter 2 of this document describes the margin methodology as well as the determination of the main model parameters: the Risk Factor and the Credit Risk Factor.

The Risk Factor is determined by using the following parameters according to the Commission Delegated Regulation (EU) 153/2013

- Confidence Interval (Reg. (EU) 153/2013, Art. 24)
- Time Horizon for the Calculation of Historical Volatility (Reg. (EU) 153/2013, Art. 25)
- Time Horizon for the Liquidation Period (Reg. (EU) 153/2013, Art. 26)

Furthermore, CCP.A’s margin model uses an additional Credit Risk Factor, which is based on the creditworthiness of the Clearing Members.

The document also explains how CCP.A approaches Portfolio Margining (Reg. (EU) 153/2013, Art. 27) and how CCP.A limits procyclicality effects (Reg. (EU) 153/2013, Art. 28).

Chapter 3 describes the process timing, frequency and monitoring of the margin calculation as well as the procedures for margin calls.

Chapter 4 summarizes all model parameters, which are subject to review by the risk committee on a regular basis.

The collateral management of CCP.A (eligible collateral, determination of haircuts, collateral limits, etc.) is described in the "*Collateral Policy*".

# 2. Margin Methodology

## 2.1. Risk Based Margining

CCP.A calculates the margin requirement of a Clearing Member on margin account level for net positions held therein, distinguishing each instrument. Netting is done on ISIN level for all open (i.e. not yet settled) positions.

This chapter describes:

- how the initial margin is calculated for a net position in a single instrument
- how this methodology is used to calculate the margin on margin account level
- CCP.A's approach towards portfolio margining and correlations between instruments
- methods used to avoid procyclicality

### 2.1.1. Definition of "Potential Loss"

In case of a default, CCP.A has to close the non-segregated positions of the defaulting Clearing Member, e.g. sell or buy the respective financial instruments.

In case that the defaulting Member has a short position, CCP.A has the obligation to deliver (versus payment) securities to the buyer concurrently receiving the original settlement amount from the buyer. If the defaulting Member fails to deliver the securities to CCP.A, CCP.A must buy them on the market. In case that the price is higher than the original price, CCP.A will suffer a loss (market risk).

In case that the defaulting Clearing Member holds a long position, CCP.A has the obligation to pay the original settlement amount to the seller concurrently receiving the respective securities. If the ultimate buyer fails to pay the settlement amount to CCP.A, CCP.A must draw on its liquidity pool to compensate the seller for the purchase. CCP.A will then subsequently sell the securities received on the market to cover the liquidation loss. If the price of that sale is lower than the original price, CCP.A will suffer a loss.

Accordingly, the ultimate objective of initial margin calculation is to estimate the potential loss, which is due to such a forced liquidation of positions, leaving the central counterparty potentially in deficit.

Definition: Potential Loss: = position parity (+/-) * (initial value of position - liquidation costs),

where the position parity is (+1) for a long position (from Member's view, e.g. the Member was buying) and (-1) in case of a short position.

### 2.1.2. Risk Based Margin Components

To estimate the potential liquidation costs, CCP.A utilizes standard risk-based margining.

The general margin calculation approach consists of the following steps. The first step is the determination of the Initial Value ("IV") of the position:

IV = Q * Pt

where "Q" equals the quantity of the position (negative for short position, positive for long position) and "Pt" is the original price on trading day.

Current Liquidation Value ("CLV") of the position is determined by using mark-to-market valuation:

CLV = Q*P

where "Q" equals the quantity of the position (negative for short position, positive for long position) and "P" the last available market price.

The next step is to calculate the Additional Margin ("AM"), which covers the risk of adverse price movements until the time of liquidation. The calculation is based on the historical volatility of an instrument (estimated extend of future price movements) and the actual market price. With these parameters, the anticipated worst-case price of the instrument can be deduced.

For cash market instruments, the value is linear depending on its market price; therefore, in case of a Member's short position, a price up movement will reflect the worst case (from CCP.A's view). In case of a Member's long position, a price down movement will reflect the worst case for CCP.A.

Therefore, the additional margin is calculated as followed:

AM = Q*P*RF

in case of short positions, assuming an upside price movement and

AM = Q*P*(-RF) for long positions, assuming a downside price movement.

"RF" equals the Risk Factor or Margin Parameter determined using historic volatility. The Risk Factor calculation algorithm is described in detail later on.

The Liquidation Costs ("LC") are determined by adding the Additional Margin to the Current Liquidation Value of the position:

LC = CLV + AM

The Risk Based Margin ("RBM") for a position in a single instrument "i" is then calculated as

RBMi = max[(IVi-LCi);0]

### 2.1.3. Initial Margin per Member Margin Account

To compute the margin per margin account, CCP.A calculates the Risk Based Margin amount for each netted position on an instrument level. The sum of these values is the risk-based margin per margin account.

This amount is multiplied by an individual Credit Risk Factor "CF" per Member, which reflects the different risk categories of a Member. The risk category is set by CCP.A based on yearly member credit assessment and/or on publicly available information on the Clearing Member and leads to a risk premium ranging between +10% and +30%. The second component, which the Credit Risk Factor "CF" is composed of, is the anti-procyclicality margin buffer of 25%.

The Initial Margin "IM" per Clearing Member's margin account is computed according to the formula

$$IM_{account} = CF * \sum_{i} (RBM_i)$$

for all instruments "$i$" which are held in the given margin account.

Thus, the initial margin calculation formula above involves the two most important parameters in margining: the Risk Factor "$RF$" (used for calculating the additional margin of individual instruments) and the overall Credit Risk Factor "*CF*" (composed of the individual risk premium per Member (10%-30%) as well as the general margin buffer on market level (25%)).

### 2.1.4. Portfolio Margin and Correlations between Instruments

The margin is calculated on a member margin account level. CCP.A does not consider correlations between instruments. The margin requirement on an instrument level is always equal or greater than zero.

There is no positive offset for margin requirements in case of a profitable position (e.g. a position where the current liquidation would lead to a profit for CCP.A).

### 2.1.5. Procyclicality Rules

In their margin calculation policies, CCP's are required to take measures to prevent margin procyclicality – the risk that when volatility rises dramatically, margins rise exponentially in response and this may have an adverse effect on the liquidity of the clearing members.

To limit procyclicality effects, Reg. (EU) 153/2013, Art. 28 suggests the following methods:

a) Applying a margin buffer of at least 25% to the calculated margin

b) Assigning at least 25% weight to stressed observations in the look-back period

c) Ensuring the margin requirement is not lower than those using a volatility estimated over a 10-year look back period

CCP.A has implemented method a). The margin buffer amounts to 25% and is applied on the total calculated margin requirement per margin account. In periods, when calculated margin requirements are rising significantly, this margin buffer can be temporarily exhausted.

CCP.A assesses possible procyclical effects of its margin requirements on a regular basis. For this purpose, the market volatility, and changes of the Risk Factors of the cleared instruments are analysed. Furthermore, significant short-term as well as on long-term changes of the overall margin requirements of the clearing members are detected and evaluated. When determining the potential procyclical effects, CCP.A also takes the size of its cleared market and the overall capitalisation of its clearing members into consideration.

In case that the margin requirements have increased significantly due to high volatility and have reached the predefined thresholds, CCP.A's General Management will consider exhausting the margin buffer. The exhaustion as well as the subsequent replenishment of the margin buffer shall be discussed with as well as approved by the Risk Committee.

## 2.2. Model Parameters and Input Data

### 2.2.1. Risk Factor Algorithm for Equities

The actual calculation of the Risk Factors is done within the "Automatic Procedure for Margin Parameter" ("PAMP"), which was developed by the Italian CCP (CC&G). This section provides information on the functions and methodologies used. The parameters used by CCP.A can be found in section 4.

PAMP calculates the historic volatility taking into account historic price variations (real distribution) and, in addition, the statistic variation following the assumption of normally distributed price variations. Both methods can be applied by using several sets of parameters (look back period, confidence interval and holding period). Each method and parameter set delivers a respective Risk Factor.

CCP.A can define a range (a cap and a floor) for the final Risk Factor. This can be applied to groups of instruments or on a single instrument (ISIN) level.

**Step 1:**
Based on a price history, PAMP calculates the price variation for a given holding period "$h$" compared to the price at "*t*". The price variations "*PV*" are defined as followed:

$$PV := \frac{Price_t}{Price_{t-h}} - 1$$

**Step 2:**
Real distribution approach of price variations: Based on the chosen time series to be analysed (typ. 1 year or 600 days) and the confidence level (99%) to be covered through the calculation, the Risk Management sets the number of expected price variations in and out of the confidence interval. Depending on the settings, PAMP analyses the price variations starting with the last available price (current CCP.A setting) or a different date.

**Step 3:**
After calculating the series of price variations, they are sorted by their absolute values. From this ordered set the Minimum Margin Value "*MinMar*" (the highest observed variation inside the confidence interval) and the Maximum Margin Value "*MaxMar*" (the smallest observed variation outside the confidence interval) is being derived.

**Step 4:**
Standard distribution approach: In addition to the above analysis, a normal distribution of the price variations is assumed with positive and negative price variations. The standard deviation of the observed distribution "*σ*" is used to derive the 99 % value of the 'normally distributed' price variations, by multiplying the measured standard deviation "*σ*" of the observed distribution with the factor 2,57583 (i.e. the 99% quantile of the standard deviation). The parameter derived from this analysis is defined as Normal Margin Value "*NorMar*".

**Step 5:**
The Risk Factor "*RF*" of a given instrument "*i*" is then as follows.

$$RF_i = \max(MaxMar; NorMar)$$

All parameters are rounded as specified in the PAMP parameter Rounding Precision "*RP*".

**Step 6:**
The Risk Factor analysis is performed simultaneously for an instrument on more than one set of parameters (e.g. for different look back periods), still delivering one "*RF*" for the instrument analysed. The respective resulting Risk Factor is then defined as the maximum of the individual Risk Factors per parameter set.

**Step 7:**
Finally, the predefined cap and floor values for the Risk Factors are applied to the calculated "*RF*". If the parameter falls in the allowed floor/cap interval for Risk Factors, then the Risk Factor, derived through the procedure of Steps 1-6, will be fixed. Otherwise, the respective floor or cap settings overwrite the calculated "*RF*" accordingly.

### 2.2.2. Example

CCP.A is currently using the following parameters for equities:

| | parameter set 1 | parameter set 2 |
|---|---|---|
| Look back period | 1 year | 600 days |
| Holding period | 3 days | 3 days |
| Confidence interval | 99% | 99% |
| Risk Factor Floor (RF_Floor) | 5% | 5% |
| Risk Factor Cap (RF_CAP) | 99% | 99% |
| Risk Factor Default (when price history <100 days) | 25% | 25% |

Remark: EMIR requires a holding period of at least 2 days and a confidence interval of at least 99%.

For a given look back period of 600 days[2] and a required confidence interval of 99%, there are 594 events of distribution within the confidence interval and 6 outside of the confidence interval.

The table below shows the sorted price variations "*PV*" (absolute values). Position 6 (the 1st outside the confidence interval) represents the Maximum Margin Value, position 7 (the last inside the interval) the Minimum Margin Value.

| ABS(PV) | sorted position |
|---|---|
| 16,00% | 1 |
| 15,40% | 2 |
| 12,18% | 3 |
| 11,95% | 4 |
| 11,45% | 5 |
| **11,02%** | **6** |
| **10,44%** | **7** |
| 9,04% | 8 |
| 8,92% | 9 |
| … | …. |

Having defined the Rounding Precision set to 2 decimals,

*MaxMar* = 11,02; *MinMar* = 10,44

Assume the standard deviation of all variations for 600 days is 0.02798, so the

*NorMar* = 2,5758 * 0,02798 = 7,71%

For comparison, a parallel analysis of the PV series based on a holding period of 253 days delivers the following set of parameters:

[2] *In case of a look back period of 253 days, the events out would be 3, thus position 3 would deliver the "MaxMar" and position 4 the "MinMar".*

*MaxMar* = 12,18; *MinMar* = 11,95; *NorMar* = 6,01

Thus (comp. Step 7), the final Risk Factor will be:

$$RF = \max(RF^{600}; RF^{253}) = 12{,}18\%$$

with $RF^{600} = \max(11{,}02\%;\ 10{,}44\%;\ 7{,}71\%)$ and $RF^{253} = \max(12{,}18\%;\ 11{,}95\%;\ 6{,}01\%)$ )

### 2.2.3. Risk Factor Algorithm for Bonds, Certificates and Warrants

Approximately 98% of the turnover cleared by CCP.A is executed in equities and equity-like instruments. In general, due to their liquidity, equities are attributed with high quality (continuous) time series data. For margin calculation of these most important cash products, CCP.A applies the risk factor calculation based on volatility distributions of the single instrument as described in 2.2.1.

Beside equities, CCP.A clears the product categories bonds, warrants, and certificates, which are marked by a high number of instruments (>9.000) but on a very low volume. Due to the poor-quality price data, a dynamic risk factor computation based on price variations of the single instrument will not deliver reliable results; therefore, CCP.A applies a specific bulk risk factor - bulk risk factor per category. For the analysis purpose, price volatility data of all instruments in a given category has been consolidated.

Look-back period

The currently used bulk risk factors have been derived from historical (t+3) analyses of price data during a look-back period, which includes the most extreme market conditions observed during the last 30 years. On the Austrian market, this was the case in autumn/winter 2008, the period after the Lehman collapse.

Holding period

CCP.A clears all products *within t+2*. Therefore, margining the products with 99% confidence level for a holding period *t+2* would be the minimum as required by EMIR Art. 41. To be on the safe side, CCP.A uses a holding period of ***t+3*** for risk factor determination of *equities* and equity like instruments.

CCP.A has also conservatively chosen to base the risk factor determination of certificates and warrants on the **t+3** volatility distributions and for bonds on the ***t+5*** volatility distributions (that means one / three more days for possible close-out).

Currently used Bulk Risk Factors

CCP.A compiled volatility data per product category: 0.7 m bond price variations, 4.6m certificate price variations and 2.5m warrant price variations[3] from the beginning of 2008 and derived 99% confidence levels for each of the *t+1*, *t+2*, *t+3* (equities, certificates & warrants) respectively *t+2*, *t+3*, *t+4* and *t+5*[4] (bond) distributions.

In addition, CCP.A has analysed the distribution of corporate bonds with maturities above 5 years separately, as long-term corporate bonds are more likely to show higher volatility as the average government bonds[5].

[3] *For bonds only, real trading prices were used, for warrants and certificates also Price without Turnover (PwT) prices were used.*

[4] *T+5 holding period was used only for bonds, because of the very low number of prices.*

[5] *However, the analysis of the long-term time series (2008-2015) did not show any significant difference in the volatility distributions.*

The historic analyses performed for all the product categories showed that the following Bulk Risk Factors, currently used by CCP.A, are conservative and well above the long-time 99% confidence levels:

| category | bulk risk factor | holding period | confidence level |
|---|---|---|---|
| Bonds | 9.5% | t+5 | 99,46% |
| Certificates | 35% | t+3 | 99,238% |
| Warrants | 99,99% | t+3 | 99,005% |

**Outlook**

Such analyses are performed on a regular basis[6]. Furthermore, all risk factors per ISIN are subject to regular back testing and, if needed, the bulk risk factors will be adjusted accordingly.

### 2.2.4. Price Feed

For the Risk Factor calculation, PAMP requires a daily price feed to build up a price history. CCP.A imports the daily closing price for each instrument, which is provided by the Vienna Stock Exchange. In case that no actual closing price is available on a given clearing day, the last available price, which has already been imported in PAMP, is used to build the daily price history.

If the historic price series is shorter than the predefined Minimum Length Price Series (CCP.A's setting is 100 days), the calculation is skipped and the Default Risk Factor of 25% (CCP.A setting) is applied.

### 2.2.5. Credit Risk Factor

According to the result of the credit rating, each participant is designated to a rating category. The CCP.A management defines a rating surplus for each risk category.

Additional surpluses to cover additional risks can be added or multiplied to the rating surplus in order to achieve a single Credit Risk Factor per Member.

### 2.2.6. Parameters currently used by CCP.A in PAMP

Equities:

| | parameter set 1 | parameter set 2 |
|---|---|---|
| Look back period | 1 year | 600 days |
| Holding period | 3 days | 3 days |
| Confidence interval | 99% | 99% |
| Risk Factor Floor (RF_Floor) | 5% | 5% |
| Risk Factor Cap (RF_CAP) | 99.99% | 99.99% |
| Min length price series | 100 days | 100 days |
| Default RF (in case of less prices) | 25% | 25% |

[6] *Last review for bonds, warrants and certificates in Jan 2016, back tests on single instrument level are executed monthly*

**Bonds:**

| | parameter set 1 | parameter set 2 |
|---|---|---|
| Look back period | 1 year | 600 days |
| Holding period | 3 days | 3 days |
| Confidence interval | 99% | 99% |
| Risk Factor Floor (RF_Floor) | 9.5% | 9.5% |
| Risk Factor Cap (RF_CAP) | 9.5% | 9.5% |
| Min length price series | n.a. | n.a. |
| Default RF (in case of less prices) | 9.5% | 9.5% |

**Certificates:**

| | parameter set 1 | parameter set 2 |
|---|---|---|
| Look back period | 1 year | 600 days |
| Holding period | 3 days | 3 days |
| Confidence interval | 99% | 99% |
| Risk Factor Floor (RF_Floor) | 35% | 35% |
| Risk Factor Cap (RF_CAP) | 35% | 35% |
| Min length price series | n.a. | n.a. |
| Default RF (in case of less prices) | 35% | 35% |

**Warrants:**

| | parameter set 1 | parameter set 2 |
|---|---|---|
| Look back period | 1 year | 600 days |
| Holding period | 3 days | 3 days |
| Confidence interval | 99% | 99% |
| Risk Factor Floor (RF_Floor) | 99.99% | 99.99% |
| Risk Factor Cap (RF_CAP) | 99.99% | 99.99% |
| Min length price series | n.a. | n.a. |
| Default RF (in case of less prices) | 99.99% | 99.99% |

**The Credit Risk Factor per rating category:**

| rating category | rating surplus | operation | additional surplus | Credit Risk Factor |
|---|---|---|---|---|
| **1 to 5** | 10% | + | 25% | **35%** |
| **6 to 7** | 20% | + | 25% | **45%** |
| **8** | 30% | + | 25% | **55%** |

Example: for a Clearing Member in rating category 6 the Credit Risk Factor is accordingly *CF* = 1.45 (i.e. 1 + 20% + 25%), for a Member in rating category 3, *CF* = 1.35.

## 2.2.7. Confidence levels

The analysis shows that CCP.A's margin methodology is highly effective. The methodology represents a fundamentally conservative approach by applying effective risk factors for the margining process, all having sound confidence levels of well above 99,35% for the margining process.

Calculation of confidence levels for the product categories bonds, warrants and certificates as of January 2016:

| | | 2008 | | **Vola applied** | CL (effect) | **Procyclicality Shield** | | **Credit Rating applied** | |
|---|---|---|---|---|---|---|---|---|---|
| | | 99% **(T+3)** | CL (T+2) | | T+2 | 1,25 applied | CL (eff.) | CL (eff.) | |
| | | | | | | | | **10%** | 30% |
| Equities | RV | 21,67 | 99,163% | *indiv.* | *99,163%* | *indiv. * 1,25* | 99,434% | **99,543%** | 99,760% |
| **Bonds (T+5)*** | RV | 6,80 | 99,137% | 8,0% | 99,224% | 10,0% | 99,371% | **99,429%** | 99,546% |
| *C.Bonds (T+5)** | *RV* | *6,15* | *99,078%* | *8,0%* | *99,160%* | *10,0%* | *99,250%* | *99,286%* | *99,358%* |
| Certificates | RV | 31,86 | 99,154% | 35,0% | 99,238% | 43,8% | 99,471% | **99,564%** | 99,750% |
| Warrants | RV | 122,67 | 99,231% | 100,0% | 99,005% | 125,0% | 99,254% | **99,354%** | 99,552% |

*) because of the relatively small dataset (~ 680k prices) CCP.A chooses as reference a longer close out period (t+5 instead of t+3)

# 3. Margin Calculation Process

## 3.1. Timing and Frequency

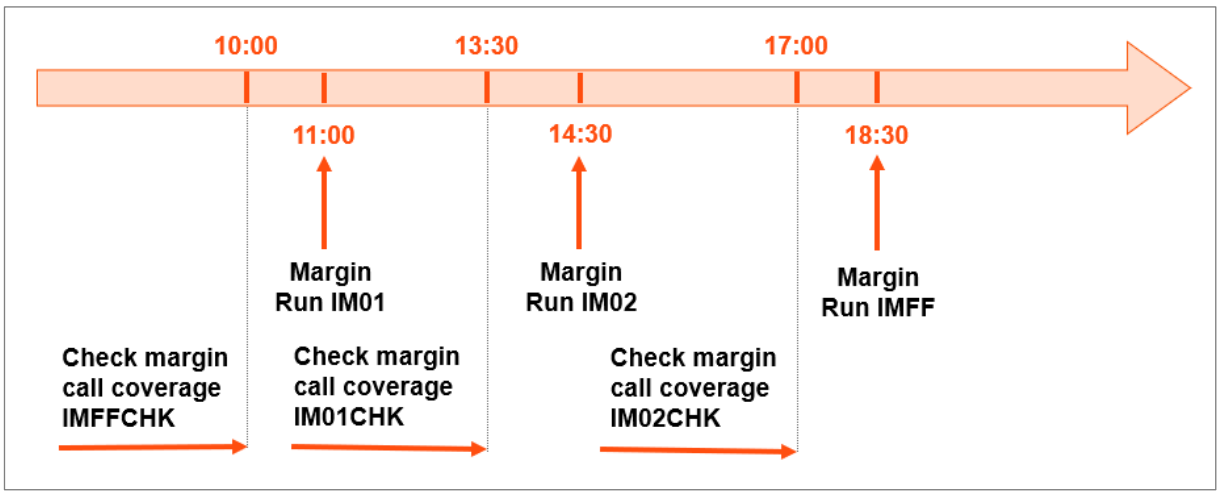
The “Risk Factors” are calculated and updated on a daily basis. The margin calculation is done several times during the day upon each change in open positions (after new trades have been loaded or positions, which have reached the settlement date, have been settled). The Margin Calls are generated after each margin run.

Currently CCP.A performs two margin runs during the day (IM01 and IM02) and the final margin run (IMFF) at the end of the day. At each margin run, the current position is calculated taking into account all trades, which are not settled by that time. This includes trades from previous days, pending positions as well as new trades from the current trade date.

Immediately after each margin run, the Clearing Members can view their updated margin and collateral values in the GUI and receive the SWIFT margin reports (ISO messages). The below time data are benchmarks when Members will receive the details of performed IM-runs. CCP.A reserves the right to perform further IM-runs if necessary.

- 11:00 – 1st Intraday Margin run (IM01)
  - excluding all balances settled so far and
  - including all new trades concluded up to that time
- 14:30 – 2nd Intraday Margin run (IM02)
  - excluding all balances settled so far and
  - including all new trades concluded up to that time
- 18:30 – Final Margin Run (IMFF) including all trades of the trading day

Daily schedule:



## 3.2. Margin Call Procedures

After each margin run, the margin requirement is compared with the pledged collateral (valued according to the collateral policy). The reconciliation ends in one of the following results:

- Margin Call
- Margin Deficit
- Margin Surplus

### 3.2.1. Margin Call

A margin call is created, if

margin requirement - pledged collateral > threshold.

During the final margin run at the end of the day, the threshold is zero, and a margin call is created, whenever the collateral is not sufficient to cover the margin requirement. During Intraday Margin Runs, the threshold is the tolerance limit for intraday margin debit. The parameter is set as an absolute value or as a percentage share of the margin requirement.

The current tolerance limits of CCP.A are EUR 50.000,00 (this is the minimum default fund contribution by each participant) or 10 % of the margin requirement.

In case of a margin request and margin calls, the Member has to deposit additional collateral to fully cover the margin requirement. Intraday Margin Calls have to be fulfilled in the timeline specified in the call by CCP.A.

### 3.2.2. Margin Deficit

A margin deficit is created after an intraday margin run, if

margin requirement - pledged collateral ≤ threshold.

As there is no threshold during the EOD margin run, there are no margin deficits at the end of the day. In case of a margin deficit, the participant receives a warning, but an increase of collateral is not required.

### 3.2.3. Margin Surplus

A margin surplus is created after each margin run, if

margin requirement ≤ pledged collateral

Up to the amount of the surplus, the collateral can be released upon request after the 2nd Intraday Margin Run. A collateral surplus higher than 1.000.000€ can be released upon request after the first Intraday Margin Run. CCP.A does not automatically release collateral surpluses.

## 3.3. Monitoring

The daily processing of each Margin Run is closely monitored by CCP.A via the Clearing System Frontend. In case of any errors during the process, error notifications are automatically generated and sent to the operations team.

CCP.A periodically (at least monthly) generates risk reports to monitor the development of the margin requirements. These reports enable CCP.A to identify unusual changes on margin levels (e.g. margin requirements drop or rise significantly during a period) or changes in distribution of margin requirements on member level.

The average margin requirements as well as the number of collateral transactions are monitored by CCP.A during the calculation of collateral management fee according to CCP.A's Price List.

CCP.A prepares monthly "Risk Reports" for CCP.A's management, which includes figures about the distribution of margin requirements amongst Members, the collateral composition and other information.

CCP.A publishes figures on the calculated margin and the collateral portfolio on its website in the CPMI-IOSCO public disclosure area: https://www.ccpa.at/en/cpmi-iosco/

# 4. Model Parameters

| Process | Parameter | effective Value | last update | last review |
|---|---|---|---|---|
| Risk factor on ISIN level | Confidence interval | 99% | 01.02.2005 | 30.09.2019 |
| | Holding period | 3 days | 01.12.2014 | 30.09.2019 |
| | Time horizon for look back period | 600 Days, 1 Year | 01.02.2005 | 30.09.2019 |
| | Risk factor cap | 99.99% | 15.04.2013 | 30.09.2019 |
| | Risk factor floor | 5% | 01.02.2005 | 30.09.2019 |
| | Minimum price length for risk factor calculation | 100 days | 16.05.2014 | 30.09.2019 |
| | Default risk factor in case of less prices | 25% | 16.05.2014 | 30.09.2019 |
| Anti-procyclicality on market level | Margin buffer | 25% | 13.05.2014 | 30.09.2019 |
| Credit risk factor | Rating surplus per risk category | 10 - 30 % | 2008 | 30.09.2019 |
| | Operation to generate credit risk factor cash market | + | 15.04.2013 | 30.09.2019 |
| Intraday margin call threshold | Fixed threshold: amount in € | 50.000 € | | 30.09.2019 |
| | Dynamic threshold: % of margin requirement | 10% | | 30.09.2019 |