

5.5 Treatment of expired FX derivatives

Initial margin is calculated for FX options and futures series for the short period between their expiry and settlement. If a FX derivative series is expired but not yet settled, it is still relevant for the initial margin calculation as the settlement risk persists. In that case, the flag “Series Status” in the “Theoretical_Prices_and_Instrument_Configuration file” is set to “E”. Whether a FX derivative is shown in member reports after expiry depends on whether it was exercised by the client. If it was not exercised (for example because it expired out-of-the-money), it is neither reported nor does it enter the margin computation after expiry. If it was exercised, it is shown either as “A” (assigned, short position) or “E” (exercised, long position) in the position-specific reports and does enter the margin computation for two more days after expiry. This handling is specific for FX derivatives, but it is the same handling as in Eurex Risk Based Margining.

6 Margin Replication

To facilitate transparency, Eurex Clearing enables its members to verify and reproduce the calculation of initial margins. Therefore, Eurex Clearing provides detailed information in form of several structured files – hence called transparency enabler files – to its clearing members.

The initial margins for each liquidation group can be replicated by the clearing members themselves outside Eurex Clearing’s systems as Eurex Clearing provides all necessary input parameters as well as the methodological documentation necessary for the calculation of the margin amounts. Figure 7 schematically illustrates the margin replication.

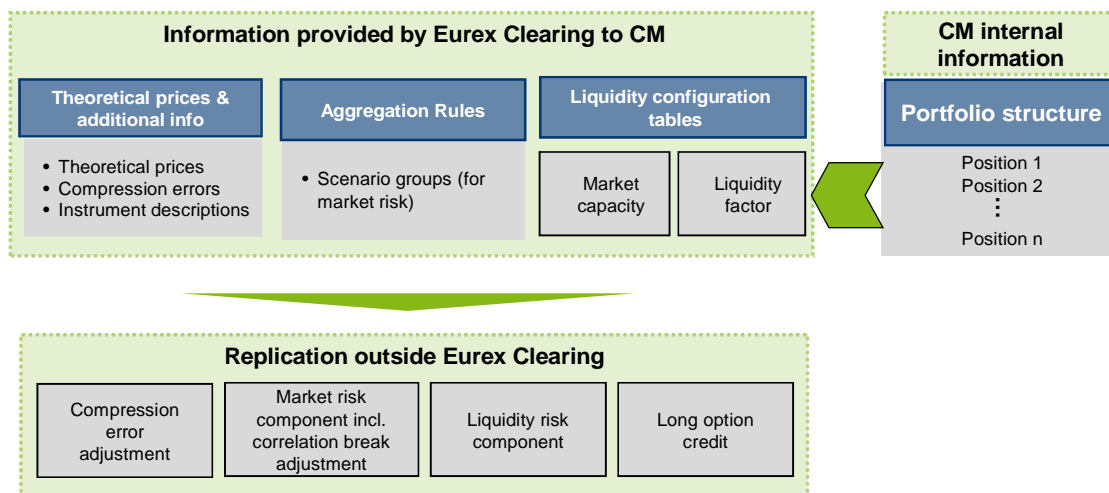


Figure 7: Margin Replication and Information provided by Eurex Clearing

6.1 Information provided by Eurex Clearing

All transparency enabler files are given in a machine-readable structure which allows for automated processing.

The files contain the following information⁵⁰:

- theoretical prices under all scenarios and instrument descriptions in product currency
- current settlement prices and PV reference prices
- risk measure details
- market risk aggregation rules
- market capacities
- liquidity factors
- FX rates under all scenarios

Transparency enabler files are available based on end-of-day and start-of-day⁵¹ data.

The following sections describe the files delivered by Eurex Clearing. A technical description of the input files can be found in Section 6.3.

6.1.1 Overview File Structure

The following table illustrates the interdependencies of the transparency enabler files in the process to calculate the initial margin figures.

File	Utilizations
Theoretical Prices and Instrument Configuration	<ul style="list-style-type: none"> · Calculation of VaR figures for market risk component · Calculation of compression model adjustment · Calculation of correlation break adjustment · Calculation of liquidity risk adjustment
Settlement Prices	<ul style="list-style-type: none"> · Calculation of VaR figures for market risk component
Risk Measure Configuration	<ul style="list-style-type: none"> · Calculation of VaR figures for market risk component · Calculation of VaR figures for liquidity risk adjustment · Calculation of correlation break adjustment
Risk Measure Aggregation Configuration	<ul style="list-style-type: none"> · Aggregation of VaR figures for market risk component · Aggregation of the market risk component · Aggregation of VaR figures for liquidity risk adjustment
Market Capacity Configuration	<ul style="list-style-type: none"> · Calculation of liquidity risk adjustment
Liquidity Factor Configuration	<ul style="list-style-type: none"> · Calculation of liquidity risk adjustment

⁵⁰ For interest rate swaps different input files will be provided, which will be explained in document [5].

⁵¹ Start-of-day transparency enabler files will include corporate actions as of the ex-date and shift the theoretical prices by one day.

File	Utilizations
FX Rates Configuration	<ul style="list-style-type: none"> · Calculation of VaR figures for market risk component · Calculation of VaR figures for liquidity risk adjustment · Calculation of correlation break adjustment · Calculation of liquidity risk adjustment

Table 36: Overview Files

6.1.2 Theoretical Prices and Instrument Configuration

The file “Theoretical_Prices_and_Instrument_Configuration” contains prices of all instruments for the scenarios based on the filtered historical simulation and the stressed period scenarios⁵². All prices reflect hypothetical returns over the n -day liquidation period of the respective liquidation group. The prices are used to calculate the profit and loss distributions⁵³, which are the basis for the subsequent estimation of risk measures for the margin components.

In addition to their prices, structured descriptions of the instruments are provided containing additional information such as the product and asset types.

For options further asset-type specific data is included such as the moneyness, Vega and current implied volatility. Additionally, compression model adjustments and VaR figures on instrument level are delivered for all scenarios in product currency and the two clearing currencies EUR and CHF⁵⁴. The mapping of instruments to distinct liquidation groups, liquidation group splits and sets of FX rates can also be extracted from this file.

6.1.3 Settlement Prices

The “Settlement Prices” file contains current and previous day’s settlement prices used for the margin calculation. In addition the file contains the underlying prices of the instruments. In case of corporate actions, the prices are adjusted accordingly.

6.1.4 Risk Measure Configuration

The “Risk_Measure_Configuration” file contains the detailed specifications of the risk measures used for the margin calculation. The risk measures are specified on liquidation group split level. All values are configurable parameters and can be changed at the discretion of Eurex Clearing. The risk measure specification is given as for each liquidation group split and consists of

- utilized risk measure
- confidence level

⁵² Compare to Section 3.3.1 (Filtered Historical Scenarios) and Section 3.3.2 (Stressed Period Scenarios). The number of filtered historical and stressed period scenario prices is flexible. Further types of scenario prices may be added in the future.

⁵³ Compare to Section 3.3.3

⁵⁴ Further clearing currencies may be introduced in the future.

- robustness enhancement, i.e. utilization of the robust VaR methodology
- scaling factor utilized in robustness enhancement
- flag indicating the risk measure type (e.g. filtered historical or stressed period)
- flag indicating if correlation break adjustment is calculated for this risk measure
- specification for correlation break adjustment (time-window size, cap, floor and kappa κ factor)
- flag indicating if liquidity risk adjustment will be calculated based on this risk measure
- specification of liquidity risk adjustment

6.1.5 Risk Measure Aggregation Configuration

The file "Risk_Measure_Aggregation_Configuration" contains the description for the aggregation of the tail risk measures for each liquidation group split including the aggregation of the subsamples. Scaling factors for the VaR figures for each risk measure are given and the aggregation function, i.e. minimum, maximum, average or median will be provided for each liquidation group.

6.1.6 Market Capacities Configuration

The lookup tables for the market capacities of the different product types are defined in file "Market_Capacities_Configuration" as described in Section 3.5. The dimensions of the lookup tables are dependent on the corresponding product type. Furthermore, the liquidity premiums are given in basispoints for each product type, expiry bucket and, in case of options, modified moneyness buckets.

6.1.7 Liquidity Factors Configuration

The lookup tables for the liquidity factors are provided depending on the size of a position relative to the market capacity for every liquidity class in file "Liquidity_Factors_Configuration". Each instrument is assigned to a liquidity class. The liquidity factor value is interpolated linearly between the upper and lower bound liquidity factors for a given relative market size of a position⁵⁵.

6.1.8 Foreign Exchange Rates Configuration

In order to convert instruments denominated in a foreign currency to the clearing currency several sets of foreign exchange rates are provided by Eurex Clearing in the file "Foreign_Exchange_Rates_Configuration". Each set of FX rates comprises FX rates for every risk measure, e.g. filtered historical and stressed period, and the current FX rate. Every set of FX rates is tagged by a unique identifier, which can also be found in the theoretical price and instrument description file. The file contains all foreign exchange rates pairs, for all combinations of product currency and clearing currency.

6.2 Replication of the Margin Calculation outside Eurex Clearing

Given the files containing the parameters for the calculation of the initial margin, the clearing members can replicate the margin payments for their liquidation group splits based on the positions of

⁵⁵ Compare to Section 7.4.

their portfolio according to the methods described in chapter 3.

The ability to replicate the margins, facilitates transparency and the acceptance of the margin amounts and the utilized methodology.

In Section 6.4, an algorithmic description of the initial margin calculation is given based on the given data in the transparency enabler files. Exemplary calculations can be found in the corresponding Excel spreadsheet [4].

6.3 Input File Format for Margin Replication

This section gives a technical overview over the input files that can be used to replicate the margin amounts and includes exemplary input files. The file formats given below are still subject to change at the discretion of Eurex Clearing. The files will be provided as csv-styled text files of flexible length. Each file consists of several sections, which contain different types of fields. Semicolons are used as separators between two values within one line. Between two lines a Windows-style line separator will be used. For all numerical values the digits after the decimal points are illustrated. If necessary, all values are rounded to that precision.

All files should end with an End of File information. The format of the same is given in Section 6.3.8.

6.3.1 “Theoretical_Prices_and_Instrument_Configuration” File

The “Theoretical_Prices_and_Instrument_Configuration file” contains the field names, the data types and exemplary values for the theoretical prices and instruments files⁵⁶. The compression model adjustments, Instrument VaR (IVaR) and Additional Instrument VaR (AIVaR) figures are provided for a variable number of currencies. These currencies comprise at least the clearing currencies and the product currency. The number of filtered historical and stressed period scenario prices is flexible.

The FX rate set can be used to identify the FX rates given in the FX rates configuration file to be used in case of a necessary currency conversion. In addition to filtered historical and stressed period scenario prices, further scenario types may be introduced at a later time. Unless specifically stated, all price information is given in product currency.

6.3.1.1 General File Structure

The theoretical price file is structured according to the following rules:

Sections P: For all products

Sections E: For all expirations of the current product⁵⁷

⁵⁶ Due to the additional information provided by Eurex Clearing the size of file “Theoretical_Prices_and_Instrument_Configuration” can be substantially larger than the old theoretical price file used in the RBM calculations.

⁵⁷ The contract year and month is provided which are the listed contract year and month. The expiration details are provided in expiration year, expiration month and expiration day fields. Note that contract year and contract month are not provided for flexible instruments. If the flexible contract has the same expiration date than the standard contract, the fields contract year and contract month will

Sections S: For all series associated with an expiry date

Section N: Neutral Scenario (Current Price) of the current series

Sections LGS: For all Liquidation Group Splits associated with the series

Sections RMS: For all risk measures set associated with the series

Section LH: Liquidation horizon for risk measure set

Section FX: FX rate set for the series

Section SP: Scenario prices for risk measure set

Sections CE: Compression model adjustments for the risk measure set

Sections IVAR and AIVAR: Instrument VaRs and Additional Instrument VaRs in respective currencies for the series and for longs and shorts respectively

Next risk measure set

Next liquidation group split

Next series

Next expiration

Next product

6.3.1.2 Fields

The theoretical price file contains the following fields:

Section	Field name	Value type ⁵⁸	Value example	Remark
Product P	Product ID	String (4)	ODAX	
	Tick Size	Number (5)	0.10000	Tick size of the product
	Tick Value	Number (4)	0.5000	Tick value of the product
	Currency	String (3)	EUR	Product currency
	Liquidity Class	String (24)	EOLC	The liquidity class will be used to calculate the liquidity adjustment. Each instrument will be assigned to a liquidity class. Example: "EOLC" as abbreviation for "Equity options (large cap)"

show the values for the standard listed contract.

⁵⁸ The number in the bracket indicates how many digits after the decimal point are provided for numbers and the maximum length of the field for String fields.

Section	Field name	Value type ⁵⁸	Value example	Remark
	Liquidation Group	String (30)	LG1	Liquidation group to which the product is assigned to
	Margin Style	String (1)	F	Margin style: F - Futures style T - Traditional
Expiration E	Contract Year	Number (0)	11	11=2011, 12=2012, 13=2013, ...
	Contract Month	Number (0)	12	1 – January, 2 – February, ...
	Expiration Year	Number (0)	11	11=2011, 12=2012, 13=2013, ...
	Expiration Month	Number (0)	12	1 – January, 2 – February, ...
	Expiration Day	Number (0)	15	Calendar day of expiration ⁵⁹ , provided for standard and flexible instruments
	Days to Expiry	Number (0)	30	In calendar days, for options theoretical pricing calendar days
	XM Maturity bucket ID	Number (0)	3	Cross margining maturity bucket identifier. For fixed income products, this would be empty and for Money Market products, this would be the Money Market Bucket, see also [6]
Series S	Call Put Flag	String (1)	C	C – call, P – put, empty for futures
	Exercise Price	Number (6)	7700.0	Exercise price of an option, zero for futures

⁵⁹ Not delivery.

Section	Field name	Value type ⁵⁸	Value example	Remark
	Series Version Number	Number (0)	1	This field contains the version number assigned to the series at creation. The value is zero for all standard series not changed as a result of capital adjustment to the underlying instrument and for futures contracts. Valid values include: 0 – standard series version or futures contract 1 – adjusted series version from most recent capital adjustment 2 – adjusted series version from the second most recent capital adjustment 3 – adjusted series version from the third most recent capital adjustment
	Time-To-Expiry Bucket ID	String (20)	OFTE_P_1	Compare to table “TTE_Bucket_Information”, used for the calculation of the liquidity adjustment
	Moneyness Bucket ID	String (20)	OFTE_P_1	Empty for futures, compare to table “Moneyness_Bucket_Information”, used for the calculation of the liquidity risk adjustment
	Risk Bucket	String (20)	OFTE_P_1_1	The risk buckets are utilized in the calculation of the liquidity adjustment as the effective net gross ratio is calculated for each risk bucket, each instrument will be assigned to a risk bucket ⁶⁰
	Series Status	String (1)	A	Series status ⁶¹ : A – Active E – Expired R – Reporting I – Inactive
	Trading Unit	Number (4)	5.0	This field contains the quantity of the underlying instrument traded per contract.

⁶⁰ Compare to specification for the calculation of the liquidity risk adjustment in Section 3.5.1.

⁶¹ Margining may also consider data for expired series, e.g. due to settlement risk.

Section	Field name	Value type ⁵⁸	Value example	Remark
	Option Vega	Number (6)	5.0	Vega divided by 100 represents the amount that an option contract's value changes in reaction to a one percent absolute shift in the volatility (measured in percent) of the underlying, zero for futures.
	Implied Volatility	Number (4)	20.0	Implied volatility used for the calculation of the neutral scenario price, annualized volatility in percent, zero for futures.
	Interest Rate	Number (6)	3.123456	This fields contains the security risk free interest rate used (continuous compounding). This value is shown in percent. Positive, zero, and negative values are allowed.
	Flex Product ID	String (4)	OF8E	This field contains the ID of the product for which flexible series were created. This field is only filled for flexible products and empty for standard products.
	Settlement Type	String (1)	C	Settlement type of the contract as delivered by Eurex Clearing. Current list of settlement types are: C – Cash Settlement E – Physical Settlement D – Derivative N – Notional Settlement P – Payment-versus-Payment S – Stock T – Cascade A – Alternate
	Series Exercise Style Flag	String(1)	E	Defines the exercise style A – American E – European Empty for Futures
	Flex Series Flag	String (1)	N	Contract is a flex contract Y – Yes N – No

Section	Field name	Value type ⁵⁸	Value example	Remark
	DV01	Number (6)	5.0	DV01 of the fixed income contract. Only filled in case this is a cross margin enabled product. For Futures it is the DV01 of the future itself, whereas for options it is the DV01 of the underlying.
	Delta	Number (6)	0.123456	(Relative) Delta of the option
	Cross Margin Eligibility Flag	String (1)	Y	Y – For series that are eligible for cross margining N – otherwise
Neutral Scenario N	Theoretical Price for Neutral Scenario	Number (6)	7650.0	Current price of the series also denoted as neutral scenario
LGS	Liquidation Group Split	String (30)	LG1_HP5_0_99999	The identifier for the liquidation group splits consists of the identifier for the liquidation group, a suffix indicating the holding period and two numbers indicating minimum and maximum time-to-maturity ⁶² . An exception to this is the so-called “basic” split which has only the suffix “Basic”.
	Default LGS indicator	String (1)	Y	Y – For liquidation group splits relevant for Prisma only margining N – otherwise
RMS	Risk Measure Set	String (30)	RMS1	Several risk measure sets can exist for every series
LH	Liquidation Horizon (= Liquidation Period) Historical Scenarios	Number (0)	5	Liquidation Period used for the historical scenarios, in business days
FX	FX Set	String (10)	FX1	Set of FX scenarios used for this instrument, compare to exchange rate file.

⁶² The time-to-maturity in the liquidation group split name, e.g. LG1_HP5_6_99999, can be used to identify expiring and non-expiring splits if these are configured.

Section	Field name	Value type ⁵⁸	Value example	Remark
SP	Scenario Prices	Number (6)	7645.5	The first scenario price is associated with the first scenario, the second price to the second scenario and so on. The first scenario price is also assigned to the first scenario subsample, the second to the second scenario subsample and so on. ⁶³
CE	Compression Error	Number (12)	10.0	Compression errors for one contract
	Currency	String (3)	EUR	Currency for the compression error.
IVAR	Instrument VaR	Number (12)	400.25	VaR figure on instrument level used to calculate the position-wise liquidity risk adjustment for a position size of 1, both for longs and shorts
	Long Short Indicator	String(1)	L	Indicates whether the IVAR is valid for long or short positions. L – long S – short
	Currency	String (3)	EUR	Currency for the Instrument VaR
AIVAR	Additional Instrument VaR	Number (12)	400.25	Additional VaR figure on instrument level. The Additional Instrument VaR will be used to calculate the diversification factor of the liquidity adjustment for a position size of 1, both for longs and shorts
	Long Short Indicator	String(1)	L	Indicates whether the AIVAR is valid for long or shorts positions. L – long S – short
	Currency	String (3)	EUR	Currency for the Additional Instrument VaR

⁶³ Note that the length of the scenario vector containing the filtered historical scenarios does not need to be divisible by the number of subsamples which is equal to the liquidation period given in section LH. This implies that the scenario vectors for the subsamples are allowed to be of different length. For example, for a liquidation period of 4 days 750 filtered historical scenarios might be given instead of usually 752. This means that according to the assignment of subsamples, the scenario vectors for the subsamples 1 and 2 are of length 188 and for the subsamples 3 and 4 are of length 187.

The file ends with an End of File information. The format of the same is described in Section 6.3.8.

6.3.1.3 Example

The structure of an exemplary input file for a non-flex product is given as:

IVAR and AIVAR are computed at the instrument level for a position size of 1, both for longs and shorts. Only the PnL vectors of filtered historical scenarios are used to compute the IVAR and AIVAR. The PnL vectors from the stressed period RMS are not taken into account for the liquidity add-on.

```
P;OFTE;2.0000;1.0000;EUR;EOLC;LG17;T
E;11;12;16;30;3
S;C;7700.000000;1;OFTE_P_1;OFTE_P_1;OFTE_P_1_1;A;0.1000;5.000000;20.0000;
3.123456;OF8E;C;E;N;0.000000;0.123456;Y
N;7650.000000
LGS;LG1_nexp;Y
RMS;RMS1
LH;2
FX;FX1
SP;7645.100000;7532.000000;7700.520000;7650.503000;...
CE;10.123456;...;15.123456;EUR
CE;11.123456;...;16.123456;CHF
IVAR;100.111111000000;L;EUR
IVAR;100.111000000000;S;EUR
IVAR;200.222222000000;L;CHF
IVAR;200.222000000000;S;CHF
AIVAR;150.111111000000;L;EUR
AIVAR;150.111111000000;S;EUR
AIVAR;300.222222000000;L;CHF
AIVAR;300.222222000000;S;CHF
RMS;RMS2
LH;2
FX;FX1
SP;7645.100000;7532.000000;7700.520000;7650.503000;...
CE;10.123456000000;...;15.123456000000;EUR
CE;11.123456000000;...;16.123456000000;CHF
LGS;LG1_XMGN;N
RMS;RMS3
LH;5
FX;FX2
SP;7645.100000;7532.000000;7700.520000;7650.503000;...
CE;10.123456000000;...;15.123456000000;EUR
CE;11.123456000000;...;16.123456000000;CHF
IVAR;100.111111000000;L;EUR
IVAR;100.111000000000;S;EUR
IVAR;200.222222000000;L;CHF
IVAR;200.222000000000;S;CHF
AIVAR;150.111111000000;L;EUR
AIVAR;150.111111000000;S;EUR
AIVAR;300.222222000000;L;CHF
AIVAR;300.222222000000;S;CHF
RMS;RMS4
LH;5
FX;FX2
SP;7645.100000;7532.000000;7700.520000;7650.503000;...
CE;10.123456000000;...;15.123456000000;EUR
CE;11.123456000000;...;16.123456000000;CHF
```

EOF;P;99999999;20120523;PRGCA;PRGCA;OI;THEORETICAL PRICES AND INSTRUMENT CONFIG

6.3.2 “Settlement_Prices” File

The “Settlement Prices” file provides the settlement prices of the current day as well as the PV reference price. The PV reference price is used in margining of futures and future style options.

6.3.2.1 General File Structure

The settlement price file is structured according to the following rules:

Sections P: For all products

 Sections E: For all expirations of the current product

 Sections S: For all series associated with an expiry date

 Next series

 Next expiration

Next product

6.3.2.2 Fields

The settlement price file contains the following fields:

Section	Field name	Value type ⁶⁴	Value example	Remark
Product P	Product ID	String (4)	ODAX	
	Tick Size	Number (5)	0.10000	Tick size of the product
	Tick Value	Number (4)	0.5000	Tick value of the product
	Currency	String (3)	EUR	Product currency
	Margin Style	String (1)	F	Margin style: F - Futures style T - Traditional
Expiration E	Contract Year	Number (0)	11	11=2011, 12=2012, 13=2013, ...
	Contract Month	Number (0)	12	1 – January, 2 – February, ...
	Expiration Year	Number (0)	11	11=2011, 12=2012, 13=2013, ...
	Expiration Month	Number (0)	3	1 – January, 2 – February, ...
	Expiration Day	Number (0)	30	Calendar day of expiration ⁵⁹ , provided for standard and flexible instruments

⁶⁴ The number in the bracket indicates how many digits after the decimal point are provided for numbers and the maximum length of the field for String fields.

Section	Field name	Value type ⁶⁴	Value example	Remark
	Underlying close Price	Number(6)	100.123456	Provides the underlying settlement price after corporate action, if any.
Series S	Call Put Flag	String (1)	C	C – call, P – put, empty for futures
	Exercise Price	Number (6)	7700.0	Exercise price of an option, zero for futures
	Series Version Number	Number (0)	1	This field contains the version number assigned to the series at creation. The value is zero for all standard series not changed as a result of capital adjustment to the underlying instrument and for futures contracts. Valid values include: 0 – standard series version or futures contract 1 – adjusted series version from most recent capital adjustment 2 – adjusted series version from the second most recent capital adjustment 3 – adjusted series version from the third most recent capital adjustment
	Series Status	String (1)	A	Series status: A – Active E – Expired R – Reporting I – Inactive
	Trading Unit	Number (4)	5.0	This field contains the quantity of the underlying instrument traded per contract.
	Settlement Type	String (1)	C	Settlement type of the contract as delivered by Eurex Clearing. Current list of settlement types are: C – Cash Settlement E – Physical Settlement D – Derivative N – Notional Settlement P – Payment-versus-Payment S – Stock T – Cascade A – Alternate

Section	Field name	Value type ⁶⁴	Value example	Remark
	Series Exercise Style Flag	String(1)	E	Defines the exercise style A – American E – European Empty for Futures
	Flex Product ID	String (4)		This field contains the ID of the product for which flexible series were created. This field is only filled for flexible products and empty for standard products.
	Flex Series Flag	String (1)	N	Contract is a flex contract Y – Yes N – No
	Settlement Price	Number(6)	100.123456	Provides the settlement price ⁶⁵
	PV Reference Price	Number(6)	100.123456	Provides the PV Reference price for futures and future style options.
	Underlying price offset	Number(6)	100.123456	Price offset applied for the contract.

The file ends with an End of File information. The format of the same is described in Section 6.3.8.

6.3.2.3 Example

The structure of an exemplary input file is given as:

```
P;OFTE;2.0000;1.0000;EUR;T
E;11;12;16;30;3;9.123456
S;C;7700.000000;1;A;5.0000;C;E;N;10.00000;10.123456;0.123456
S;C;7800.000000;1;A;5.0000;C;E;N;9.00000;9.123456;0.123456
S;C;7900.000000;1;A;5.0000;C;E;N;8.00000;8.123456;0.123456
S;P;7700.000000;1;A;5.0000;C;E;N;8.00000;8.123456;0.123456
S;P;7800.000000;1;A;5.0000;C;E;N;9.00000;9.123456;0.123456
S;P;7900.000000;1;A;5.0000;C;E;N;10.00000;10.123456;0.123456
```

...

```
*EOF*;P;99999999;20120523;PRGCA;PRGCA;OI;SETTLEMENT PRICES
```

6.3.3 “Risk_Measure_Configuration” File

The risk measure configuration file is provided by Eurex Clearing on liquidation group split level enabling a separate risk measure specification for each liquidation group split. The risk measures are specified at least for the filtered historical and the stressed period scenarios. Other risk measures might be added over time.

⁶⁵ For expired currency derivatives: Theoretical Price based on underlying price carried forward since expiry of the instrument.

6.3.3.1 General File Structure

The risk measure configuration file is structured according to the following rules:

Sections LG: For every liquidation group

 Sections LGS: For each liquidation group split of current liquidation group

 Sections RMS: For every risk measure set associated to current liquidation group split

 Risk measure specifications

 Next risk measure set

 Next liquidation group split

Next liquidation group

6.3.3.2 Fields

The file contains the following fields:

Section	Field name	Value type	Value example	Remark
Liquidation Group Identifier LG	Liquidation Group	String (30)	LG1	Defines for which liquidation group the following specification is valid
	Currency Type Flag	String(1)	C	Provides the information whether the clearing currency is used or product currency for computing the initial margin in this liquidation group. Currently, this is always equal to C – Clearing currency.
Liquidation Group Split Identifier LGS	Liquidation Group Split	String (30)	LG1_Basic	Defines for which liquidation group split the following specification is valid.
Risk Measure RMS	Risk Measure Set ID	String (30)	RMS1	Risk measure set identifier
	Historical / Stressed	String (1)	F	Risk measure is used for: H – historical scenarios F – filtered historical scenarios S – stressed period scenarios

Section	Field name	Value type	Value example	Remark
	Risk Measure	String (1)	V	Utilized risk measure: V – VaR C – CVaR U – undiversified VaR
	Anchor Confidence Level	Number (5)	97.0	Confidence level for risk measure before scaling, in percent
	Robustness	String (1)	Y	Use robustness enhancement for this risk measure Y – Yes N – No
	Scaling Factor	Number (5)	1.44071	Scaling factor for robustness enhancement 1 if robustness enhancement is not used (Robustness – N)
	Correlation Break Flag	String (1)	Y	Will correlation break adjustment be added to risk measure Y – Yes N – No
	Moving Sub-Window	Number (0)	60	Size of the sub-windows used for the calculation of the correlation break expressed as number of scenarios. Empty if correlation break is not used for current risk measure set.
	Confidence Level Correlation Break	Number (5)	95.0	Confidence level used for the calculation of the correlation break, empty if correlation break adjustment is not used, in percent
	Cap	Number (5)	100.0	In percent, maximum correlation break adjustment in percent of market risk, empty if correlation break adjustment is not used

Section	Field name	Value type	Value example	Remark
	Floor	Number (5)	0.0	In percent, minimum correlation break adjustment in percent of market risk, empty if correlation break adjustment is not used
	Multiplier	Number (5)	1.75761	Multiplier for the calculation of the correlation break adjustment
	Liquidity Risk Adjustment	String (1)	Y	Will liquidity risk adjustment be applied to the risk measure: Y – Yes N – No
	Confidence Level Diversification Factor	Number (5)	95.0	Confidence level for the calculation of the diversification factor alpha, in percent Empty if liquidity risk adjustment is not used
	Alpha Floor	Number (5)	0.0	Floor for diversification factor used for the calculation of the liquidity risk adjustment, in percent Empty if liquidity adjustment is not used

The file ends with an End of File information. The format of the same is described in Section 6.3.8.

6.3.3.3 Example

An exemplary file will have the following structure:

```

LG;LG1;C
LGS;LGS_Basic
RMS;RMS1;H;V;95.12345;Y;1.92123;Y;40;90.00123;20.00001;10.00001;1.00000;Y;9
0.00123;10.12345
RMS;RMS2;S;V;95.12345;Y;1.92345;N;;;N;;
...
*EOF*;P;2;20120523;EUREX;EUREX;NI;RISK MEASURE CONFIG

```

6.3.4 "Risk_Measure_Aggregation_Configuration" File

The aggregation rules for the market risk measures are specified independently on liquidation group

split level enabling a separate specification of the aggregation rules for every liquidation group split. Both the aggregation of the different scenario types, e.g. filtered historical scenarios and stressed period scenarios, and the aggregation of the scenario subsamples are described in this file.

6.3.4.1 General File Structure

The market risk aggregation file is structured according to the following rules:

Sections LG: For every liquidation group

Sections LGS : For each liquidation group split of current liquidation group

Section RM: One risk method for each liquidation group split

- Aggregation method for risk measure set of the risk method

Sections RMS: For every risk measure associated to current risk method

- Subsample Aggregation Method
- Weighting factor of risk measure set

Next risk measure set

End risk method

Next liquidation group split

Next liquidation group

6.3.4.2 Fields

The market risk aggregation file contains the following data fields:

Section	Field name	Value type	Value example	Remark
Liquidation Group Identifier LG	Liquidation Group	String (30)	LG1	Defines for which liquidation group the following risk method specification is valid.
Liquidation group split identifier LGS	Liquidation Group Split	String (30)	LG1_Basic	Defines for which liquidation group split the following risk method specification is valid.
RM	Risk Method ID	String (30)	RM1	Risk method ID The risk method defines the aggregation concerning risk measure sets.
	Aggregation Method	String (10)	Max	Aggregation method to aggregate the different risk measures for each risk method Max / Avg / Sum / Med (maximum / average / sum / median / minimum)
RMS	Risk Measure Set ID	String (30)	RMS1	Risk measure set of a given risk method, compare to risk measure configuration file.

Section	Field name	Value type	Value example	Remark
	Weighting Factor	Number (5)	60.0	Weighting factor for the aggregated risk measure In percent
	Aggregation Method	String (10)	Avg	Subsample aggregation method Max / Avg / Sum / Med (maximum / average / sum / median)

The file ends with an End of File information. The format of the same is described in Section 6.3.8.

6.3.4.3 Example

An exemplary file will have the following structure:

```

LG;LG1
LGS;LG1_Basic
RM;RM1;Max
RMS;RMS1;100.0;Avg
RMS;RMS2;60.0;Avg
LGS;LG1_0-4
RM;RM3;Max
RMS;RMS3;100.0;Avg
RMS;RMS4;60.0;Avg
LG;LG2
RM;RM1;Max
RMS;RMS1;100.0;Avg
RMS;RMS2;60.0;Avg
...
*EOF*;P;2;20120523;EUREX;EUREX;NI;RISK MEASURE AGGREGATION CONFIG

```

6.3.5 “Market Capacities Configuration” File

The market capacities file provides information concerning the market capacities and liquidity premiums for the positions.

6.3.5.1 Fields

The market capacities file contains the following data fields. The market capacities and liquidity premiums are used for the calculation of the liquidity risk adjustment.

Section	Field name	Value type	Value example	Remark
Product Line		String (1)	O	O – Option F – Future Other product lines might be introduced at a later time
	Product ID	String (4)	ODAX	
	U/L_ISIN	String (12)		ISIN of underlying

Section	Field name	Value type	Value example	Remark
	Put Call Flag	String (1)	P	P – Put C – Call Empty for futures
	Time-To-Expiry Bucket ID	String (20)	ODAX_P_1	Compare to table “TTE_Bucket_Information”
	Moneyness Bucket ID	String (20)	ODAX_P_100	Empty for futures, compare to “Moneyness_Bucket_Information” table
	Market Capacity	Number (5)	600.0	Derived from trading volume or similar figure
	Liquidity Premium	Number (5)	200.0	The liquidity premium is used for the calculation of the liquidity risk adjustment ⁶⁶ Given in basis points.

The file ends with an End of File information. The format of the same is described in Section 6.3.8.

6.3.5.2 Example

An exemplary file will have the following structure:

```
O;ODAX;DE0009652644;C;ODAX_C_1;ODAX_C_1;10.00000;100.00000
O;ODAX;DE0009652644;C;ODAX_C_2;ODAX_C_1;2;100.00000;50.00000
O;ODAX;DE0009652644;C;ODAX_C_3;ODAX_C_1;90.00000;80.00000
O;ODAX;DE0009652644;C;ODAX_C_4;ODAX_C_1;100.00000;90.00000
...
O;OFBD;DE0009652644;P;OFBD_P_1;OFBD_P_1;30.00000;80.00000
O;OFBD;DE0009652644;P;OFBD_P_2;OFBD_P_1;40.00000;70.00000
O;OFBD;DE0009652644;P;OFBD_P_3;OFBD_P_1;50.00000;60.00000
...
F;ALFV;DE0009652644;;ALFV_1;;20.00000;100.00000
F;ALFV;DE0009652644;;ALFV_2;;10.00000;120.00000
F;ALFV;DE0009652644;;ALFV_3;;30.00000;130.00000
...
F;FBND;DE0009652651;;FBND_1;;30.00000;140.00000
...
*EOF*;P;9999;20120523;EUREX;EUREX;NI;MARKET CAPACITIES CONFIG
```

6.3.6 “Liquidity_Factors_Configuration” File

The liquidity factors are used for the calculation of the liquidity risk adjustment. Each instrument is assigned to a liquidity class. The liquidity factor is determined based on the net effective position size of the position.

⁶⁶ The liquidity premium is calculated based on the bid/ ask spreads as defined in Section 3.5.1.

6.3.6.1 Fields

The liquidity factors configuration file contains the following data fields:

Section	Field name	Value type	Value example	Remark
Liquidity Class		String (24)	EOLC	ELOC = "Equity Option Large Cap"
	Minimum Percentage Threshold	Number (5)	0.0	Lower percentage threshold (including) net effective position size
	Maximum Percentage Threshold	Number (5)	5.0	Upper percentage threshold (excluding) , net effective position size; empty for last bucket
	Liquidity Factor Minimum Threshold	Number (5)	0.0	Liquidity Factor for lower threshold (including)
	Liquidity Factor Maximum Threshold	Number (5)	0.15	Liquidity Factor for upper threshold (excluding) , empty for last bucket

The file ends with an End of File information. The format of the same is described in Section 6.3.8.

6.3.6.2 Example

An exemplary file will have the following structure:

```
EOLC;0.00000;5.00000;0.00000;0.15000
EOLC;5.00000;10.00000;0.15000;0.35000
EOLC;10.00000;15.00000;0.35000;0.75000
EOLC;15.00000;20.00000;0.75000;1.00000
EOLC;20.00000;40.00000;1.00000;1.40000
EOLC;40.00000;60.00000;1.40000;1.60000
EOLC;60.00000;;1.60000;
EOSC;0.00000;5.00000;0.00000;0.05000
EOSC;5.00000;10.00000;0.05000;0.25000
EOSC;10.00000;15.00000;0.25000;0.50000
EOSC;15.00000;20.00000;0.50000;0.75000
...
*EOF*;P;9999;20120523;EUREX;EUREX;NI;LIQUIDITY FACTORS CONFIG
```

6.3.7 "Foreign Exchange Rates Configuration" File

Several sets of foreign exchange rates are provided by Eurex Clearing, which can be identified by the FX set identifier. Each set of foreign exchange rates comprises FX rates for all scenario prices of all risk measure sets.

6.3.7.1 Fields

The foreign exchange rates configuration file contains the following data fields:

Section	Field name	Value type (digits after decimal point)	Value example	Remark
FX	FX Set	String (10)	FX1	Defined set of FX rates
P	Currency Pair	String (6)	USDEUR	Only for currency pairs containing a clearing currency
C	Current Exchange Rate	Number (12) ⁶⁷	1.451	Current exchange rate, used to convert the neutral scenario
RMS	Risk Measure Set	String (30)	RMS1	Risk measure set
	Exchange Rate for Scenarios	Number (12) ⁶⁷	1.431	One exchange rate for each scenario price of the risk measure set. Corresponding to the scenario prices, the first exchange rate corresponds to the first scenario, the second exchange rate to the second scenario and so on. To convert a USD value into a EUR value using the currency pair USDEUR, the USD value is multiplied by the exchange rate.

The file ends with an End of File information. The format of the same is described in Section 6.3.8.

6.3.7.2 Example

An exemplary file will have the following structure:

```
FX;FX1
P;EURUSD
C;1.451000
RMS;RMS1;1.431000;1.500100;1.357800;...
RMS;RMS2;1.427500;1.309000;1.398300;...
```

⁶⁷ For cross exchange rates and the currency conversion from CHF to EUR the rounding to 12 decimals has to be implemented by the clearing member. Only the exchange rate from EUR to CHF is given. Therefore, small differences in the replication of the margin components might occur due to different precision of the exchange rates being used.

```

...
P;EURGBP
C;0.850000
RMS;RMS1;0.875100;0.764100;0.790100;...
RMS;RMS2;0.894100;0.714400;0.890100;...
...
P;CHFUSD
C;1.623100
RMS;RMS1;1.501003;1.621000;1.470091;...
RMS;RMS2;1.230001;1.600342;1.100531;...
...
P;CHFGBP
C;1.100001
RMS;RMS1;1.123001;1.321009;1.100791;...
RMS;RMS2;1.230012;1.120034;1.120003;...
...
FX;FX2
P;EURUSD
C;1.650010
RMS;RMS1;1.330010;1.700001;1.470078;...
RMS;RMS2;1.500275;1.400096;1.893001;...
...
P;EURGBP
C;0.750000
RMS;RMS1;0.910051;0.820021;0.795001;...
RMS;RMS2;0.700941;0.810044;0.910001;...
...
P;CHFUSD;
C;1.530031
RMS;RMS1;1.400013;1.670030;1.573001;...
RMS;RMS2;1.100041;1.520042;1.120031;...
...
P;CHFGBP
C;1.100001
RMS;RMS1;1.120031;1.320019;1.170091;...
RMS;RMS2;1.230012;1.120034;1.120003;...
...
*EOF*;P;2;20120523;EUREX;EUREX;OI;FOREIGN EXCHANGE RATES CONFIG

```

6.3.8 End of File marker

The End of File marker is the last line in file. For technically split files, this will be the last record in the last split.

6.3.8.1 Fields

The End of File marker consists of the following components:

Section	Field name	Value Type	Value example	Remark
File end marker		String (5)	*EOF*	Static field '*EOF*'

Section	Field name	Value Type	Value example	Remark
	Environment type	String (1)	P	Provides the environment type information. P – Production S – Simulation A – Acceptance D – Development
	File Counter	String(8)	99999999	Contains the number of records. <ul style="list-style-type: none"> Series for theoretical price file Risk measure set (RMS lines) for risk measure configuration file Risk methods(RM lines) for risk measure aggregation file Number of records, excluding the EOF record, for Market Capacities Number of records, excluding the EOF record, for liquidity factors configuration files Number of FX sets (FX lines) for foreign exchange rates configuration file.
	Current business day	String(8)	20120907	Current business day in YYYYMMDD format.
	Clearing member	String(5)	EUREX	Clearing member for whom the file is created. “EUREX” for the non member specific file.
	Non-Clearing member	String(5)	EUREX	Non Clearing member for whom the file is created. “EUREX” for the non member specific file.

Section	Field name	Value Type	Value example	Remark
	File content type	String(2)	NI	<ul style="list-style-type: none"> NI – non open interest file OI – for open interest file <p>For all files except the theoretical price file, this value would be NI.</p>
	File Description	String(50)	Theoretical prices and instrument config	<ul style="list-style-type: none"> THEORETICAL PRICES AND INSTRUMENT CONFIG RISK MEASURE CONFIG RISK MEASURE AGGREGATION CONFIG MARKET CAPACITIES CONFIG LIQUIDITY FACTORS CONFIG FOREIGN EXCHANGE RATES CONFIG

6.3.8.2 Example

```
*EOF* ; P ; 99999999 ; 20120523 ; EUREX ; EUREX ; OI ; THEORETICAL PRICES AND INSTRUMENT CONFIG
```

6.4 Algorithmic description of the Initial Margin Calculation

The algorithmic description of this section explains the necessary steps to calculate the initial margins based on the input files described in Section 6.3.

All steps and their corresponding sub-steps can be found in the spreadsheet containing the exemplary calculation [4].

6.4.1 Step 1: Calculation of Profit and Loss Distributions

Input:

- File: "Settlement_Prices"
- File: "Theoretical_Prices_and_Instrument_Configuration"
- File: "Foreign_Exchange_Rates_Configuration"
- Portfolio Data from Clearing Member

Output:

- Profit and loss distributions in form of profit and loss vectors for every relevant liquidation group split within a clearing member's portfolio separated by scenario subsamples for every