



DEFAULT FUND

Cash/Equity & Eq. Derivatives

Methodological notes

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1. Executive Summary

This document aims at describing the methodological changes that Euronext Clearing (ENXC) intends implement to calibrate the Default Fund for the Equity/Eq. Derivatives asset class for Borsa Italiana Markets, Euronext legacy markets (Amsterdam, Brussels, Dublin, Lisbon, Oslo, Paris). These changes will also include the Default Fund target coverage level and the optimization of the reverse stress test procedures, while the sensitivity analysis will remain unchanged. The currently employed set of stress test scenarios described in [Stress Test Methodologies: [Methodologies | euronext.com](https://www.euronext.com/en/methodologies)] - which aim at quantifying the additional resources (Default Fund) beyond margin requirements necessary to cope with extreme but plausible variations of the risk factors, larger than those covered by the margining system – will remain unchanged¹. The new Default Fund will be gauged by computing, under each existing stress test scenario, the Stress Loss Over Initial Margins² (SLOIM) of each Banking Group, that is the difference between the P&L calculated in each scenario and the stressed available collateral without excesses.

The SLOIM is calculated for each Clearing Member at single Account level and then aggregated at Banking Group level, under the assumption that Clearing Members have deposited an amount of collateral – in cash or securities – at least equal to the amount calculated by ENXC as initial margins and that the securities deposited are also subject to stressed market conditions.

The Default Fund amount is set by ENXC to a value such as to ensure the stability of the guarantee system even in case of simultaneous banking groups' defaults under stress conditions. In particular, ENXC stress testing programme will be structured to ensure that default fund contributions are sufficient to cover the default of at least the two most exposed banking groups under extreme but plausible market conditions. The number of the banking groups to be covered by the Default Fund is reviewed at least annually, in line with the Risk Appetite Framework of the company.

In the interim period, ranging from the migration of Euronext legacy markets to ENXC up to the fourth quarter of 2024 (to be confirmed), Borsa Italiana and Euronext legacy markets will be managed through two distinct clearing platforms with different account structures and referential data. In this interim period, two distinct default funds will be calibrated according to the new methodology described in this document and applying separately a “Cover 2” approach for both Borsa Italiana and Euronext legacy markets. The total default fund available to manage a default occurring on BITA and/or on Euronext legacy markets will be the sum of the two default funds separately calibrated. Once also Borsa Italiana markets will migrate to the new clearing platform, a single default fund will be gauged for all markets according to the methodology here described and ensuring the coverage of the two most exposed Banking Groups, under extreme but plausible market conditions, across all markets.

¹ Minor changes will be made in order to align such scenarios to the new set of parameters used for ES calculation.

² Initial Margins include “what if” margins, mark to market and variation margins and all margins add-ons with the exception of Daily Stress Add-ons (the SLOIM is calculated considering the available resources without excesses).

2. Methodological Aspects

2.1. Stress Testing

Differently from initial margins, stress testing can be intended as a conditional loss forecast, which uses specified scenarios (“*what-if scenarios*”), to evaluate the impact of different market conditions on a given portfolio.

Stress tests scenarios currently adopted by ENXC for the Equity/Eq. Derivatives asset class are described in [Stress Test Methodologies: [Methodologies | euronext.com](#)] and will remain unchanged.

Such scenarios, currently adopted by ENXC for Borsa Italiana markets, will be applied also to Euronext legacy markets, taking into account all available historical timeseries since the beginning of 1998, to ensure that most relevant periods of volatility are taken into account in the stress test scenarios.

The goal of the stress testing exercise is to calculate the worst loss under specific conditions in order to define the total Default Fund amount to be allotted among Clearing Members. Finally, the *reverse stress test* exercise allows to analyse for what market conditions the default fund is no more sufficient to cover the two most exposed Banking Groups (which is the target coverage level). The reverse stress test procedure that will be applied by ENXC is described in Section 5.

For products with daily settlement of variation margins, the market shocks are applied on the end of day prices used for the variation margins calculation to be settled on the morning after. For products with no daily settlement of variation margin, the market shocks are applied on the end of day prices used to model the current exposure in the margin called for the morning after.

The stress test will be performed every day at the end of the day (I); two separate stress addons will be calculated, **Monthly and Daily Stress Addon**, calculated with the goal of limiting the proportion of mutualistic resources that can be consumed by an individual member default with the aim to ensure that the default fund always meets the target coverage level. Further details on such addons are reported in sections 3.1 and 3.2.

2.2. Calculation Steps

2.2.1. Calculation of Total P&L

The first step in calculating P&L is to net long and short positions on the same instrument for each portfolio. Moreover, net short call positions and net short futures positions could be further reduced where underlying stocks are deposited to cover the short positions (the so called “bulk deposit”). In this specific case, the number of contracts covered is determined by dividing the number of shares deposited by the contracts size (multiplier). To calculate Profit and Loss (P&L) for each portfolio, the following components are considered:

- **Mark to Market**

The Mark to Market represents the cost to liquidate a portfolio at stressed market price and it is calculated for shares, options, and expired futures. The Mark to Market is calculated as:

- **Cash instruments:**

$$MTM = (Stress\ Price - Trade\ Price) * Net\ Position$$

- **Expired futures:**

$$MTM = (Stress\ Price - Settlement\ Price) * Multiplier * Net\ Position$$

- **Options:**

$$MTM = Stress\ Price * Multiplier * Net\ Position$$

- **Physical Exercised / Assigned Options**

$$MTM = (Stress\ Price - Strike\ Price) * Multiplier * Net\ Position$$

- **Variation Margins (futures only)**

Variation Margins (VM) are calculated for futures positions in the period between the trading date and the expiration date. Specifically, to calculate the variation margins, futures positions are subject to marking to market through the payment / receipt of the differential between the stressed price and the Previous Price (trade price for same days trades; previous day price for positions opened in previous days).

$$VM = (Stress\ Price - Previous\ Price) * Multiplier * Net\ Position$$

- **Options premiums**

The options premiums are determined according to the option trade price.

- **Cash Exercised / Assigned Options**

The cash Exercised / Assigned Options in the money amount is taken into account considering that this component leads to a realized P&L.

2.2.2. Calculation of Available Resources

For each collateral account the following amounts must be calculated (Summing the resources required for EQDER):

- **Available Resources**
It is the amount of “what if” margins, market to market margins, add-ons (without Daily Stress Addon) and variation margins collected by ENXC to collateralise accumulated losses at the stress test date, *without excesses*. Such amount is equal to the sum of any margin payment met by the Clearing Member until end of day without excesses.
The allocation between required and excess collateral is done pro-rata in terms of different asset types (cash/securities).
- **Stress Available Resources**
It is the stress amount of the Available Resources. The stressed value of collateral posted in securities by each Clearing Member is always stressed according to the Yield Increase Scenario applied to the Fixed Income Asset Class [Stress Test Methodology: Methodologies | euronext.com].
- **Total Resources**
It is the amount of “what if” margins, market to market margins, add-ons (without Monthly Stress Addon and Daily Stress Addon) and variation margins collected by ENXC to collateralise accumulated losses, *including excesses*.
- **Stress Total Resources**
It is the stress amount of the Total Resources. The stressed value of collateral posted in securities by each Clearing Member is always stressed according to the Yield Increase Scenario applied to Fixed Income Asset Class [Stress Test Methodology: Methodologies | euronext.com].
- **Default Fund Contribution**
It is the default fund contribution quota at the stress test date.
- **Stress Default Fund Contribution**
It is the stress amount of the default fund contribution quota at the stress test date. This amount could be useful in the future should ENXC decide to allow Participants to cover the Default Fund contribution quota in securities.

All the necessary steps to calculate the previous amounts are summarized in the Annex 1 (NCAs – module A9 - Annex 1 – Collateral Calculation Steps”).

For each collateral account the following information are calculated and stored:

Table 1 - P&L Account level

<i>Item</i>	<i>Field Name</i>	<i>Field Description</i>	<i>Field Format</i>	<i>Example</i>	<i>Additional Info</i>
1	<i>Stress Date</i>	<i>Stress Reference Date</i>	<i>Int using the format yyyymmdd</i>	20220818	-
2	<i>Asset Class</i>	<i>Asset Class Short Code</i>	<i>Text, max 6 characters</i>	BOND EQDER ELECT	-
3	<i>Clearing Member Code</i>	<i>Clearing Member short code</i>	<i>Text, max 10 characters</i>	MEDI ISP	-
4	<i>Clearing Member LEI</i>	<i>LEI Code</i>	<i>Text, 20 digit alpha numeric code</i>	LEIPROV A00001234 5678	-
5	<i>Account Group Code</i>	<i>Account Type</i>	<i>Text, max 6 characters</i>	HOUSE CLIENT SEG	-
6	<i>Account Code</i>	<i>Account Code</i>	<i>Text, max 10 characters</i>	HOUSE_1 SEG_1 SEG_2	-
7	<i>Last Margin Call</i>	<i>Last Initial Margins calculated and paid including add-ons (excluding Monthly Stress Addon and Daily Stress Addon)</i>	<i>Number, float</i>	€ 1.234.567,8 9	-
8	<i>Asset Class Percentage</i>	<i>The percentage of Initial Margins on the specific asset class</i>	<i>Percentage, Int</i>	80%	<i>Equal to the amount of Initial Margins and Addons of the specific account over the total Initial Margins and Addons of the specific asset class</i>
9	<i>Cash posted as collateral</i>	<i>Total Cash posted as collateral</i>	<i>Number, float</i>	€ 123.456,89	-
10	<i>Excess Cash</i>	<i>Excess Cash</i>	<i>Number, float</i>	€ 123.456,89	-
11	<i>Securities posted as collateral</i>	<i>Total Securities' value posted as collateral</i>	<i>Number, float</i>	€ 123.456,89	-
12	<i>Excess Securities</i>	<i>Production value of Excess Securities</i>	<i>Number, float</i>	€ 123.456,89	-
13	<i>Available Resources</i>	<i>The production value of available resources without excesses</i>	<i>Number, Int</i>	€ 1.234.567	-

14	<i>Stress Available Resources</i>	<i>The stress value of available resources without excesses</i>	<i>Number, Int</i>	<i>€ 1.234.567</i>
15	<i>Total Resources</i>	<i>The production value of Total Resources with excesses</i>	<i>Number, Int</i>	<i>€ 1.234.567</i>
16	<i>Stress Total Resources</i>	<i>The stress value of Total Resources with excesses</i>	<i>Number, Int</i>	<i>€ 1.234.567</i>

2.2.2.1. Collateral Stress Scenario

As above mentioned, the stressed value of collateral posted in securities by each Clearing Member is always stressed according to the *Yield Increase* Scenario applied to the Fixed Income Asset Class [Stress Test Methodology: [Methodologies | euronext.com](https://www.euronext.com/methodologies)]. No changes with respect to the current procedure are envisaged.

2.2.3. SLOIM Calculation

The Stress Loss Over Initial Margins is calculated at three different levels:

- SLOIM Account Level;
- SLOIM General Clearing Member (GCM) Level;
- SLOIM Banking Group Level.

Such calculation will be performed without considering monthly and daily stress add-ons in the available resources.

In the interim period, ranging from the migration of Euronext legacy markets to ENXC up to the fourth quarter of 2024 (to be confirmed), Borsa Italiana and Euronext legacy markets will be managed through two distinct clearing platforms with different account structures and referential data. In this interim period, the SLOIM calculation will occur separately for BITA and Euronext legacy markets. Once also Borsa Italiana markets will migrate to the new clearing platform, a single SLOIM calculation will occur across all markets.

2.2.3.1. P&L Account Level

For each margin account the following information are calculated and stored (considering EQDER positions):

Table 2 - P&L Account level

<i>Item</i>	<i>Field Name</i>	<i>Field Description</i>	<i>Field Format</i>	<i>Example</i>	<i>Additional Info</i>
1	<i>Stress Date</i>	<i>Stress Reference Date</i>	<i>Int using the format yyyymmdd</i>	20220818	-
2	<i>Scenario Date</i>	<i>Field used to identify if the reported results correspond to a stress scenario</i>	<i>Int using the format yyyymmdd</i>	20200309	-
3	<i>Scenario Description</i>	<i>Scenario Description</i>	<i>Text, max 20 characters</i>	Price Increase Double Volatility	-
4	<i>Asset Class</i>	<i>Asset Class Short Code</i>	<i>Text, max 6 characters</i>	BOND EQDER ELECT	-
5	<i>Clearing Member Code</i>	<i>Clearing Member short code</i>	<i>Text, max 10 characters</i>	MEDI ISP	-
6	<i>Clearing Member LEI</i>	<i>LEI Code</i>	<i>Text, 20 digit alpha numeric code</i>	LEIPROV A00001234 5678	-
7	<i>Account Group Code</i>	<i>Account Type</i>	<i>Text, max 6 characters</i>	HOUSE CLIENT SEG	-
8	<i>Account Code</i>	<i>Account Code</i>	<i>Text, max 10 characters</i>	HOUSE_1 SEG_1 SEG_2	-
9	<i>ISIN Code</i>	<i>Instrument ISIN Code</i>	<i>Text, 12 characters</i>	IT1234567 890	-
10	<i>Instrument Type</i>	<i>Futures, Option, Cash</i>	<i>Text, 1 character</i>	F O C	-
11	<i>Prod MTM</i>	<i>Production Mark to Market amount in EUR</i>	<i>Number, Int</i>	€ 100	-
12	<i>Prod VM</i>	<i>Production Variation Margins in EUR</i>	<i>Number, Int</i>	€ 100	-
13	<i>Prod Option Premium</i>	<i>Production Option Premium in EUR</i>	<i>Number, Int</i>	€ 100	-
14	<i>Prod EA</i>	<i>Production Option Exercised / Assigned in EUR</i>	<i>Number, Int</i>	€ 100	-
15	<i>Stress MTM</i>	<i>Stress Mark to Market amount in EUR</i>	<i>Number, Int</i>	€ 100	-

16	Stress VM	Stress Variation Margins in EUR	Number, Int	€ 100
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2.2.3.2. SLOIM Account Level

First of all, it is necessary to calculate the stress loss over initial margins for each collateral account (SLOIM Account Level). In particular, the following information are calculated and stored:

Table 3 - SLOIM Account Level

Item	Field Name	Field Description	Field Format	Example	Additional Info
1	Stress Date	Stress Reference Date	Int using the format <i>yyyymmdd</i>	20220818	It is the stress test calculation date
2	Scenario Date	Field used to identify if the reported results correspond to a stress scenario	Int using the format <i>yyyymmdd</i>	20200309	
3	Scenario Description	Scenario Description	Text, max: 20 characters	Price Increase Double Volatility	-
4	Asset Class	Asset Class Short Code	Text, max: 6 characters	BOND EQDER ELECT	-
5	Clearing Member Code	Clearing Member short code	Text, max: 10 characters	MEDI ISP	-
6	Clearing Member LEI	LEI Code	Text, 20 digit alpha numeric code	LEIPROV/A0000123 45678	
7	Account Group Code	Account Type	Text, max: 6 characters	HOUSE CLIENT SEG	GCM House = "HOUSE" Trading Clients and GCM Client = "CLIENT" Segregated Account = "SEG"
8	Account Code	Account Code	Text, max: 10 characters	HOUSE_1 SEG_1 SEG_2	
9	Total Scenario PnL	Total Stress PnL in EUR. PnL corresponds to products cleared under the specific Asset Class, given the specific <u>market stress scenario</u> and <u>before</u> using margins or other available resources.	Number, Integer	-100.000	Reported in EUR, negative for loss, positive for profit, i.e. if closing the positions of this Clearing Member would result to losses it should be negative.
10	Total PnL	Total Stress PnL in EUR considering profits and losses for GCM House account and only losses for other accounts. Therefore only GCM House account could have positive PnL.	Number, Integer	-100.000	Reported in EUR, negative for loss, positive for profit, i.e. if closing the positions of this Clearing Member would result to losses it should be negative.
11	Non Stress PnL	Total Production PnL in EUR. PnL corresponds to products cleared under the specific Asset Class, given the <u>production prices</u> and <u>before</u> using margins or other available resources.	Number, Integer	-100.000	Reported in EUR, negative for loss, positive for profit, i.e. if closing the positions of this Clearing Member would result to losses it should be negative.
12	Available Resources	Production Value of collateral provided to meet Margin requirement the day of the stress test (not including excesses)	Number, Integer	100.000.564	Reported in EUR, positive or zero
13	Stress Available Resources	Stressed Value of collateral provided to meet Margin	Number, Integer	90.000.564	Reported in EUR, positive or zero

		<i>requirement (not including excesses)</i>			
14	Total Resources	<i>Production Value of all provided margin collateral (including excesses)</i>	Number, Integer	105.000.564	Reported in EUR, positive or zero
15	Stress Total Resources	<i>Stressed Value of all provided margin collateral (including excess)</i>	Number, Integer	95.000.564	Reported in EUR, positive or zero
16	DF Contribution	<i>Default Fund Contribution of the Clearing Member</i>	Number, Integer	20.000.078	Reported in EUR, positive
17	Stress DF Contribution	<i>Stressed Value of collateral provided to meet default fund contribution (not including excess)</i>	Number, Integer	15.000.078	Reported in EUR, positive or zero
18	Stress Loss Over Stressed Available Resources	<i>Total Stress Loss in EUR. Loss corresponds to products cleared under the specific Default Fund, given the specific market scenario and after using the stress value of available resources (not including excess). It's equal to the sum of Total PnL and Stress Available Resources.</i>	Number, Integer	-100.000.832	Reported in EUR For Account Type = "HOUSE" Profits and Losses are considered For Account Type <> "HOUSE" only Losses are considered (profits are set to 0).
19	Stress Loss Over Stressed Total Resources	<i>Total Stress Loss in EUR. Loss corresponds to products cleared under the specific Default Fund, given the specific market scenario and after using the stress value of total resources (including excess). It's equal to the sum of Total PnL and Stress Total Resources.</i>	Number, Integer	-100.000.832	For Account Type = "HOUSE" Profits and Losses are considered For Account Type <> "HOUSE" only Losses are considered (profits are set to 0).

2.2.3.3. SLOIM CM Level

Then, the results so obtained are aggregated at Clearing Member³ Level (SLOIM CM Level) applying ENXC segregation rules. The following information are calculated and stored:

Table 4 - SLOIM GCM Level

Item	Field Name	Field Description	Field Format	Example	Additional Info
1	Stress Date	Stress Reference Date	Int using the format <i>yyyymmdd</i>	20220818	-
2	Scenario Date	Field used to identify if the reported results correspond to a stress scenario	Int using the format <i>yyyymmdd</i>	20200309	-

³ Both General and Individual Clearing Members fall in the Clearing Members category..



3	<i>Scenario Description</i>	<i>Scenario Description</i>	<i>Text, max 20 characters</i>	<i>Price Increase Double Volatility</i>	-
4	<i>Asset Class</i>	<i>Asset Class Short Code</i>	<i>Text, max 6 characters</i>	BOND EQDER ELECT	-
5	<i>CM Code</i>	<i>Clearing Member short code</i>	<i>Text, max 10 characters</i>	MEDI ISP	-
6	<i>CM LEI</i>	<i>Clearing Member LEI Code</i>	<i>Text, 20 digit alpha numeric code</i>	LEIPRO VA00001 2345678	
7	<i>Banking Group Code</i>	<i>Banking Group short code</i>	<i>Text, max 10 characters</i>	BG_ISP BG_MED I	
9	<i>Total Scenario PnL</i>	<i>Sum of Account Total Scenario PnL at GCM Level</i>	<i>Number, Integer</i>	-100.000	<i>Reported in EUR, negative for loss, positive for profit, i.e. if closing the positions of this Clearing Member would result to losses it should be negative.</i>
10	<i>Total PnL</i>	<i>MIN(0, Sum of Account Total PnL)</i>	<i>Number, Integer</i>	-100.000	<i>Could be less than or equal to 0. Only debits are reported.</i>
11	<i>Non Stress PnL</i>	<i>Sum of Account Non Stress PnL</i>	<i>Number, Integer</i>	-100.000	<i>Reported in EUR, negative for loss, positive for profit, i.e. if closing the positions of this Clearing Member would result to losses it should be negative.</i>
12	<i>Available Resources</i>	<i>Sum of Account Available Resources</i>	<i>Number, Integer</i>	100.000.5 64	<i>Reported in EUR, positive or zero</i>



13	Stress Available Resources	Sum of Account Stress Available Resources	Number, Integer	90.000.56 4	Reported in EUR, positive or zero
14	Total Resources	Sum of Account Total Resources	Number, Integer	105.000.5 64	Reported in EUR, positive or zero
15	Stress Total Resources	Sum of Account Stress Total Resources	Number, Integer	95.000.56 4	Reported in EUR, positive or zero
16	DF Contribution	Default Fund Contribution of the Clearing Member	Number, Integer	20.000.07 8	Reported in EUR, positive
17	Stress DF Contribution	Stressed Value of collateral provided to meet default fund contribution	Number, Integer	15.000.07 8	Reported in EUR, positive or zero
18	Stress Loss Over Stressed Available Resources	Min(0; sum of Account Stress Loss Over Stressed Available Resources)	Number, Integer	- 100.000.8 32	Reported in EUR, negative or zero
19	Stress Loss Over Stressed Total Resources	Min(0; sum of Account Stress Loss Over Stressed Total Resources)	Number, Integer	- 100.000.8 32	Reported in EUR, negative or zero
20	DF Contribution remaining after covering loss with stressed available resources	Amount of stressed default fund collateral of the clearing member remaining after covering its stress loss using its stressed available resources (not including excess) and its stressed default fund collateral	Number, Integer	122.550	Reported in EUR, positive or zero.

21	DF Contribution remaining after covering loss with stressed Total resources	Amount of stressed default fund collateral of the clearing member remaining after covering its stress loss using its stressed total resources (not including excess) and its stressed default fund collateral	Number, Integer	122.550	Reported in EUR, <u>positive or zero.</u>
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2.2.3.4. SLOIM Banking Group Level

Lastly, the results obtained at CM level are furtherly aggregated at Banking Group Level (SLOIM Banking Group Level). The following information are calculated and stored:

Table 5 - SLOIM Banking Group Level

Item	Field Name	Field Description	Field Format	Example	Additional Info
1	Stress Date	Stress Reference Date	Int using the format .yyyymmdd	20220818	-
2	Scenario Date	Field used to identify if the reported results correspond to a stress scenario	Int using the format .yyyymmdd	20200309	-
3	Scenario Description	Scenario Description	Text, max 20 characters	Price Increase Double Volatility	-
4	Asset Class	Asset Class Short Code	Text, max 6 characters	BOND EQDER ELECT	-
5	Banking Group Code	Banking Group short code	Text, max 10 characters	BG_ISP BG_ME DI	-
6	Total Scenario PnL	Sum of CM Total Scenario PnL	Number, Integer	-100.000	Reported in EUR, negative for loss, positive for profit, i.e. if closing the positions of this Clearing Member would result to losses it should be negative.
7	Total PnL	Sum of CM Total PnL	Number, Integer	-100.000	Could be less than or equal to 0. Only debits are reported.



8	Non Stress PnL	Sum of CM Non Stress PnL	Number , Integer	-100.000	Reported in EUR, negative for loss, positive for profit, i.e. if closing the positions of this Clearing Member would result to losses it should be negative.
9	Available Resources	Sum of CM Available Resources	Number , Integer	100.000.5 64	Reported in EUR, positive or zero
10	Stress Available Resources	Sum of CM Stress Available Resources	Number , Integer	90.000.56 4	Reported in EUR, positive or zero
11	Total Resources	Sum of CM Total Resources	Number , Integer	105.000.5 64	Reported in EUR, positive or zero
12	Stress Total Resources	Sum of CM Stress Total Resources	Number , Integer	95.000.56 4	Reported in EUR, positive or zero
13	DF Contribution	Sum of CM Default Fund Contribution	Number , Integer	20.000.07 8	Reported in EUR, positive
14	Stress DF Contribution	Sum of CM Stress DF Contribution	Number , Integer	15.000.07 8	Reported in EUR, positive or zero
15	Stress Loss Over Stressed Available Resources	Sum of CM Stress Loss Over Stressed Available Resources	Number , Integer	- 100.000.8 32	Reported in EUR, <u>negative or zero</u>
16	Stress Loss Over Stressed Total Resources	Sum of CM Stress Loss Over Stressed Total Resources	Number , Integer	- 100.000.8 32	Reported in EUR, <u>negative or zero</u>
17	DF Contribution remaining after covering loss with stressed available resources	Sum of CM DF Contribution remaining after covering loss with stressed available resources	Number , Integer	122.550	Reported in EUR, <u>positive or zero.</u>
18	DF Contribution remaining after covering loss with stressed Total resources	Sum of CM DF Contribution remaining after covering loss with stressed total resources	Number , Integer	122.550	Reported in EUR, <u>positive or zero.</u>

In the interim period, ranging from the migration of Euronext legacy markets to ENXC up to the fourth quarter of 2024 (to be confirmed), Borsa Italiana and Euronext legacy markets will be managed through two distinct clearing platforms with different account structures and referential data. In this interim period, the whole default fund calculation (including also the MSA and DSA add-ons that will be described in the following sections) will occur separately for BITA and Euronext legacy markets. Once also Borsa Italiana markets will migrate to the new clearing platform, a single default fund calculation will occur across all markets.

3. Default Fund Dimensioning

The core element of stress testing lies in defining the total mutualized pre-funded resources (Total Default Fund amount). The applicable minimum standards for the Default Fund size are provided in the European Market Infrastructure Regulation and are further elaborated in the Regulatory Technical Standards published by ESMA. It requires the pre-funded mutualized financial resources to withstand the simultaneous default of those two Banking Groups which pose the largest credit exposure in extreme but plausible market conditions.

At least once per month, the default fund amount is dimensioned as the median of the Stress Loss Over Initial Margins (without considering the stressed add-ons in the available collateral resources) of the two most exposed banking groups in the worst case stress test scenarios over the past n business days (where n is currently set equal to 20 days and can be periodically recalibrated), according to the following formula:

Total Default Fund

$$= \text{median over } n \text{ business days} \left(\sum_{BGs=1}^2 SLOIM_{\text{worst scenario}} \right) * (1 + \text{buffer})$$

where the $SLOIM_{\text{worst scenario}}$ is Stress Loss Over Initial Margins at Banking Group Level not including both monthly and daily stress add-ons in the available collateral and the buffer is currently set at 10%.

ENXC Internal Risk Committee retains the faculty to define a different amount of the Total Default Fund, for conservative reasons.

The mutualistic default fund is then defined as:

$$\textbf{Total Mutualistic Default Fund} = \text{Total Required Resources} - \alpha * \text{Sum}(MSA)$$

where the *Total Required Resources* ensure that the sum of the $SLOIM_{\text{worst scenario}}$ of the 2 most exposed banking groups is always covered through mutualistic and additional guarantees ($\text{Total Required Resources} = \text{Total Default Fund} + \text{Sum}(MSA)$); while $\text{Sum}(MSA)$ represents the sum of the monthly stressed margin add-ons (MSA), calculated at current time T , as described in the next paragraph. α is a multiplier (lower than or equal to 100%) currently set equal to

100% that can be reviewed by ENXC internal risk committee. In the current configuration, where $\alpha = 100\%$, the *Total Mutualistic Default Fund* is equal to the *Total Default Fund*. The *Total Default Fund* represents the portion of guarantees actually mutualized and it is calibrated once per month, the respect of the target coverage level on a daily basis is always ensured through the stress margin add-ons application, as described in the following sections.

The Cover 2 assumption is defined on the basis of the Risk Appetite of the company and it can be reviewed when necessary.

ENXC internal Risk Committee retains the faculty to recalibrate the default fund on ad hoc basis whenever market circumstances require so. In ordinary circumstances, the default fund will be recalibrated only on a monthly basis.

3.1. Monthly Stress Addon (MSA)

Where the Stress Loss Over Initial Margins (excluding the stressed add-ons) of each Banking Group exceeds a predefined threshold $X\%^4=45\%$ of the Total Default Fund value, an amount up to the difference between the BG's SLOIM and the $X\%=45\%$ is required as Monthly Stress Addon "MSA".

The MSA calculated at Banking Group level is then assigned to each collateral account proportionally to the SLOIM value (excluding the stressed add-ons).

The MSA is treated as additional margin and this amount is held from the Default Fund resizing payment date to the following Default Fund resizing payment date. For the sake of clarity, the MSA is calculated only in occasion of Default Fund Contribution Quotas Calculation (in ordinary periods once per month). The MSA is calculated, at banking group level, according to the following formula:

$$MSA_{BG} = \text{Max}(0, SLOIM_{BG} - X\% * DF)$$

Where:

- $SLOIM_{BG}$ is Stress Loss Over Initial Margins⁵ at Banking Group Level (excluding the stressed add-ons) in the worst-case scenario related to the Cover 2 assumption;
- $X\%=45\%$ is the proportion of the Total Default Fund that can be consumed by an individual group.
- DF is the Total Default Fund, dimensioned as described in 17 Default Fund Dimensioning.

Such value is then compared with the MSA previously calculated to adjust the amount posted as collateral.

$$MSA \text{ margin call} = MSA_T - MSA_{T-1}$$

3.2. Daily Stress Addon (DSA)

To limit the proportion of mutualistic resources that can be consumed by an individual member default and with the aim to ensure that the default fund always meets the target coverage level on the day-to-day activities, ENXC may require to Banking Groups to post additional resource to reduce the size of their stress losses in excess of the amount covered by initial margins and MSA. For instance, a BG whose stress loss in excess of the amount covered by initial margins and MSA exceeds a predefined threshold $Y\%$ of the default fund (where $Y\%$ is parametrically defined, depending on the

⁴ The threshold is reviewed at least annually.

⁵ Collateral posted in securities is stressed.

creditworthiness of the Banking Group Leader and according to Table 6 – Y% threshold) is required to post the difference as supplementary margin (Daily Stress Addon, DSA).

Table 6 – Y% threshold

Default Probability Bucket	Default Probability Interval	Description	Y%
DP ₁	[0%;1.5%]	Low Credit Risk	45%
DP ₂	(1.5%;6%]	Medium Credit Risk	30%
DP ₃	(6%;100%]	High Credit Risk	15%

The DSA may be required, on a daily basis, together with the other EOD margins and it is calculated on the end of day positions, at banking group level, in line with the following formula:

$$DSA_{BG} = \text{Max}(0, SLOIM_{BG} - MSA_{BG} - Y\% * DF)$$

Where:

- $SLOIM_{BG}$ is Stress Loss Over Initial Margins (without considering stress addons) at Banking Group Level in the worst-case scenario related to the Cover 2 assumption;
- $Y\%$ is the proportion of Default Fund that can be consumed by an individual group.
- DF is the Total Default Fund, dimensioned as described in 3 Default Fund Dimensioning.
- MSA_{BG} is the Monthly Stress Addon calculated for the Banking Group.

This DSA calculated at Banking Group level is then assigned to each collateral account proportionally to the SLOIM value.

Such value is then compared with the DSA of the previous day to adjust the amount posted as collateral at banking group level.

$$DSA \text{ margin call} = DSA_T - DSA_{T-1}$$

Both MSA and DSA are additional resources to be called to Clearing Members to ensure a defaulter pays mechanism. Together with the mutualistic default fund amount, their collection always ensures that the Cover 2 level is guaranteed.

Default fund monthly recalibration aims at having an updated and risk sensitive ratio between mutualistic resources and stressed addons.

3.3. Calculation of Stress Addons at Margin Account level

Once the MSA and DSA are calculated at Banking Group level the next step is to calculate the related quota associated to each margin account as follows (considering the same worst case scenario).

1. First of all, the stress addons at Clearing Member level (CM) are calculated as:

$$(1) MSA_{CM} = \frac{SLOIM_{CM_i}}{SLOIM_{BG_n}} * MSA_{BG}$$

$$(2) DSA_{CM} = \frac{SLOIM_{CM_i}}{SLOIM_{BG_n}} * DSA_{BG}$$

2. Then, such amount is divided among CM's collateral accounts (CA) as:

$$(1) MSA_{CA} = \frac{SLOIM_{CA_j}}{SLOIM_{CM_i}} * MSA_{CM}$$

$$(2) DSA_{CA} = \frac{SLOIM_{CA_j}}{SLOIM_{CM_i}} * DSA_{CM}$$

3. Then, such amount is divided among margin accounts (MA) as:

$$1) MSA_{MA} = \frac{Loss_{MA_m}}{\sum Losses_{CA_j}} * MSA_{CA}$$

$$2) DSA_{MA} = \frac{Loss_{MA_m}}{\sum Losses_{CA_j}} * DSA_{CA}$$

3.4. Stress Addons Tables

The following information are calculated and stored:

Table 7 – Stress Addons Banking Group Level

<i>Ite m</i>	<i>Field Nam e</i>	<i>Field Descriptio n</i>	<i>Field Form at</i>	<i>Examp le</i>	<i>Additional Info</i>
1	Stress Date	Stress Reference Date	Int using the format yyyymm d	20220818	-
2	Scenario Date	Field used to identify if the reported results correspond to a stress scenario	Int using the format yyyymm d	20200309	-
3	Worst Case Scenario	Worst Case Stress Scenario	Text max 20 character s	Price Increase Double Volatility	-
4	Asset Class	Asset Class Short Code	Text, max 6 character s	BOND EQDER ELECT	-
5	Banking Group Code	Banking Group short code	Text, max 10 character s	BG_ISP BG_ME DI	-



6	Stress Loss Over Stressed Available Resources	Sum of GCM Stress Loss Over Stressed Available Resources	Number , Integer	- 100.000.8 32	Reported in EUR, <u>negative or zero</u>
7	Current Default Fund	Current Default Fund Amount	Number , Int	100.000.0 00	
8	Proposed Default Fund	Proposed Default Fund	Number , Int	120.000.0 00	
9	Is Resize Date	"YES" if it is a DF resize date	Text	YES / NO	
10	Max DF Amount	% DF amount * Current / Proposed DF	Number , float	55.000.00 0	If resize date = "YES" then the proposed DF is used else the current DF is used.
11	MSA	Monthly Stress Addon	Number , float	10.000.00 0	
12	DSA	Daily Stress Addon	Number , float	10.000	

Table 8 – Stress Addons Clearing Member Level

Item	Field Name	Field Description	Field Format	Example	Additional Info
1	Stress Date	Stress Reference Date	Int using the format <i>yyyymmdd</i>	20220818	-
2	Scenario Date	Field used to identify if the reported results correspond to a stress scenario	Int using the format <i>yyyymmdd</i>	20200309	-
3	Worst Case Scenario	Worst Case Stress Scenario	Text max: 20 characters	Price Increase Double Volatility	-
4	Asset Class	Asset Class Short Code	Text, max: 6 characters	BOND EQDER ELECT	-
5	CM Code	Clearing Member short code	Text, max: 10 characters	MEDI ISP	-
6	CM LEI	Clearing Member LEI Code	Text, 20 digit alpha numeric code	LEIPRO VA0000 12345678	-
7	BG MSA	Banking Group Monthly Stress Addon	Number , Float	100.000.8 32	
8	BG DSA	Banking Group Daily Stress Addon	Number , Float	100.000.8 32	
9	% CM	Stress Loss Over Initial Margins % compared to the BG SLOIM	Number , float	0.45	



10	MSA	BG MSA * % CM	Number , float	10.000.00 0
11	DSA	BG DSA * % CM	Number , float	10.000

Table 9 – Stress Addons Collateral Account Level

<i>Item</i>	<i>Field Name</i>	<i>Field Description</i>	<i>Field Format</i>	<i>Example</i>	<i>Additional Info</i>
1	Stress Date	Stress Reference Date	Int using the format .yyyymmdd	20220818	-
2	Scenario Date	Field used to identify if the reported results correspond to a stress scenario	Int using the format .yyyymmdd	20200309	-
3	Worst Case Scenario	Worst Case Stress Scenario	Text max 20 characters	Price Increase Double Volatility	-
4	Asset Class	Asset Class Short Code	Text, max 6 characters	BOND EQDER ELECT	-
5	Collateral Account Code	Clearing Member short code	Text, max 10 characters	MEDI ISP	-
6	Collateral Account LEI	Clearing Member LEI Code	Text, 20 digit alpha numeric code	LEIPRO VA0000 12345678	-
7	Account Group Code	Account Type	Text, max 6 characters	HOUSE CLIENT SEG	GCM House = "HOUSE" Trading Clients and GCM Client = "CLIENT" Segregated Account = "SEG"
8	Account Code	Account Code	Text, max 10 characters	HOUSE_ 1 SEG_1 SEG_2	-
9	CA MSA	Collateral Account Monthly Stress Addon	Number , Float	100.000.8 32	-
10	CA DSA	Collateral Account Daily Stress Addon	Number , Float	100.000.8 32	-
11	% Account	Stress Loss Over Initial Margins % compared to the CM SLOIM	Number , float	0.45	-
12	MSA	CA MSA * % Account	Number , float	10.000.00 0	-
13	DSA	CA DSA * % Account	Number , float	10.000	-

3.5. Monthly and Daily Stress Addon Example

Please find below an example on how the MSA and DSA are calculated:

Default Fund Resizing Date																										
Banking Groups	Clearing Members	CMs Account	Ref Date	SLOIM			Current Default Fund	Proposed Default Fund	DF Resizing?	X%	X% * Proposed / Current DF	MONTHLY STRESS ADDON			Mutualistic Default Fund	BG Score (Leader)	Y%	Y% * Proposed / Current DF	DAILY STRESS ADDON			Margin addons to be paid the morning after				
				SLOIM BG	SLOIM CM	SLOIM ACC						MSA BG	MSA CM	MSA ACC					DSA BG	DSA CM	DSA ACC	MSA (+ = debit)	DSA (+ = debit)			
AAA	A1	House	T	9 000	4 000	-1 000	18 000	19 250	YES	45%	8 663	338	150	0	19 250	DP1	45%	8 663	0	0	0	0	0	0		
		Client	T			5 000							150	0						150	0	0	150	0	0	
	House	T	3 000			188							113	0						0	0	113	0	0		
	A2	House	T		5 000	2 000							188	75					0	0	0	0	75	0		
		Seq	T			7 000							0	0					2 565	2 244	0	0	2 244	0		
BBB	B1	House	T	8 500	8 000	1 000	18 000	19 250	YES	45%	8 663	0	0	0	19 250	DP2	30%	5 775	2 725	160	321	0	0	321	0	
		Client	T			500							0	0						0	0	160	0	0	160	0
	House	T	1 000			0							0	0						0	0	0	0	0	0	0
	B2	House	T		500	-500							0	0					0	0	0	0	0	0		
		Client	T		1 500	2 000							0	0					0	0	0	0	0	0	0	
		House	T			-500							0	0					0	0	0	0	0	0	0	
CCC	C1	House	T	1 500	1 500	2 000	18 000	19 250	YES	45%	8 663	0	0	0	19 250	DP3	15%	2 888	0	0	0	0	0	0	0	0
		Client	T			-3 000							0	0						0	0	0	0	0	0	0
	House	T	0			0							0	0						0	0	0	0	0	0	0
	C2	House	T		0	1 000							0	0					0	0	0	0	0	0	0	
		Client	T			1 000							0	0					0	0	0	0	0	0	0	

Normal Business Day (SLOIM Increase)																										
Banking Groups	Clearing Members	CMs Account	Ref Date	SLOIM			Current Default Fund	Proposed Default Fund	DF Resizing?	X%	X% * Proposed / Current DF	MONTHLY STRESS ADDON			Mutualistic Default Fund	BG Score (Leader)	Y%	Y% * Proposed / Current DF	DAILY STRESS ADDON			Margin addons to be paid the morning after				
				SLOIM BG	SLOIM CM	SLOIM ACC						MSA BG	MSA CM	MSA ACC					DSA BG	DSA CM	DSA ACC	MSA (+ = debit)	DSA (+ = debit)			
AAA	A1	House	T+1	13 500	9 000	-1 000	19 250	19 250	NO	45%	8 663	338	150	0	19 250	DP1	45%	8 663	4 500	3 000	3 000	0	0	3 000	0	
		Client	T+1			10 000							150	0						150	0	0	1 000	0	1 000	0
	House	T+1	3 000			188							113	0						0	0	1 500	500	0	500	0
	A2	House	T+1		4 500	1 500							0	0					1 610	1 380	0	0	-864	0		
		Seq	T+1			6 000							0	0					115	115	0	0	-45	0		
BBB	B1	House	T+1	7 500	7 000	1 000	19 250	19 250	NO	45%	8 663	0	0	0	19 250	DP2	30%	5 775	1 725	1 610	230	0	0	-91	0	
		Client	T+1			500							0	0						0	0	115	115	0	0	-45
	House	T+1	500			0							0	0						0	0	0	0	0	0	0
	B2	House	T+1		500	-500							0	0					0	0	0	0	0	0		
		Client	T+1		1 500	2 000							0	0					0	0	0	0	0	0	0	
CCC	C1	House	T+1	1 500	1 500	-500	18 000	19 250	YES	45%	8 663	0	0	0	19 250	DP3	15%	2 888	0	0	0	0	0	0	0	0
		Client	T+1			2 000							0	0						0	0	0	0	0	0	
	House	T+1	-3 000			0							0	0						0	0	0	0	0	0	0
	C2	House	T+1		0	1 000							0	0					0	0	0	0	0	0	0	
		Client	T+1			1 000							0	0					0	0	0	0	0	0	0	

Normal Business Day (SLOIM Decrease)																											
Banking Groups	Clearing Members	CMs Account	Ref Date	SLOIM			Current Default Fund	Proposed Default Fund	DF Resizing?	X%	X% * Proposed / Current DF	MONTHLY STRESS ADDON			Mutualistic Default Fund	BG Score (Leader)	Y%	Y% * Proposed / Current DF	DAILY STRESS ADDON			Margin addons to be paid the morning after					
				SLOIM BG	SLOIM CM	SLOIM ACC						MSA BG	MSA CM	MSA ACC					DSA BG	DSA CM	DSA ACC	MSA (+ = debit)	DSA (+ = debit)				
AAA	A1	House	T+2	10 000	4 500	-1 000	19 250	19 250	NO	45%	8 663	338	150	0	19 250	DP1	45%	8 663	1 000	450	450	0	0	-2 550	0		
		Client	T+2			5 500							150	0						150	0	0	400	0	400	0	-600
	House	T+2	4 000			188							113	0						0	0	150	0	150	0	-350	0
	A2	House	T+2		5 500	1 500							0	0					550	400	0	0	0	0			
		Seq	T+2			6 000							0	0					1 610	1 380	0	0	0	0			
BBB	B1	House	T+2	7 500	7 000	1 000	19 250	19 250	NO	45%	8 663	0	0	0	19 250	DP2	30%	5 775	1 725	115	115	0	0	0	0		
		Client	T+2			500							0	0						0	0	0	0	0	0	0	
	House	T+2	500			0							0	0						0	0	0	0	0	0	0	
	B2	House	T+2		500	-500							0	0					0	0	0	0	0	0			
		Client	T+2		1 500	2 000							0	0					0	0	0	0	0	0	0		
CCC	C1	House	T+2	1 500	1 500	-500	18 000	19 250	YES	45%	8 663	0	0	0	19 250	DP3	15%	2 888	0	0	0	0	0	0	0	0	
		Client	T+2			2 000							0	0						0	0	0	0	0	0		
	House	T+2	-3 000			0							0	0						0	0	0	0	0	0	0	
	C2	House	T+2		0	1 000							0	0					0	0	0	0	0	0	0		
		Client	T+2			1 000							0	0					0	0	0	0	0	0	0		

In the above example, the BG “AAA” pays in T € 338 as MSA, while the BGs “BBB” pays € 2 725 as DSA (in light of the fact that the DSA% is lower than the MSA%). and “CCC” pays € 0 as stress addons. At day T+1 (SLOIM Increase Scenario) the default fund is supposed to remain stable and the BG “AAA” pays a DSA equal to € 4500 (considering he has already deposited a MSA equal to € 338), while the BG “BBB” pays a DSA equal to € 1 725 and the BG “CCC” doesn’t pay any DSA.

At day T+2 (SLOIM Decrease Scenario) the BG “AAA” pays € 1 000 as DSA (considering he has already deposited a MSA equal to € 338). The BG “BBB” pays a DSA equal to € 1725 considering that its sloim remains stable.

MSA and DSA are then proportionally assigned to each CM’s account. As example, considering the MSA calculated at T for the BG “AAA” equal to € 338:

- The MSA portion allocated to CM **A1** is equal to € 150 ($€ 4\,000 / € 9\,000 \text{ SLOIM} * € 338$) so divided:
 - House account: € 0;
 - Client Account: € 150.
- the MSA portion allocated to CM **A2** is equal to € 188 as MSA ($€ 5\,000 / € 9\,000 \text{ SLOIM} * € 338$) so divided:
 - House account: € 113;
 - Seg account: € 75.

The example is reported in the attached excel file (NCAs – module A9 – Annex 2 – Stress Addons Example).

4. Default Fund Contribution Quota calculation

The contribution quota calculation is based on the average Expected Shortfall (without mark to market component and including other add-ons without MSA and DSA) over the last 20 business days considering all Sections (Equity Cash, Equity Derivatives, Bonds) of EQDER asset class. The number of business days used is reviewed at least annually.

The calculation takes place every time there is a change in the total default fund amount and at least monthly (at the beginning of each month).

The theoretical Total Mutualistic Amount (α) of the *Default Fund* must be allotted among all clearing members of the EQDER asset class; for this reason, a Quota is calculated for each clearing member, on the basis of the average of the Expected Shortfall (without mark to market component and including other add-ons without MSA and DSA) in a certain former period ($\tau=20$ business days). This amount is then compared with the minimum Contribution Quota (currently equal to € 100 000). If the calculated contribution quota is below the minimum contribution quota, the last one is considered. The Contribution Quota must be deposited in cash (Euro)⁶.

The following table summarizes the parameters used in the calculation of the Contribution Quota, which values will be periodically revised by ENXC.

Symbol	Description	Example
a	Total Mutualistic Amount of the Default Fund to be allotted (Total Default Fund – MSAs)	€ 100.000.000
P	Periodicity of Calculation	At least monthly (first working day of each month). Depends on the results of daily stress tests.
τ	Observation Period	20 (business days)
Q_{\min}	Min Contribution Quota	€ 100.000

At day t , separately for the house account and for the client/segregated accounts, the average of the Initial Margins deposited by the Clearing Member x in the τ previous working days is calculated. Such amounts are then summed up in order to assign to each clearing member x a unique indicator of the Average Initial Margins (IMx) deposited in the previous τ business days.

$$IMx = IMx_{house} + IMx_{client} + IMx_{segregated}$$

⁶ To evaluate.

The ratio between the Average of the Initial Margins of the Clearing Member x (IMx) and the Total Average of the Initial Margins (IM), given by the sum of all the average values IMx previously calculated for each Participant, is computed. Such ratio is then multiplied by the Total Mutualized Amount of the Default Fund (α) (please refer to section 3.1) to be allotted, in order to obtain the Default Fund Contribution Quota for the Clearing Member x (CQx):

$$CQx = \alpha * \frac{IMx}{MI}$$

The Required Contribution quota, RQx , is compared with the minimum contribution quota (MQ) and the maximum between the two measures is considered (rounded to thousands of Euro).

$$RQx = \text{Max}(CQx, MQ)$$

The Total Mutualistic Default Fund Amount shall be equal to the sum of all Clearing Members contribution quotas.

$$\text{Total DF} = \sum_{CM=i}^N RQx$$

The following table should be produced and stored:

Table 10 – Default Fund Contribution Quota at Account Level

<i>Ite m</i>	<i>Field Name</i>	<i>Field Description</i>	<i>Field Format</i>	<i>Example</i>	<i>Additional Info</i>
1	<i>Ref Date</i>	<i>Reference Date</i>	<i>Int using the format yyyymmdd</i>	20220818	-
2	<i>Asset Class</i>	<i>Asset Class Short Code</i>	<i>Text, max 6 characters</i>	BOND EQDER ELECT	-
3	<i>Clearing Member Code</i>	<i>Clearing Member short code</i>	<i>Text, max 10 characters</i>	MEDI ISP	-
4	<i>Clearing Member LEI</i>	<i>LEI Code</i>	<i>Text, 20 digit alpha numeric code</i>	LEIPRO VA0000 12345678	
5	<i>Account Group Code</i>	<i>Account Type</i>	<i>Text, max 6 characters</i>	HOUSE CLIENT SEG	
6	<i>Account Code</i>	<i>Account Code</i>	<i>Text, max 10 characters</i>	HOUSE_ 1 SEG_1 SEG_2	



7	ES Average	Average Expected Shortfall paid over the last N days (At Clearing Member Account Level)	Number, float	€ 1.234.567,89	
8	Total ES Average	Sum of all ES Average	Number, float	€ 1.234.567,89	
9	DF Percentage	ES Average / Total ES Average	Number, float	0.3	
10	Total Default Fund	Total Default Fund Amount	Number, int	€ 1.234.567.890	
11	Calculated Contribution Quota	Calculated contribution quota for the CM at account level (DF Percentage * Total Default Fund)	Number, int	€ 1.234.567	
12	Old Contribution Quota	Current Default Fund contribution quota	Number, int	€ 1.234.567	-
14	Required Contribution Quota	Max(Calculated Contribution Quota; Minimum Contribution Quota)	Number, int	€ 100.000	

Table 11 – Default Fund Contribution Quota at CM Level

Item	Field Name	Field Description	Field Format	Example	Additional Info
1	Ref Date	Reference Date	Int using the format <i>yyyymmdd</i>	20220818	-
2	Asset Class	Asset Class Short Code	Text, max 6 characters	BOND EQDER ELECT	-
3	Clearing Member Code	Clearing Member short code	Text, max 10 characters	MEDI ISP	-
4	Clearing Member LEI	CM LEI Code	Text, 20 digit alpha numeric code	LEIPRO VA0000 12345678	
5	ES Average	Sum of ES Average calculated at account level for the specific CM	Number, float	€ 1.234.567,89	
6	Total ES Average	Total ES Average	Number, float	€ 1.234.567,89	
7	DF Percentage	Sum of DF Percentage calculated at	Number, float	0.3	



<i>account level for the specific CM</i>				
8	<i>Total Default Fund</i>	<i>Total Mutualistic Default Fund Amount</i>	<i>Number , int</i>	<i>€ 1.234.567 .890</i>
9	<i>Calculated Contribution Quota</i>	<i>Sum of Calculated contribution quota at account level</i>	<i>Number , int</i>	<i>€ 1.234.567</i>
10	<i>Old Contribution Quota</i>	<i>Sum of Old Contribution Quota at account level</i>	<i>Number , int</i>	<i>€ 1.234.567 -</i>
11	<i>Minimum Contribution Quota</i>	<i>Minimum contribution quota</i>	<i>Number , int</i>	<i>€ 100.000</i>
12	<i>Required Contribution Quota</i>	<i>Sum of Required Contribution Quota at Account Level</i>	<i>Number , int</i>	<i>€ 100.000</i>

5. Reverse Stress Test

The Reverse Stress Test exercise consists in a reprocessing of the stress tests using a “trial and error” approach up to identify how many defaulting members(s) and/or what scenario would it take to Breach the Default Fund Target Coverage.

Reverse stress testing is performed by applying a multiplier to the resulting risk factors (prices, volatilities, interest rates) of each selected stress scenario.

The iterative procedure stops when, for each stressed scenario, the breakeven point has been reached, i.e., the SLOIM for the first two Banking Groups is higher than the current amount of the default fund.

The Break-Even point is found using numerical methods (e.g., Newton, Bisection, Brent) that allows, with few iterations, to find the root of the function.

The Reverse Stress Test is performed daily, and the results are analysed quarterly by the Internal and External Risk Committee.

5.1. Reverse Stress Test Numerical Method

Let us assume that \mathbf{P} is a portfolio structure that consists of N_{sto} stocks, N_{opt} options and N_{fut} futures. The total value of \mathbf{P} at a stress date (sd) is:

$$V(\mathbf{P}, sd) = \sum_{i=1}^{N_{sto}} W_i^{sto} S_{sd,i} + \sum_{j=1}^{N_{opt}} W_j^{opt} S_{sd,j} + \sum_{h=1}^{N_{fut}} W_h^{fut} S_{sd,h}$$

Where W is the weight that explains the quantity and position of the instrument, where a negative weight means a short position and positive long position and S represents the price of the instrument. The stress P&L of a portfolio is the change in value of the portfolio in the specific stress scenario [t, sd].

$$\begin{aligned} P\&L(\mathbf{P}) &= \nabla V(\mathbf{P}) = V(\mathbf{P}, t) - V(\mathbf{P}, sd) = \\ &= \sum_{i=1}^{N_{sto}} W_i^{sto} (S_{t,i} - S_{sd,i}) + \sum_{j=1}^{N_{opt}} W_j^{opt} (S_{t,j} - S_{sd,j}) + \sum_{h=1}^{N_{fut}} W_h^{fut} (S_{t,h} - S_{sd,h}) \end{aligned}$$

The objective of the reverse stress test is to find the condition where the ENXC’s resources pool, \mathcal{Q} , is no more sufficient to cover the SLOIM of the first two Banking Groups in a given stress test scenario \tilde{S} .

$$f(c) = Q \leq \sum_{i=1}^2 SLOIM_{BG_i}^{c\bar{s}} \leq Q * (1 + tol)$$

where *tol* is a tolerance threshold. To find the scenario multiplier *c* in the reverse stress test, we have to find the value of *c* that satisfies the equation:

$$f(c) = 0$$

i.e., when the loss of the first 2 Banking Groups is equal to the resource pool. Numerical algorithms could be used to solve this nonlinear equation like the Bisection Method.

The Bisection Method takes as input:

- the function to solve
- c_{min} is the min scenario multiplier = 1
- c_{max} is the max scenario multiplier = 10
- c_{guess} is the initial guess value of the multiplier = 4
- *tol* is the tolerance = 5%
- *max_iterations* = 100

Considering the above settings, the iterative process ends when the scenario multiplier *c* that solve the above equation is found (within the admitted tolerance).

The first iteration takes as scenario multiplier the initial c_{guess} value. The SLOIM is calculated in the above reported scenarios and the worst-case scenario is selected.

If the SLOIM of the first two Banking Groups is comprised between the Total Default Fund and $(1 + tol) * Total\ Default\ Fund$ the process ends, the root of the function has been found.

If the SLOIM of the first two Banking Groups is lower than the Total Default Fund a new multiplier is calculated as:

$$c = round((c_{guess} + c_{max}) / 2, 2)$$

While if the SLOIM of the first two Banking Groups is greater than $(1 + tol) * Total\ Default\ Fund$ a new multiplier is calculated as:

$$c = round((c_{guess} + c_{min}) / 2, 2)$$

The process iterates considering the above parameters up to a *max_iterations* number that is currently set at 100 (Considering the tolerance, it is expected that maximum 10 iterations are needed to find the solution).

If the solution is not found considering the *max_iterations* parameter, an alert is raised to the Risk Management team that will modify the above settings.

5.2. Reverse Stress Test Items

The following table should be produced and stored for each reverse stress test run.

Table 12 – Reverse Stress Test Items

<i>Item</i>	<i>Field Name</i>	<i>Field Description</i>	<i>Field Format</i>	<i>Example</i>	<i>Additional Info</i>
1	Reverse Stress Test Date	Reverse Stress Test Reference Date	Int using the format <i>yyyymmdd</i>	20220818	-
2	Scenario Date	Field used to identify if the reported results correspond to a stress scenario	Int using the format <i>yyyymmdd</i>	20200309	-
3	Scenario Description	Scenario Period	Text max 20 characters	Covid Theoretical	-
4	Iteration	Iteration number	Number , int	1	
5	Scenario Multiplier	Stress Scenario Multiplier	Number , float	1.5	
6	Asset Class	Asset Class Short Code	Text, max 6 characters	BOND EQDER ELECT	-
7	Banking Group Code	Banking Group short code	Text, max 10 characters	BG_ISP BG_ME DI	
8	Total Scenario PnL	Sum of GCM Total Scenario PnL	Number , Integer	-100.000	Reported in EUR, negative for loss, positive for profit, i.e. if closing the positions of this Clearing Member would result to losses it should be negative.
9	Total PnL	Sum of GCM Total PnL	Number , Integer	-100.000	Could be less than or equal to 0. Only debits are reported.
10	Non Stress PnL	Sum of GCM Non Stress PnL	Number , Integer	-100.000	Reported in EUR, negative for loss, positive for profit, i.e. if closing the positions of this Clearing Member would result to losses it should be negative.
11	Available Resources	Sum of GCM Available Resources	Number , Integer	100.000.5 64	Reported in EUR, positive or zero
12	Stress Available Resources	Sum of GCM Stress Available Resources	Number , Integer	90.000.56 4	Reported in EUR, positive or zero



	Resources				
13	Total Resources	Sum of GCM Total Resources	Number, Integer	105.000.564	Reported in EUR, positive or zero
14	Stress Total Resources	Sum of GCM Stress Total Resources	Number, Integer	95.000.564	Reported in EUR, positive or zero
15	DF Contribution	Sum of GCM Default Fund Contribution	Number, Integer	20.000.078	Reported in EUR, positive
16	Stress DF Contribution	Sum of GCM Stress DF Contribution	Number, Integer	15.000.078	Reported in EUR, positive or zero
17	Stress Loss Over Stressed Available Resources	Sum of GCM Stress Loss Over Stressed Available Resources	Number, Integer	-100.000.832	Reported in EUR, <u>negative or zero</u>
18	Stress Loss Over Stressed Total Resources	Sum of GCM Stress Loss Over Stressed Total Resources	Number, Integer	-100.000.832	Reported in EUR, <u>negative or zero</u>
19	DF Contribution remaining after covering loss with stressed available resources	Sum of GCM DF Contribution remaining after covering loss with stressed available resources	Number, Integer	122.550	Reported in EUR, <u>positive or zero</u> .
20	DF Contribution remaining after covering loss with stressed Total resources	Sum of GCM DF Contribution remaining after covering loss with stressed total resources	Number, Integer	122.550	Reported in EUR, <u>positive or zero</u> .

Table 13 – Reverse Stress Test Summary

Item	Field Name	Field Description	Field Format	Example	Additional Info
1	Reverse Stress Test Date	Reverse Stress test Reference Date	Int using the format <i>yyyymmdd</i>	20220818	-
2	Asset Class	Asset Class Short Code	Text, max 6 characters	BOND EQDER ELECT	-
3	Banking Groups	First N Banking Group short code	Text, max 20	BG_ISP	

			<i>character s</i>	<i>BG_ME DI</i>	
4	<i>SLOIM</i>	<i>SLOIM of the first N Banking Groups</i>	<i>Number , Integer</i>	<i>€ 1.000.000</i>	<i>Reported in EUR. Could be lower than or equal to 0.</i>
5	<i>Iteration</i>	<i>Reverse stress test iteration number</i>	<i>Number , integer</i>	<i>1</i>	
6	<i>Worst case Scenario</i>	<i>Worst case Stress Scenario Date</i>	<i>Number , integer</i>	<i>20200309</i>	<i>Worst case scenario selected to calculate the SLOIM of the first N Banking Groups</i>
7	<i>Scenario Multiplier</i>	<i>Stress Scenario Multiplier</i>	<i>Number , float</i>	<i>1.5</i>	
8	<i>EC Resource s</i>	<i>e.g. Total Default Fund Amount</i>	<i>Number , Integer</i>	<i>€ 1.000.000</i>	<i>Reported in EUR.</i>

5.3. Parameters

The CCP reserves the faculty to periodically review the parameters values and change them whenever deemed appropriate.

6. Governance

6.1. Board of Directors

The Board of Directors (BoD) defines the Risk Appetite of the company and approves the strategy and the management policies for the Risks.

In compliance with ESMA (art. 29), the BoD has to approve, either as a first approval or as yearly update, the methodology framework for the definition of the amount of the Default Fund, which includes the definition of extreme, but plausible, market scenarios.

6.2. Internal Risk Committee

The Internal Risk Committee analyses the results of the stress tests defined by the Risk Management and approves the stress test framework and the methodologies used to calibrate the default fund.

The Chief Executive Officer, with the support of the Internal Risk Committee, is responsible for the evaluation and formal approval of any change to:

- parameters used for Default Fund dimensioning (including the target coverage);
- definition of the stress test scenarios;
- sensitivity analysis;
- reverse stress test model.

The Internal Risk Committee approves any potential decrease of the Default Fund.

6.3. External Risk Committee

As per art. 4.1.1 (Activity of the Committee) of the Terms of Reference, the External Risk Committee examines, if needed and in a form that does not breach confidentiality, the results of the stress tests, reverse stress, sensitivity test and the analysis carried out on tests results. On a yearly basis, it also delivers a non binding opinion to the board on the adequacy of the extreme but plausible conditions adopted by ENXC in its stress tests framework. Additionally, it is required to provide an opinion in case of substantial change to the methodologies adopted. In each case, the opinions expressed on methodological choices adopted by Risk Management are not binding.

6.4. Risk Management

The definition and the elaboration of Stress, Sensitivity and Reverse Stress Test is up to Risk Management function. In particular, these are its main responsibilities:

- definition of the methodologies to be adopted and to be submitted to the Internal Risk Committee;

- the proposal to the Internal Risk Committee of the parameters considered by the model (definition of historical and hypothetical scenarios, the time series to analyse, size of the shocks, etc.);
- maintenance of the model;
- running and analysis of the results of the tests;
- predisposition of periodic reports for Internal and External Risk Committees;
- presentation of the models to the External Risk Committee and the Board.

6.5. Risk Policy

Risk Policy Office is in charge of different tasks including the Model Validation of CC&G's Risk Models, as prescribed by EMIR, Article 49 (1) (Review of models, stress testing and back testing).

Below are reported its main responsibilities relating to this task:

- annual validation of all risk models, including:
 - assessment of the conceptual soundness of the model,
 - review of the adequacy of the model and - if appropriate - model benchmarking,
 - validation of model components,
 - analysis of the outcomes of the validation;
- production of a model validation report, including a list of findings and an overall model validation outcome;
- notification or escalation of the report, according to the overall outcome;
- management of model validation findings and follow-up;
- validation of any new risk model, prior to its go-live;
- validation of any changes to existing risk models, prior to their go-live;
- production of ad-hoc analysis and guidance to Risk Management, when deemed necessary;
- submission of model validation reports to the Board.

ENXC CEO and CRO can request the support of an independent external company to validate risk models.

6.6. Internal Audit

The function of Internal Audit monitors the effectiveness of the internal control system and risk management policies, reporting regularly to the Board of Auditors in its role as the Committee for Internal Control and the statutory audit.

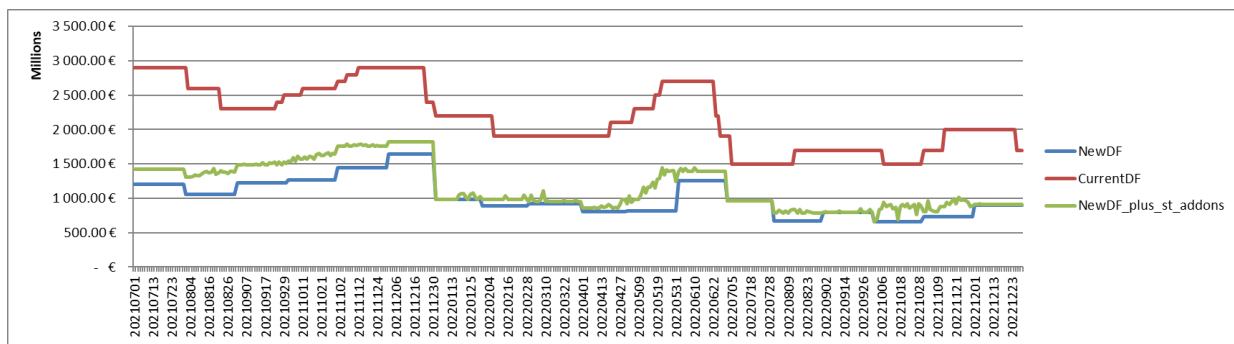
6.7. Actions to be taken on the basis of test results

The Risk Management reports (at least with a monthly frequency) stress tests results to the Internal Risk Committee, to enable it to evaluate possible changes in the stress tests methodology / scenarios used for SLOIM calculation and to evaluate possible changes in the amount of the default fund in light of the market context (qualitative analysis).

Reverse Stress Test results are reported on a quarterly basis to both Internal and External Risk Committees. On the basis of the outcome of the tests, the CEO, with the support of the Internal Risk Committee, evaluates the opportunity of modifying stress test scenarios.

Sensitivity analyses are reported on a monthly basis to both Internal and External Risk Committees.

7. Numerical Results (EQDER BITA Markets)



On average the New Default Fund is 54% lower than the Current Default Fund and the stress addons are on average equal to € 162 mln.