



# LME Clear Risk Management

Frequently Asked Questions

*Please respond to:*

**Risk Management**

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**THE LONDON METAL EXCHANGE AND LME CLEAR LIMITED**

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The London Metal Exchange is registered in England no 2128666.

LME Clear Limited is a private limited company and is registered in England no 07611628.

Registered offices as above.

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# 1 General

## 1.1 SPAN<sup>1</sup> margining

### What is the inter-prompt spread charge?

Inter-prompt spread risk exists when 2 positions on the same contract are offsetting each other, but have different prompt dates. For the purpose of calculating the outright exposure (scanning risk) SPAN nets positions across prompt dates. An inter-prompt spread margin is required to cover basis risk where prices for all expiries within a commodity will not move by the same direction and magnitude. This reflects the price risk of spread positions.

### How are options margined?

At a summary level the initial margin (IM) of an option is derived from a combination of price and implied volatility risks and option delta. In the money options have deltas close to 1 or -1 with higher IM requirement as they are very likely to be exercised into a forward. Out the money options have deltas close to zero and therefore lower IM requirements as they will most likely not be exercised. IM of options and futures are offset within the same portfolio.

**LMEC states that “known SPAN margin algorithm limitations will be taken into account. Where breaches at an account level are caused by a known limitation, which are managed outside of the Initial Margin calculation, these will be documented”. Can you explain these limitations and how they are managed outside of the Initial Margin calculation?**

The risk not captured in SPAN (e.g. volatility smile, interest rates and full FX exposure for non-USD contracts) is reflected in the discretionary additional margin. LMEC monitors the exposures on a daily basis and would contact clearing members in advance of the additional margin being required, providing a full explanation of the factors impacting their portfolio and where in the report the additional margin will be shown.

### How often are the risk parameters reviewed and updated in the calculation algorithm?

LMEC will conduct a margin parameter review monthly, however if there are significant changes or backtesting breaches intra-month then LMEC has the discretion to change margin parameters more frequently. Prior to changes being made, a notice is issued to members highlighting the key changes. Within the LMEmercury clearing GUI secondary SPAN will be updated in advance of the go-live of parameter changes and members can assess the impact on their accounts.

### How frequently do you make intraday calls?

Every hour, the IM is recalculated and margin calls generated. In addition, margins calls are generated in between hours when there are position changes. Each clearing member is provided with a credit tolerance which reduces the likelihood of intra-day margin calls.

Please refer to the intra-day margining section of the [Margin calculations](#) disclosure on the link below.

<https://www.lme.com/en-GB/LME-Clear/Risk-management>

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<sup>1</sup> 'SPAN' is a registered trademark of Chicago Mercantile Exchange Inc., used herein under license. Chicago Mercantile Exchange Inc. assumes no liability in connection with the use of SPAN by any person or entity



## 1.2 Model validation

### How often are the LMEC models independently validated?

LMEC will conduct an annual independent validation which is submitted to the Board Risk Committee and regulators. Any key findings which require methodology changes will be presented to the Risk Advisory Group as part of the LMEC governance structure.

## 1.3 Default Fund and Stress testing

### How is the default fund size set?

The combined stress losses for the largest 2 members are calculated daily over the last 6 months. The average of the 3 largest losses (with an additional buffer) is the default fund size. The full calculation is documented within the Rulebook and available in the below disclosure slides, please click on the [Default Fund](#) link;

<https://www.lme.com/LME-Clear/Risk-management/Default-management#tabIndex=0>

### How often will the default fund be re-calculated?

The default fund is re-calculated monthly, on the first day of the month. However LMEC will have the discretion to re-size the default fund at any point, if deemed necessary based on daily backtesting.

### What actions will LMEClear undertake if the daily result of stress-tests exceeds the current size of the DF between two DF recalibration dates?

Ahead of financial resources being breached by the stress testing losses, LMEC has internal trigger levels at which the Clearing Risk Committee is informed and analysis is performed to understand the reasons for the lower buffer level and if any action should be taken. Action may include requesting further additional margin from specific members or an intra-month re-sizing of the default fund.

### How is the required default fund contribution calculated?

Default fund contribution of a member = Total Default Fund size x fraction of member's IM in overall CCP-wide IM pool.

The IM used is the average of the Intraday IM and End of Day IM, with a 50/50 weighting, over the last month.

Contributions are then subject to a minimum value, currently \$1mn.

Clearing members can view their theoretical contribution based on a daily up-to-date calculation in the LMEmercury GUI. Towards the end of the month this will provide a very good indication of the impact at the monthly re-set on the 1<sup>st</sup> business day of the month.

### The default fund size lookback is 6 months. Is there a separate process that looks back longer than this?

Within the annual validation review testing is performed of shorter (3months) and longer (9 months) look back periods. Previous testing has shown that the 6 month look-back has been deemed as the most appropriate, by being stable and less pro-cyclical while being reactive to stress testing losses.

The number of days history used for the averaging, current set as 3, is also reviewed.



### How regularly do you re-assess the relevancy and appropriateness of the stresses based on current market conditions?

LME Clear has a conservative framework for a daily analysis of market conditions, which is reported monthly to the Clearing Risk Committee. This includes;

- 1 and 2 day price returns against the highest ever stress shifts for each metal.
- Daily closing price of each metal against the highest price in history. If the price reaches a defined trigger against the maximum price in history, it will indicate market conditions are evolving to levels which have not been experienced before.
- If the scanning ranges as a percentage of the price for the main contract are greater than the maximum upward or downward shifts within the stress testing scenarios for each metal, then it would be a trigger to view the stress shift as no longer extreme.

Any of these triggers will prompt LME Clear to undertake a stress testing review with the potential to modify scenarios.

### Can you provide details on reverse stress testing that is performed?

In order to identify extreme scenarios and/or market conditions where the available liquid financial resources will not be sufficient, reverse stress testing is performed on a quarterly basis. These tests include hypothetical conditions that go beyond standard extreme but plausible scenarios, identifying the severity that would create liquidity requirements beyond available resources. All stress and reverse stress tests are subject to regular review, challenge and update through the Clearing Risk Committee and Board Risk Committee in order to ensure that they remain sufficiently robust and reflective of current market conditions. Key market sensitivities for individual members are identified and then used to identify product based extreme events as well as multiple member failures. The testing is completed on a number of scenarios:

- Price shock on each single contract for a one member default
- Price shock on each single contract for a two member default where the members have positions in the same direction
- Price shock on all contracts for a one member default
- Price shock on all contracts for a two member default where the members have positions in the same direction

### Have the stress losses ever breached the financial resources available to LMEC and how was it remediated?

No. Triggers points are set to prevent breaches occurring, which require both internal and external escalations; LMEC has internal trigger levels at which the Clearing Risk Committee is informed and analysis is performed to understand the reasons for the lower buffer level and if any action should be taken. Action may include requesting further additional margin from specific members or an intra-month re-sizing of the default fund.

## 1.4 Additional margin

### When members' internal credit ratings are below a certain threshold, how is additional credit margin charged? Is there a specific multiplier, additional margin %, used based on the rating?

Members whose creditworthiness deteriorates below the minimum internal credit rating of 6 will have an increased Margin Requirement to cover the additional risk they pose to LME Clear. This is



not automatic and will be implemented following discussions with the clearing member to ensure the management of pro-cyclicality.

LME Clear Rating	Credit Additional Margin as a % of Stress Loss
1 to 6	0%
7	50%
8	100%
9	100%
10	100%

## 1.5 Default Management

**Please outline what Broker arrangements exist to support Default Management.**

LME Clear has agreements with a minimum of three clearing members to transact hedges trades on our behalf, with a range of banks and brokers. Default brokers participate in default management fire-drill exercises. In doing so they provide indicative market quotes for the purpose of LMEC hedging the theoretical defaulted member's positions.

We would encourage any clearing member who is interested in providing this service to LMEC to contact the relationship management team.

## 2 LME Base

### 2.1 Contingent Variation Margin

**Which discount factors are used to calculate Variation Margin?**

Discount factors are calculated from OIS swap interest rates curve on a daily basis. For expiry dates between tenor points, linear interpolation will be used to calculate the appropriate rate. Therefore, there will be a discount factor set for all prompt dates.

**What is Net Liquidating Value (NLV)?**

Net Liquidation value = price of option x contract size x number of lots

With premium-paid-up-front options, LME Clear uses the concept of NLV to margin members. When a buyer purchases an option, they receive a credit on their NLV account, which will offset the initial margin. When they sell an option, their NLV is a debit liability, as LMEC would need to buy the option in case the member defaults to hedge the short position. The NLV is recalculated on a daily basis and is seen as the amount of money that LME Clear would require in order to close out a member's position in the event of a member default.

**If I am the buyer of an option and have already paid my premium, do I need to pay Initial Margin?**

IM is calculated due to the potential change in value of option. However for open long option positions, where the premium has been paid up-front, credit NLV is calculated. This credit will always offset or in some cases be greater than the IM calculated by SPAN. Therefore, it can be said that a buyer of an option has no net margin requirement.



## 3 Collateral

### Why are not more forms of collateral accepted?

LMEC accept collateral which meets the minimum requirements with regards to credit risk, wrong-way risk, liquidity risk, currency risk and concentration risk. Therefore only high quality collateral is accepted, with it needing to be liquid enough to be closed out in LMECs 2-Day liquidation period.

Further forms of collateral, may be added where acceptable under prevailing regulation and following a full risk and systems assessment resulting in the implementation of robust risk management measures/operating processes and requisite approval required by the Group New Product Policy.

### What are warrants as collateral?

Base clearing members can lodge warrants in certain metals to cover all margin liabilities in accordance with approved limits. LME Clear only allow warrants to cover margin liabilities resulting from the cleared metal forward or option position of the same underlying (thus a copper warrant is allowed to cover a margin liability resulting from a long or short copper position but it is not be allowed to cover a margin liability resulting from any other metal). For more information regarding Warrants as Collateral, refer to <https://www.lme.com/en-GB/LME-Clear/Collateral-management/Warrants-as-collateral>

### What is meant by collateral tiering?

All non-cash collateral accepted by LME Clear is subject to a tiering hierarchy. This takes into account the internal credit rating of the collateral type as calculated under the Credit Risk Policy and also a measure of the liquidity related to the issuer/instrument type. Therefore, the tiering of the non-cash collateral determines how much of that particular collateral type can make up of the members overall margin liabilities.

### Please outline what Broker arrangements exist to support Default Management?

LMEC have multiple default brokers for each specific collateral type. Default brokers participate in default management fire-drill exercises. In doing so they provide indicative market quotes for the purpose of LMEC liquidating the defaulting members collateral.

## 4 Liquidity

### How does LMEC perform Liquidity Stress Testing?

For LMEC liquidity risk manifests in two key distinct areas, covering operational activity and default management. LMEC performs daily stress tests across various time horizons which include assessing available liquidity versus actual requirements and uses a maturity ladder related to investment activity, a settlement ladder of cleared positions and associated flows as well as the availability of other liquid financial resources and when they can be realised.

### Does LMEC perform Reverse Stress Testing for Liquidity?

In order to identify extreme scenarios and/or market conditions where the available Liquid Financial Resources will not be sufficient, reverse stress testing is performed periodically. These tests include hypothetical conditions which go beyond standard extreme but plausible scenarios, identifying the severity that would create liquidity requirements beyond available liquid resources.



### What is Minimum Cash?

LME Clear performs a prudent calculation, which underpins LMEC liquidity management and is set to determine the Minimum Cash Amount that it needs to hold at all times in order to meet the liquidity requirements in a period of stress.

The Minimum Cash Requirement is the percentage of a member's requirement, which needs to be covered in USD Cash to protect LMEC from falling below the Minimum Cash Amount.

## 5 Investment

### How do investment arrangements work?

LME Clear retains full control of investments and has access to near-real time visibility of the activity and the associated risks for which it is responsible and which could impact its operational, credit and liquidity risk profile.

Subsequently LMEC set and maintain all risk parameters, while agents execute the investments and perform the operational processes.

Investment accounts are in LME Clear's name, which allows investment balances to be failed over to a backup agent in the event of an agent default.

### What is the composition of LMEC's investments?

LMEC has 99% of the investment portfolio invested securely either in reverse repo or outright securities.

### How does LMEC defend against Non-Default Market Risk Losses on investment collateral?

LME Clear may face Market Risk losses from its investment activity without the default of any counterparty but just reflective of a change in the value of the assets within its investment portfolio. These losses may be unrealised or, in the event that loss making positions are liquidated, become realised. The portfolio remains extremely short dated in order to protect against such interest rate risk and limits are maintained reflecting the sensitivity towards this.

