	<b>N°</b>	<b>Title</b>
<b>Instruction</b>	<b>IV.2-1</b>	<b>MARGIN REQUIREMENTS FOR TRANSACTIONS ON SECURITIES TRADED ON A CASH MARKET OPERATED BY A MARKET UNDERTAKING.</b>

***Pursuant to Chapter 2 of Title IV of the Clearing Rule Book.***

For any information regarding Margins payment arrangement, Collateral accepted and cash payments please refer to Instruction IV.4-1.

## **CHAPTER 1 SCOPE**

### Article 1

For Transactions on Securities registered in Cash & Derivatives Clearing System, the “Margin required” covers two notions:

- The “Margin required” for the liquidation risk, which covers the Open Positions value variation in case of unfavourable market evolution;
- The “Margin required” for the negotiation risk, which covers the Open Positions past variations ("marked to market").

LCH SA informs Clearing Members of the amount relative to the “Margins required” in the morning of the payment of the Margin.

In addition to Margins required for the liquidation risk and for the negotiation risk, LCH SA calculates Intra-day Margins as described in Chapter 5 of this Instruction.

For the avoidance of doubt, the provisions of this Instruction shall also apply to the Transactions on Securities registered in the Clearing System and resulting from the Exercise or Assignment of option contracts or from the expiry of futures contracts, which involve the physical settlement of such underlying Security.

## **CHAPTER 2 LIQUIDATION RISKS**

### Article 2

The “Margins required” for the liquidation risk are calculated using an algorithm specific to Securities market (stocks and bonds).

The liquidation risk calculation formula elaborated by LCH SA has officially obtained the SPAN® label.

LCH SA calculates the liquidation risk that it bears regarding the Open Positions.

This risk is calculated each Clearing Day per Clearing Member, per currency, at the Margin Accounts level.

The calculation of the liquidation risk is based on two different algorithms, one for stocks and one for bonds.

The detailed SPAN® algorithm for calculating the liquidation risk related to Transactions on Securities is available on LCH SA web site: <https://www.lch.com/risk-management/risk-management-sa/sa-margin-methodology/sa-securities>

## **Section 1 Intermediary liquidation risk**

### Article 3

LCH SA assigns the stocks to liquidity classes according to their liquidity and the bonds to duration classes according to their modified duration.

Then, it values the Open Position per Security as follows:

- for stocks: for each liquidity class, each Open Position per stock is valued by multiplying the number of stocks by their reference price<sup>1</sup>.
- for bonds: for each duration class, each Open Positions per bonds are valued by multiplying the number of bonds by its reference price and by its modified duration.

### Article 4

LCH SA calculates an overall net Open Position per liquidity or duration class.

It corresponds to the difference within a given class between the sum of the valued buying Open Positions (BP) and the sum of the valued selling Open Positions (SP):

$$\text{Overall net Open Position} = | \text{BP} - \text{SP} | .$$

### Article 5

LCH SA calculates an overall gross Open Position per liquidity or duration class.

It corresponds to the sum of the valued buying Open Positions (BP) and the sum of the valued selling Open Positions (SP) within a given class:

$$\text{Overall gross Open Position} = \text{BP} + \text{SP} .$$

### Article 6

The specific risk, measured by a coefficient **x**, must cover:

- for a stock: its variations in case it moves away from the general market movement, because of its own characteristics or,
- for a bond: its excess variation compared to the general market variation.

The specific risk is a percentage of the overall gross Open Position: **x% (BP+SP)**.

### Article 7

The general market risk, measured by a coefficient **y**, must cover:

- the variations of a market segment, the segment corresponding to a liquidity class for a stock or,
- the uniform translation risk of the yield curve segment corresponding to a duration class for a bond.

The general market risk is a percentage of the overall net Open Position (in absolute value) : **y% |BP-SP|**.

### Article 8

For a given class, the intermediary liquidation risk is the sum of the specific risk and the general market risk, the formula is therefore : **x% (BP+SP) + y% |BP - SP|** .

## **Section 2 liquidation risk**

### Article 9

An inter-class credit for stocks and bonds, which allows reducing the liquidation risk by taking into account the correlation between the different classes, can be applied by LCH SA.

An intra-class charge for bonds, which covers the risk not taken into account when calculating the general market risk because of the offsetting, within a single class, of Securities not perfectly correlated, can be applied by LCH SA.

### Article 10

The liquidation risk is equal to the sum of the intermediary liquidation risk for bonds and stocks, the inter-class credits for bonds and stocks and the intra-class charge for bonds.

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<sup>1</sup> The reference price is the last quoted price or this price adjusted in case of specific corporate events

## CHAPTER 3 NEGOTIATION RISKS

### Article 11

LCH SA calculates the negotiation risk it bears regarding guaranteed Open Positions which are not settled yet.

This calculation is made each Clearing Day per Clearing Member, per Security, at the level of Margin Account.

The negotiation risk is the difference between the buying or selling Open Positions revalued at a reference price and the Open Positions on Securities valued at the trading price.

### **Section 1 Selected reference price**

#### Article 12

Special prices set by LCH SA for Securities involved in specific corporate events, are selected for calculating the negotiation risk, but only for Open Positions which Settlement Dates are included in the period of such event.

#### Article 13

The buying reference price and the selling reference price determined daily correspond to:

- either to the last quoted price adjusted with the corporate events;
- or the aforementioned price credited by respectively a coefficient  $C_{ai}$  and a coefficient  $C_{vi}$  to increase the negotiation risk in order to anticipate a price variation specific to the Security.

### **Section 2 Calculation of the negotiation risk**

#### Article 14

The negotiation risk – the difference between the Open Positions on Securities revaluation and the Open Positions on Securities valued at the trading price – reflects the loss or the gain that would be caused by the complete liquidation of the Open Positions according to the market conditions at the last close, whereas the future risk is being covered by the liquidation risk (cf. supra).

This calculation is executed for each Security, in the currency in which such Security is cleared, according to the following formula, for which gains are considered positive and losses negative:

**Negotiation risk<sub>i</sub> =**

Open Positions on Securities valued at the trading price<sub>i</sub> + (BP<sub>i</sub> - SP<sub>i</sub>) \* Selected reference price

where, BP<sub>i</sub> is the quantity of Securities bought and SP<sub>i</sub> the quantity of Securities sold.

To obtain an amount at the level of the Margin Account (positive if it is a gain and negative if it is a loss), the negotiation risk is sum per Margin Account, per currency, for all Securities.

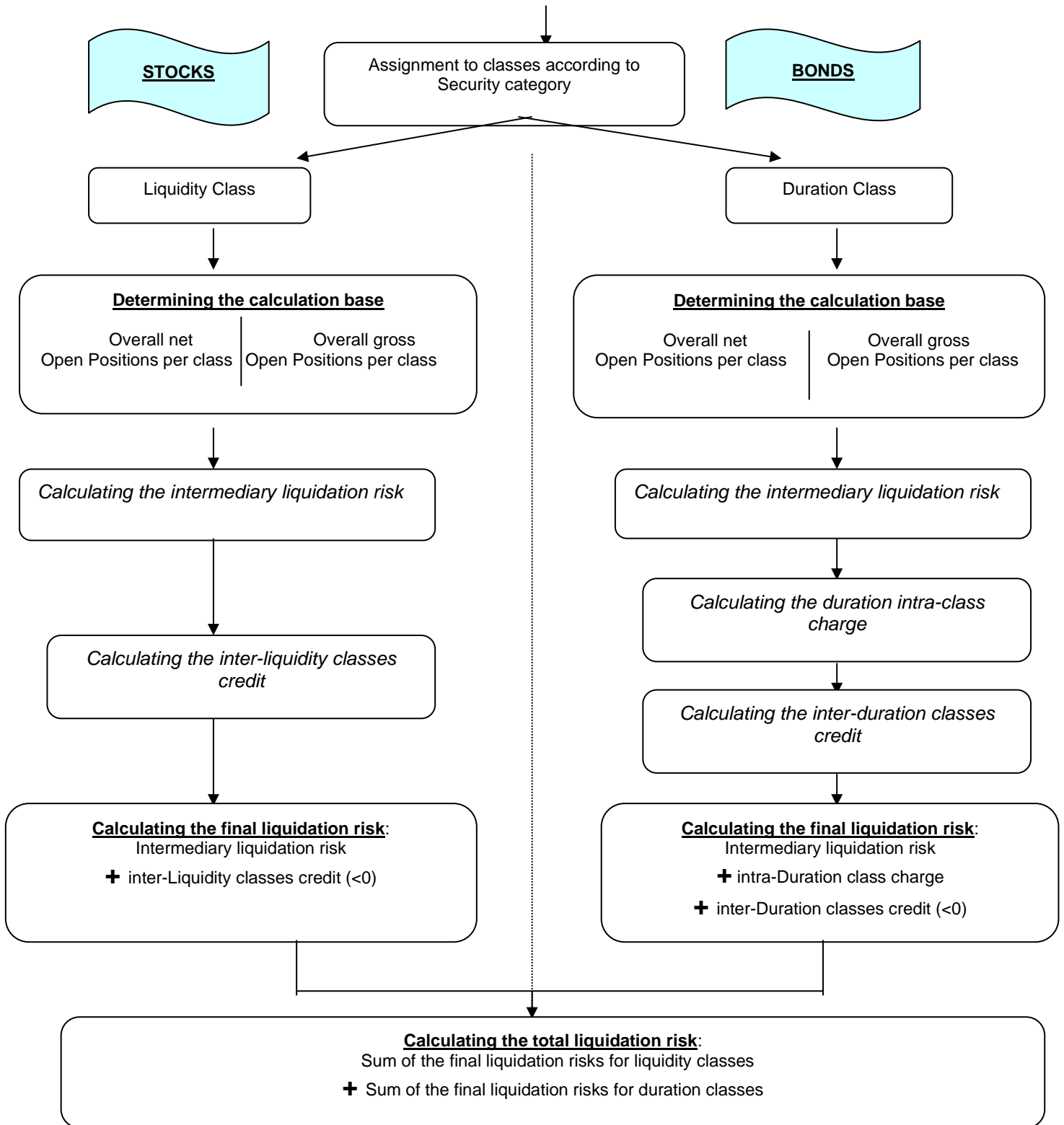
$$\text{Negotiation risk}_{\text{Margin Account}} = \sum_i \text{Negotiations risk}_i$$

The negotiations risk required at the level of the segregation type (client, house, ...) is the sum of absolute values of all the losses calculated per Margin Account belonging to the same segregation type after conversion into Euro and application of a fx haircut.

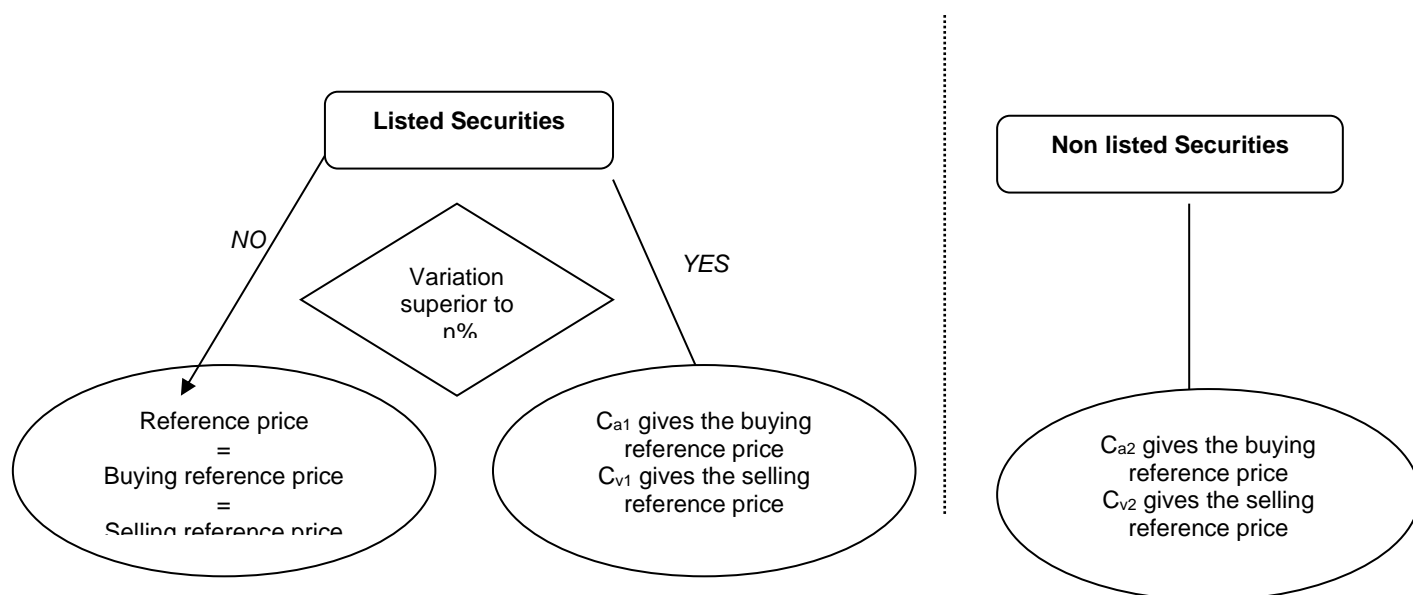
$$\text{Required Negotiations risk} = \sum_{\text{Margin Account}} |\text{Min}(\text{Negotiation risk}_{\text{Margin Account}}, 0)|$$

# EXPLANATORY CHARTS

## GENERAL DIAGRAM OF THE SPAN® ALGORITHM



## REFERENCE PRICE



### **The Security was quoted:**

**If the variation with the previous day reference price is strictly superior to n%,** then the reference price is charged by the coefficient  $C_{a1}$ , — which gives the selected buying reference price — and credited by the coefficient  $C_{v1}$  — which gives the selling selected reference price:

$$\text{Buying reference price} = \text{Reference price} * (1 - C_{a1})$$

$$\text{Selling reference price} = \text{Reference price} * (1 + C_{v1})$$

**If the variation with the previous day reference price is inferior or equal to n%,** then the selected buying reference price is equal to the selected selling reference price which in turn is equal to the reference price.

$$\text{Selected buying reference price} = \text{Selected selling reference price} = \text{Reference price}$$

### **The Security was not quoted:**

The previous day reference price is charged by the coefficient  $C_{a2}$ , — which gives the selected buying reference price — and credited by the  $C_{v2}$  — which gives the selling selected reference price.

$$\text{Selected buying reference price} = \text{Reference price} * (1 - C_{a2})$$

$$\text{Selected selling reference price} = \text{Reference price} * (1 + C_{v2})$$

Coefficients  $C_{a1}$ ,  $C_{v1}$ ,  $n\%$ ,  $C_{a2}$ ,  $C_{v2}$  are set and published by LCH SA.

Note: If there is no reference price for a given security, no negotiation risk will be calculated on Open Positions on this Security.

## CHAPTER 4 ADDITIONAL MARGINS

In addition to the Margins calculated and called pursuant to Article 4.2.0.1 of the Rule Book and related Instructions, LCH SA may call for additional Margins pursuant to Article 4.2.0.3 of the Rule Book. Specifics relating to additional margins are set forth in a Notice.

## CHAPTER 5 INTRA-DAY MARGINS

Pursuant to Article 4.2.0.2 of the Rule Book, Intra-day Margins calculation is performed several times per Clearing Day in the course of Intra-day Margin calculation sessions, and consists in calculating Intra-day Margin requirement based on re-evaluated Clearing Members' Open Positions and real-time prices. This calculation process may result in an Intra-day Margin call in the conditions described in this Instruction and related Notice.

Each Intra-day Margin calculation session is qualified as either "With Margin call" or "Without Margin call" as set-up in a Notice.

In any event, there is at least one "With Margin call" Intra-day session per Clearing Day. However, LCH SA can as it deems necessary re-qualify any "Without Margin call" sessions into "With Margin call" sessions or the other way around.

A "With Margin call" session implies that for each Clearing Member LCH SA compares the amount of Intra-day Margin requirement to the amount of the latest Margin call.

LCH SA proceeds to the following calculations for each Clearing Member:

### 1 – Calculation of Open Positions per Margin Account

LCH SA performs two types of snapshots on Open Positions:

- a snapshot of all Open Positions excluding Open Positions sent for settlement in D (hereinafter referred to as "OP1") and;
- a snapshot of all Open Positions including Open Positions sent for settlement in D and not yet settled (hereinafter referred to as "OP2").

Each Open Position (OP1 and OP2) is valued, applying the real time prices where available or using the last reference price. If the last reference price is unknown, LCH SA will use the last known price. The price used is hereinafter referred to as the "New Reference Price".

### 2 – Intra-day Margins calculation at Margin Account level

Based upon these Open Positions valuation, LCH SA calculates:

- OP1 Margins required for the liquidation risk and for the negotiation risk (hereinafter referred as to "OP1 Margins"); and
- OP2 Margins required for the liquidation risk and for the negotiation risk (hereinafter referred to as "OP2 Margins").

These Margins are calculated applying the same methodologies as described under Chapters 2 and 3 of this Instruction and using the New Reference Price.

LCH SA takes into account the highest amount between (i) the sum of OP1 Margins and (ii) the sum of OP2 Margins.

LCH SA compares the amount of Intra-day Margin requirement to the amount of the latest Margin call. It then performs the following process:

- For each Clearing Member (at Collateral Account level) for which:

latest Margin call < latest Intra-day Margin requirement

LCH SA values the amount of available Collateral and compares such amount to the amount of the latest Intra-day Margin requirement.

And then,

- For each Clearing Member (at Collateral Account level) for which as a result of such comparison it appears that:

available valued Collateral < Intra-day Margin requirement

LCH SA actually performs an Intra-day Margin call amounting to the difference between the Intra-day Margin requirement and the available valued Collateral.

### **3 – Collateral valuation**

There is at least one Intra-day Margin calculation session “With Margin call” per day, where Collateral is valued. The details of the Collateral valuation schedule are set out in a Notice.