

SPECTRUM TRADING MANUAL

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DOCUMENT HISTORY

VERSION	DATE PUBLISHED	DESCRIPTION
1.0	19 Aug 2019	Initial Version
1.1	23 Feb 2021	Update to Pre-Trade Controls
1.2	27 Mar 2021	Update to Circuit Breaker
1.3	1 May 2021	Added Stop Market/Limit Orders
1.4	16 Aug 2021	Update to accommodate products with new trading schedule.
1.5	29 Apr 2022	Updates to the Product Description and Settlement process
1.6	31 Oct 2022	Update to include RFE (Request for Execution) matching methodology

1.1 PURPOSE

The purpose of this document is to provide participants with:

- Communication channels related to trading on the Spectrum System.
- Overview and reference to the technical interfaces of the Spectrum Trading System.
- A business overview of Spectrum Trading System.
- Details regarding Trading Operations.
- Procedures to handle recovery and extraordinary Events.

This document sets out guidance and practical information on SPECTRUM and the processing and implementation of the rules as set down in the Spectrum Rulebook. In case of discrepancies the rules and definitions of 1. the Spectrum Rulebook or 2. the prospectus of Products traded on the Spectrum Trading System prevail.

1.2 RELEVANT SPECTRUM COMMUNICATION CHANNELS

PLEASE PROVIDE THE FOLLOWING INFORMATION IN ALL COMMUNICATIONS TO SPECTRUM:

ISIN	if referring to an instrument
Spectrum Order-ID	if referring to an order
Spectrum Trade-ID	if referring to a trade

TARGET GROUP FOR PHONE AND MAIL

All Spectrum phone and mail contacts are only for the communication between Spectrum and its business Partners (including regulators) or entities preparing for a potential membership. Other groups should use the contacts of their current or intended contracting party.

RECORDING OF PHONE CALLS TO AND FROM SPECTRUM

Callers of Spectrum Phone numbers must agree that phone calls with Spectrum can be recorded. In case there is a disagreement to recording communication must be done in written form (e.g. e-mail).

SPECTRUM RULEBOOK

The current Spectrum Rulebook is available on: www.spectrum-markets.com/rulebook

Changes or amendments to the Spectrum Rulebook will be announced by Website Notice.

WEBSITE NOTICES

Spectrum Website Notices including historical ones are published on: www.spectrum-markets.com/notices

SPECTRUM MARKET OPERATIONS (DURING SPECTRUM OPERATING HOURS)

Functional enquiries and questions regarding trading and rulebook can be addressed to:

Telephone: +49 69 4272991 11

E-mail: operations@spectrum-markets.com

SPECTRUM IT (DURING SPECTRUM OPERATING HOURS)

Technical enquiries and questions regarding connectivity and messages can be addressed to:

Telephone: +49 69 4272991 12

E-mail: it@spectrum-markets.com

SPECTRUM COMPLIANCE

Compliance related enquiries and complaints according to Spectrum Rulebook can be addressed to:

E-mail: compliance@spectrum-markets.com

1.3 COMMUNICATION FROM SPECTRUM TO MEMBERS

Members must provide Spectrum with Telephone and e-mail address for enquiries and urgent Information (e.g. trade cancellation), separate contacts can be provided for different areas of enquiries. Telephone and e-mail of the trading contact must be processed during Spectrum operating hours by a person who is authorised to act on behalf of the member (e.g. consultation/agree on transaction cancellations) and agrees to the recording of the phone calls. Members must also assure, that in case of connecting or forwarding calls the caller agrees to the recording.

1.4 SPECTRUM MEMBER CONTACTS

Spectrum will publish a page with the contact details of every member on the Spectrum Website (www.spectrum-markets.com/member-contacts). Members have to assure, that the contact information published there is up to date. Members can provide their contact Information via e-mail to operations@spectrum-markets.com. In case no special contact details were sent by a member the data will be taken from the Onboarding documents. Contact Data will consist of:

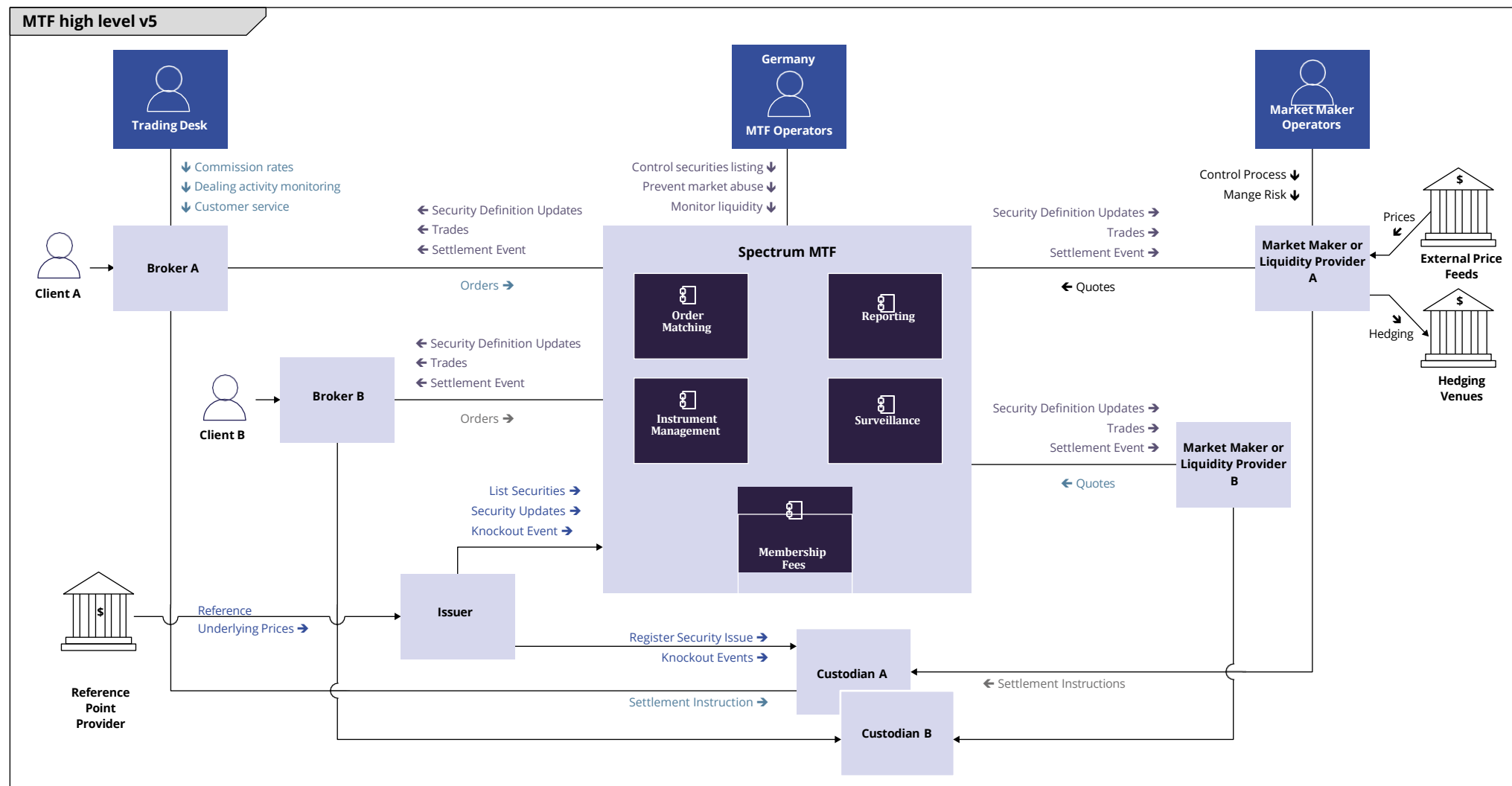
Company Name
Company Address
Telephone Number
Fax Number (optional)
E-mail address
LEI
Member-ID
Type of Membership (e.g., Broker, Market Maker, Liquidity Provider)
CSD (e.g., Clearstream)
Relevant CSD BIC11
Custody Account number within the relevant CSD Beneficiary
BIC8 for the provided Custody Account Details

1.5 READERSHIP

This document is intended as a major source of information for all functions involved in executing or preparing a trading membership with Spectrum in a function related to Trading, BackOffice, System Design, IT or Compliance.

2.1 OVERVIEW

The following diagram shows the main interfaces of Spectrum:



2.2 MESSAGE WORKFLOW, TYPES AND FORMATS

The technical interaction between Spectrum and its Members is performed using the FIX (Financial Information eXchange) protocol. The corresponding Messages and Formats are described in the Document "Spectrum FIX Rules of Engagement" available on the Spectrum website (www.spectrum-markets.com/fixroe).

2.3 TIME SYNCHRONISATION

Members shall synchronise the business clocks they use to record the date and time of events with Coordinated Universal Time (UTC) issued and maintained by timing centres list in the latest BIPM annual report. Spectrum System times refer to local time of Frankfurt/Main, Germany.

2.4 SUPPORTED HARD AND SOFTWARE

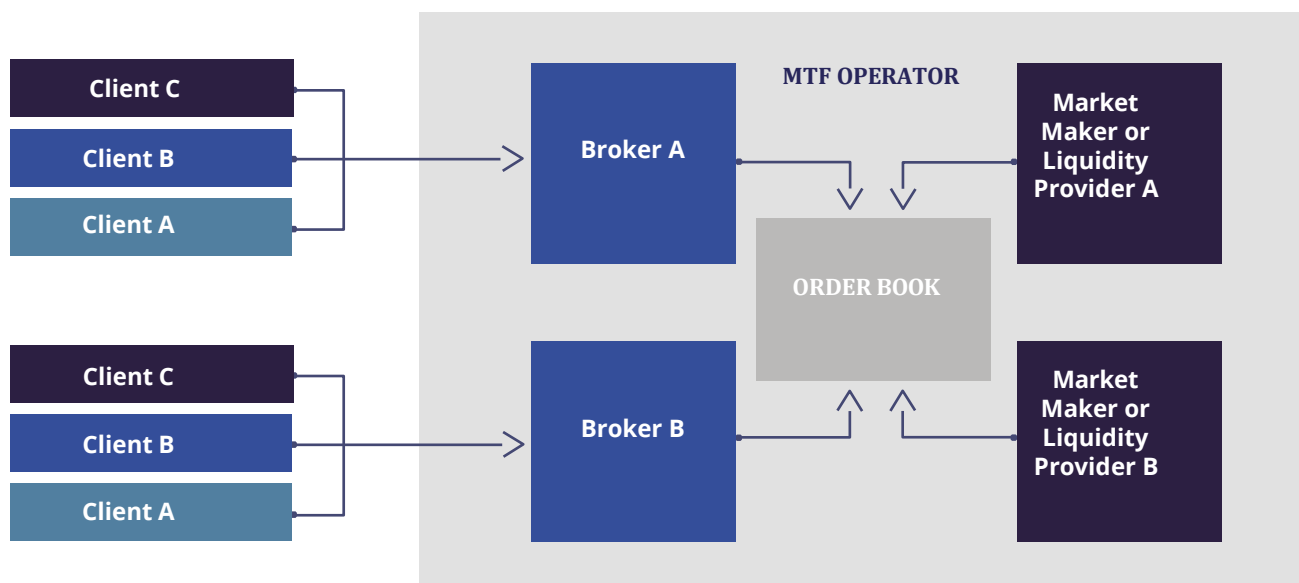
Currently there are no restrictions on supported Hardware and Software if it is conformed to the "Spectrum FIX Rules of Engagement" and the "Spectrum Technical connectivity guide".

3.1 PARTICIPANTS

Participants within Spectrum are known as Members and these Members are categorised into the following groups:

- Member – All Members that wish to engage in trading on Spectrum and have entered into a Membership Agreement and allows the submission of orders and quotes into the order book.
- Market Maker Member - means a Member who is a Market Maker or Liquidity Provider and meets the Market Making Membership Eligibility Criteria as set out in Rule 5.10 and has entered into a Membership Agreement and a Market Maker Agreement or Liquidity Provider Agreement with the Operator.

The following diagram shows the basic structure of the of the Spectrum Operator along with the connectivity of the types of Members outline previously. All trading connectivity into Spectrum will be facilitated over FIX Protocol, further details of which can be found in the “Spectrum FIX Rules of Engagement” available on the Spectrum Website.



Orders and quotes contained within the Order Book shall be executed in accordance with the applicable provisions governing the matching process to form Transactions as defined in the Spectrum Rulebook.

3.2 TRADING TIMES

The trading venue days and trading cycle of Spectrum shall generally be the days determined by the Management Board of Spectrum.

Spectrum offers a 24-hour by 5 days trading cycle with each 24-hour trading session being punctuated with a 2-minute closed period for maintenance. The 2-minute closure will begin at 23:00 CE(S)T and opening of the new trading session will commence at 23:02 CE(S)T. Closing and Opening prices on either side of this 2-minute period will be calculated and made available for members.

Although the exchange is open 24x5, there are certain products offered on Spectrum that may be closed longer than the said 2-minute closure period starting at 23:00 CE(S)T until 23:02 CE(S)T. During this extended closure or during the trading session, the issuers can conduct instrument maintenance on the products they offer on the exchange.

Instrument maintenance may include, but is not limited to:

- Strike and Knock-Out levels adjustment of the instruments made available for trading to accommodate overnight funding.
- any Index dividend adjustments, or
- other events the Issuers deem necessary.

Please consult the Issuer directly for more information regarding the maintenance period of their products.

The Spectrum trading week will commence on a Sunday Evening at 23:00 CE(S)T, offering continuous trading (less the 2-minute closures for security maintenance every 23:00 to 23:02 CE(S)T) until its conclusion at 23:00 CE(S)T on a Friday evening, when Spectrum closes for the weekend to accommodate any system maintenance that may be required. The chart below outlines the weekly Spectrum trading cycle:

		OPEN		CLOSED		
SUN	MON	TUES	WED	THU OPEN	FRI	SAT
CLOSED	OPEN	OPEN	OPEN	23.00	OPEN	CLOSED
	23.00	23.00	23.00	23.02	23.00	
23.00	23.02	23.02	23.02			

Spectrum will operate every week, Sunday night through to Friday night irrespective of any National public holidays, with the exception of Christmas Day (25th December) and New Year's Day (1st January) where these days fall on a business day. Any additional closures to those mentioned here will be notified ahead of time at www.spectrum-markets.com/notices

For more details, please check the Trading Schedule section of the Spectrum website under <https://www.spectrum-markets.com/trading-schedules>

3.3 SETTLEMENT, PROVISIONS AND DISCIPLINE

Trades concluded on Spectrum are not subject to Central Clearing and as such Members are responsible to ensure that bilateral settlement occurs directly with the Spectrum counterparty that formed the transaction with them. Spectrum will provide Members with the Legal Entity Identifier (LEI code) of the counterparty that they have transacted with on Spectrum as part of the FIX Execution Report (ER) and Trade Capture Report (TCR) that they receive back into their Order Management System (OMS) following the partial or full execution of an order to trade submitted onto Spectrum. Members should use this LEI code to identify whom they should be instructing to match settlement instructions within the relevant Central Securities Depository (CSD), where the settlement of transactions concluded on Spectrum shall be done. Members shall ensure that settlement occurs on the intended delivery date, which for securities offered for trading on Spectrum is 2 business days after the date of the transaction (T+2). A directory of Spectrum Members, their LEI codes, and their associated Standard Settlement Instructions (SSIs) for the relevant CSDs is available on the Spectrum Website, to assist Members in the provision of orderly settlement of trades concluded on Spectrum, and can be found at the following link <https://www.spectrum-markets.com/member-contacts>. Members are also responsible for informing the Spectrum operations team of any changes to their SSIs.

Spectrum Trading Members should during the onboarding process, bi-laterally, before the start of trading, agree with all other connected Spectrum Trading Members on the creation method and submission timings of their bi-lateral instructions with every other specific member to ensure orderly settlement, in addition to performing the required Due Diligence and KYC (Know Your Client) checks, when a bi-lateral relationship is being established and direct counterparty risk is present.

By default, each individual trade execution that members receive for orders submitted to Spectrum can be settled gross by submitting standard SWIFT DvP (Delivery versus Payment) SSIs into the relevant CSD to match with the counterparty that the member transacted against. However, during the on-boarding process, as mentioned previously, members can agree bi-laterally to optimise settlement and arrange to instruct using aggregated settlement instructions per ISIN, per counterparty transacted against, for each trading session and at the end of that session. Aggregation means all the buy trades are aggregated into one settlement instruction per ISIN for the session, and all sell trades are instructed in the same way.

Where the buyer Member and the seller Member or their respective custodian agent are participants to the CSD securities settlement system, and they bilaterally settle a transaction through the said settlement system, the said CSD settlement regulations shall apply.

Members are obliged to submit all instructions for settlement to the relevant CSD in a timely manner for matching and settlement i.e., within the T+2 settlement window.

All settlement messages should be submitted using the standards set by the relevant CSD.

In addition, Members have to comply with Article 7 paragraphs 3 to 8 of Regulation (EU) No 909/2014 of 23 July 2014 on improving securities settlement in the EU and on central securities depositories. These are outlined in the following sections:

3.3.1 PREVENTION

After the partial or total completion of a transaction on Spectrum, the Members involved will receive confirmation and details of the said transaction via a FIX Execution Report (ER). A Trade Capture Report (TCR) is also available to Members, this TCR service is available over an additional FIX connection and details of executed trades can be drop copied to members over it. Further details can be found in the Spectrum FIX Rules of Engagement (www.spectrum-markets.com/fixroe).

Members should ensure that they have all the necessary settlement information from their clients in time to allow for an effective and efficient settlement of transactions. To that end, Members should communicate with their clients to obtain the information relevant for an efficient settlement, including the standardised data needed for the settlement process.

Members shall require their clients to send them all the relevant settlement information for transactions concluded via Spectrum trading system by 12.00 CE(S)T on the trading day after that on which the transaction has taken place within the time zone of the investment firm, unless that client holds the relevant financial instruments and cash in custody under the name of the Member.

For their professional clients, Members are expected to require the necessary settlement information in accordance with Article 2 of Commission Delegated Regulation of 25/05/2018 with regard to regulatory technical standards on settlement discipline.

Members' settlement instructions shall be sent in accordance with the relevant CSD regulations or in accordance with their custodian agent where the settlement is to be done via an internalisation of settlement outside of such securities settlement system. Custodian agents shall identify Spectrum and the transactions in their settlement instructions in the absence of a direct transaction feed from Spectrum to the relevant CSD.

3.3.2 FAILED SETTLEMENT

Where it is found that a transaction concluded on Spectrum system is not settled by the agreed settlement date, Spectrum shall:

- (i) Seek provision of all relevant information concerning the settlement fail from Members involved in the transaction;
- (ii) Initiate proceedings for breach of CSDR provision(s) against the Member responsible for repeated and systematic settlement fails, without prejudice to any obligations for compensation;
- (iii) If necessary, after communication with BaFin and immediate notification of the Member concerned, impose a suspension of its membership, and make public the fact of this suspension.

Notwithstanding the preceding paragraph, in case of failure to settle a transaction by the agreed settlement date, Spectrum shall be informed without delay of the failure by the Members that are party to the transaction.

The Member that causes a failed settlement of securities (the failing Member) shall have an extension period of seven (7) business days to regularise the settlement if the settlement fail persists.

Members that are party to the trade shall proceed to the buy-in of the securities that have not been delivered by the failing Member, under the expense of the latter and including any services costs. The securities subject to the buy-in shall be delivered within seven (7) business days to the Member that did not receive the securities (the receiving Member).

The failing Member shall also promptly compensate Spectrum for any amounts due under the preceding paragraph and for all incidental fees and expenses that Spectrum may have incurred as a result of the settlement failure of the failing Member.

If a buy-in of the undelivered securities is not possible, the receiving Member may accept a deferral of the buy-in to a maximum of seven (7) business days (deferral period) as determined by the failing Member, or receive cash compensation from the failing Member, at the latest within two (2) business days after the expiration of the extension period.

If it is found that the settlement of securities remains impossible at the expiration of the deferral period, cash compensation shall be paid by the failing Member to the receiving Member within two (2) business days after expiration of the deferral period.

3.3.3 MANDATORY BUY-IN

Members that originally concluded the relevant transaction are responsible for the execution of the buy-in. The buy-in is to be affected at the level where the contractual obligations to buy and sell securities have been created. The failing Member bears responsibility for the payment of the buy-in costs, the price difference, and the cash compensation in the first place.

Where the failing Member does not comply with their obligation to pay those amounts, their client, as the failing client, should, however, cover the buy-in costs and the price difference but not the cash compensation.

Delivery obligations of bought-in securities or the payment of cash compensation or of any price difference in the financial instruments subject to buy-in should ultimately be performed through the reception of the relevant securities or cash by the Members through their clients.

Where the buy-in fails and in the absence of express communication on whether to extend the buy-in period within the prescribed timeframe, cash compensation should be paid so as to protect the interests of the parties and avoid any uncertainty resulting from the failed buy-in.

3.3.4 INITIAL VERIFICATION

The receiving custodian shall inform the receiving Member(s) of any settlement fails without undue delay. The receiving Member(s) shall in turn immediately inform Spectrum of any settlement fails.

Spectrum shall disclose to the receiving Member the identity of the failing Member(s) upon request. On the business day following the expiry of the extension period, the receiving trading Member shall verify whether a buy-in is possible. Here however, due to the bi-lateral settlement process of trades executed on Spectrum, Members are aware of their execution counterparty immediately following an execution, as they are provided with the Legal Entity Identifier (LEI) of the contra-Member on the execution report they receive back from Spectrum. This process means they should not be required to contact Spectrum for identification of the failing Member.

A buy-in shall only be considered not possible where the relevant securities no longer exist, or the failing Member is subject to insolvency proceedings.

Where a buy-in is possible, the receiving trading venue member shall appoint a buy-in agent on the business day following the expiry of the extension period and notify the failing Member thereof.

Upon receipt of the notification mentioned above, the failing Member shall ensure that any relevant settlement instruction relating to the settlement fail is put on hold. The failing Member may only deliver the securities to the buy-in agent where the buy-in agent gives prior consent.

Prior to receipt of the notification mentioned above, the failing Member may still deliver the securities directly to the receiving Member.

The receiving Member shall notify the results of the buy-in to the failing Member at the latest on the last business day of the seven business days after the extension period.

Where the buy-in is successful in part or in full, the notification mentioned shall include the quantity and price of the bought-in securities.

Where a buy-in is not possible, the receiving Member shall notify the failing Member of the results of the verification and the cash compensation amount calculated in accordance with the calculation of the cash compensation process below. The cash compensation shall be paid by the failing Member.

Where the buy-in fails in part or in full, the notification shall include the cash compensation amount calculated in accordance with the calculation of the cash compensation process below unless that notification specifies that the execution of the buy-in is deferred.

Where the execution of the buy-in is deferred, the receiving Member shall notify the results of that deferred buy-in to the failing Member at the latest on the last business day of the deferral period.

Where the buy-in fails in part or in full after the deferral period, the notification shall include the cash compensation amount calculated in accordance with the cash compensation process below.

The receiving Member shall accept and pay for the bought-in securities.

The receiving and the failing Members shall ensure that the following is carried out at the end of each business day on which the receiving Member receives the securities:

- (a) The settlement instructions relating to the settlement fail are cancelled;
- (b) The new settlement instructions are entered into the securities settlement system for any non-delivered securities and the CSD receives the information necessary to identify such new settlement instructions accordingly.

The failing Member shall pay the relevant cash compensation.

The failing and receiving Members shall ensure that the relevant settlement instructions relating to the settlement fail are cancelled upon payment of the cash compensation mentioned above or at the latest on the second business day after the notification of the amount of cash compensation.

3.3.5 CALCULATION OF THE CASH COMPENSATION

The cash compensation to be paid pursuant to CSDR Article 7(7) shall be the difference between the market value of the relevant securities on the business day before the payment of the cash compensation and the settlement amount included in the failed settlement instruction where that settlement amount is lower than that market value.

Where it not already included in the market value of the securities, the cash compensation to be paid pursuant to CSDR Article 7(7) shall include a component reflecting exchange rates variation, as well as corporate entitlements and accrued interest.

The market value of the securities shall be determined as the value determined on the basis of the closing price of Spectrum. Such market value and the component reflecting exchange rates variation, corporate entitlements and accrued interest, shall be disclosed to Members in a detailed breakdown.

INTRODUCTION TO SECURITIZED DERIVATIVES

Securitized derivatives are transferable securities that permit economic exposure, being leveraged or not, into the price changes of the underlying financial instrument or asset that they represent. Leveraged products provide a higher degree of exposure than investing the same amount of capital directly into the underlying financial instrument or asset, meaning that it also comes with more risk than the same investment into that underlying instrument or asset. Non-leveraged products, also known as investment products, provide a specific exposure to the underlying instrument or asset. The price of the investment products will deviate from its underlying and will perform according to specific scenarios. Both leveraged and investment products may overperform or underperform the underlying price evolution. In all cases, the final pay-off is clearly known in advance in the issuance documentation.

Underlying financial instruments or assets as previously stated can be Indices, Equities (and basket of equities), Currencies, Commodities, or additional assets that issuers may offer. The diversified scope of securitized derivatives available on Spectrum Markets include products with knock-out or knock-in barrier options, vanilla options, zero-coupon and other components and financial products, and a combination of different strategies, all securitized in one unique product. Every incremental movement in the price of the underlying financial instrument or asset can lead to proportional or disproportional returns or losses due to the leveraged or investment nature of the product category. Generally, the sensitivity of a marginal price change on the underlying to the price of the securitized derivative is measured by the Delta, which may vary, in absolute terms, between 0% and more than 100%.

The diversity of securitized derivatives available on Spectrum Markets allows, in general, to match with any market scenario or strategy, from hedging to high return, from diversification or market access to focus on a given underlying, from participation to yield enhancement. Product holders, depending on the product selected, may benefit from the underlying price increase, decrease, or sideways.

There are a number of risks associated with securitized derivatives: the risk of losing the entire amount of initial capital invested if the knock-out level is breached or in the case of a vanilla warrant expiring out of the money. Some other risk factors are available on the Issuers' Prospectus, and they vary from product-specific related risk to more general and broader risks.

The objective of Spectrum Markets is to operate a trading venue where issuers will constantly be able to propose products corresponding to many different market scenarios and to the current market conditions prevailing at any point in time. Issuers are given the opportunity to issue and list intraday, if need be, notably if the underlying price change (or other pricing parameters) has made the available product(s) no longer relevant.

Securitized derivatives representing the same underlying financial instrument or asset, but with differing characteristics, are totally separate financial instruments with different ISIN numbers. They are not fungible and will trade on separate order books. In case where a given ISIN is sold out on the initial tranche and the issuer proceeds with further issuance on the same ISIN with a second tranche, both tranches are deemed to be fungible.

Some securitized derivatives will be "Open-Ended", meaning that they will be issued without an expiry calendar date. Other products in issuance at present may have a future expiry date and will therefore naturally expire at this date (or eventually before in case of knock-out or similar de-activation feature).

Please refer to the Issuer's Prospectus for any further details on the products available on Spectrum Markets.

4.1 OPENING PRICE

The Opening Price of the Instruments made available for trading on Spectrum will be updated at the start of every new trading session.

The Opening Price will be the Closing Price of the previous trading session. Unless:

- When new trading occurs on Sunday evening at 23:00pm CE(S)T after weekend downtime then:

The Opening Price will be the midpoint of the first two-way quote, for that trading session, sent by the Market Maker or Liquidity Provider. At the start on Spectrum for the introduction of new instruments (new ISINs) then:

- The Opening Price will be the midpoint of the first two-way quote, for that trading session, sent by the Market Maker or Liquidity Provider.

4.2 CLOSING PRICE

The closing price of a daily trading session on Spectrum is the Last Traded Price (LTP) for the given instrument in that trading session.

Where there was no transaction at all during the said trading session on Spectrum: The closing price will be the midpoint of the last two-way quote for the given instrument sent by the Market Maker or Liquidity Provider in that trading session.

Closing prices will reset at session close (23:00 CE(S)T) and will remain available until the next session close.

Opening and Closing prices for instruments made available for trading on Spectrum can be requested by Members through the FIX market data gateway. Further details of which can be found under the Market Data section of the "Spectrum FIX Rules of Engagement" document available on the Spectrum Website.

5.1 STANDARD ORDERS

Spectrum offers four order types:

- Limit Order
 - A Limit Order is a priced order that remains visible when persistent in the order book and may be executed at a price equal to or better than its set price. Limit Orders will never have priority over a Market Order.
- Market Order
 - A Market Order is an un-priced order, which has priority over Limit Orders. During regular trading sessions, a Market Order cannot persist in the order book. Two Market Order types are offered; Fill or Kill and Immediate or Cancel, with the first type either executing the order completely or cancelling it without any execution. The latter allows an order to be partially executed, and any outstanding volume to be cancelled.
- Stop Market Order*
 - A Stop Market Order is an un-priced order that remains off-book until the Stop price on the specified trigger side is reached. Once triggered, the order will enter the book behaving as an Immediate-Or-Cancel (IOC) market order that would start matching against the best available quotes/orders on the opposite side of the book prior to cancelling the rest of the order once the available liquidity was exhausted.
- Stop Limit Order*
 - A Stop limit order is a priced order that remains off-book until the Stop price on the specified trigger side is reached. Once triggered, the order will be placed on the book behaving as a limit order that could be matched with another order/quote having an equal or better price to the set limit on the opposite side of the book. A triggered Stop Limit Order will persist and remain visible on the book until it is matched or withdrawn.

Stop Orders are triggered when top of the book price of the user-specified trigger side has reached the stop price of the order and when a Market Maker quote is available on the trigger side of the Stop Order.

If a member submits a Sell Stop Order with Bid-side as the trigger side, the Stop Price is greater than or equal to the best price on bid side, and the market maker is quoting on the bid-side, then the Stop Order will automatically trigger.

If a member submits a Buy Stop Order with ask-side as the trigger side, the Stop Price is equal or less than the best price on ask side, and the market maker is quoting on the ask-side, then the Stop Order will automatically trigger.

All persistent Limit/Stop Orders will be removed from the order book whenever the product Issuer applies an adjustment for when an underlying futures contract is changed from the front month to the back month future contract. Members should re-send any end-client order flow that they wish to keep following such an event.

*Stop Market and Stop Limit Orders are not accepted in the Request for Execution trading methodology.

5.2 QUOTES

Spectrum operates 2 types of trading methodology. Firstly, a Direct Matching trading model where Market Makers post firm immediately executable 2-way quotes, and secondly, a Request for Execution (RFE) model where Liquidity Providers post an indicative volume of liquidity with Bid/Offer Spread. Spectrum will monitor for price crosses between orders and this indicative liquidity, and, when a cross is detected will send an RFE to the Liquidity Provider.

5.2.1 Direct Matching Trading Model

Spectrum operates a matching engine that uses the same mechanics as a standard cash instruments exchange, matching buying and selling interests (orders and quotes) on a price and time priority in a central limit order book. As written in Spectrum's Market Maker Agreement, section 4.1: Except in Exceptional Circumstances and where continuous trading takes place, the Market Maker is obliged, for at least the predetermined percentage time of the daily Trading Hours, and calculated for each Trading Day, unless otherwise notified by the Operator by posting a Website Notice, to post simultaneous Two-Way Quotes that qualify as Firm Quotes and are of Comparable Size and Competitive Prices in at least the Market Volume in all Financial Instrument on Spectrum they are authorised to quote. For full details regarding the Market Maker Agreement and Obligations, please see the Members' Documents on Spectrum's website.

5.2.2 Request for Execution Model

In this model Liquidity Providers post indicative non-binding pricing and liquidity. As non-binding this liquidity is not immediately executable. Spectrum will monitor for price crosses between market and limit orders with this indicative pricing. When a cross between an order and an indicative quote is detected, Spectrum will trigger an RFE message to the Liquidity Provider. The Liquidity Provider is then expected within a configurable time-out period to respond by submitting a firm executable quote of comparable price and size into the Spectrum orderbook. Spectrum on receipt of this firm quote will run a matching phase of all the available liquidity in the orderbook and execute using price, time priority. Any residual unexecuted volume of the firm quote is immediately downgraded back to indicative awaiting update from the Liquidity Provider. Any unexecuted volume of limit orders is left to rest in the orderbook awaiting the next matching phase following an RFE, and any unexecuted volume of order types with IOC or FOK as time in force immediately cancelled back to the member. Should the Liquidity Provider fail to respond with a firm quote within the time-out period then the RFE will expire, and matching is run with the interest available in the orderbook. If a firm quote arrives after the RFE time-out period, or at any time outside of an RFE phase, Spectrum will reject the quote with the message "unexpected quote type". Direct Client versus Client matching is not available unless an RFE and subsequent matching phase has been run.

As referenced in Spectrum's Rulebook, section 6.14, the Operations team imposes parameters and/or limits on the number of Quotes that a Member can enter into on any one day, including the total value of those Quotes and the number of messages that can be submitted to the System. The Operations team will notify the relevant Member(s) of these parameters and limits, along with possible amendments.

5.3 TIME IN FORCE

Spectrum Members submitting order flow will be permitted to utilise the following combinations of Time in Force:

- Limit Order
 - Good to Day (DAY) - Expired at the end of the trading day (23:00 CE(S)T).
 - Good till Cancelled (GTC) - Expired when the order is cancelled (e.g., by the member or a trading suspension).
 - Immediate or Cancel (IOC) - Executed upon entry, with any outstanding volume to be expired.
 - Fill or Kill (FOK) - Order is either executed fully upon entry or expired without execution.
 - Good till Date (GTD) - Expired at the end of the trading day (23:00 CE(S)T) as specified in the order placing.
- Market Order
 - Immediate or Cancel (IOC) - Executed upon entry, with any outstanding volume to be cancelled.
 - Fill or Kill (FOK) - Order is either executed fully upon entry or expired without execution.

- Stop Market Order*

The following Time in Force are supported for Stop Market Orders upon submission.

- Good to Day (DAY) - Expired at the end of the trading day (23:00 CE(S)T).
- Good till Cancelled (GTC) - Expired when the order is cancelled (e.g., by the member or a trading suspension).
- Good till Date (GTD) - Expired at the end of the trading day (23:00 CE(S)T) as specified in the order placing.

When a Stop Market Order is triggered, it will execute as an IOC Market order, getting the best fill it can before cancelling the rest of the order giving the client the best chance at execution.

- Stop Limit Order*
 - Good to Day (DAY) - Expired at the end of the trading day (23:00 CE(S)T).
 - Good till Cancelled (GTC) - Expired when the order is cancelled (e.g., by the member or a trading suspension)
 - Good till Date (GTD) - Expired at the end of the trading day (23:00 CE(S)T) as specified in the order placing.

ORDER TYPE	DAY	GTC	IOC	FOK	GTD
LIMIT ORDER	Yes	Yes	Yes	Yes	Yes
MARKET ORDER	No	No	Yes	Yes	No
STOP MARKET ORDER*	Yes	Yes	No	No	Yes
STOP LIMIT ORDER*	Yes	Yes	No	No	Yes

Should a Member attempt to submit an order to trade with a combination not supported in the above list, then that order will be rejected at the Spectrum FIX Gateway and a rejection message returned to the Member with a rejection text.

*Stop Market and Stop Limit orders are not accepted in the Request for Execution trading model.

5.4 TICK SIZES

Spectrum can accept a wide range of tick sizes when dealing with order and quote inputs. However, it is currently configured to Order and Quote inputs from Members with a precision of three decimal points (0.001).

5.5 ORDER AND EXECUTION PRIORITY

Matching on Spectrum is operated by price-time priority. Orders are first ranked according to the price, and prices that have multiple orders are then ranked on the time each was entered. A Market Order will always have priority over a Limit Order.

5.6 ORDER AMENDMENT OR CANCELLATION

During the trading session, a Member who entered an Order may Change/Amend any Order that has not been cancelled, deleted, or executed in full. When Spectrum is closed, any persistent orders will remain in the order book, thus cannot be cancelled or amended. Changing/Amending an order will lead to a new time priority if the Limit Price is changed or if the Order Size is increased. The current time priority of an existing Order will remain the same if the Order Size is decreased.

6.1 ORDER BOOK MONITORING

With volatile markets and rapid price movements, Spectrum operates price movement monitoring. If our set price tolerance levels are breached, Spectrum will halt trading and resume after a random end. If this halt occurs during a Limit Order execution, any outstanding quantity of the aggressive order or mass quote that triggers the halt will be cancelled. The price monitoring does not absolve the Members of their responsibility to ensure enough protection from erroneous order entries.

The price level thresholds, the random end duration's, the Order units, and the Order values are continuously managed by Spectrum's operations team from a business perspective. Spectrum also incorporate pre-trading controls such as price collars to prevent erroneous trading, which are described in more detail in the following sections.

6.2 TRANSACTION CANCELLATION

As set forth in Spectrum's Rulebook, section 7.10, if both parties to a Transaction agree to the cancellation, the Operator may terminate such Transaction upon receipt of both notices no later than 120 minutes after the Transaction was executed. The fee for such a cancellation is €1000 to the initiating party, payable to Spectrum. Should one party request to have a Transaction Cancelled and the Spectrum Operations Team is unable to reach the Transaction's counterpart - the Transaction will remain. Should the counterpart not be willing to agree to the proposed Transaction Cancellation - the Transaction will remain.

The Operator may, in accordance with the Rules and Regulations set forth in Spectrum's Rulebook, section 6.11, cancel, amend, or correct a Transaction. The Operator may at its discretion consult the relevant Member(s) and will notify them of its decisions and actions under this rule as soon as practicable. For further details, and specific instructions on how to cancel orders and quotes, please see section 7.4 below.

6.3 TRANSACTION REVIEW

The Operator may, in its reasonable discretion and in accordance with Section 74 para. 2 WpHG in connection with Section 24 para. 2 sentence 4 BörsG, cancel or amend a Transaction upon request by a Member that entered in the Transaction following the procedure set forth in Spectrum's Rulebook, section 6.13.

The Operator will inform the affected Members of its decision to either cancel or amend the relevant Transaction as soon as practicable or will, otherwise, notify all affected Members indicating that the Transaction shall stand. In making its decision, the Operator may reasonably consider the circumstances at the time the transaction was entered into, the current market situation, and the interests of the Members involved in the Transaction.

6.4 PRE- AND POST-TRADE CONTROLS

Spectrum in accordance with RTS 7 Article 20 has in place a number of pre-trade controls that will reject automatically, potentially aberrant orders that maybe unusual in their number, price or size (in both units and value). These controls are described further in the following;

6.4.1 PRE-TRADE CONTROLS

PriceCollars

Limit orders submitted to the Spectrum matching engine are subject to a price collar check before being made available for execution. The price collar check is based on the prices available in the Spectrum order book for the instrument that is being submitted for possible execution. Orders are rejected if one of the three below references is available and order limit is below the lower bound or above the upper bound. The order will be rejected back to the Member that submitted the order with the rejection FIX message explaining that the order has failed the price collar validation.

Lower Bound = $\text{Max}(\text{Minvalue}, \text{reference} - \text{Max}(\text{reference} * \text{Multiplier}, \text{Absvalue}))$

Upper Bound = $\text{Min}(\text{Maxvalue}, \text{reference} + \text{Max}(\text{reference} * \text{Multiplier}, \text{Absvalue}))$

The **reference** is determined as:

- If both sides are priced, then:
Midpoint of Best Bid and Ask
- Else if we have a Last Traded Price:
LTP
- Else if we have a previous-close price:
Previous-close
- Else (default)
No reference price available - accept all limits

Maximum order value collar

Spectrum will automatically reject new incoming member orders should they be of a size (value in €) exceeding a configurable threshold for that instrument as determined by the Spectrum management.

Maximum order size collar

Spectrum will automatically reject new incoming member orders should they be off a size (number of units) exceeding a configurable threshold for that instrument as determined by the Spectrum management.

Please contact Spectrum's Operations team for full information on specific markets' thresholds.

6.4.2 LIFTING OF PRE-TRADE CONTROLS

In accordance with regulation, Spectrum is obliged to offer its Members the facility to bypass the previously described pre-trade controls, should a member request such an action, and the nature of the order(s) to bypass the control has been disclosed to and approved by the Spectrum Operations Team after they have reviewed the nature of the request against the current market conditions. Spectrum will provide a bypass code for each the Demo and the Live environment. The code for the Demo environment can be used by the Members to test their software without further alignment with Spectrum. The bypass code for the live environment must only be used after written (e-mail) approval of Spectrum Operations.

Please see the Spectrum FIX Rule of Engagement for full details regarding the FIX tag to be used to facilitate the described process.

The Spectrum matching engine will on the submission of the order requested to bypass the pre-trade controls, check the validity of the code, and if valid, allow it to bypass all of the pre-trade controls and become available for execution. Should the bypass pre-trade controls code be found to be expired, or for an incorrect member, then the order will be subject to the pre-trade controls described earlier, and should it fail those checks it will be rejected back to the member with a rejection FIX message saying it has failed pre-trade control checks with an invalid bypass code.

6.4.3 POST-TRADE CONTROLS

Spectrum is not obliged to have its own post trade controls because the entity does not offer clearing and settlement services. Spectrum has not the means to monitor its member positions after transactions.

6.5 MECHANISMS FOR VOLATILITY MANAGEMENT

Spectrum in accordance with RTS 7 Article 19 has in place a number of dynamic system controls to facilitate the orderly functioning of the trading venue, and to ensure that there is sufficient capacity to carry out all its functions without system failures, outages or errors in the matching and execution of transactions. These controls are described in the following;

6.5.1 CIRCUIT BREAKERS

Spectrum has adopted 2 hybrid solutions of circuit breaker to ensure the orderly functioning of its order books, one for the Direct Matching model, and a second for the RFE model, both are described in the following paragraphs:

- Direct Matching Model

Trading will be automatically halted on Spectrum prior to a trade price that would touch or move outside a corridor of the reference price +/- the circuit breaker range. The corridor for each orderbook is determined by:

For long Turbo Warrants:

Lower Limit: $\max(((1 - \text{circuit breaker range}) * \text{reference price} - \text{strike}) * \text{multiplier}, 0)$

Upper Limit: $((1 + \text{circuit breaker range}) * \text{reference price} - \text{strike}) * \text{multiplier}$

For short Turbo Warrants:

Lower Limit: $\max((\text{strike} - (1 + \text{circuit breaker range}) * \text{reference price}) * \text{multiplier}, 0)$

Upper Limit: $(\text{strike} - (1 - \text{circuit breaker range}) * \text{reference price}) * \text{multiplier}$

The reference price is determined per orderbook as:

At start of trading session: previous trading session closing price of the underlying if no new reference price was set since the close of the underlying.

When a circuit breaker is triggered, the new reference price is calculated as:

Strike + (potential execution price)/multiplier for long Turbo Warrants

Strike - (potential execution price)/multiplier for short Turbo Warrants

- RFE Matching Model

Trading will be automatically halted on Spectrum prior to a trade price that would touch or move outside a corridor of the reference price +/- the circuit breaker range. The corridor for each orderbook is determined by:

Lower Limit = Reference Price - $\max(\text{Lower Limit Multiplier} * \text{Reference Price}, \text{Lower Limit Absolute})$

Upper Limit = Reference Price + $\max(\text{Upper Limit Multiplier} * \text{Reference Price}, \text{Upper Limit Absolute})$

The reference price is determined per orderbook as:

1. The mid of the 1st 2-sided indicative quote after start of trading session
2. The potential trade price that triggered a circuit breaker

A circuit break event will only happen during the matching phase following an RFE. An order or quote that triggers an RFE at a price at or outside the LL/UL corridor will not cause a circuit break.

The orders that were part of triggering the circuit breaker will be cancelled without execution in case they order types with IOC or FOK as time in force. Otherwise, they stay passive in the book. Circuit breaker check is done after the wash trade prevention so that wash trades can't be used by traders to trigger circuit breakers.

The circuit breaker range which governs the percentage price movement from the reference price point before a trading halt is initiated is currently configured for both matching models, and this value can be adjusted should it need to be widened or narrowed.

6.5.2 TRADING HALT

Should a circuit breaker threshold be touched during the continuous trading period on Spectrum, the trading on the order book for the security subject to the circuit breaker event will be halted. Any outstanding quantity of the aggressive order or mass quote that triggers the circuit breaker event will be cancelled. Executing against quotes and orders will be unavailable during the halt. Orders currently passive in the book will remain but no matching/execution will be facilitated.

The trading halt will persist for a period of 10 seconds up to 30 seconds with a random end to prevent any gaming on the trading venue. Once trading is resumed following a halt initiated by a circuit breaker event, should the price again move by enough to touch a circuit breaker threshold, another trading halt will be activated. This process will continue until the security price has stabilised. The time period for which the trading halt initiated by a circuit breaker event persists for can be adjusted.

Securities authorised for trading on Spectrum will, in addition to circuit breaker halts, follow the underlying market that they represent into, any unscheduled, intraday, limit up / limit down trading halts on that underlying market. They will also automatically resume trading in line with the underlying market once it resumes trading. Once again during these halts, executing against Market Maker quotes and client orders will be unavailable during the halt. Resting passive orders will stay frozen in the book until a trading resumption.

During a Trading Halt, orders can be added so long as their price does not cross the top of the book, modified but not the price nearer to the current market level, cancelled, and its status enquired. Quoting into the book is also permitted but no matching will take place.

6.5.3 TRADING SUSPENSION

Spectrum may suspend or limit the availability for trading of securities or take any other measure it deems necessary in the interests of maintaining an orderly and proper market. Such suspension or limitation, and any restoration or resumption of availability for trading, shall be published on the Spectrum website.

Should a trading suspension be initiated then all resting orders and quotes in the order book subject to the suspension will be purged (removed/cancelled) clearing the order book of any open interest. Market makers will be prevented from posting new quotes and

6. ORDER BOOK EXECUTION (CONTINUED)

Broker Members will see any new orders to trade rejected back to their OMS with a rejection text. This status will remain until the restoration of the trading suspension.

An Issuer may seek the suspension or withdrawal of securities from trading. To this end, a justified request specifying the reasons for such request must be addressed to the Spectrum Operations Team. Upon review the request, the Spectrum Operations Team shall take into account the interests of Spectrum and its Members, the interests of securities holders and, if applicable, interests of the Issuer.

Should an underlying market become suspended due to factors outside of the control of Spectrum, then Spectrum will follow the underlying market into the suspension and subsequent restoration.

6.5.4 MESSAGE RATE THROTTLING

To ensure stability, resilience, and performance optimisation, Spectrum is equipped with a configurable message rate throttling mechanism in the Order Entry Gateway to limit the rate at which Members can submit messages (orders & quotes) to the matching engine. The rates will be checked on a per FIX session basis and will be calculated as the number of incoming Member messages during a specified time bucket, during the session. This will be exercised at two levels as explained below:

- Hard Limit Rate, which if exceeded during a time bucket, will lead to the rejection of the incremental FIX messages and the disconnection of the infringing Member(s) gateway. All the messages beyond the limit during this time bucket will be rejected and the Members will receive rejection messages back into their OMS. Spectrum Operations will be alerted to the Members disconnection, and they will directly contact the infringing member to determine the nature of the breach and request they reconnect should they have resolved the reason behind the message rate breach.
- Soft Limit Rate, which is configured at a level lower than that of the hard limit rate will trigger an e-mail notification to the Spectrum Operations Team, alerting with respect to potentially infringing Member(s).

There will be continuous monitoring within each time bucket during the ensuing FIX session and will lead to rejections and alerting based on the nature of breach, if any. Please contact the Spectrum's Operations Team for full information on message throttling in terms of soft limit, hard limit and time bucket specifications at operations@spectrum-markets.com

6.5.5 MATCHING ENGINE KILL SWITCH PROVISION

In the rare event of technical or market issues, it will become critical for the Spectrum Operations Team to instantly stop the matching engine to prevent any serious impact, financial or otherwise, on the overall working of the MTF. To that effect, Spectrum will be equipped with a "Kill Switch" feature within the system which will enable the Operations Team to shut down all of the matching engine functionality instantaneously at the press of a button.

The following process will be adhered to during deactivation and reactivation of the matching functionality using the Kill Switch:

- Spectrum Operations Team to use the switch to SHUTDOWN the MTF.
- Once shutdown is activated, the following processes will be initiated:
 - Rejection of new orders and quotes
 - Turn-off matching engines
 - Cancel all working orders
 - Cancel all working quotes
 - Set status of all the order books to "**Closed**"
- Spectrum Operations Team to use the switch to RESTART the MTF.
- Once restarted, Spectrum Operations Team will ensure:
 - Restoration of all order books to scheduled states
 - Set status of all orders books that should be open at that time according to the trading schedule to "Open"
 - Turn-on matching engine
 - Accept new orders and quotes

However, it must be noted that the use of Kill Switch will not affect the Issuer connectivity into Spectrum in any manner. As a result, Issuer will be able to send new instruments and perform knockouts and strike price updates as usual. New instruments will be listed as scheduled but will be set to "Closed" state immediately thereafter in adherence to the Kill Switch process cited above.

Please contact Spectrum's Operations Team for more information on Matching Kill Switch Functionality at operations@spectrum-markets.com

7.1 INFORMATION CHANNELS

In case of unexpected Service interruptions or limitations. Spectrum will inform Members by

- putting a notice on the Spectrum Website (<https://www.spectrum-markets.com/notices>)
- via e-mail to the e-mail addresses of the trading contact provided according to Section 1.3.

Information will be updated during the cause of the Limitation.

7.2 DESCRIPTION OF FAILOVER AND DISASTER RECOVERY PROCESSES

Spectrum fail-over and disaster recovery is described in the Spectrum “Technical connectivity guide” available on the Spectrum website under <https://www.spectrum-markets.com/client-connectivity-guide>.

Spectrum will offer regular timeslots (minimum once per year) for the Members to test the fail-over and recovery processes together with Spectrum. Such Tests will be announced in advance by a notice on the Spectrum website. Respective tests will also be part of the technical conformance Tests during the process of member Onboarding.

7.3 SYSTEM STATES AFTER RECOVERY OR SERVICE INTERRUPTION

In case of a service interruption or disaster recovery the affected instruments will normally be set to halt status (description see above). There will be a time (announced by website notice) before trading is continued. During this time, it can also happen, that Instruments or Members are suspended.

7.4 DELETION OF ORDERS AND QUOTES FOR MEMBERS

In case Members have Problems with their trading Systems or the connection to Spectrum, Operations will on best effort Basis delete orders or quotes for a member. Such requests have to be addressed via phone by an authorised trader as provided in the membership application to Spectrum Market Operations. Spectrum Operations will verify authenticity by asking for the Pin provided in the list of authorised persons or calling back on the registered phone number.

8.1 DEFINITIONS

TERMS/ACRONYMS	EXPLANATION
CE(S)T	Means the time zone of Frankfurt/Germany that can be (CET) or Central European Summertime (CEST)
CSD	Central Securities Depository
CSDR	Central Securities Depository Regulation
ER	FIX 'Execution Report'
LEI	Legal Entity Identifier
Liquidity Provider (LP)	Means a person who entered into a Liquidity Provider Agreement and is, on a Request for Execution basis, willing to deal on own account by buying and selling Financial Instruments in scope of the relevant Liquidity Provider Agreement against that person's proprietary capital at prices defined by that person.
Market Maker	Means a person who entered into a Market Maker Agreement and is, on a continuous basis, willing to deal on own account by buying and selling Financial Instruments in scope of the relevant Market Maker Agreement against that person's proprietary capital at prices defined by that person.
MTF	Multi-Lateral Trading Facility
Request For Execution (RFE)	Means a message sent by the Operator to a Market Making Member as a request to respond with an executable quote or a quote rejection. The Market Making Member may decide not to react to such a request.
Spectrum	Means the Spectrum MTF Operator GmbH
Member	A person that has been admitted by the Operator in accordance with Rule 5.2. It meets at least the General Membership Eligibility Criteria as set out in Rules 5.7 and has entered into a Membership Agreement with the Operator.
SSI	Standard Settlement Instruction

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