



## **CBOE EUROPE EQUITIES GUIDANCE NOTE PERIODIC AUCTIONS BOOK**

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## 1. Introduction

This guidance note is intended to provide contextual detail to the Cboe Europe Equities (“Cboe”) Periodic Auctions Book service which went live in Production on Monday 19<sup>th</sup> October 2015.

### Intended Audience

This guide is intended to be read by those with responsibility for implementing and supporting interfaces to Cboe (typically software engineers, support staff, business analysts and systems administrators).

### Reason for Changes

Various Cboe functional protocols were changed in 2015 to provide support for Periodic Auctions on the Cboe BXE and DXE Environment.

### Reference

For a summary of all upcoming major technical changes, please refer to the [Technical Change Calendar](#).

Market data feeds:

- i. Whilst Cboe TCP and Multicast feeds provide all Cboe market data information, the Cboe Auction Feed (BAF) disseminates Cboe Auction price and size information only over TCP PITCH for Opening, Closing and Periodic Auctions.
- ii. The Last Sale Feed disseminates real-time trade data only over TCP PITCH and includes price, volume and time while specifically excluding order information. It includes MiFID II-compliant flags for the purpose of post-trade transparency and is available in BETA format.

## 2. Auctions on Cboe Europe Equities

### Periodic Auctions

Periodic Auctions will operate as a distinct order book and will be separate from the BXE, CXE and DXE Integrated (Lit) and Dark Books.

There will be **no interaction** between the Periodic Auctions Book and the other order books.

Periodic Auctions will be identifiable under the new Sub Market Identifier Code (MIC) of **BATP** in BXE and **BEUP** in DXE. A full list of current Cboe MICs can be found on the [website](#).

The Periodic Auctions Book runs on the Cboe BXE and DXE environments only.

The Periodic Auction frequency is derived from activity levels and so can differ per symbol and will be identified in the [Cboe Reference Data Files](#). Details on Reference Data are described in the [Reference Data](#) section of this document.

A TimeInForce of ‘Good For Auction’ (GFA) is supported for Periodic Auctions orders.

Periodic Auctions operate between 09:00 and 17:30 (CET), honouring any market segment holidays or early closings.

Periodic Auctions are subject to a Minimum Order Entry Size check on order entry and order modifications.

### Opening and Closing Auctions

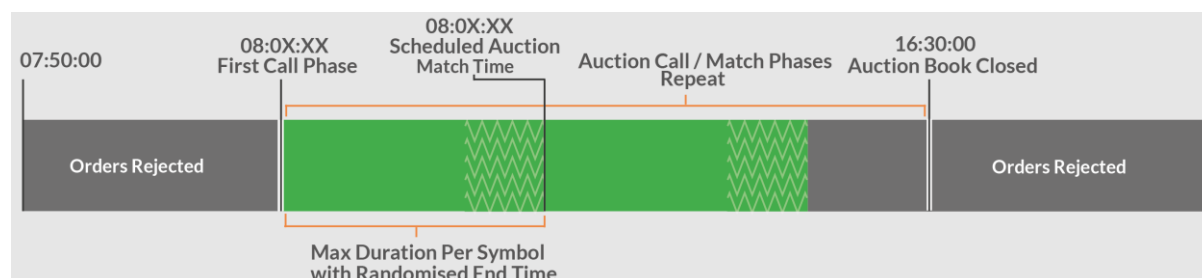
Opening and Closing Auction functionality for Cboe Regulated Market Listed ETF (REGM segment) securities is completely distinct, separate and unaffected by the Periodic Auctions Book.

**Multicast and TCP PITCH auction messages:** Auction Update and Auction Summary messages are used for all auction types, Opening/Closing and Periodic Auctions. Please see the [Multicast and TCP PITCH](#) section of this document.

Opening and Closing Auctions operate between 08:50 and 17:35 (CET) on the CXE Environment **only**. Again, these auctions are separate from the Periodic Auctions Book which operates on the Cboe BXE and DXE Environments only, and on its own schedule.

## 3. Auction Phase Overview

### The Shape of the Trading Day



Periodic Auctions will not generate executions past 16:30:00.

The latest start time of an auction call phase will be the symbols maximum duration before 16:30:00.

## 4. Periodic Auctions features

### Auction Match Algorithm

An Auction Match comprises two steps – Price Determination followed by Execution Allocation.

### Price Determination

To determine a single equilibrium match price the following criteria shall be assessed in sequence:

- i. Maximum executable volume. If a single auction price can be chosen which uniquely maximises the auction volume, then this is chosen as the auction price.

- ii. Minimum surplus. If, within the set of prices identified in (i) which maximise executable volume, there is a price which minimises the order volume which would be left on the order book priced at the auction price, then this price level is selected.
- iii. Market pressure. If the set of prices identified in (ii) would always result in unexecuted order volume on the buy side of the book, then the highest price identified in (ii) is selected as the auction price. Similarly, if the remaining volume would always be on the sell side of the book, then the lowest price would be used.
- iv. Reference price. If (iii) does not yield a unique price level, then out of the set of potential prices identified in (ii), the price which is closest to the Reference Price for the security is chosen.

Reference Price is defined as the last auction traded price, open or close price of the BXE or DXE environment; whichever is the most recent; if none of these exist then the prospectus price or equivalent shall be used.

### Execution Allocation

Execution allocations will take place on a **Price x Volume x Time** basis. Market orders will be deemed to have the highest Price priority, meaning they will be allocated first at the equilibrium match price.

### Broker Preferencing

Participants can select a Broker Preferencing attribute at a port level where orders submitted to the PAB will be executed in priority against each other at the Execution Allocation phase.

At the end of the auction call period, once the equilibrium price has been determined for the maximised volume and data disseminated, the Execution Allocation takes place. Broker Preferencing will take effect at the Execution Allocation point and will move the allocation priority from **Price x Volume x Time** to **Broker x Price x Volume x Time** for all orders submitted with this attribute. Broker Preferencing orders will be uncrossed starting from the non-surplus side, at the equilibrium price and within the indicative volume previously disseminated.

### Marketable Order Lock

Participants can select the Marketable Order Lock mechanism at the port level, so that orders submitted to the Periodic Auctions Book which are marketable are locked in until the end of an auction even if a cancel request is received.

With Marketable Order Lock enabled, an order cancel request is rejected with a reason 'k' (Pending Auction), if an auction is active and the order is marketable in auction.

If a cancel request is rejected and order partially executes at the end of an auction, the order is then cancelled with a reason 'U' (User Requested). Any cancel request made when an order is not marketable in auction is accepted and the order is cancelled with a reason 'U' (User Requested).

Order amendments continue to be actioned as normal.

Expiration times for GTD orders will be respected. Marketable Order Lock has been available on request since 12<sup>th</sup> October 2018 in BXE and DXE Production.

### **Accept Or Cancel (AOC) Order Type**

The AOC order type behaves in one of two ways:

- Marketable orders (those for which a contra exists on the book at time of submission) are accepted and added to the book as Good For Auction (GFA) orders (with any unfilled residual expiring at the end of that auction cycle). The acceptance of an AOC order as a GFA order will contribute to the published indicative auction quantity and price.
- Non-marketable orders (those for which there is no valid contra at time of submission) are cancelled back immediately and would not contribute to any change in published indicative auction quantity and price.

The AOC order type can be used with Minimum Acceptable Quantity (MAQ).

The assessment of marketability for AOC orders gives consideration to price (including price-improvement if specified – see below) and any MAQ specified, but does not give consideration to broker-preferencing.

It should be noted that AOC orders accepted into PAB are likely to result in an execution but are not guaranteed to. Accepted orders will not be re-evaluated after every auction update. It is therefore possible to have an AOC order accepted but not receive an execution. This could be due to another more marketable PAB order being entered, or the cancellation of a contra side order.

### **AOC Price Improvement**

AOC Limit orders can additionally request Price Improvement. The price improvement feature is not supported for non-Limit order types e.g. Market, Pegged.

The following Price Improvement options are available, with any adjustment applied upon order acceptance:

- i. None - no adjustment is performed to the client-provided Limit Price
- ii. Limit - the client-supplied Limit Price is adjusted one tick passively
- iii. Far Touch - The client-supplied Limit Price is adjusted to the more passive option of: 1 tick inside EBBO far touch, or the supplied limit price.
- iv. Both – The client-supplied Limit Price is adjusted to the more passive option of: 1 tick inside EBBO far touch, or 1 tick inside the supplied Limit Price.

### **Dark To PAB Sweep Order Type**

The Dark to Periodic Auction Book (PAB) Sweep order type allows Participants access to the dark and periodic auction order books with a single order. Dark to PAB orders will first sweep the dark book (midpoint matching) as an effective IOC before targeting the PAB as a midpoint pegged order with any residual quantity resting on the PAB for the remainder of the order's time in force.

The Dark to PAB Sweep order has a Routing Instruction (FIX tag 9303) value of BH. However, at a port level, Dark to PAB Sweep orders must be enabled to support the new sweep order type. This can be enabled through a request to the Trade Desk.

Alternatively, at a port level, all dark book orders can be automatically converted to Dark PAB Sweep orders. This can be enabled through a request to the Trade Desk.

The Dark to PAB Sweep order has the following characteristics:

- The order will be Midpoint pegged. Where ExecInst (FIX tag 18) is supplied only the value Midpoint pegged (M) is supported. Supplying any other value will cause the order to be rejected.
- The AOC order type is supported for Dark to PAB with a TimeInForce (FIX tag 59) of IOC and, if marketable, will be treated as a GoodForAuction in the PAB
- Executions resulting from a Dark to PAB order will have a LastMkt (FIX tag 30) value reflecting the market of execution. For BXE (BATD or BATP) and for DXE (CEUD or BEUP).
- If a symbol is capped due to MiFID/ESMA dark volume cap or primary market pricing is unavailable the Dark to PAB order will route directly to the PAB instead of being rejected
- Broker preferencing will be honoured in the PAB but not in the Dark order book
- Order amendments to a Dark to PAB Sweep order which is resting on the PAB will not route through the Dark order book
- MinQty (FIX tag 110) is supported
- MaxFloor (FIX tag 111) is not supported and if entered will be ignored

### **Dark on Expiry (DOE) Order Attribute**

The Dark on Expiry (DOE) order attribute enables sweeping the dark book on expiry of a PAB Auction where residual volume exists.

- Applied at the end of a PAB auction, opted-in residuals are swept against the local Dark Book (in time priority)
- Applicable to marketable AOC and GFA time in force values only. Other, unsupported values will still be accepted but will be ignored i.e. will not sweep the local dark book
- Compatible with Vanilla PAB, Dark/PAB and PAB-Lit Sweep Order Types
- Port and order-level setting (order-level overwrites port-default if RoutingInst(9303) has 4<sup>th</sup> character set)
- e.g., Dark to PAB (9303=BH) orders with DoE enabled either on the port level or the order message will not scrape the dark book on expiry if the order is deemed non-marketable

### **Near-touch Peg with Aggressive Offset**

Pegging option available only on resting PAB orders, an alternative to Mid-point peg, and guarded mid-point peg. Unavailable to dark-PAB sweep order types. Compatible with PAB-DoE.

The Near Touch Peg with aggressive offset has the following characteristics:



- Support for ExecInst (18) = R “Near Touch Peg” which will apply the specified offset in PegDifference (211) to the near-side of the EBBO, whilst capping to the midpoint of the EBBO
- i.e., When specified on a buy PAB order, the price pegs to “EBBO:Bid + Peg Difference”, when on a Sell order, the price pegs to the “EBBO:Ask + Peg Difference”. In either case, the price will be capped passively to the EBBO-mid price. Note, that to achieve an aggressive peg difference on a Sell order, PegDifference must be specified as a negative value.
- The aggressive offset will never move an order to be more aggressive than the Mid
- PegDifference (211) must be specified as an absolute value on each order. ExecInst may be defaulted (including to ‘R’), but to default to R, the PegDifference would still need to be specified per-order.
- Orders which specify ExecInst(18)=R, where RoutingInst(9303) is not BP, shall be rejected.

### All or Nothing (AON) Order Attribute

All-Or-Nothing (AON) setting, only applied in the PAB phase, and resulting in the MAQ of the order being set to the full order size. Will form part of the marketability check when combined with an AOC Time In Force.

- Compatible with broker preferencing
- Can be enabled per order flag and can also be defaulted on a port level.
- Applicable to marketable AOC and GFA (Good for Auction) order types only, PAB-Lit Sweep Order Types are supported as they are implicitly GFA. PAB-Lit Sweep Order Types will support AON only in the periodic auction phase.
- The Minimum Acceptable Quantity (MAQ) interactions are the following:
  - The AON setting will honour order size amendments (up or down). The order will either fully execute its new size, or it will not execute at all, in the PAB phase. If AON is set on the port as a default, and an MAQ value is supplied on an inbound individual order, the port-level default will take precedence in the PAB phase.
  - If AON is not set, the MAQ value will be honored in the PAB as it is today.

	MAQ/AON Applicability to order book	
Instruction on inbound order	PAB	Dark
MAQ only	MAQ	MAQ
AON only	AON	-
AON & MAQ	AON	MAQ

The AON setting will not be carried forward into any subsequent sweep phases, and hence any order-level MAQ supplied by the client will be used instead.

### Participant Trade Prevention (PTP) Order Attribute

The PTP setting can be specified on orders in PAB to help Participants avoid unintentionally trading with their own orders. PTP is available on order submitted directly to PAB as well as sweep orders that interact with PAB.

- PTP options can be provided by the Participant on each order or defaulted on request via the corresponding port attribute.

- PTP field (existing FIX tag 7928) comprises three components:
  - Modifier - defines desired action when a self-match is detected. Available modifiers in PAB are "N" (Cancel Newest) and "O" (Cancel Oldest):
 

**N = Cancel Newest**  
If the limit price on the new order would lock or cross any applicable contra order(s), the new order is cancelled and thus prevented from entering the next periodic auction phase, regardless of whether an auction is currently underway.

**O = Cancel Oldest**  
If the limit price on the new order would lock or cross any applicable contra order(s), all such older contra orders are cancelled and the new order is accepted. Should this action disrupt an ongoing auction, "Cancel Newest" behaviour will take effect instead and the new order is cancelled without entering the auction.  
More specifically, if the last auction update sent indicated a non-zero indicative size and the new order would lock or cross any applicable contra orders then Cboe falls back to the "Cancel Newest" behaviour.
  - Level - defines whether PTP operates at the bank code or MPID (Participant) level when considering orders.
  - Trading Group ID – offers further granularity for Participants to restrict which orders are considered for PTP.
- With regards to Market and Pegged order types submitted without a fixed limit price, PTP will consider any such order to be a potential self-match if any applicable contra orders exist, regardless of their price.
- With regards to Market and Pegged order types with a fixed limit price, only the limit price as specified on the order is considered for PTP.
- If an order with PTP is sent on a port which also has Broker Preferencing enabled, then Broker Preferencing will take precedence and PTP considerations will be disregarded for the PAB only.

### PAB-Lit Sweep Order Types

The Periodic Auction Book (PAB) to Lit Sweep orders allow Participants to use a single routing instruction (AOC) to check the PAB for marketable contra liquidity (meeting any specified MAQ and Price Improvement) in which case the order is accepted into the PAB book as a GFA order. If the order is not marketable in the PAB, it will immediately target the local Lit book.

PAB Lit Sweep attribute must be enabled at a port level to support the new sweep order types. This can be enabled through a request to the Trade Desk.

The PAB Lit Sweep Order Types Routing Instructions are:

Order Type	Routing Instruction Value
PAB/Lit	BLNN
PAB/DOE/Lit	BLND
Dark/PAB/Lit	BMNN
Dark/PAB/DOE/Lit	BMND

- PAB/Lit – Targets the PAB as an AOC order which, if marketable vs. a resting contra will be accepted as a GFA order, or if not accepted, will then immediately target the Lit order book with the client-specified TIF.
- PAB/DOE/Lit – Same as PAB/Lit, with Dark-on-Expiry applicable only if accepted into PAB. (See Dark to PAB Sweep Order Type). Any residual quantity remaining after expiry of the periodic auction will sweep to the Dark book (midpoint matching) as an IOC.
- Dark/PAB/Lit – Will first sweep the Dark book as an effective IOC before targeting the PAB book as an AOC order. If it is not accepted into the PAB, it will immediately target the local Lit order book with the client-specified TIF.
- Dark/PAB/DOE/Lit - Same as Dark/PAB/Lit with DOE (See Dark to PAB Sweep Order Type) introduced after the PAB phase. Dark-on-Expiry eligible, only if accepted into PAB.

The PAB Lit Sweep order suite have the following characteristics:

- All TimeInForce (TIF)’s are implicitly IOC/AOC in the Dark and PAB trading phases with the client-specified TIF being applied if the order reaches the Lit book.
- PAB orders deemed to be “marketable” vs. an existing contra order will enter the next periodic auction as a GFA order, and will not subsequently be sent to the Lit book
- Only non-marketable PAB orders that have not entered a periodic auction will be sent to the Lit book.
- A dedicated new AON (All or Nothing) attribute for PAB-Lit sweep orders is supported as an order level setting or port default, and is only applied in PAB
- Price improvement instructions are supported and applied in the PAB phase only.
- The OrdType (FIX tag 40) and ExecInst (FIX tag 18) of an order are updated automatically as the order sweeps between books.
- WaiverType is also automatically adjusted.
- Midpoint and Guarded Midpoint peg are supported in PAB, but Near-touch is not supported. No pegging is applied to the order when sweeping into the Lit Book.

Summary of PAB-Lit Sweep order handling:

Feature	Phase		
	Dark	PAB	Lit
<b>TIF</b>	Always handled as an IOC	Always handled as an AOC, converted to GFA if order is deemed “marketable” vs. an existing contra at point of receipt	Client-specified TIF honoured
<b>MAQ</b>	Always honoured	Applied unless AON specified at order/port level, in which case AON takes precedence	IOC MAQ honoured Other TIFs MAQ disregarded
<b>AON</b>	Disregarded	Always honoured	Disregarded
<b>Price Improvement</b>	Always honoured	Always honoured	Disregarded
<b>Peg Instructions</b>	Primary Midpoint Pegged supported	Midpoint and Guarded Midpoint supported (Cboe EBBO Midpoint Pegged)	Disregarded

## 5. Multicast and TCP PITCH

For market data technical protocol details, please reference the relevant specification:

[Multicast PITCH Specification](#)

[TCP PITCH Specification](#)

### **Auction Update Message**

- Includes an Auction Type value of 'P' for Periodic Auctions
- Includes an 'Outside Tolerance' field
- Includes an 'Includes Primary' field

### **Auction Summary Message**

- Includes an Auction Type value of 'P' for Periodic Auctions

Please see [Appendix 1](#) for full details.

### **Trading Status Messages**

Trading Status Messages are not published separately on the Periodic Auctions Book. Periodic Auctions follow the BXE Continuous Trading Session hours as outlined on the [website](#), with the exception of securities in a regulatory halt.

## 6. Order Entry

Please reference the relevant specification:

[FIX Specification](#)

[BOEv2 Specification](#)

### FIX Details

- i. RoutingInst values:
  - 9303=BP for Periodic Auction Book
  - 9303=BH for Dark Book - Periodic Auction Book
  - Additional 3<sup>rd</sup> characters to above 'BP' value:
    - None
    - L=Limit
    - T=Far Touch
    - B=Both
  - Additional 4<sup>th</sup> characters to above values:
    - D=Dark on Expiry
    - N=None
- ii. TradeLiquidityIndicator value (9730=P) for Periodic Auction
- iii. ExecInst value (18=G) Guarded Midpoint
- iv. ExecInst value (18=M) EBBO Midpoint
- v. ExecInst value (18=R) Near Touch Peg
  - PegDifference (211) with Aggressive offset
- vi. ExtendedExecInst value (9416=G) for AON
- vii. MinQty value (110=<Minimum fill quantity>)
- viii. TimeInForce value (59=3) AOC

### BOEv2 Details

- i. RoutingInst values:
  - 'BP' for Periodic Auction Book
  - 'BH' for Dark Book - Periodic Auction Book
  - Additional 3<sup>rd</sup> characters to above 'BP' value:
    - None
    - L=Limit
    - T=Far Touch
    - B=Both
  - Additional 4<sup>th</sup> characters to above values:
    - D=Dark on Expiry
    - N=None
- ii. BaseLiquidityIndicator value 'C' for Auction and SubLiquidityIndicator value 'P'

- iii. ExecInst value 'G' Guarded Midpoint<sup>1 2</sup>
- iv. ExecInst value 'M' EBBO Midpoint<sup>2 3</sup>
- v. ExecInst value 'R' Near Touch Peg
  - PegDifference with Aggressive offset<sup>4</sup>
- vi. ExtendedExecutionInstruction value 'G' for AON
- vii. extExecInst='G' for AON
- viii. MinQty value for "Minimum fill quantity"
- ix. TimeInForce value '3' for AOC

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<sup>1</sup> Guarded Midpoint (peg to Cboe EBBO midpoint but suspend order if primary market quote becomes one-sided or disappears).

<sup>2</sup> RoutingInst and ExecInst can be set as port defaults upon request, please contact the Trade Desk for more information.

<sup>3</sup> Midpoint (peg to Cboe EBBO midpoint).

<sup>4</sup> Pegged to the EBBO with offset specified in PegDifference

## 7. Reference Data

### Symbol Reference Data

- i. Symbols eligible for Periodic Auctions are identified in the Cboe Live Symbols CSV with a value of 'P' in the Supported Services column.
- ii. The column 'Periodic Auction Max Duration' (expressed in milliseconds) in the Live Symbols CSV, indicates the maximum periodic auction duration per symbol.
- iii. The columns 'Periodic Auction Min Order Entry Size' and 'Periodic Auction Min Order Entry Notional' in the Live Symbols CSV, indicate minimum order size (in shares), and minimum order notional (in traded currency), respectively.

These values will be assigned on a per symbol basis and can be found in the BXE, CXE and DXE Symbols CSV files:

- i. Live Symbols CSV: [BXE CXE DXE](#)
- ii. Live Symbols Enhanced CSV: [BXE CXE DXE](#)
- iii. CERT Symbols CSV: [BXE CXE DXE](#)
- iv. CERT Symbols Enhanced CSV: [BXE CXE DXE](#)
- v. Described in the [Reference Data Specification](#)

## 8. Order Validity Matrix

The order Validity Matrix provides an overview of the supported OrderType and TimeInForce (TIF) values for Periodic Auctions.

- i. Day, Good Till Cancel (GTC), Good Till Date (GTD) and Market Orders will roll between auctions until fully executed, their specified expiry time (GTD), the end of the last auction of the day or until cancelled by the submitter
- ii. Individual orders will not be published on the market data feeds
- iii. Only midpoint orders with the ExecInst value of 'G' or 'M' will be accepted
- iv. Orders will be subject to Minimum Order Entry Size check
- v. The 'IOC' TimeInForce value is used for AOC orders

		Time In Force					
Session	Order Type	Day	GTD/GTC	GFA	AtTheOpen	AtTheClose	IOC
Periodic Auction Session 08:00 – 16:00	Market	Accepted	Accepted	Accepted	Rejected	Rejected	Accepted
	Limit	Accepted	Accepted	Accepted	Rejected	Rejected	Accepted
	Iceberg	Accepted (MaxFloor Ignored)	Accepted (MaxFloor Ignored)	Accepted (MaxFloor Ignored)	Rejected	Rejected	Accepted (MaxFloor Ignored)
	Pegged	Accepted	Accepted	Accepted	Rejected	Rejected	Accepted
Rolled into next Periodic Auction?		Yes	Yes	No	N/A	N/A	No



## FAQ

Please note that at present, Periodic Auctions and all related behaviour applies only in the Cboe BXE and DXE environments. Symbols in the CXE Environment remain unchanged.

### General

*When did Cboe launch Periodic Auctions?*

Cboe launched Periodic Auctions for all securities in the Production Cboe BXE Environment on **Monday 19<sup>th</sup> October 2015**. Testing was made available in the BXE Certification (UAT) Environment, effective from **Tuesday 11<sup>th</sup> August 2015**. It has also been available since launch of the DXE Environment.

*What are the auction times?*

Periodic Auctions operate between 08:00 and 16:30 UK time in the Cboe BXE and DXE Environments only. Opening and Closing Auctions continue to operate on REGM securities between 08:50 and 17:35 (CET) in the CXE and DXE Environments only. All auctions will be subject to Cboe On-Exchange Trading Hours and Holiday Schedule as shown on the [website](#).

*Are Periodic Auctions subject to market order imbalances and price monitoring extensions?*

No, only Opening and Closing Auctions support these types of extensions.

*How will the Competitive Liquidity Provider Program (CLP) or the Liquidity Provider Program (LPP) be affected by Periodic Auctions?*

The CLP and LPP programmes apply only to the Integrated Book.

*Are Clearing and Settlement affected by Periodic Auctions?*

No, all Periodic Auctions trades are cleared under the same participant clearing and settlement arrangements for other Cboe trades.

*Will the CXE Order Book have Periodic Auctions?*

We currently have no plans to support Periodic Auctions on the CXE Order Book.

*Will you have any execution price protection linked to Periodic Auctions?*

Yes, where the auction will not match at or within the Cboe EBBO, the Periodic Auction will roll onto the next call phase, until the auction price is within the collar.

The execution collar uses the best Displayed buy Order and the best Displayed sell Order of:

- Cboe UK lit venues (BXE, CXE) and Cboe NL lit venue (DXE)
- Turquoise UK and Turquoise EU (excluding the Czech Republic, Hungary and Poland)
- The Listing Market (excluding Spain, the Czech Republic, Hungary and Poland)

Note that in DXE, the PAB uncrossing price collar is an additional tick either side of the execution collar described above.

*How are Cboe Risk Controls affected?*

Cboe participant risk controls incorporate all Cboe orders, including Periodic Auction orders. Market order exposure is calculated on order entry against the symbol reference price.

*How can we identify the start of a Periodic Auction?*

**BXE**

Cboe does not publish specific start times or Trading Status messages for the Periodic Auctions Book. Market data is only published when the indicative auction value or executable volume changes. The Periodic Auction book will be available and always in Auction from 0900 up to 1730 (CET) at the latest. After the final auction of the day (which could be just before 1730) all new orders will be rejected.

**DXE**

From 20th November 2020, at the start of the auction, an Auction Update message is published. The start of an auction is indicated by the first Auction Update message after an Auction Summary message or the first Auction Update message of the day.

*How can we identify the end of Periodic Auction with zero executed volume?*

**BXE**

Only the expiry of GFA (Good For Auction) orders would indicate the end of the current Periodic Auction. Eligible orders will roll into the next Periodic Auction, see [Order Validity Matrix](#).

**DXE**

If no execution takes place during the auction, an Auction Summary message will be published with zero Price and Share values

*Can symbols have a Periodic Auction at the same time as continuous trading on BXE and DXE? Can both of these operate in parallel?*

Yes. The Periodic Auctions book operates separately from the Integrated (Lit) and Dark Books in both BXE and DXE.

*How long will a symbol remain in auction for and when will it go into the Auction Call/Match Phase?*

The duration of the auction could be any length of time up to the max duration specified as milliseconds in the [BXE and DXE](#) Live Symbol CSV file “periodic\_auction\_max\_duration” column.

*How do I enable Broker Preferencing and Marketable Lock mechanisms?*

These can be enabled on a per port basis by our [Trade Desk](#)

## **Order Entry**

*How will the new GFA TimeInForce (TIF) value behave during a Periodic Auction?*

This TIF will result in any remaining quantity on the order being cancelled back after the next auction match attempt, even if the auction is aborted due to the execution price being outside the Cboe EBBO collar.

*Are Iceberg orders accepted in the Periodic Auctions book?*

MaxFloor values will be ignored. Iceberg orders are treated as normal limit orders.

*Will Minimum Acceptable Quantity (MAQ) be supported?*

Orders submitted with a MinQty value (FIX tag 110) will be accepted.

*Will any information derived from my order be disseminated in Auction Updates on the data feed if the executable quantity is less than my specified MAQ?*

No, only the executable quantity of an auction is disseminated. If there is insufficient contra volume to satisfy a MAQ on an order then that order is not considered for execution (at that time) and so will not contribute to any calculated indicative executable volume in auction update messages.

*Will Minimum Acceptable Quantity (MAQ) order behaviour override any Minimum Executable Size (MES) port default settings?*

Yes, if a MinQty (tag 110) value is specified on an order routed to the Periodic Auction Book (9303=BP), then for that order, Minimum Acceptable Quantity (MAQ) behaviour will override any port specific Minimum Executable Size (MES) settings.

*What will happen if I enter Periodic Auction orders outside of continuous trading (08:00 – 16:30) UK Time?*

These orders will be rejected.

*Can orders be updated or cancelled during the auction?*

Yes, orders can be amended and cancelled throughout the auction.

*Will executions from Periodic Auction be uniquely identifiable?*

Yes, FIX tag 9730 TradeLiquidityIndicator value 9730=P or BOE Field BaseLiquidityIndicator = 'C' and SubLiquidityIndicator='P' uniquely identifies trades executed during Periodic Auctions.

*Is it possible to receive half tick executions?*

Yes, executions in the Periodic Auctions book can occur at a level that matches the tick increment or half tick increment for the stock.

*Will order entry support half tick prices?*

No, non-standard tick prices are not supported for order submission.

*Market Order(s) against Market Order(s) possible?*

If the Periodic Auctions book is exclusively made up from market orders the price determination algorithm will calculate against the executable volume and surplus to calculate a price within the EBBO which is closest to the reference price.

*How does the Minimum Order Entry Size work?*

The Minimum Order Entry Size criteria is implemented as a quantity (size) check per symbol in the Matching Engine calculated statically from the Cboe previous close price for the BXE or DXE book. The calculated daily value is derived by taking the minimum order size in euros, converting to the

traded currency and dividing by the Cboe previous close (any partial shares being rounded up). In normal operation the Min Order Entry Size will not vary during the day.

Practically, the Minimum Order Entry Size is checked on order entry and on any modifications to the order. Stubs resulting from partial fills are allowed to roll between periodic auctions. However, any subsequent modifications to a stub will be rejected if the new size does not meet the Minimum Order Entry Size (the original stub order will be left on the book).

*Can I submit a tag or value to enable broker preferencing on a per order basis?*

No. Broker Preferencing can only be enabled on a Port basis by Cboe Trade Desk team

*Will Broker Preferencing take place at an overall Firm basis or at a Trading Identifier level?*

Broker Preferencing will take place at a Trading Identifier (Bank Code) level once enabled on a Port.

*If Broker Preferencing is enabled on multiple sessions/ports will preferencing be between multiple market data section trading identifiers?*

No. Even though broker preferencing is enabled on a port/session level it is reliant on you submitting the same trading identifier, even on different sessions i.e. if you have broker preferencing enabled on two different ports and you submit different trading identifiers on each of the sessions this flow will not be preferenced. You will need to submit the same trading identifier on both sessions for preferencing to occur.

*If Broker Preferencing is enabled on a session/port, will this preference with orders on any of my non preferenced ports?*

No. Only ports which have Broker Preferencing enabled and are submitting the same Trading Identifier will be preferenced.

*If Broker Preferencing is enabled on a session/port and I send a MinQty value, will this be honored when preferencing my orders?*

Yes. Any orders marked with both MinQty and broker preferencing will see the MinQty being taken into consideration during the broker preferencing phase of Execution Allocation.

*How is 'marketable' defined for the AOC order type?*

- Meets the price improvement conditions stipulated on the order
- considers possible Broker Preferencing on contra orders
- Meets MAQ if specified
- An order in a symbol where the contra side already has an order in PAB and likely to cross in the next auction

*Why was my AOC order accepted but received no execution?*

AOC orders accepted into PAB are likely to result in an execution but are not guaranteed to. Accepted orders will not be re-evaluated after every auction update. It is therefore possible to have an AOC order accepted but not receive an execution. This could be due to another more marketable PAB order being entered, or the cancellation of a contra order.

*Can I send an AOC order with Broker Preferencing enabled on a session/port?*

Yes, but Broker Preferencing will be ignored.

## Market Data

*When will the Auction Summary message be published?*

### **BXE**

The Auction Summary message will only be published at the end of the auction phase, if the auction executes volume. **Auctions with zero executed volume will not generate an Auction Summary message.**

### **DXE**

The Auction Summary message will be published at the end of the auction phase, if the auction executes volume. If no execution takes place during the auction, an Auction Summary message will still be published. Price will be 0; Shares will be 0

*What will the frequency be at which Auction Update Messages will be published?*

An indicative auction update will be published each time the indicative auction value or executable volume changes. If there is no executable volume then no auction update messages shall be disseminated. Cboe will only publish zero values in the 'Indicative Price' and 'Indicative Shares' fields to indicate a change to the indicative auction value or executable volume.

*What does the Outside Tolerance field indicate in the new Auction Update Message?*

Auction update messages shall have an "Outside Tolerance" flag to identify when the indicative price is outside the Dynamic Collar threshold - European Best Bid Best Offer (EBBO). Possible values: 0 = Outside tolerance (Auction will not match)

I = Inside tolerance (If possible, auction will match)

- = Not specified (Used for Opening and Closing Auctions)

*What does the Includes Primary field indicate in the new Auction Update Message?*

This indicates whether the Cboe EBBO, used to collar the auction and for order pegs, includes the Primary Market quotes.

*What is used as the Reference Price in the Auction Update Message?*

Reference Price is defined as the last auction traded price, open or close price on the BXE or DXE environment; whichever is the most recent; if none of these exist then the prospectus price or equivalent shall be used.

*Will market data depth be available during auctions?*

No, the order book will not be disseminated. Only the indicative auction price and executable volume will be disseminated via the Auction Update message.

*How are executions represented on market data?*

The Cboe Trade Message is published in the event of any Periodic Auction executions.

*Which MMT flags are present on Periodic Auction executions?*

Periodic Auction executions are flagged as Central Limit Order Book and Scheduled Intraday Auction.

*Are Statistics Messages (Open/High/Low/Close) generated as a result of Periodic Auctions?*

Yes, as per the [Vendor Matrix](#).

*Does the Periodic Auctions Book have unique ticker symbols?*

No.

*Will market data for Periodic Auctions be published down a new feed?*

No, all Periodic Auction market data is published over existing BXE and DXE feeds.

*Will AuctionSummary messages be disseminated for AOC orders which aren't deemed marketable?*

Yes, any interaction with the Periodic Auction Book will result in an auction phase and as a result an AuctionSummary message.

## 9. Certification (UAT) Testing

The Periodic Auctions Book is available for testing in the BXE and DXE Certification (UAT) environment.

## 10. Document Links

[2015 Q3 Exchange Release](#)

[Multicast PITCH Specification](#)

[TCP PITCH Specification](#)

[BOEv2 Specification](#)

[FIX Specification](#)

[Reference Data Specification](#)

[Vendor Matrix](#)

## 11. Multicast and TCP PITCH Examples

### Multicast PITCH Auction Update

Length	25	37 bytes
Type	AC	Auction Update
Time Offset	C8 47 17 06	102,189,000 ns since last Time Message
Symbol	4C 45 4D 44 6C 20 20 20	LEMDI
Auction Type	50	P = Periodic Auction
Reference Price	7B 88 01 00 00 00 00 00	10.0475
Indicative Price	7B 88 01 00 00 00 00 00	10.0475
Indicative Shares	88 13 00 00	5000 shares
Outside Tolerance	49	I = Inside Tolerance
Includes Primary	50	P = Includes Primary

### TCP PITCH Auction Update Message

Field	Offset	Length	Data Type	Description
Timestamp	0	8	Time	Timestamp
Message Type	8	1	"I"	Auction Update Message
Symbol	9	8	Alphanumeric	Symbol right padded with spaces

Auction Type	17	1	Alpha	<p>O = Opening Auction</p> <p>C = Closing Auction</p> <p>H = Halt Auction</p> <p>V = Volatility Auction</p> <p>P = Periodic Auction</p>
Reference Price	18	19	Long Price	Reference price used in tie-breaker situations
Indicative Price	37	19	Long Price	Price at which the auction would match if executed at the time of the message
Indicative Shares	56	10	Binary	Number of shares at the Indicative Price
Outside Tolerance	66	1	Alphanumeric	<p>Indicates whether the price on this update is outside the Cboe EBBO collar:</p> <p>O = Outside tolerance</p> <p>I = Inside tolerance</p> <p>- = Not specified</p>
Includes Primary	67	1	Alphanumeric	<p>Indicates whether the Cboe EBBO used to collar this update includes the Primary Market quotes.</p> <p>P = Includes Primary</p> <p>N = Excludes Primary</p> <p>- = Not specified</p>





## 12. Further Resources and Contact

Please contact the [Trade Desk](#) or your [Account Manager](#) if you have any questions.