# Cboe Titanium Europe Aggregated Depth Feed Specification

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# Contents

# 1 Glossary

| Term | Definition |
|------|-----------|
| APA | Approved Publication Arrangement – a service authorised to publish trade reports on behalf of investment firms |
| BXE | Cboe Europe equities exchange operating under UK regulation |
| CXE | Cboe Europe equities exchange operating under UK regulation |
| DXE | Cboe Europe equities exchange operating under EU regulation (Netherlands) |
| ESMA | European Securities and Markets Authority – the EU securities and markets regulatory body |
| ETC | Exchange Traded Commodity – a debt security tracking commodity prices |
| ETF | Exchange Traded Fund – a pooled investment security that tracks an index, sector, or asset |
| ETN | Exchange Traded Note – an unsecured debt security tracking an underlying asset or index |
| FCA | Financial Conduct Authority – the UK financial regulatory body |
| ISIN | International Securities Identification Number – a 12-character alphanumeric code uniquely identifying a security |
| MIC | Market Identifier Code – a 4-character code identifying trading venues and markets |
| MiFID II | Markets in Financial Instruments Directive II – EU legislation governing investment services |
| MiFIR | Markets in Financial Instruments Regulation – EU regulation on market transparency |
| PAB | Periodic Auction Book – a trading mechanism where orders are matched at discrete intervals |
| RTS 1 | ESMA Commission Delegated Regulation 2017/587 (EU) and FCA RTS 1 (UK), specifying pre-trade and post-trade transparency requirements for equity instruments (shares, depositary receipts, ETFs, certificates and other similar financial instruments) |
| RTS 2 | ESMA Commission Delegated Regulation 2017/583 (EU) and FCA RTS 2 (UK), specifying pre-trade and post-trade transparency requirements for non-equity instruments (including ETCs and ETNs) |
| SI | Systematic Internaliser – an investment firm executing client orders on own account outside a trading venue |
| 3C | Cboe Closing Cross – Lit auction available after continuous trading ceases |

## 2 Introduction

### 2.1 Overview

This specification describes the Cboe Europe Aggregated Depth Feed, which provides pre-trade and post-trade transparency data in accordance with EU and UK regulatory requirements under the Regulatory Technical Standards (RTS 1 and RTS 2).

The Aggregated Depth Feed delivers data for:

- **Equities and ETFs** – according to RTS 1 regulations.

- **ETCs and ETNs** – according to RTS 2 regulations.

On all Cboe Europe trading venues (BXE, CXE, DXE) and Cboe Europe APA facilities for off-exchange trade reports.

### 2.2 Regulatory Context

The Aggregated Depth Feed is designed to comply with pre-trade and post-trade transparency requirements under RTS 1 and RTS 2 for both EU and UK jurisdictions. See the Glossary for definitions and Section 3.2 for the specific regulatory tables that apply.

For EU venues, requirements follow ESMA regulations. For UK venues, requirements follow FCA rules which are substantively aligned. Where minor differences exist, these are noted in the relevant sections. The feed provides a consistent field structure across all venues to simplify integration.

### 2.3 Document Conventions

Throughout this document:

- Field names are shown in **bold**

- ASCII field values use `monospace` formatting

- EU-specific requirements are marked with [EU]

- UK-specific requirements are marked with [UK]

### 2.4 Feed Variants

This specification covers the aggregated depth feed. A separate specification exists for the delayed (15-minute) transparency feed: *Cboe Europe Delayed Transparency Feed Specification*.

# 3 Feed Overview

## 3.1 Data Scope

The Aggregated Depth Feed provides the following data:

### 3.1.1 Pre-Trade Transparency Data

Pre-trade transparency data consists of Cboe proprietary information based on trading activities observed in real-time:

- For continuous limit order book (CLOB) trading: the aggregate number of orders and the shares, depositary receipts, ETFs, certificates and other similar financial instruments that they represent at each price level for at least the five best bid and offer price levels

- For periodic auction systems (PAB): the price at which the auction trading system would best satisfy its trading algorithm in respect of shares, depositary receipts, ETFs, certificates and other similar financial instruments traded on the exchange and the volume that would potentially be executable at that price by participants in that system

Note: Dark books are exempt from pre-trade transparency requirements and therefore are not included in the pre-trade transparency data.

### 3.1.2 Post-Trade Transparency Data

Post-trade transparency data consists of executed transaction information. See Section 5 for the complete field definitions.

## 3.2 Regulatory References

This feed complies with the following regulatory technical standards:

- **RTS 1** – Commission Delegated Regulation (EU) 2017/587, as amended
  - Pre-trade: Table 1b (actionable indications of interest for equity instruments)
  - Post-trade: Annex I Table 3 (details of transactions in equity instruments)
- **RTS 2** – Commission Delegated Regulation (EU) 2017/583, as amended
  - Pre-trade: Table 1 (pre-trade transparency for non-equity instruments)
  - Post-trade: Table 2 (details of transactions in non-equity instruments)

For UK venues, the feed complies with the equivalent FCA requirements which are substantively aligned with the EU regulations listed above.

## 3.3 Venues Covered

| Venue | Segment MIC | Description |
|-------|-------------|-------------|
| BXE | BATS | Cboe Europe – BXE Lit Book |
| CXE | CHIX | Cboe Europe – CXE Lit Book |
| DXE | CEUX | Cboe Europe – DXE Lit Book |
| BXE | BATD | Cboe Europe – BXE Dark Book |

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| Venue | Segment MIC | Description |
|-------|-------------|-------------|
| CXE | CHID | Cboe Europe – CXE Dark Book |
| DXE | CEUD | Cboe Europe – DXE Dark Book |
| BXE | BATP | Cboe Europe – BXE Periodic Auction Book |
| DXE | BEUP | Cboe Europe – DXE Periodic Auction Book |
| BXE | BATF | Cboe Europe – BXE Off-Book Trade Reports |
| CXE | CHIO | Cboe Europe – CXE Off-Book Trade Reports |
| DXE | CEUO | Cboe Europe – DXE Off-Book Trade Reports |
| BXE | LISX | Cboe BIDS Europe – BIDS UK LIS MTF Trade Reports |
| DXE | LISZ | Cboe BIDS Europe – BIDS Europe LIS MTF Trade Reports |
| BXE | XWAP | Cboe BIDS Europe – BIDS UK VWAP MTF Trade Reports |
| DXE | VWAP | Cboe BIDS Europe – BIDS Europe VWAP MTF Trade Reports |
| APA | CAPA | Cboe NL APA Trade Reports |
| APA | BOTC | Cboe UK APA Trade Reports |

Cboe supports reporting of other MTF services' trade reports (e.g., MTF dark book trades) via Cboe's APA services. Where MTFs report trades via Cboe's APAs, these shall be reported with the venue of execution field populated as the MTF's segment MIC, and the trading system field populated as `OTHR`. These trades are specifically are referred to as **MTF Trade Reports** subsequently in this specification.

## 3.4   Data Format

The Aggregated Depth Feed delivers data in ASCII format with the following characteristics:

- **Character encoding**: UTF-8

- **Field separator**: Comma (,)

- **Record separator**: Newline (LF)

- **Date/Time format**: ISO 8601 with microsecond precision (YYYY-MM-DD HH:MM:SS.ffffff)

- **Numeric values**: Decimal notation without thousands separators

- **Price values**: Decimal notation without thousands separators. Prices will be reported with 4 decimal places for on-exchange trades, and 7 decimal places for APA trade reports

- **Field lengths**: Fields are variable length up to the maximum length specified in the field tables

# 4 Pre-Trade Transparency Data

This section defines the pre-trade transparency fields for real-time data. Pre-trade data provides current order book information including bid/offer prices and depths.

## 4.1 On-Exchange Trading

On-Exchange trading pre-trade transparency data comprises of: Lit continuous limit order book trading, Periodic Auction Book (PAB) trading, and Cboe's Closing Cross (3C) auctions.

Lit limit order book trading will be displayed with 5 levels of depth i.e. 5 rows in the form described below representing the top 5 price levels on each side of the central limit order book. PAB and 3C auctions will be represented in the form of a single row corresponding to the indicative auction price and size of the respective auction.

Lit limit order book trading, Periodic Auction book trading, and Cboe's Closing Cross (3C) auctions will be differentiated by the Trading System and Trading System Phase fields (see Section 7).

**Price Level Invalidation:** When a previously reported price level (either top-of-book or within the five levels of depth) moves outside of the top depth display or is removed (e.g., due to execution, modification, or cancellation), it will be reported as a price level row for the corresponding invalidated price with a quantity and order count of zero.

| # | Field | Max Length | Description |
|---|---|---|---|
| 1 | Update Date and Time | 26 | Date and time when the order was received, cancelled, or modified. Specified to microsecond precision in the form YYYY-MM-DD HH:mm:ss.ffffff. |
| 2 | Instrument Identification Code | 12 | ISIN identifying the financial instrument |
| 3 | Side | 4 | Order book side: BUYL (buy) or SELL (sell) |
| 4 | Price | 18 | Price of orders excluding commission and accrued interest. Provided for 5 levels of depth. |
| 5 | Price Currency | 3 | ISO 4217 currency code (e.g., EUR, GBP) |
| 6 | Price Notation | 4 | MONE (monetary value), PERC (percentage), YIEL (yield), or BAPO (basis points) |
| 7 | Quantity | 18 | Number of units at the price level |
| 8 | Quantity Currency | 3 | Currency if quantity is expressed as nominal/monetary value |
| 9 | Aggregated Number of Orders and Quotes | 18 | Number of aggregated orders and quotes at the price level |
| 10 | Venue | 4 | Segment MIC of the trading venue |
| 11 | Trading System | 4 | Type of trading system (see Section 7): CLOB, QDTS, PATS, RFQT, HYBR, or OTHR |
| 12 | Trading System Phase | 4 | Current trading phase (see Section 7): COTR, SOAU, SCAU, ODAU, OMST, etc. |
| 13 | Publication Date and Time | 26 | Timestamp when data was published. Specified to microsecond precision in the form YYYY-MM-DD HH:mm:ss.ffffff. |

**Example Message:**

```
2026-01-08 14:30:15.123456,BMWd,BUYL,125.5000,EUR,MONE,1500,EUR,12,CEUX,CLOB,COTR,2026-01-08
↪ 14:30:15.123457
```

**Example 5 Level of Depth Display:**

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```
2026-01-08 14:30:15.123456,BMWd,SELL,119.5000,EUR,MONE,1500,EUR,1,CEUX,CLOB,COTR,2026-01-08
↪ 14:30:15.123457
2026-01-08 14:30:16.123457,BMWd,SELL,120.0000,EUR,MONE,1500,EUR,5,CEUX,CLOB,COTR,2026-01-08
↪ 14:30:15.123458
2026-01-08 14:30:15.123458,BMWd,SELL,120.2500,EUR,MONE,1500,EUR,8,CEUX,CLOB,COTR,2026-01-08
↪ 14:30:15.123459
2026-01-08 14:30:15.123459,BMWd,SELL,120.5000,EUR,MONE,1500,EUR,3,CEUX,CLOB,COTR,2026-01-08
↪ 14:30:15.123460
2026-01-08 14:30:15.123460,BMWd,SELL,121.0000,EUR,MONE,1500,EUR,5,CEUX,CLOB,COTR,2026-01-08
↪ 14:30:15.123461
```

**Example Periodic Auction Message:**

```
2026-01-08 14:35:25.123456,BMWd,BUYL,123.2500,EUR,MONE,5500,EUR,10,BEUP,PATS,ODAU,2026-01-08
↪ 14:35:25.123457
```

**Example Closing Cross Message:**

```
2026-01-08 16:35:15.123456,BMWd,SELL,121.7500,EUR,MONE,600,EUR,1,CEUX,PATS,OMST,2026-01-08
↪ 16:35:15.123457
```

**Example Price Level Invalidation Message:**

```
2026-01-08 14:30:20.123456,BMWd,SELL,121.0000,EUR,MONE,0,EUR,0,CEUX,CLOB,COTR,2026-01-08
↪ 14:30:20.123457
```

## 4.2 Regulatory Applicability

Pre-trade transparency data complies with the regulatory tables specified in Section 3.2 for both ESMA (EU) and FCA (UK) regulations. The feed provides 5 levels of depth for all venues, ensuring consistency regardless of jurisdiction. While UK regulations have fewer mandatory fields (e.g., Trading System, Trading System Phase), all fields are included for consistency across all venues.

# 5 Post-Trade Transparency Data

This section defines the post-trade transparency fields for real-time data. Post-trade data provides information about executed transactions.

Post-trade data is separated by trading type (on-exchange trading or APA trade reports) and by instrument class (Equities and ETFs, or ETCs and ETNs):

- **On-Exchange Trading** – Trades executed on BXE, CXE, DXE venues (Lit, Dark, PAB, 3C) and on-exchange MTF Trade Reports

- **APA Trade Reports** – Off-Exchange and SI trades published via Cboe APA facilities

## 5.1 On-Exchange Trading

On-exchange post-trade data is published for trades executed on Cboe's BXE, CXE, and DXE venues (Lit, Dark, PAB, and 3C), including off-book exchange trades reported to Cboe's trading venues, and MTF Trade Reports from other MTF services reported via Cboe's APAs.

### 5.1.1 Equities & ETFs

Post-trade fields for equity and ETF on-exchange trades:

| # | Field | Max Length | Description |
|---|-------|------------|-------------|
| 1 | Trading Date and Time | 26 | Date and time when transaction was executed. Specified to microsecond precision in the form YYYY-MM-DD HH:mm:ss.ffffff. |
| 2 | Instrument Identification Code | 12 | ISIN identifying the financial instrument |
| 3 | Price | 18 | Traded price |
| 4 | Price Currency | 3 | ISO 4217 currency code |
| 5 | Price Notation | 4 | MONE, PERC, YIEL, or BAPO |
| 6 | Quantity | 18 | Number of units traded |
| 7 | Venue of Execution | 4 | Segment MIC where transaction executed. |
| 8 | Trading System | 4 | Type of trading system (see Section 7): CLOB, QDTS, PATS, RFQT, HYBR, or OTHR |
| 9 | Publication Date and Time | 26 | Date and time when the transaction was published. Specified to microsecond precision in the form YYYY-MM-DD HH:mm:ss.ffffff. |
| 10 | Venue of Publication | 4 | MIC of publishing venue/APA |
| 11 | Transaction Identification Code | 52 | Alphanumeric transaction identification code |
| 12 | Flags | Var | Double-quoted, comma-separated list of four-character trade flags (see Section 6) |

**Example Message:**

```
2026-01-08 14:30:15.123456,BMWd,125.5000,EUR,MONE,1500,CEUX,CLOB,2026-01-08 14:30:15.123457,CEUX,
↪ ABCD12345,"ALGO"
```

**Example Message (Cancelled Trade):**

```
2026-01-08 14:35:22.456789,SIEd,142.7500,EUR,MONE,800,BATE,CLOB,2026-01-08 14:35:22.456790,BATE,
↪ EFGH67890,"CANC"
```

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### 5.1.2 ETNs & ETCs

Post-trade fields for ETN and ETC on-exchange trades:

| # | Field | Max Length | Description |
|---|-------|-----------|-------------|
| 1 | Trading Date and Time | 26 | Date and time when transaction was executed. Specified to microsecond precision in the form YYYY-MM-DD HH:mm:ss.ffffff. |
| 2 | Instrument Identification Code | 12 | ISIN identifying the financial instrument |
| 3 | Price | 18 | Traded price |
| 4 | Missing Price | 4 | PNDG if price is pending, otherwise shall be left blank |
| 5 | Price Currency | 3 | ISO 4217 currency code |
| 6 | Price Notation | 4 | MONE, PERC, YIEL, or BAPO |
| 7 | Quantity | 18 | Number of units traded |
| 8 | Quantity Notation | 4 | SHRS if traded in shares, or UNIT if traded in units |
| 9 | Notional Amount | 18 | Notional value of the instrument |
| 10 | Notional Currency | 3 | Currency of notional amount |
| 11 | Venue of Execution | 4 | Segment MIC where transaction executed. |
| 12 | Trading System | 4 | Type of trading system (see Section 7): CLOB, QDTS, PATS, RFQT, HYBR, or OTHR |
| 13 | Publication Date and Time | 26 | Date and time when the transaction was published. Specified to microsecond precision in the form YYYY-MM-DD HH:mm:ss.ffffff. |
| 14 | Venue of Publication | 4 | MIC of publishing venue/APA |
| 15 | Transaction Identification Code | 52 | Alphanumeric transaction identification code |
| 16 | Number of Transactions | 8 | Number of transactions reported (aggregation indicator) |
| 17 | Flags | Var | Double-quoted, comma-separated list of four-character trade flags (see Section 6) |

**Example Message:**

```
2026-01-08 11:45:22.345678,IGLDd,185.2000,,EUR,MONE,200,SHRS,37040.0000,EUR,CEUX,CLOB,2026-01-08
↪ 11:45:22.345679,CEUX,ABCD12345,1,"BENC"
```

## 5.2 APA Trade Reports

APA Trade reports are published from Cboe NL APA (CAPA) or Cboe UK APA (BOTC) for off-exchange and SI trades. APA Trade reports have the following characteristics:

- Venue of Execution is SINT (Systematic Internaliser), XOFF (off-exchange).

- Third-country venue field shall only be populated when a trade executed on a third-country venue

### 5.2.1 Equity & ETF APA Trade Reports

Post-trade fields for equity and ETF APA trade reports:

| # | Field | Max Length | Description |
|---|-------|-----------|-------------|
| 1 | Trading Date and Time | 26 | Date and time when transaction was executed. Specified to microsecond precision in the form YYYY-MM-DD HH:mm:ss.ffffff. |
| 2 | Instrument Identification Code | 12 | ISIN identifying the financial instrument |
| 3 | Price | 18 | Traded price |
| 4 | Missing Price | 4 | PNDG if price is pending, otherwise shall be left blank |
| 5 | Price Currency | 3 | ISO 4217 currency code |
| 6 | Price Notation | 4 | MONE, PERC, YIEL, or BAPO |
| 7 | Quantity | 18 | Number of units traded |
| 8 | Venue of Execution | 4 | SINT for Systematic Internaliser trades, XOFF for off-venue trades, or venue MIC for MTF trade reports. |
| 9 | Third-Country Trading Venue of Execution | 4 | MIC of third-country trading venue where transaction was executed. Shall be left blank if not executed on a third-country venue. |
| 10 | Trading System | 4 | Type of trading system (see Section 7): CLOB, QDTS, PATS, RFQT, HYBR, or OTHR. For SI trades reported to Cboe's APA, where the Venue of Execution is 'SINT', the Trading System field shall be left blank. |
| 11 | Publication Date and Time | 26 | Date and time when the transaction was published. Specified to microsecond precision in the form YYYY-MM-DD HH:mm:ss.ffffff. |
| 12 | Venue of Publication | 4 | MIC of publishing venue/APA |
| 13 | Transaction Identification Code | 52 | Alphanumeric transaction identification code |
| 14 | Flags | Var | Double-quoted, comma-separated list of four-character trade flags (see Section 6) |

**Example Message (SI Trade):**

```
2026-01-08 10:15:30.123456,VOD1,142.3500000,,GBP,MONE,2500,SINT,,,2026-01-08 10:15:30.123457,CAPA,
↪ XYZABC123,"ALGO"
```

**Example Message (Off-Exchange Trade Report):**

```
2026-01-08 11:22:45.987654,BARC1,185.2000000,,GBP,MONE,1000,XOFF,,CLOB,2026-01-08 11:22:45.987655,
↪ BOTC,DEFGH456,"NEGO"
```

**Example Message (Amended Trade Report):**

```
2026-01-08 12:45:10.111222,HSBA1,658.4000000,,GBP,MONE,3500,SINT,,,2026-01-08 12:45:10.111223,BOTC,
↪ LMNOP789,"AMND"
```

### 5.2.2 ETN & ETC APA Trade Reports

Post-trade fields for ETN and ETC APA trade reports:

| # | Field | Max Length | Description |
|---|-------|-----------|-------------|
| 1 | Trading Date and Time | 26 | Date and time when transaction was executed. Specified to microsecond precision in the form YYYY-MM-DD HH:mm:ss.ffffff. |
| 2 | Instrument Identification Code | 12 | ISIN identifying the financial instrument |
| 3 | Price | 18 | Traded price |
| 4 | Missing Price | 4 | PNDG if price is pending, otherwise shall be left blank |
| 5 | Price Currency | 3 | ISO 4217 currency code |
| 6 | Price Notation | 4 | MONE, PERC, YIEL, or BAPO |
| 7 | Quantity | 18 | Number of units traded |
| 8 | Quantity in Measurement Unit | 18 | Number of units if different from lot/share quantity |
| 9 | Notional Amount | 18 | Notional value of the instrument |
| 10 | Notional Currency | 3 | Currency of notional amount |
| 11 | Venue of Execution | 4 | SINT for Systematic Internaliser trades, XOFF for off-venue trades, or venue MIC for MTF trade reports. |
| 12 | Third-Country Trading Venue of Execution | 4 | MIC of third-country trading venue where transaction was executed. Shall be left blank if not executed on a third-country venue. |
| 13 | Publication Date and Time | 26 | Date and time when the transaction was published. Specified to microsecond precision in the form YYYY-MM-DD HH:mm:ss.ffffff. |
| 14 | Venue of Publication | 4 | MIC of publishing venue/APA |
| 15 | Transaction Identification Code | 52 | Alphanumeric transaction identification code |
| 16 | Flags | Var | Double-quoted, comma-separated list of four-character trade flags (see Section 6) |

**Example Message (SI Trade):**

```
2026-01-08 10:15:30.123456,IGLDd,185.2000000,,EUR,MONE,200,200,37040.0000000,EUR,SINT,,2026-01-08
↪ 10:15:30.123457,CAPA,XYZABC123,"LRGS"
```

**Example Message (Off-Exchange Trade Report):**

```
2026-01-08 11:22:45.987654,GOLDd,142.5000000,,EUR,MONE,500,500,71250.0000000,EUR,XOFF,,2026-01-08
↪ 11:22:45.987655,BOTC,DEFGH456,"PRIC"
```

## 5.3   Regulatory Applicability

The feed provides a consistent field structure across all venues. Minor regulatory differences (e.g., UK does not require NOAP for Missing Price field, Trading System, or Price Notation fields) are accommodated by including all fields for consistency.

# 6 Post-Trade Flags

Post-trade transparency requires publication of applicable flags to identify special trade circumstances. The following flags are defined per RTS 1 and RTS 2, and shall be published on this feed.

## 6.1 Amendment Flags

| Flag | Description |
|------|-------------|
| CANC | Cancellation – previously published trade has been cancelled |
| AMND | Amendment – previously published trade has been amended |

## 6.2 Trade Type Flags

| Flag | Description |
|------|-------------|
| BENC | Benchmark transaction |
| NPFT | Non-price forming transaction |
| TNCP | Transaction not contributing to the price discovery process |
| SDIV | Special dividend transaction |
| ALGO | Algorithmic transaction |
| PRIC | Price reference waiver |
| NEGO | Negotiated transaction |

## 6.3 Deferral Flags

| Flag | Description |
|------|-------------|
| LRGS | Large in scale deferral |
| DEFF | Deferred publication |

# 7 Trading System and Trading System Phase Flags

Pre- and post-trade transparency data can include Trading System and Trading System Phase fields to identify the type of trading system and their current operational phase. These fields are required per RTS 1 (equities) and RTS 2 (non-equities), and shall be populated as defined below where applicable.

## 7.1 Trading System

The Trading System field identifies the type of trading system on which the order book or transaction data originates. The following values are defined per RTS 1 Annex I:

| Code | Description |
|------|-------------|
| CLOB | **Central Limit Order Book** – A continuous order book trading system where orders are matched based on price-time priority. This includes trading systems that combine elements of a continuous order book and a periodic auction trading system (such systems shall be classified as CLOB, not HYBR). |
| QDTS | **Quote Driven Trading System** – A trading system where transactions are concluded on the basis of firm quotes that are continuously made available to participants, requiring market makers to maintain quotes within published spreads. |
| PATS | **Periodic Auction Trading System** – A system that matches orders on the basis of a periodic auction and a trading algorithm operated without human intervention. This includes the Periodic Auction Book (PAB) and Cboe Closing Cross (3C). |
| RFQT | **Request For Quote Trading System** – A trading system where a quote or quotes are provided in response to a request for quote submitted by one or more members or participants. The quote is executable exclusively by the requesting member or market participant. |
| HYBR | **Hybrid Trading System** – A trading system that falls into two or more of the above categories. Note: A trading system combining elements of a continuous order book trading system (CLOB) and of a periodic auction trading system (PATS) shall *not* be considered a hybrid system but shall be classified as CLOB. |
| OTHR | **Other Trading System** – Any other type of trading system not covered by the above categories. |

### 7.1.1 Cboe Europe Trading System Mapping

The following table shows how Cboe Europe venues and trading mechanisms map to Trading System values:

| Venue/Mechanism | Trading System | Notes |
|-----------------|----------------|-------|
| BXE/CXE/DXE Lit Book | CLOB | Lit Continuous limit order book trading |
| BXE/CXE/DXE Dark Book | CLOB | Dark pools classified as CLOB per ESMA guidance |
| Periodic Auction Book (PAB) | PATS | Frequent batch auctions |
| Cboe Closing Cross (3C) | PATS | End-of-day auction mechanism |
| BXE/CXE/DXE Off-Book Trade Reports | OTHR | On-exchange, off-book trade reports to Cboe's trading venues |
| MTF Trade Reports | OTHR | On-exchange trade reports from other MTF services to Cboe's APA |
| APA Trade Reports | N/A | Trading System not populated for off-venue trades |

**Note:** For post-trade transparency, when the Venue of Execution field is populated with `SINT` (Systematic Internaliser) or `XOFF` (off-venue), the Trading System field shall not be populated.

## 7.2 Trading System Phase

The Trading System Phase field identifies the current operational phase of the trading system. This field provides context for the pre-trade transparency data, indicating whether the system is in continuous trading, auction, or another phase.

| Code | Description |
|------|-------------|
| COTR | **Continuous Trading** – The trading system is operating in continuous trading mode where orders are matched immediately upon arrival based on price-time priority. This is the standard phase for continuous order book trading. |
| SOAU | **Scheduled Opening Auction** – The trading system is in a scheduled opening auction phase, occurring at market open. Orders accumulate and are matched at a single clearing price. |
| SCAU | **Scheduled Closing Auction** – The trading system is in a scheduled closing auction phase, occurring at market close. |
| SIAU | **Scheduled Intraday Auction** – The trading system is in a scheduled intraday auction phase, occurring at predetermined times during the trading day. |
| UAUC | **Unscheduled Auction** – The trading system is in an unscheduled auction phase, triggered by market events such as volatility interruptions or circuit breakers. |
| ODAU | **On-Demand Auction** – The trading system is operating a frequent batch auction (on-demand auction), where auctions are triggered by incoming order flow. This applies to the Periodic Auction Book (PAB). |
| UDUC | **Undefined Auction** – An auction phase that does not fall into any of the other defined auction categories. |
| MACT | **At Market Close Trading** – Trading occurring at or around market close, outside of the main continuous trading session. |
| OMST | **Out of Main Session Trading** – Trading occurring outside of the main trading session hours, such as pre-market or after-hours trading. This includes Cboe's Closing Cross (3C) auctions. |
| OTSP | **Other Phase** – Any other trading phase not covered by the above categories. |

### 7.2.1 Cboe Europe Trading Phase Mapping

The following table highlights how Cboe Europe trading phases shall map to Trading System Phase values:

| Trading Phase | Phase Code | Notes |
|---------------|------------|-------|
| Continuous Trading | COTR | On-exchange limit order book trading |
| Opening Auction | SOAU | Market open auction |
| Closing Auction | SCAU | Market close auction |
| Cboe Closing Cross (3C) | OMST | Out of main session trading |
| Periodic Auction (PAB) | ODAU | On-demand frequent batch auction |
| Volatility Auction | UAUC | Circuit breaker triggered auction |

## 7.3 UK Regulatory Notes

UK MiFIR (as implemented by the FCA) does not mandate the Trading System or Trading System Phase fields for pre-trade or post-trade transparency. However, Cboe includes these fields in the feed for all venues to maintain

consistency and to support participants who may have EU reporting obligations.

For UK-only participants, these fields may be ignored when processing feed data for UK regulatory purposes.

# 8 Connectivity

## 8.1 Access Method

The Aggregated Depth Feed is delivered via Apache Kafka, served from Amazon Web Services (AWS) infrastructure in the EU West 2 (London) region. Clients may connect to the Kafka broker cluster and subscribe to the relevant topics for pre-trade and post-trade transparency data in the venues and instrument classes they require.

Contact Cboe Europe Market Data Services at `marketdataeu@cboe.com` for connection credentials and broker endpoints.

## 8.2 Kafka AWS Connectivity

The Aggregated Depth Feed's Kafka brokers support a replication factor of three through the following endpoints:

- `Primary` – b-1.cgceumskdxetbceuw2.qoycbp.c4.kafka.eu-west-2.amazonaws.com:9094

- `Secondary` – b-2.cgceumskdxetbceuw2.qoycbp.c4.kafka.eu-west-2.amazonaws.com:9094

- `Secondary` – b-3.cgceumskdxetbceuw2.qoycbp.c4.kafka.eu-west-2.amazonaws.com:9094

Messages will be published to all three brokers, it is suggested clients connect to all three endpoints for redundancy.

## 8.3 Kafka Topic Structure

Topics are organised by instrument class, data type, and venue MIC. The topic naming convention follows the pattern:

$$\texttt{<instrument\_class>-<data\_type>-<venue\_mic>-<aws\_region>}$$

Where:

- `instrument_class` – eqt (Equities & ETFs) or neqt (Non-Equities: ETNs & ETCs)

- `data_type` – pretrade (Pre-Trade Transparency) or trade (Post-Trade Transparency)

- `venue_mic` – The MIC for the venue (see tables below)

- `aws_region` – The AWS region code where the topic is served from (e.g., euw2 for EU West 2)

Topics will be in all lowercase letters with fields separated by hyphens.

### 8.3.1 BXE Topics

BXE (Cboe Europe UK Equities) topics use the `BATE` MIC:

| Topic Name | Data Type | Instrument Class |
|---|---|---|
| `eqt-pretrade-bate-euw2` | Pre-Trade | Equities & ETFs |
| `neqt-pretrade-bate-euw2` | Pre-Trade | ETNs & ETCs |
| `eqt-trade-bate-euw2` | Post-Trade | Equities & ETFs |
| `neqt-trade-bate-euw2` | Post-Trade | ETNs & ETCs |

### 8.3.2 CXE Topics

CXE (Cboe Europe UK Equities) topics use the `CHIX` MIC:

| Topic Name | Data Type | Instrument Class |
|---|---|---|
| `eqt-pretrade-chix-euw2` | Pre-Trade | Equities & ETFs |
| `neqt-pretrade-chix-euw2` | Pre-Trade | ETNs & ETCs |
| `eqt-trade-chix-euw2` | Post-Trade | Equities & ETFs |
| `neqt-trade-chix-euw2` | Post-Trade | ETNs & ETCs |

### 8.3.3 DXE Topics

DXE (Cboe Europe EU Equities) topics use the `CEUX` MIC:

| Topic Name | Data Type | Instrument Class |
|---|---|---|
| `eqt-pretrade-ceux-euw2` | Pre-Trade | Equities & ETFs |
| `neqt-pretrade-ceux-euw2` | Pre-Trade | ETNs & ETCs |
| `eqt-trade-ceux-euw2` | Post-Trade | Equities & ETFs |
| `neqt-trade-ceux-euw2` | Post-Trade | ETNs & ETCs |

### 8.3.4 APA Trade Report Topics

Trade Reporting Facility topics provide post-trade transparency data for off-exchange and SI trades published via Cboe APAs. Pre-trade topics are not applicable for APA trade reports.

**UK APA (BOTC)** – Cboe UK Approved Publication Arrangement:

| Topic Name | Data Type | Instrument Class |
|---|---|---|
| `eqt-trade-botc-euw2` | Post-Trade | Equities & ETFs APA Trade Reports |
| `neqt-trade-botc-euw2` | Post-Trade | ETNs & ETCs APA Trade Reports |
| `eqt-trade-botc-mtf-euw2` | Post-Trade | Equities & ETFs MTF Trade Reports |
| `neqt-trade-botc-mtf-euw2` | Post-Trade | ETNs & ETCs MTF Trade Reports |

**EU APA (CAPA)** – Cboe NL Approved Publication Arrangement:

| Topic Name | Data Type | Instrument Class |
|---|---|---|
| `eqt-trade-capa-euw2` | Post-Trade | Equities & ETFs APA Trade Reports |
| `neqt-trade-capa-euw2` | Post-Trade | ETNs & ETCs APA Trade Reports |
| `eqt-trade-capa-mtf-euw2` | Post-Trade | Equities & ETFs MTF Trade Reports |
| `neqt-trade-capa-mtf-euw2` | Post-Trade | ETNs & ETCs MTF Trade Reports |

# Revision History

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|---|---|
| 15 January 2026 | Version 1.0.0<br>Initial version of the Aggregated Depth Feed Specification. |
| 22 January 2026 | Version 1.0.1<br>Update on-exchange trading sections to clarify applicability to Dark, and add Dark segment MICs. |
| 27 January 2026 | Version 1.0.2<br>Finalise connectivity section with Kafka topic structure per environment (BXE, CXE, DXE, TRF). |
| 29 January 2026 | Version 1.0.3<br>Update wording around on-exchange trading, and fix post-trade flag values. |
| 30 January 2026 | Version 1.0.4<br>Clarify EU/UK regulatory scope, consolidate regulatory requirements sections, add dedicated regulatory references section, update pre-trade/post-trade data descriptions, note Dark book pre-trade exemption, change timestamp precision from nanoseconds to microseconds. |
| 30 January 2026 | Version 1.0.5<br>Rename specification from Real-Time Transparency Feed to Aggregated Depth Feed. |
| 10 February 2026 | Version 1.0.6<br>Amend kafka connectivity with updated topic names, AWS region, and endpoints etc. |
| 19 February 2026 | Version 1.0.7<br>Update wording around MTF trade reports and off-book trade reports; add MTF Trade Report topic details to APA connectivity. |