GROUP TICKER PLANT

GTP 003 – Statistics Guide

Issue 13.1

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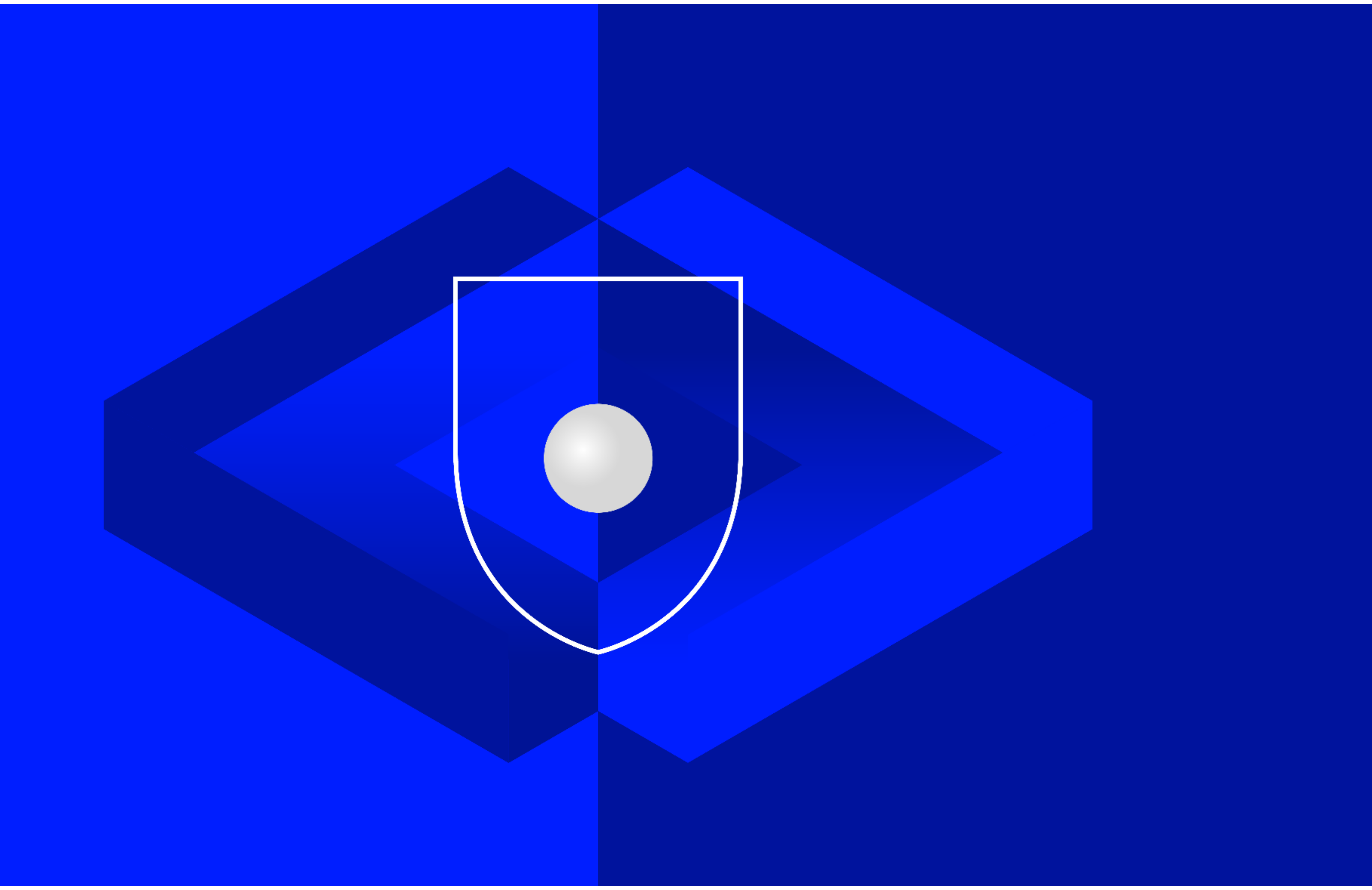

LONDON STOCK EXCHANGE

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Guide disclaimer

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For further information, please contact your usual London Stock Exchange Group contact.

1. Documentation

1.1 This guide

The purpose of this document is to provide an overview of the statistics derived and published by the Group Ticker Plant.

1.2 Readership

This document is particularly relevant to business and technical teams within member firms, information vendors and other market participants who currently receive or are interested in receiving London Stock Exchange Group market data from the Group Ticker Plant.

When read in conjunction with other Group Ticker Plant documents, it is intended to provide an overview of how our statistics are calculated and published to directly connected clients.

1.3 Document series

This guide, 'GTP003 – Statistics guide', forms part of the documentation library supporting those clients interacting with the Group Ticker Plant. For information, the full series of currently available documentation is outlined below:

- GTP001 – Product guide
- GTP002 – Technical guide
- GTP003 – Statistics guide (this document)
- GTP004 – Parameters guide
- GTP005 – Testing services guide
- GTP006 – External sources guide
- GTP007 – GTP lite guide
- GTP008 – Market attributes guide

Further documentation to support displaying our data and our go-live will be released in due course.

The full library of Group Ticker Plant documentation can be found at:
https://www.lseg.com/areas-expertise/technology/group-technology/group-ticker-plant

1.4 Document history

This document has been subject to the following iterations:

Issue	Date	Description
1.0	30 November 2012	First issue of this document
10.4	13 July 2018	4.5 – Added Applicable Trade Types (Statistic Message) for Turquoise Plato™, Turquoise Lit™, Turquoise Plato Lit Auctions™ 4.7 – Updated TradeEcho MiFID II Statistics 4.7 – Removed ATF market model on Pending Price
10.5	23 December 2019	4.2 – Section updated to reflect introduction of Closing Auction period in Borsa Italiana MOT market 4.5 – Section update to include Turquoise NYLON™ Cash Order Book Statistics derivation logic
10.6	9 March 2020	3.11 – Updated Open Interest – Statistics are carried forward to next trading day
10.7	01 December 2020	All sections – Removed content related to Borsa Italiana and associated venues
10.8	01 August 2021	4 – Added details on the statistics published by the Order Book Analytics Service
10.9	21 September 2021	4.4 – Removed CPX trades from the exceptions list under the second bullet point
10.10	15 October 2021	5.2.2, 5.3.2 – Introduction of BTF trades for Turquoise
10.11	05 May 2023	3.4 - Turnover calculation formula that is not relevant to LSE and TQ was deleted 3.15 – Added 'Previous Close Price' section 5.4 – Section updated to clarify TRADEcho instruments where statistics publication is supported 5.2.2, 5.3.2 – removed the note that statistics is not applicable for Turquoise Europe™ BTF Trades
11.0	05 May 2023	3.16 – Added 'Static and Dynamic Reference Prices' section
12.0	18 January 2024	Decommission of Turquoise NYLON Cash Order Book™ Service and removal of all references to it. Decommission of LSE Cross/BTF Order and removal of all references to it. 3.15 Previous Close Price – removed footnote "Applicable to Turquoise Lit Order Books™", since this limitation is no longer relevant
13.0	04 April 2025	3.3 Best Closing Bid and Ask – section updated to better reflect the actual system behaviour. 5.1 London Stock Exchange Best Closing Bid and Ask – section merged with 3.3 Best Closing Bid and Ask 3.11 Open interest and 3.12 Volatility – sections removed since such statistics are not available within LSEG trading venues 5.1.2 Turquoise and Turquoise Europe – removed Private RFQ value from statistics table since the functionality is not in use 5.2.2 - Turquoise and Turquoise Europe - removed Private RFQ value from trade type table since the functionality is not in use

13.1	17 July 2025	Naming of Turquoise titles was updated due to re-branding	
		Previous Names	**Rebranded Names**
		Turquoise®	Turquoise
		Turquoise Europe™	Turquoise Europe
		Turquoise Lit™	Turquoise Lit
		Turquoise Lit Order Books™	Turquoise Lit Order Books
		Turquoise Plato™	Turquoise Dark
		Turquoise Plato Order Books™	Turquoise Dark Order Books
		Turquoise Plato Block Discovery™	Turquoise Block Discovery
		Turquoise Block Insights™	Turquoise Block Insights
		Turquoise Plato Uncross™	Turquoise Dark Uncross
		Turquoise Plato Dark-Lit Sweep™	Turquoise Dark-Lit Sweep
		Turquoise Plato Continuous™	Turquoise Dark Continuous
		Turquoise Plato Trade at Last™	Turquoise Dark Trade at Last
		Turquoise Plato Lit Auctions™	Turquoise Periodic Auctions
		Turquoise Plato Lit Auctions Order Books™	Turquoise Periodic Auctions Order Books

In subsequent issues of this document, where amendments have been made, these changes will be indicated through the use of red text and sidebars (example left).

1.5 Enquiries

For further information on Group Ticker Plant, please contact either your Technical Account Manager or the Client Technology Services (UK):

– Telephone: +44 (0)20 7797 3939
– E-mail: lsetam@londonstockexchange.com

Please contact the market data team of LSEG for further information regarding data licensing for this service by emailing marketdata@lseg.com.

Further information can also be found on our project websites: https://www.lseg.com/areas-expertise/technology/group-technology/group-ticker-plant

2. Statistics overview

The Group Ticker Plant calculates a rich package of statistical information designed to educate customers on a security's behavior and facilitate interaction with the Group's markets through informed decision making. Whilst this document details the core logics employed to calculate the Group Ticker Plant statistics, the Group strongly advises clients to process statistical data as disseminated by the Group Ticker Plant – applying the information as delivered. This is of particular relevance for our customers redistributing London Stock Exchange Group data to third parties. When a customer redistributing data does implement their own method of calculation for a statistic, it is advised that this is clearly identified as not originating from the Group Ticker Plant service lines.

Please note that, while this document details the logic of how our statistics are derived from the underlying data, it does not describe best practice for the display of data as delivered by the Group Ticker Plant.

Customers should note that following the launch of the TRADEcho service, London Stock Exchange market data channels (market data groups A-G) will no longer broadcast off-book trade reports. As such, off-book statistics will no longer be calculated for these channels. In contrast, the TRADEcho market data channels (market data groups 1-4) will broadcast off-book statistics only. The on-book statistic fields for these channels will always be blank, with off-book trades published contributing to the All Trades fields only.

All other markets are unaffected by this change. Therefore, underlying trade types and their contribution statistics – sections 4.6 and 4.7 of this document – remain unchanged.

2.1 Statistics delivery and data recovery

The Group Ticker Plant delivers statistics in two message types. In an effort to minimise the dissemination of redundant message fields, those statistics which update frequently as a result of an execution are contained within the Statistics message. In contrast, those statistics which update less frequently, such as Trade High and Low, are delivered to clients in the Statistics Update message. Further information is contained within 'GTP002 – Technical guide'.

The Group Ticker Plant statistics package is available for clients to recover during the trading day. Available via the recovery service, the Statistics Snapshot message contains the real-time statistics package and the last available auction information as calculated.

3. Statistics logic

The Group Ticker Plant statistics package is derived from executions either on or off book. Customers should note that not all trades contribute to statistics. Further information is contained within section 4 of this document.

3.1 Official Opening Price

- Group Ticker Plant will publish the Official Opening Price as reported by upstream markets
- For details on how this is derived for London Stock Exchange, clients should refer to the Millenium Exchange and TRADEcho Business Parameters via the following link: http://www.londonstockexchange.com/products-and-services/millennium- exchange/technicalinformation/technicalinformation.htm

3.2 Official Closing Price

- Group Ticker Plant will publish the Official Closing Price as reported by upstream markets
- For details of how this is derived for London Stock Exchange, clients should refer to the Millennium Exchange and TRADEcho Business Parameters via the following link: http://www.londonstockexchange.com/products-and-services/millennium- exchange/technicalinformation/technicalinformation.htm

3.3 Best Closing Bid and Ask

For instruments where the calculation of the Official Closing Price is enabled, the system will additionally publish a snapshot with Best Closing Bid and Ask.

These values reflect the best bid and offer price and size available at the moment of the session transition:
- from Regular Trading to the Closing Auction (for order book instruments), or
- from Mandatory to Post-Mandatory (for quote-driven instruments)

The source (Order Book or Quote Book) is selected based on the instrument’s trading model.

No values are carried forward into the following day

London Stock Exchange - Trading Model	Source session	Source Book
SETS	Regular Trading	Order Book
ETPs - ICSD settlement model		
International Order Book		
Order book for Retail Bonds		
Order book for Fixed Income Securities - CONT		
SETSqx - with market makers	Mandatory	Firm Quote
SEAQ		
European Quoting Service		
Fixed interest (SEAQ)		
SETSqx - no market makers	N/A	N/A
Securitised Derivatives		
Order book for Fixed Income Securities - EOD		

3.4 Turnover

On-book Turnover equates to the total value of order book trades executed on the Group's electronic order books. The value of an individual on-book trade is calculated as follows:

Trade Value = Price x Executed Size

- On-book trade cancellations are applied as a reversal to the statistic
- Bulk Trade Amendments contribute to statistic calculations
- Trades reported with a delayed publication to a date other than the traded date do not update statistics
- Statistics which are cancelled on T+*n* are not included in any statistic calculation
- The statistic is reset at the end of each day

3.5 Number of trades

- Core on-book GTP channels include only On Book statistics, whereas TRADEcho channels include only Off Book statistics
- On-Book trade cancelations are applied as a reversal to the statistic
- Bulk Trade amendments update the statistic accordingly
- Under MiFID II, all Off Book Trades, except those reported with ESMA Flag CANC or DUPL, contribute to the statistic
- Off Book Trades reported with ESMA Flag CANC are applied as a reversal to the statistic
- Trades reported with a delayed publication on a date other than the traded date do not update statistics
- Statistics which are cancelled on T+*n*, are not included in any statistic calculation
- The statistic is reset at the end of each day

3.6 Volume

- Core GTP channels include only On Book statistics, whereas TRADEcho channels include only Off Book statistics
- On-Book trade cancelations are applied as a reversal to the statistic
- Bulk Trade amendments update the statistic accordingly
- Under MiFID II, all Off Book Trades, except those reported with ESMA Flag CANC or DUPL, contribute to the statistic
- Off Book Trades reported with ESMA Flag CANC are applied as a reversal to the statistic
- Trades reported with a delayed publication on a date other than the traded date do not update statistics
- Statistics which are cancelled on T+*n*, are not included in any statistic calculation
- The statistic is reset at the end of each day

3.7 Volume Weighted Average Price (VWAP)

- VWAP is calculated as follows:

$$\textbf{VWAP} = \frac{\sum \textbf{(Last Trade Price x Last Executed Size)}}{\sum \textbf{Executed Trade Size}}$$

- On-Book trade cancellations are applied as a reversal to the statistic
- VWAP is derived based on On-Book only trades
- Bulk Trade Amendments update the statistics accordingly
- Trades reported with a delayed publication on a date other than the traded date do not update statistics
- Statistics which are cancelled on T+*n* are not included in any statistic calculation
- The statistic is reset at the end of each day

3.8 Trade High/Trade High On-Book/Trade High Off Book

- On-Book trade cancellations are applied as a reversal to the statistic
- TRADEcho channels do not offer these statistics
- Core GTP channels include only On Book statistics
- Bulk Trade Amendments update the statistics accordingly
- Trades reported with a delayed publication on a date other than the traded date do not update statistics
- Statistics which are cancelled on T+*n* are not included in any statistic calculation
- The statistic is reset at the end of each day

3.9 Trade Low/Trade Low On-Book/Trade Low Off Book

- On-Book trade cancellations are applied as a reversal to the statistic
- TRADEcho channels do not offer this statistic
- Core GTP channels include only On Book statistics
- Bulk Trade Amendments update the statistics accordingly
- Trades reported with a delayed publication on a date other than the traded date do not update statistics
- Statistics which are cancelled on T+*n* are not included in any statistic calculation
- The statistic is reset at the end of each day

3.10 52-week Trade High and Low

- This price may be updated within a trading day
- On-Book trade cancellations are applied as a reversal to the statistic
- This statistic is not offered on TRADEcho channels
- Core GTP channels include only On-Book trades in the derivation of statistic
- Bulk Trade Amendments update the statistics accordingly
- Trades reported with a delayed publication on a date other than the traded date do not update statistics
- Trades which are cancelled on T+*n* are not included in any statistic calculation
- The statistic value is carried forward to the next day

3.12 Indicative auction information

- Values are re-published from exchange
- The values may be published multiple times per day
- Indicative Auction Price, Paired Quantity, Auction Type, Imbalance Direction and Imbalance Size values are disseminated
- Values are not carried forward into the next trading day

3.13 Last traded

The Statistics Snapshot message, available via the Recovery service, will be enhanced to support the inclusion of three additional new fields. Used to disseminate the last trade time, quantity and price for a security, these fields will include on-book executions only (including Automatic, Uncrossing and Cross trades) in their derivation.

3.14 Previous Close Price

- Group Ticker Plant will publish Closing Price established on the previous trading day
- Previous Close Price will be available in Instrument Directory message via recovery service starting from morning
- Further information is contained within 'GTP002 – Technical guide – London Stock Exchange' and 'GTP002 – Technical guide – Turquoise'

3.15 Static and Dynamic Reference Prices

- Group Ticker Plant will publish automated Static Reference Price and Dynamic Reference Price as reported by London Stock Exchange for ETFs & ETCs/ETNs only.
- Automated reference price updates are triggered due to order book trades and automated reference price updates due to stale reference prices. For more details on how this is derived for London Stock Exchange, clients should refer to section “Regular trading price monitoring” in “MIT201 - Guide to the Trading system” via the following link: https://www.londonstockexchange.com/resources/securities-trading-resources?tab=technical-library

4. Analytics

The Order Book Analytics service is intended to provide additional statistics related to order book activity. This service publishes a snapshot of statistics every one (1) second for each instrument available on London Stock Exchange, Turquoise and Turquoise Europe markets.

4.1 Buy/Sell Order Count and Size

- States the number of buy/sell orders received within the calculation interval and the cumulative size of all such buy/sell orders
- Statistics are calculated for the electronic (normal) order book
- Amendments of orders will not contribute to the statistic
- Hidden orders will not contribute to the statistic
- Carried forward orders published at the start of the trading day do not contribute to the statistic as it does not relate to order book activity
- Named orders and anonymous orders are treated similarly by the Analytics service
- If the order book is cleared by the source venue, this will reset the statistic to zero

4.2 Order cancellation statistics

- States the number of client-initiated cancellation for orders. Cancellations initiated by Market Operations or Order expirations will not count toward this statistic
- Statistics are calculated for the electronic (normal) order book
- Only client-initiated cancellations will be published via this statistic
- Hidden orders will not contribute to the statistic
- Named orders and anonymous orders are treated similarly by the Analytics service
- If the order book is cleared by the source venue, this will reset the statistic to zero

4.3 Bid Ask Spread

- States the last view of the Bid/Ask spread in the given interval
- Statistics are calculated for the electronic (normal) order book
- Hidden orders will not contribute to the statistic
- In the absence of sell/buy liquidity (one-sided order book) the statistic will reset to zero
- When the order book is locked or crossed, the statistic will reset to zero
- If the order book is cleared by the source venue, this will set the statistic to zero

4.4 Buy/Sell VWAP

- States the Volume Weighted Average Price for the buy/sell triggered trades within the given interval
- The calculation logic will consider trades that happen in cases where an aggressor can be clearly defined. It will exclude any trades in auction sessions and trading behavior where both sides of the trade were passive. (Ex: Turquoise Dark Uncross, trades that take place due to shift in the mid-point, trades from Turquoise Periodic Auctions)
- Statistics are calculated for the electronic (normal) order book
- On-Book trade cancellations are applied as a reversal to the statistic
- Trades from Request for Quote (RFQ) sessions will not be considered for this statistic
- Cross or BTF trades will not be considered for this statistic

5. Additional information

5.1 Applicable trade types (statistics message)

5.1.1 London Stock Exchange

			On-Book only				All trades			
	Trade Type	Description	Volume	VWAP	Number of trades	Turnover	Volume	VWAP	Number of trades	Turnover
Trade Message	0	Regular Trade	✓	✓	✓	✓	✓	✓	✓	✓
	1	Auction Trade – Bulk	✓	✓	✓	✓	✓	✓	✓	✓
	2	Auction Trade – Indiv.								
	22	Private RFQ					✓	✓	✓	✓

5.1.2 Turquoise and Turquoise Europe

			On-Book only				All trades			
	Trade Type	Description	Volume	VWAP	Number of trades	Turnover	Volume	VWAP	Number of trades	Turnover
Turquoise Periodic Auctions, Turquoise Lit, Turquoise Dark										
Trade Message	0	Regular Trade	✓	✓	✓	✓	✓	✓	✓	✓
	1	Auction Trade – Bulk								
	2	Auction Trade – Indiv.	✓	✓	✓	✓	✓	✓	✓	✓
Turquoise Lit										
Trade Cross	6	Internal BTF					✓	✓	✓	✓
	8	Committed BTF					✓	✓	✓	✓

- Turquoise Dark statistics taken into account are Auction Trade – Indiv. and Regular Trade
- Turquoise Lit statistics taken in account are Regular Trade
- Turquoise Periodic Auctions statistics taken into account are Auction Trade – Indiv.

5.2 Applicable trade types (statistics update message)

5.2.1 London Stock Exchange

	Trade Type	Description	On-Book only	Off-Book	All trades
			Trade High/Low	Trade High/Low	Trade High/Low
Trade Message	0	Regular Trade	✓		✓
	1	Auction Trade – Bulk	✓		✓
	2	Auction Trade – Indiv.			
	22	Private RFQ		✓	✓

5.2.2 Turquoise and Turquoise Europe

	Trade type	Description	On-Book only	Off-Book	All trades
			Trade High/Low	Trade High/Low	Trade High/Low
Trade Message	0	Regular Trade	✓		✓
	1	Auction Trade – Bulk			
	2	Auction Trade – Indiv.	✓		✓
Trade Cross	6	Internal BTF			✓
	8	Committed BTF			✓

5.3 TRADEcho MiFID II statistics

TRADEcho MiFID II Statistics service is intended to provide statistics related to Trade Reports published on instruments where GTP Instrument identifier is available:

- Statistics values will exclude trades published on the day different than the day of execution.
- Off Book Trades with a Trade Date other than that of the Current Trading Date will not update the statistics package. Including the supplementary deferrals and aggregated trades publications.
- Following TRADEcho Phase 2 Go-Live, GTP will publish Off Book statistics for Total Trades and Volume only. Off Book Trade statistics will not be published for supplementary and aggregated trade publications.