



LSEG

LONDON STOCK EXCHANGE GROUP

GROUP TICKER PLANT

GTP 003 - **STATISTICS GUIDE**

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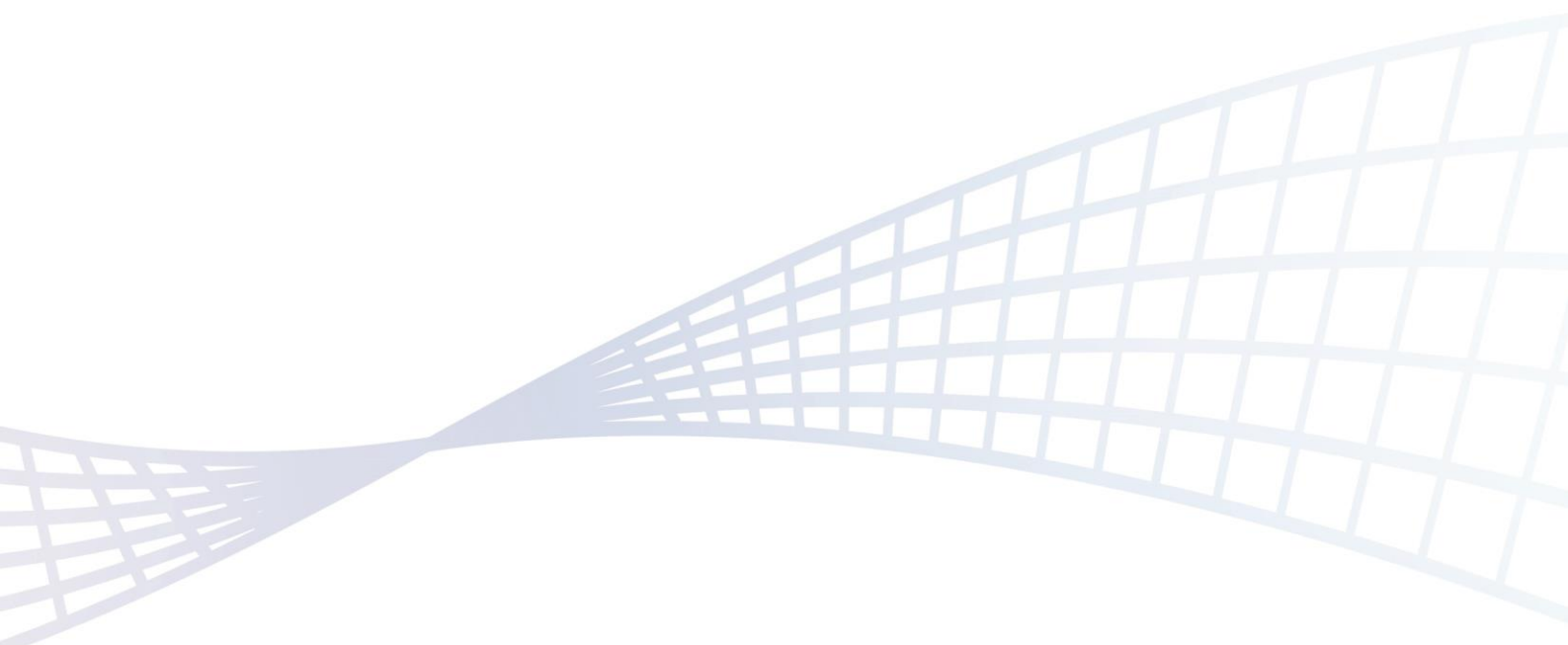
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Guide Disclaimer

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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 is 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

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) 207 797 3939
- Email: lsetam@londonstockexchange.com

Please contact the LSEG market data team 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 whilst 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 and 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 Millennium Exchange and TRADEcho Business Parameters <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 <http://www.londonstockexchange.com/products-and-services/millennium-exchange/technicalinformation/technicalinformation.htm>

3.3 Best Closing Bid and Ask

- BBO is calculated using MBP order book reconstruction
- Section 4 details variances in derivation logic between different markets
- When the mid-price is used to derive the closing price, the Group Ticker Plant does not redistribute the contributing Bid or Offers used.
- No values are carried forward into the following day

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:

$$\text{Trade Value} = \text{Price} \times \text{Executed Size}$$

- On-Book trade cancellations are applied as a reversal to the statistic
- Bulk Trade Amendments contribute to statistic calculations

$$\text{Trade Value} = \frac{(\text{Last Trade Price} \times \text{Last Executed Size})}{100}$$

- 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:

$$VWAP = \frac{\sum (\text{Last Trade Price} \times \text{Last Executed Size})}{\sum \text{Executed Trade Size}}$$

- 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 this 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

3.11 Open Interest

- Open interest is not applicable to LSEG Trading Venues
- The value is re-published as reported by upstream systems
- The latest value calculated on the trading venue will be carried forward into the next trading day.

3.12 Volatility

- Volatility is not applicable to LSEG Trading Venues
- Volatility is re-published as received from upstream exchange
- The value is not carried forward into the next trading day

3.13 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

3.14 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 included on-book executions only (including Automatic, Uncrossing and Cross trades) in their derivation.

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 1 second for each instrument available on the LSE, 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 Plato Uncross™, trades that take place due to shift in the mid-point, trades from Turquoise Plato Lit 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 London Stock Exchange Best Closing Bid and Ask

Trading Model	Derivation Logic
SETS	Immediately prior to Closing Auction Call;
SETSqx	Immediately prior to Post-Mandatory session;
SEAQ	Immediately prior to Post-Mandatory session;
IOB	Immediately prior to Closing Auction Call;
IB	Immediately prior to Closing Auction Call;
ORB	Immediately prior to Closing Auction Call.

5.2 Applicable Trade Types (Statistics Message)

5.2.1 London Stock Exchange

	Trade Type	Description	On-Book Only				All Trades			
			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					✓	✓	✓	✓
Trade Cross	5	Internal Cross	✓		✓	✓	✓	✓	✓	✓
	6	Internal BTF	✓		✓	✓	✓	✓	✓	✓
	7	Committed Cross	✓		✓	✓	✓	✓	✓	✓
	8	Committed BTF	✓		✓	✓	✓	✓	✓	✓

- Customers should note that TRADEcho Off Book statistics will be disseminated via the new TRADEcho channels.

5.2.2 Turquoise and Turquoise Europe

	Trade Type	Description	On-Book Only				All Trades			
			Volume	VWAP	Number of Trades	Turnover	Volume	VWAP	Number of Trades	Turnover
Turquoise NYLON™, Turquoise Plato Lit Auctions™, Turquoise Lit™, Turquoise Plato™										
Trade Message	0	Regular Trade	✓	✓	✓	✓	✓	✓	✓	✓
	1	Auction Trade - Bulk								

	2	Auction Trade - Indiv.	✓	✓	✓	✓	✓	✓	✓	✓
	22	Private RFQ								
Trade Cross (Only for Turquoise, not applicable to Turquoise Europe)	Turquoise Lit™									
	6	Internal BTF					✓	✓	✓	✓
	8	Committed BTF					✓	✓	✓	✓

- Turquoise Plato™ statistics taken into account are Auction Trade–Indiv. and Regular Trade
- Turquoise Lit™ statistics taken in account are Regular Trade
- Turquoise Plato Lit Auctions™ statistics taken into account are Auction Trade – Indiv.
- Turquoise NYLON™ Cash Order Book statistics derived from Auction Trade – Indiv.

5.3 Applicable Trade Types (Statistics Update Message)

5.3.1 London Stock Exchange

	Trade /Cross 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		✓	✓
Trade Cross	5	Internal Cross			✓
	6	Internal BTF			✓
	7	Committed Cross			✓
	8	Committed BTF			✓

5.3.2 Turquoise and Turquoise Europe

	Trade /Cross 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			

Trade Cross (Only for Turquoise, not applicable to Turquoise Europe)	6	Internal BTF			✓
	8	Committed BTF			✓

- Customers should note that TRADEcho Off Book statistics will be disseminated via the new TRADEcho channels.

5.4 TRADEcho MiFID II Statistics

- 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.