MIAX Pearl Equities Exchange

Equities Order Management Using FIX Protocol

FIX Interface Specification

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1. Overview

MIAX Pearl Equities™ FIX Orders Interface (**FOI**) is a messaging interface that allows MIAX Pearl Equities members and sponsored firms to send and manage their Equities orders. FOI also facilitates real-time electronic communication of transaction information corresponding to such Equities orders.

FOI is a flexible interface that uses FIX protocol version 4.2 with minor customization of certain tags. FOI uses FIX protocol for both application messages and session level messages. This document describes the messages that will be supported by FOI. For detailed information regarding FIX protocol and session protocol, please refer to the FIX documentation provided by FIX Protocol Limited (FPL) on their website http://www.fixtradingcommunity.org/.

FOI Features:

FOI has been designed for flexibility, reliability, low latency and high throughput messaging. Some of the key features of the interface are:

- Use of FIX protocol that has been adopted by many participants in the Equities industry. FIX tag/value messaging is a **flexible** messaging protocol that eliminates platform dependencies and allows to largely decouple exchange and Firm deployments.
- FIX session layer is implemented over TCP/IP and facilitates sequenced transmission and recovery of messages across TCP/IP sessions thereby achieving **reliable** communication.
- FOI allows multiple connections per Firm. On each FOI connection, Firms can send orders for any equity symbol and any of their MPIDs or their clients MPIDs that are entitled for the session. These features enable firms to achieve **load balancing** and **higher resiliency**.
- The FOI design, coupled with the Exchange architecture, facilitates **low latency** and **high throughput** messaging.
- FOI allows Auto Cancel on Disconnect on each session thereby allowing firms to reduce their risk in case of system problems at their end.
- FOI also allows Auto Cancel on System/Matching Engine Failure on each session allowing firms to reduce their risk in case of Pearl Equities system failures that prevent Firm's interaction with existing orders.

Orders entered via FOI are provided the following risk protection mechanisms:

- Per Order Risk Metrics
    - Maximum Order Size Protection
    - Minimum and Maximum Order Price Protection
    - Price Tick Size Check
    - Limit Order Price Protection
    - Market Order Price Protection
    - Maximum Order Notional Value Protection
    - ISO Reject
    - Short Sale Reject

- Short Sale Exempt Reject
- Market Order Reject
- Average Daily Volume (ADV) Check
- Regulation SHO Security List Reject
- Restricted Security List Reject
- Non-Agency Reject
- Override Capacity to Agency
- Locate Account Validation
- Early Trading Session Restriction
- Late Trading Session Restriction

- Cumulative Risk Metrics
  - Maximum Gross Notional Trade Value Protection
  - Maximum Net Notional Trade Value Protection
  - Maximum Gross Notional Open Value Protection
  - Maximum Net Notional Open Value Protection
  - Maximum Gross Notional Trade and Open Value Protection
  - Maximum Net Notional Trade and Open Value Protection
  - Duplicate Order Check
  - Order Rate Protection

- Trade Risk Metrics
  - Trading Collar
  - Market Impact Collar
  - Self-Trade Protection

Above protections are available to all members that use the FOI interface.

This specification is intended to be used only by MIAX Pearl Equities member firms and the firms that are sponsored for MIAX Pearl Equities access by MIAX Pearl Equities member firms. Members are encouraged to refer to MIAX Pearl Equities User's Manual for additional details on functionalities supported by the exchange.

1.1 Exchange related information

1.1.1 Hours of operation for MIAX Pearl Equities Exchange

Please refer to MIAX website for details about times for each of these events.

Note: Times specified in the website are in United States Eastern Time zone.

3:00 am	**Firm Interface Start up time**
	Firms are allowed to connect to FOI
3:30 am	**Live Order Window (LOW)**

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	Start of acceptance of messages (including Orders). Orders received at or after this time can be accepted by MIAX Pearl Equities.
04:00 am	**Early Trading Session** Start of Early Trading Session on MIAX Pearl Equities.
9:30 am	**Regular Opening Process** Start of MIAX Pearl Equities Regular Opening process.
9:30 am to 4:00 pm	**Regular Trading Session** (ends at 1:00 pm on early closing days) MIAX Pearl Equities stops accepting orders with a Time In Force (TIF) RHO and DAY for all traded symbols at the end of this trading session. All resting RHO and DAY orders are cancelled back to the members at this time. MIAX Pearl Equities may send queued executions following the end of the trading session for various operational reasons as needed.
4:00 pm to 8:00 pm	**Late Trading Session** (starts at 1:00 p.m and ends at 5:00 pm on early closing days) Start of Late Trading Session on MIAX Pearl Equities. MIAX Pearl Equities may send trade related data following the end of the trading session for various operational reasons as needed.
8:10 pm (approx.)	**Firm Interface End Time** (ends at 5:10 pm on early closing days) FOI has completed sending all messages and Firms will soon be disconnected

1.1.2 Obtaining more information

Information such as (but not limited to) membership, rules, fees and support can be obtained by sending an email to Trading Operations at TradingOperations@miaxglobal.com or by visiting MIAX website.

1.2 Certification for trading via FOI

MIAX Pearl Equities will provide a test bed for member firm's testing and certification needs. Please contact MIAX Trading Operations to obtain more information about this environment.

In order to connect to MIAX Pearl Equities production, member firms must certify their application with MIAX Pearl Equities. This certification testing is a manual process. In order to schedule a certification test, please email MIAX Trading Operations.

1.3 FAQs

Membership: Contact member services for details about membership. As a part of the on-boarding process, each member will be required to provide the NSCC MPIDs that will be used for order entry on each FOI session. These MPIDs will have to be sent in every message as required by the message format.

Routing Instruction: Firms are allowed to designate each order as non-routable (DNR: Do Not Route), Route Once or Re-Routable. An order marked as Route Once is eligible for routing upon receipt, except when received before the Opening process. When received before the Opening process, the Route Once order is eligible to

route as part of the Opening process. An order marked as Re-Routable is eligible for routing upon receipt as well as any subsequent time that resting quantity is locked or crossed by an away market quote. Please refer to MIAX Pearl Equities rules as to the order types that are routable.

Routing Strategy:
- Order Protection: This is the default routing strategy available for Route Once and Re-Routable orders. The strategy will attempt to execute against the Protected BBOs of the away markets after it is executed locally at or better than each away BBO.
- Primary Auction (PAC): This is the routing strategy available only for Displayed Re-Routable orders. The strategy will attempt to route the order to participate in the Primary Listing Exchange's Opening, Closing and Regulatory Halt auctions when they occur. PAC orders will only participate in the Regular Trading Session of the Primary Listing Exchange i.e. from 9:30 AM ET to 4:00 PM ET (or 1:00 PM ET in case of an early close). Outside of these Primary Listing Exchange's auctions, the PAC order will rest and be available for trading on the Pearl Equities orderbook and routing to better priced away exchanges for "Price Improvement".

Auto Cancel on Disconnect (ACOD): In the event a member's session with the exchange is disconnected, orders submitted via that session that are open on the Order Book can be cancelled automatically upon disconnect.

Members must select one of the following actions on a session by session basis which will be enforced when the protection is triggered:
- Cancel All Open Orders: All orders that were sent through this session and are open will be cancelled upon session disconnect.
- Do Not Cancel All Open Orders: This will disable Auto Cancel on Disconnect and MIAX Pearl Equities will not cancel any open orders upon that session's disconnect. This is the default behavior for the session if the member does not opt in for ACOD.

When FOI detects a disconnect for any reason (whether due to graceful logout, a connection loss or loss of heartbeats), it will trigger the auto cancel on disconnect process, whereby FOI will try to cancel all eligible orders (eligibility defined above).

The ACOD feature is provided on a best effort basis. Executions can occur while FOI is processing the ACOD event. As the technical circumstances initiating a disconnect may vary, Firms may contact Trading Operations to confirm the status of ACOD eligible open orders remaining at MIAX Pearl Equities that were sent via the session(s) that disconnected. The execution reports resulting from cancels or trades during the disconnect can also be received upon a subsequent reconnect by the Firm on the same day.

Auto Cancel on System/Matching Engine Failure (ACOSF): In the event of a Matching Engine or FOI failure that prevents Firm's interaction with existing orders, members may request that their open orders are cancelled automatically for a given session. Orders submitted via any of the member's other sessions will not be affected. Additionally, orders submitted to any Matching Engines that are not impacted will not be affected.

Members must select one of the following actions on a session by session basis which will be enforced when the protection is triggered:
- Cancel All Open Orders: All open orders in the impacted Matching Engine(s) that were sent through this session will be cancelled upon system failure.

- Do Not Cancel All Open Orders: This will disable Auto Cancel on System Failure and MIAX Pearl Equities will not cancel any open orders from that session upon system failure. This is the default behavior for the session if the member does not opt in for ACOSF.

The ACOSF feature is provided on a best effort basis. Executions can occur while the ACOSF event is being processed. As the technical circumstances initiating an ACOSF may vary, Firms are advised to contact Trading Operations to confirm the status of ACOSF eligible open orders remaining at MIAX Pearl Equities. The execution reports resulting from cancels or trades during the failure can also be received upon a subsequent reconnect by the Firm on the same day.

Executions/Busts/Adjustments: All executions, including trade busts (trade cancels) and adjustments (trade corrections) from current trading day are conveyed to firms via MIAX Pearl Equities MEO interface (for binary orders), FOI (for FIX orders) and MIAX Pearl Equities FIX Drop (both binary and FIX orders). As of Trades, Trade busts and adjustments are sent only on FIX Drops.

Flow control: FOI is a synchronous messaging interface that supports a "N"-in-flight paradigm to the Matching Engines. Upon receipt of "N" messages, FOI will not read the firm facing port until it sends out a response. Firms that do not strictly follow a "N"-in-flight paradigm are advised to limit the number of in-flight FIX messages to less than 20 for optimal TCP protocol performance; i.e. under certain limited circumstances, exceeding this limit could result in shrinking window size and/or dropped packets. For more information regarding the in-flight settings, please reach out to MIAX Trading Operations.

Failure/Recovery: In the event of a catastrophic hardware problem servicing FOI, MIAX Pearl Equities will activate backup FOI services on alternative hardware with different IP addresses. Other than a change in IP address, the FIX session can be reestablished just as after a normal disconnect and resynchronized per normal FIX protocol. Note that selected outbound messages from MIAX Pearl Equities to the Firm, in transition during the failure, may be sent **or resent** with PossResend=Y. Firms may have already seen some of these messages before, with lower sequence numbers, and should handle the possible duplicate communications.

Note that the backup FOIs are not available for connectivity testing during the trading day.

Firms are encouraged to conduct failover testing to ensure seamless interaction during such events. To schedule such testing with the exchange, please contact Trading Operations.

1.4 Configuration

Firms can configure their session(s) with the below properties.

Comp ID: All messages sent in either direction must contain SenderCompID and TargetCompID. Firms and MIAX Pearl Equities will agree upon the values, to be used for these fields, at the time of initial setup. Firms are allowed to use a single *Comp ID* for each connection. MIAX Pearl Equities will allow connections from a preconfigured computer (CompID).

Firm to MIAX Pearl Equities			MIAX Pearl Equities to Firm	
SenderCompID	**TargetCompID**		**SenderCompID**	**TargetCompID**
Firm Comp ID	MIAX Pearl Equities		MIAX Pearl Equities	Firm Comp ID

OnBehalfOfCompID: All application messages sent from the Firms to MIAX Pearl Equities must contain OnBehalfOfCompID. This is not required in administrative messages, and will be ignored if sent. The OnBehalfOfCompID sent in an application message should be a NSCC MPID. At the time of initial setup, Firms and MIAX Pearl Equities will agree upon a list of NSCC MPIDs that can be sent on a FOI session. Firms are allowed to use any of these NSCC MPIDs in their order messages sent via the session after the permission is setup.

IP Address: At the time of setup, MIAX Pearl Equities will require Firms source IPs and will allocate one or more MIAX Pearl Equities FIX server IPs to your firm as agreed upon by the Firm and MIAX Pearl Equities membership.

Port: At the time of setup, MIAX Pearl Equities will allocate one or more MIAX Pearl Equities FIX server ports as agreed upon by the Firm and MIAX Pearl Equities membership.

Session Based Configuration: Firms have the ability to configure their individual FIX sessions to receive various protections. The settings are only applied at the time of order entry or order modification. Please refer to MIAX Pearl Equities Port Attributes document (available at the MIAX website) for details on the configurable attributes.

2. FIX Message Format and Delivery

Please refer to **FIX v4.2 Protocol** document (https://www.fixtrading.org/standards/fix-4-2/) for details about **FIX message format and delivery**. That section offers insights into the general format of a FIX message being comprised of a *standard header* followed by the message body fields and terminated with a *standard trailer*. It further states that the non-printing, ASCII "SOH" (#001, hex: 0x01, referred to in this document as <SOH>) must be used as the field and message delimiter.

All tags must have a value specified. Optional fields without values should not be specified in the FIX message. An order that contains a missing required tag, or a tag with no associated value, will be rejected back to the user.

Note: Char String fields are case sensitive unless otherwise noted.

2.1 Standard Message Header

The Standard Header precedes each administrative or application message in the FIX protocol. The header identifies the message type, length, destination, sequence number, origination point, and time.

The following table contains the Standard Header tags processed by MIAX Pearl Equities. Any other header tag will be ignored.

Tag	FIX Name	Req'd	Details
8	BeginString	Yes	Always the first field in a FIX message. Valid value: FIX.4.2
9	BodyLength	Yes	Always the second field in a FIX message. Length of message expressed as the number of characters in the message following the BodyLength field up to, and including, the delimiter immediately preceding the CheckSum tag ("10=").
35	MsgType	Yes	Always the third field in a FIX message. Defines the message type. Valid values - Administrative messages: '0' = Heartbeat '1' = Test Request '2' = Resend Request '3' = Reject (Session level reject) '4' = Sequence Reset '5' = Logout 'A' = Logon Valid values – Application messages: '8' = Execution Report '9' = Order Cancel Reject

Tag	FIX Name	Req'd	Details
			'D' = New Order Single 'F' = Order Cancel Request 'G' = Order Cancel/Replace 'j' = Reject (Business message reject) 'UCC' = Trade Cancel/Correct
34	MsgSeqNum	Yes	Message sequence number (numeric).
43	PossDupFlag	No	Indicates a message resent from the admin level (has a duplicate sequence number). Default is 'N'.
49	SenderCompID	Yes	Identifies the party sending the message. The sending Firm should use their Line Identifier as assigned by MIAX Pearl Equities. Same value is used for *TargetCompID* in messages from MIAX Pearl Equities to the Firm. See Configuration section (1.4) for more details.
50	SenderSubID	Cond.	Sub identifier of the party sending the message. Required for all application messages from MIAX Pearl Equities to Firm. Valid values: "TEST" = MIAX Pearl Equities TEST Env. "PROD" = MIAX Pearl Equities PROD Env.
52	SendingTime	Yes	Time of message transmission expressed in UTC (Universal Time Coordinated), also known as GMT. In the message header from the Firm, this value must be within a configurable interval of the current time; else the order will be rejected. The configurable interval is defined by Regulatory Circular. Format: YYYYMMDD–HH:MM:SS.mmm
56	TargetCompID	Yes	Identifies the party receiving the message. Firms should use the value as assigned by MIAX Pearl Equities. Same value is used for *SenderCompID* in messages from MIAX Pearl Equities to the Firm. See Configuration section (1.4) for more details.
57	TargetSubID	Cond.	Sub identifier of the party receiving the message. Required for all application messages from Firm to MIAX Pearl Equities. Valid values: "TEST" = MIAX Pearl Equities TEST Env. "PROD" = MIAX Pearl Equities PROD Env.
97	PossResend	No	Applicable to application messages.

Tag	FIX Name	Req'd	Details
			From Firm to MIAX Pearl Equities: 'N' = Indicates a new message (Default) 'Y' = Indicates an application level resend and is not supported. The message will be logged, but effectively ignored. From MIAX Pearl Equities to Firm: Set to 'Y' during certain failure/recovery scenario.
115	OnBehalfOfCompID	Cond.	Required for all application messages from Firm to MIAX Pearl Equities. The NSCC MPID of the Firm who owns the order sent in the message.
116	OnBehalfOfSubID	No	From Firm to MIAX Pearl Equities: Any 4 character string provided by the Firm. Could be used to identify specific entity or trading desk of the Firm.
122	OrigSendingTime	Cond.	Required for resent messages. If no data is available, this value is set to the SendingTime value. Format: YYYYMMDD–HH:MM:SS.mmm
128	DeliverToCompID	Cond.	From MIAX Pearl Equities to Firm: The NSCC MPID sent in OnBehalfOfCompID from the Firm is sent back.
129	DeliverToSubID	Cond.	From MIAX Pearl Equities to Firm: The value sent in OnBehalfOfSubID by the Firm is sent back.

2.2 Standard Message Trailer

The Standard Trailer terminates each administrative or application message in the FIX protocol. The trailer is used to segregate messages and contains the three-digit character representation of the Check Sum value. Tag must be present.

The following table contains the Standard Trailer tags processed by MIAX Pearl Equities. Any other Trailer tag will be ignored.

Tag	FIX Name	Req'd	Details
10	CheckSum	Yes	Always the last field of a FIX message.

3. Session Protocol

Please refer to **FIX v4.2 Protocol** document (https://www.fixtrading.org/standards/fix-4-2) for details about **FIX session protocol**. This protocol layer offers session management capabilities such as establishing a FIX session, authentication, application/administrative messaging over TCP/IP, sequencing of messages, heartbeats and gap fills.

Order sending firm will always be the *Initiator* of the FIX session and MIAX Pearl Equities is the *Acceptor*.

4. Administrative Messages

This section consists of administrative messages such as those that are used for session protocol.

4.1 Logon Request (MsgType = A)

Please refer to **FIX v4.2 Protocol** document for details about **FIX Logon Request**.

The logon message authenticates a user establishing a connection to a remote system. The logon message must be the first message sent by the Firm that needs to initiate a FIX session with FOI. Firms must wait for a Logon message as a response from FOI before sending other messages.

The message format is as follows:

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = A
98	EncryptMethod	Yes	(always unencrypted)
108	HeartBtInt	Yes	Value specified in seconds. Note: Must be > 0 and same value must be used by both sides.
141	ResetSeqNumFlag	No	Indicates both sides of a FIX session should reset sequence numbers
	Standard Trailer	Yes	

Points to note:

- Firms can specify a heartbeat interval that is greater than zero and FOI will use the same. Both sides must use that same interval to check if the other side is alive. A Heartbeat interval of 5 seconds is recommended. Upon missing of a single heartbeat, FOI will send a *Test Request*. Upon missing of 2 heartbeats, FOI will send a logout and terminate the connection. MIAX Pearl Equities recommends using as low of a value the reliability and latency of your telecommunications channel will allow.

- Encryption is not supported and hence the EncryptMethod field is ignored.

- When Firms reconnect due to a loss of connection, the login response from MIAX Pearl Equities <u>may</u> contain a sequence number greater than what the Firm expects. This will require the Firm to follow the FIX resend protocol to do a gap fill. MIAX Pearl Equities will initiate a similar gap fill process if MIAX Pearl Equities detects a gap. MIAX Pearl Equities will also reject orders with a SendingTime older than 60 seconds.

4.2 Heartbeat (MsgType = 0)

Please refer to **FIX v4.2 Protocol** document for details about **FIX Heartbeat**.

The heartbeat format is as follows:

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = 0
112	TestReqID	Cond	Required when the heartbeat is the result of a Test Request message.
	Standard Trailer	Yes	

Points to note:

- Check the Logon message for details about the heartbeat interval

- Each side must send a heartbeat only when the agreed upon interval has elapsed since the last message was sent.

4.3 Test Request (MsgType = 1)

Please refer to **FIX v4.2 Protocol** document for details about **FIX Test Request**.

The test request message forces a heartbeat from the opposing application. The test request message checks sequence numbers or verifies communication line status. The opposite application responds to the Test Request with a Heartbeat containing the TestReqID.

The heartbeat format is as follows:

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = 1
112	TestReqID	Yes	
	Standard Trailer	Yes	

Points to note:

- If heartbeat interval + 1 second has elapsed since the last message was received, a Test request can be issued. After two such iterations, the connection must be dropped. This ensures a proactive detection and cleanup of a broken TCP connection.

4.4 Resend Request (MsgType = 2)

Please refer to **FIX v4.2 Protocol** document for details about **FIX Resend Request**.

The message format is as follows:

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = 2
7	BeginSeqNo	Yes	
16	EndSeqNo	Yes	
	Standard Trailer	Yes	

4.5 Reject – Session Level (MsgType = 3)

Please refer to **FIX v4.2 Protocol** document for details about **FIX Reject (session level)**.

FOI will disregard any message that is garbled, cannot be parsed or fails a data integrity check. MIAX Pearl Equities will also terminate the connection.

The message format is as follows:

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = 3
45	RefSeqNum	Yes	MsgSeqNum of rejected message
371	RefTagID	Cond	Required if reject reason refers to a specific tag
372	RefMsgType	Yes	The MsgType of the FIX message being referenced
373	SessionRejectReason	Yes	Code to identify reason for a session-level Reject message Valid Values: "0" = Invalid tag number "1" = Required tag missing "2" = Tag not defined for this message type "3" = Undefined tag "4" = Tag specified without a value "5" = Value is incorrect (out of range) for this tag "6" = Incorrect data format for value "7" = *Unused/Not applicable* "8" = *Unused/Not applicable* "9" = Comp ID problem "10" = SendingTime accuracy problem "11" = Invalid MsgType
58	Text	No	Will be supplied if there is a need to supply more information regarding the reject
	Standard Trailer	Yes	

4.6 Sequence Reset (MsgType = 4)

Please refer to **FIX v4.2 Protocol** document for details about **FIX Sequence Reset (Gap Fill)**.

The message format is as follows:

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = 4
123	GapFillFlag	No	
36	NewSeqNo	Yes	
	Standard Trailer	Yes	

4.7 Logout Request (MsgType = 5)

Please refer to **FIX v4.2 Protocol** document for details about **FIX Logout Request**.

The logout message initiates or confirms the termination of a FIX session. Disconnection without the exchange of logout messages will be interpreted as an abnormal condition.

Before actually closing the session, the logout initiator must wait for the opposite side to respond with a confirming logout message. This gives the remote end a chance to perform any Gap Fill operations that may be necessary. The session may be terminated if the remote side does not respond in 10 seconds.

After sending the Logout message, the logout initiator should not send any messages unless requested to do so by the logout acceptor via a ResendRequest.

The message format is as follows:

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = 5
58	Text	N	Can be used to send readable information to the recipient. FOI will just log this and no alerts will be generated on any human readable display devices.
	Standard Trailer	Yes	

5. Application Messages

This section consists of application messages such as Order Request, Cancel Request, Cancel/Replace Request and Execution Report.

5.1 New Order - Single (MsgType = D)

Firms can send new orders to the MIAX Pearl Equities exchange with the New Order Single message. The following table contains the fields MIAX Pearl Equities supports for the New Order Single message.

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = D
1	Account	No	Customer ID defined by the firms. Maximum length is 16 characters. FOI will pass this through for clearing.
11	ClOrdID	Yes	Day unique identifier of the order as assigned by the Firm. 20 characters or less. Characters in ASCII range 33-126 are allowed, except for pipe. MIAX Pearl Equities will validate that *ClOrdID* is unique across all open orders for the Session within a Matching Engine. However, firms are responsible to ensure this uniqueness across all orders sent during the trading day**.**
18	ExecInst	Cond	Valid values: f = Inter-market Sweep Order (ISO) M = Midpoint Peg m = Midpoint Peg, but do not match when NBBO is locked R = Primary Peg r = Primary Peg, but do not match when NBBO is locked Note: If any other value is present, the order will be rejected.
38	OrderQty	Yes	Number of shares specified on the order. Has to be a whole number equal to or greater than 1. Maximum Size: Defined in Regulator Circular and/or configured per session.

FIX Tag	FIX Name	Req'd	Details
40	OrdType	Yes	Valid values: 1 = Market 2 = Limit P = Pegged Pegged requires ExecInst = M, m, R or r
44	Price	Cond	Limit Price for limit orders and pegged orders. Required for limit orders and pegged orders. Price should not be specified on market orders. Trailing zeros to the right of the decimal point are allowed up to six digits, if more than six digits the order will be rejected. Maximum Price: Defined by Regulatory Circular.
54	Side	Yes	Side of order. Valid values: 1 = Buy 2 = Sell 5 = Sell Short 6 = Sell Short Exempt
55	Symbol	Yes	Ticker symbol for the security in NASDAQ Integrated Platform format.
59	TimeInForce	Yes	Specifies how long the order remains in effect. Valid values: 0 = Day (Early and Regular Hours) 3 = IOC (Immediate or Cancel) 4 = Fill or Kill (FOK) 5 = Good Till Extended Day (GTX) 6 = Good Till Time (GTT) R = RHO (Regular Hours Only)
60	TransactTime	Yes	Time request was initiated/released expressed in UTC (Universal Time Coordinated), also known as GMT. Format: YYYYMMDD–HH:MM:SS.mmm
76	ExecBroker	No	Specifies order handling. Valid values: "PO" = Post Only

FIX Tag	FIX Name	Req'd	Details
110	MinQty	No	Minimum fill quantity. Must be > 1 to be a MinQty order. Tag 9110 MinQtyExecType may be used to allow multiple contra orders to fulfill MinQty on order arrival.
111	MaxFloor	No	Number of shares of the order to display. The balance is reserve. Must be > 0 and in round lots to be a Reserve order. 0 displays entire quantity (Default). Tag 8020 DisplayRange may be used to specify a range for random replenishment of the Reserve order.
114	LocateReqd	No	Valid values: N = Client affirms ability to borrow or Member is relying on an exception to the Regulation SHO locate requirement (Default). Y = Client does not affirm ability to borrow (results in a reject)
126	ExpireTime	Cond	Required when TimeInForce (59) = '6'. Order will be rejected if the tag is provided for other TIF's. Time/Date of order expiration expressed in UTC (Universal Time Coordinated), also known as GMT. NOTE: The entered time will be rounded down to the nearest second.
211	PegOffset	No	Signed dollar value up to four decimal places for a pegged order. Note: Does not apply to Midpoint Peg order.
528	OrderCapacity	Yes	Specifies the order origin type. Valid values: A = Agency P = Principal R = Riskless Principal

FIX Tag	FIX Name	Req'd	Details
5700	LocateAccount	Cond	Locate Account specified by the Firm for Short Sell or Short Sell Exempt order. Maximum length is 4 characters. FOI will pass this through for clearing. Required if Firm opts in for Locate Account Validation Risk Protection.
7699	PurgeGroup	No	Optional Member specified alphanumeric value 0-9, A-Z, or a-z. Cancellation by PurgeGroup is available only on the binary Purge Port. See MIAX Pearl Equities MEO interface specification for details on Purge Port.
7928	SelfTradeProtection	No	2 or 3 character (not space separated) **1st character – Self Trade Protection Level** F = Firm M = MPID P = Parent Group **2nd character – Self Trade Protection Instruction** N = Cancel Newest O = Cancel Oldest B = Cancel Both D = Decrement and Cancel **3rd character – Customer specified protection group (optional)** Member specified alphanumeric value 0-9, A-Z, or a-z. NOTE: **Self Trade Protection Level** should only be set to Parent Group by firms that have set up an affiliation agreement through the MIAX Membership Team. Otherwise, using Parent Group will result in Self-Trade Protection not being applied to the order. Please contact MIAX Pearl Equities Trading Operations for affiliation agreement details. **Self Trade Protection Group** is an optional attribute that can be provided on the order which more granularly defines the Self Trade Protection Level.

FIX Tag	FIX Name	Req'd	Details
7947	PriceSlidingAndRepriceFrequency	No	D = Display Price Sliding, Re-price Once (Default for displayed orders) C = Display Price Sliding, Re-price Once, but Cancel if Crossed at Entry M = Display Price Sliding , Reprice Multiple Times N = No Price Sliding
8020	DisplayRange	No	Used for random replenishment of Reserve orders. Must be in round lots and less than MaxFloor.
9110	MinQtyExecType	No	MinQty Execution Type. Applicable when MinQty is non-zero. 1 = Only single contra order can fulfill MinQty requirement (Default when MinQty is specified) 2 = Multiple contra orders can fulfill MinQty requirement
9303	RoutingInst	No	O = Route Once R = Re-routable N = Do Not Route Default is *Do Not Route* for Midpoint Peg, Primary Peg, Minimum Quantity, Post Only and ISO orders. Else default is *Route Once.*
9400	RoutingStrategy	No	Not applicable to Post Only, ISO, Midpoint Peg, Primary Peg, Minimum Quantity or 'Do Not Route' orders. P = Order Protection (Default) PAC = Primary Auction
9478	TradingCollarDollarValue	No	Custom Dollar Value for Trading Collar Protection. When tag is not present or has a zero or negative value, exchange default will be used.
9479	DisplayIndicator	No	Y = Displayed (Default for Limit and Market orders) N = Non-Displayed (Default for Midpoint Peg and Primary Peg orders)
9481	RetailOrderIndicator	No	Y = Retail Order N = Non Retail Order (Default)

FIX Tag	FIX Name	Req'd	Details
9482	AttributableIndicator	No	When the tag is not present, session setting will be used. N = Do not attribute Y = Attributed to Firm MPID R = Attributed to 'RTAL'
9483	CancelOrderIfNotNBBOSetter	No	Y = If not NBBO Setter, order will be cancelled back N = If not NBBO Setter, order will not be cancelled back (Default)
9485	CancelOrderIfNotNBBOSetterWithSize	No	Y = If not NBBO Setter with Size, order will be cancelled back N = If not NBBO Setter with Size, order will not be cancelled back (Default)
	Standard Trailer	Yes	

Points to note:

- *Order Validation*: MIAX Pearl Equities will validate each order it receives by checking that the user sent all the required FIX fields for the order. FIX field level validation failure will result in a session reject. Business rule validation failures will result in rejection in the form of an Execution Report (MsgType = 8) with an Execution Type of Rejected (ExecType = 8). When the Firm message passes FIX field level validations and Business rule level validation and still has to be rejected, MIAX Pearl Equities will send a Business reject message for them. Once the Order is accepted and Acked, any further Business rule validations that fail will result in an unsolicited cancel.

- *Order Acknowledgement*: Upon receipt of an order, MIAX Pearl Equities validates the order and then sends an acknowledgement back to the client. This acknowledgement tells the user that a MIAX Pearl Equities Matching Engine has received the order and has started to process it. This acknowledgement is in the form of an Execution Report (MsgType = 8) with an Execution Type of New (ExecType =0) and an Order Status of New (OrdStatus = 0). See the section "Execution Report (MsgType = 8)" for more information about the individual Execution Report fields.

- *Maximum Price and Size*: Please refer to the Regulatory circulars for the maximum price and size accepted by the system. Additionally, Firms may provide a configuration of maximum order size applicable to their orders, otherwise exchange default maximum order size check will be used.

5.2 Order Cancel Request (MsgType = F)

Firms can send an Order Cancel Request message to MIAX Pearl Equities to cancel the remaining quantity of an existing order. The following table summarizes the format for the Order Cancel Request message.

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = F

FIX Tag	FIX Name	Req'd	Details
11	ClOrdID	Yes	Day unique identifier of the order as assigned by the firm. 20 characters or less. Characters in ASCII range 33-126 are allowed, except for pipe. MIAX Pearl Equities will validate that *ClOrdID* is unique across all open orders for the Session within a Matching Engine. However, firms are responsible to ensure this uniqueness across all order requests sent during the trading day.
37	OrderID	No	MIAX Pearl Equities assigned Order ID of the order targeted by the cancel request. OrigClOrdID must be set if OrderID is not. If both OrderID and OrigClOrdID are present the request will be rejected.
38	OrderQty	No	**Ignored.**
41	OrigClOrdID	Cond	*ClOrdID* of the targeted order to cancel. OrderID must be set if OrigClOrdID is not. When OrderID is supplied, this tag must not be sent. If both OrderID and OrigClOrdID are present the request will be rejected.
54	Side	No	**Ignored.**
55	Symbol	Yes	As specified in the New Order request.
60	TransactTime	Yes	Time request was initiated/released expressed in UTC (Universal Time Coordinated), also known as GMT. Format: YYYYMMDD–HH:MM:SS.mmm
	Standard Trailer	Yes	

Points to note:

- Upon receipt of a cancel request, the order will be fully canceled if there is no pending routed quantity. MIAX Pearl Equities responds with an Execution Report that has *ClOrdID* set to the *ClOrdID* of the cancel, *OrigClOrdID* set to the *ClOrdID* of the target order. If the order is fully canceled, OrdStatus and ExecType are both set to Canceled, otherwise OrdStatus and ExecType are both set to Pending Cancel(6).

- An order may have been partially routed away when MIAX Pearl Equities receives the Cancel Request. MIAX Pearl Equities will immediately cancel quantity on the MIAX Pearl Equities book and send an Execution Report as the response. Tag 58 (Text) will contain the number of shares canceled. Formatted "CxlQty:N" where N is a whole number. When the routed order comes back, the unexecuted portion will be canceled immediately till all response(s) are back.

- An order with a cancel pending must not be considered closed until MIAX Pearl Equities sends an Execution message with a status indicating that the order is closed. For example, an Execution with ExecType = Cancelled, where *ClOrdID* refers to the *ClOrdID* of the cancel, and *OrigClOrdID* refers to the *ClOrdID* of the order.

- An order may have only one cancel request pending at a time. Sending a second cancel request while one is pending will result in the second cancel request being rejected. Only after the first cancel request is rejected can the Firm send another cancel.

- If a binary purge port is set up, the binary purge port can be used to purge all orders for the same MPID, these include orders received over MIAX Pearl Equities binary order interface (MEO) as well as FOI sessions. Members have the option to apply the Purge Group filter to further narrow the scope of the request. If this filter is used only orders with the Purge Group specified will be cancelled. See MIAX Pearl Equities MEO interface specification for details on Purge Port.

- Order Cancel Request using the OrderID can be used to cancel an order entered through the same or a different FOI session.

- Session needs to be entitled to send the order cancel request with OrderID.

- Cancelling an order entered through a MEO session is not allowed.

5.3 Order Cancel/Replace Request (MsgType = G)

The MIAX Pearl Equities FIX Engine allows customers to replace orders with the Order Cancel/Replace Request message. Only *Price*, *Side, OrderQty, Min Qty and Max Floor* may be changed. Fields not listed in the table will be ignored.

FIX Tag	FIX Name	Req'd	Can Repl	Details
	Standard Header	Yes		MsgType = G
11	ClOrdID	Yes	Must	Day unique identifier of the order as assigned by the Firm. 20 characters or less. Characters in ASCII range 33-126 are allowed, except for pipe. MIAX Pearl Equities will validate that *ClOrdID* is unique across all open orders for the Session within a Matching Engine. However, firms are responsible to ensure this uniqueness across all order requests sent during the trading day.
18	ExecInst	No	No	**Ignored** – value preserved from original order.
38	OrderQty	Yes	Yes	The intended order quantity. This will modify the OrderQty of the current order; it does not directly set the remaining quantity. Has to be a whole number equal to or greater than 1. Maximum Size: Defined in Regulator Circular and/or configured per session.

FIX Tag	FIX Name	Req'd	Can Repl	Details
40	OrdType	No	No	**Ignored** – value preserved from original order.
41	OrigClOrdID	Yes	N/A	*ClOrdID* of the targeted order to replace. In the case of multiple changes to a single order, this will be the *ClOrdID* of the **most recent** accepted change.
44	Price	Cond	Yes	Price for Limit or Midpoint Peg Orders or Primary Peg Orders. Required for these order types. Price should not be specified for Market Orders. Maximum Price: Defined by Regulatory Circular.
54	Side	Yes	Yes	May only be used to change among Sell, Sell Short and Sell Short Exempt. Otherwise value should be the same as original order. Valid values: 1 = Buy 2 = Sell 5 = Sell Short 6 = Sell Short Exempt
55	Symbol	Yes	No	As specified in the New Order request.
59	TimeInForce	No	Yes	Valid values: 0 = Day (Early and Regular Hours) 5 = Good Till Extended Day (GTX) 6 = Good Till Time (GTT) R = RHO (Regular Hours Only) NOTE: If this field is not provided, the value will be preserved from the original order.
60	TransactTime	Yes	N/A	Time request was initiated/released expressed in UTC (Universal Time Coordinated), also known as GMT. Format: YYYYMMDD-HH:MM:SS.uuu
110	MinQty	No	Yes	New MinQty for the order. A MinQty order cannot be modified to be a non-MinQty order and vice versa.
111	MaxFloor	No	Yes	New MaxFloor for the Reserve order. Must be in round lots. A Reserve order cannot be modified to be a non-Reserve order and vice versa.
114	LocateReqd	No	Yes	Valid values: N = Client affirms ability to borrow or Member is relying on an exception to the Regulation SHO locate requirement (Default). Y = Client does not affirm ability to borrow (results in a reject)

FIX Tag	FIX Name	Req'd	Can Repl	Details
126	ExpireTime	Cond	Yes	Required when TimeInForce (59) = '6'. Order will be rejected if the tag is provided for other TIF's. Time/Date of order expiration expressed in UTC (Universal Time Coordinated), also known as GMT. NOTE: The entered time will be rounded down to the nearest second.
5700	LocateAccount	Cond	Yes	New Locate Account specified by the Firm for Short Sell or Short Sell Exempt order. Maximum length is 4 characters. FOI will pass this through for clearing. Required if Firm opts in for Locate Account Validation Risk Protection.
528	OrderCapacity	No	No	**Ignored** – value preserved from original order.
	Standard Trailer	Yes		

Points to note:

- Tags not listed in the above Cancel/replace message will be ignored.

- Changing Price, MinQty or increasing the OrderQty of the original order will result in the order losing its current time priority in the book.

- A replace request will be rejected if the order is partially or fully routed to an away market with the exception of orders with routing strategy of Primary Auction (PAC). Replace request can be accepted for Primary Auction (PAC) orders if the order is fully routed to the Primary Listing Exchange's Opening, Re-Opening or Closing auction and will receive a response with Execution Report (MsgType='8') message with ExecType = 'E' (Pending Replace). The final state of the replace request will be communicated with an Execution Report (MsgType='8') message with ExecType = '5' (Replaced) in case of request being accepted, or by Order Cancel Reject (MsgType = '9') in case of a reject.

- OrderQty may not be the actual open quantity of the new order. MIAX Pearl Equities will subtract executed volume of the original (target) order from the OrderQty in the replace request and leave open any remaining quantity in the new order.

5.4 Don't Know Trade (MsgType = Q)

The MIAX Pearl Equities FIX Engine **does not** accept a Don't Know Trade message. If the Firm has any questions or issues with a trade, please contact MIAX Pearl Equities Trading Operations with the details.

5.5 Order Cancel Reject (MsgType = 9)

If any of the validations of a Cancel or a Cancel/Replace request fail, MIAX Pearl Equities responds with an Order Cancel Reject message.

For Primary Auction (PAC) Orders:

- If a Cancel/Replace request sent to a Primary Listing Exchange is rejected, MIAX Pearl Equities responds with an Order Cancel Reject message.
- If a Cancel request sent to a Primary Listing Exchange is rejected because the order targeted in the request is not resting at the Primary Listing Exchange, MIAX Pearl Equities responds with an Order Cancel Reject message.

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = 9
11	ClOrdID	Yes	Unique order ID assigned by the Firm to the cancel request or to the cancel/replace request.
37	OrderID	Yes	MIAX Pearl Equities assigned OrderID of the order targeted by the cancel request. 'Unknown' if the order targeted by the cancel request is unknown to MIAX Pearl Equities.
39	OrdStatus	Yes	Current status of the order after the Cancel Reject.
41	OrigClOrdID	No	As specified in the Order Cancel Request.
58	Text	Yes	Text describing error specified in Appendix Format: 'Error Code': 'Description' E.g. 5: Invalid OrigClOrdID
102	CxlRejReason	Yes	Code to identify reason for cancel rejection. Valid values: 0 = Too late to cancel 1 = Unknown order 2 = Broker Option (Details provided in Text tag, See Appendix B) 3 = Previous cancel or cancel/replace request is still pending
434	CxlRejResponseTo	Yes	Identifies the type of request in which Cancel Reject is the response. Valid values: 1 = Order Cancel Request 2 = Order Cancel/Replace Request
9687	OrigSession	Cond	Identifies the type of session on which the order was received. Order's FirmCode will be appended after a "-". Format: "SessionType-FirmCode"

FIX Tag	FIX Name	Req'd	Details
			Valid values for SessionType: "FOI" = Order received on FOI session "MEO" = Order received on MEO session e.g. FOI-FRM1, MEO-FRM2. If entitled, present along with *OrigCompID* on the drop copy only.
9688	OrigCompID	Cond	*SenderCompID* value from the NewOrderSingle message received on the FOI session or *Computer ID* value from the Login Request message received on the MEO session. If entitled, present along with *OrigSession* on the drop copy only.
	Standard Trailer	Yes	

Points to note:
- Note that when a cancel or cancel/replace request is rejected, the target order is still alive, except in certain scenarios. Please refer to the MIAX Pearl Equities User's Manual for additional details.

5.6 Execution Report (MsgType = 8)

The MIAX Pearl Equities FIX engine transmits Execution Report messages back to the Firm that sent the order. The Execution Report message is used to:

- Confirm the receipt of an order
- Confirm changes requested for an existing order (i.e. acceptance of cancel or cancel/replace requests)
- Relay fill information on working orders
- Send size decrement or cancellation due to Self Trade Protection
- Send the working price when a new order is added to the book or when a cancel/replace request is processed
- If entitled, send working price update when an order is repriced
- Reject orders

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = 8
1	Account	No	Copied from order if specified.
11	ClOrdID	Yes	*As applicable:* *(1) ClOrdID* of the order being accepted, executed or rejected or of the cancel/replace request.

FIX Tag	FIX Name	Req'd	Details
			(2) ClOrdID of the cancel request when done on the order entry session. *(3) ClOrdID* of the target order when cancel is done over a session different than the order entry session. *(4) ClOrdID* of the target order subject to unsolicited cancel in case of ACOD or other system cancel.
14	CumQty	Yes	Cumulative quantity of shares executed for this order.
17	ExecID	Yes	Unique identifier for each Execution Report message. Uniqueness is guaranteed within a single trading day.
18	ExecInst	No	Copied from order.
20	ExecTransType	Yes	Identifies the trade type. Valid values: 0 = New
31	LastPx	No	Price traded on this fill (zero for non-fills). For ExecRestatementReason = 5: Match price if the order had not been prevented from execution by Self Trade Protection
32	LastShares	No	Quantity of shares traded on this fill (zero for non-fills). For ExecRestatementReason = 5: Number of shares that would have matched if the order had not been prevented from execution by Self Trade Protection.
37	OrderID	Yes	Unique OrderID, as assigned by MIAX Pearl Equities when order is accepted. Order ID is unique across the exchange across trading days. Set to zero if the order is rejected.
38	OrderQty	No	Copied from order. On restatements (150=D) the OrderQty may be updated due to Self Trade Protection Decrement.
39	OrdStatus	Yes	Identifies the current status of an order. Valid values: 0 = New 1 = Partially Filled 2 = Filled 4 = Canceled 5 = Replaced 6 = Pending Cancel 8 = Rejected E = Pending Replace
40	OrdType	No	Copied from order.
41	OrigClOrdID	No	*ClOrdID* of the canceled or replaced order (for a System Cancel, ACOD, solicited Cancel (Cancel

FIX Tag	FIX Name	Req'd	Details
			request is not using Exchange OrderID or Cancel request is using Exchange OrderID and is on the same session as the order entry session), or a Cancel/Replace, otherwise not present). This is the target order of the previous request and **not** the initial order of the day.
44	Price	Cond	Copied from order.
54	Side	Yes	Copied from order.
55	Symbol	Yes	Copied from order.
58	Text	Cond	Reject Reports (ExecType = 8) contain text describing error specified in Appendix B Format: 'Error Code':' Description' E.g. 1: Unknown Symbol User requested Cancel with ExecType equal to "6" contain partial Canceled Quantity Format: CxlQty:'value' E.g. CxlQty:40 Unsolicited Canceled (ExecType = 4) will contain a free form human readable reason for the cancel. (See Error Code 0 in Appendix B)
59	TimeInForce	No	Copied from order.
60	TransactTime	Yes	Time of execution/order creation in the Matching Engine expressed in UTC (Universal Time Coordinated), also known as GMT. Format: YYYYMMDD–HH:MM:SS.mmm
76	ExecBroker	No	Copied from order.
103	OrdRejReason	No	The reason the order was rejected. Valid values: 0 = Broker Option (Details listed in tag 58 Text Field; See Appendix B) 1 = Unknown Symbol 2 = Exchange Closed 6 = Duplicate Order (duplicate ClOrdID)
110	MinQty	No	Copied from order.
111	MaxFloor	No	Copied from order.
126	ExpireTime	No	Copied from order.
150	ExecType	Yes	Identifies the type of execution report. Valid values: 0 = New 1 = Partially filled 2 = Filled 4 = Canceled 5 = Replaced

FIX Tag	FIX Name	Req'd	Details
			6 = Pending Cancel 8 = Rejected E = Pending Replace D = Restated
151	LeavesQty	Yes	Number of open shares remaining for further execution. If the OrdStatus is Canceled or Rejected (no longer active) then LeavesQty = 0, otherwise LeavesQty = OrderQty - CumQty.
198	SecondaryOrderID	No	Applicable to Reserve orders. Secondary Order ID used on MIAX Pearl Equities DOM feed for the executed display portion of the Reserve order.
211	PegOffset	No	Copied from order.
382	NoContraBrokers	Cond	Only present when the execution occurred on an exchange other than MIAX Pearl Equities. Always 1.
375	ContraBroker	Cond	Market ID (MIC code) of the market on which this execution occurred when it occurs on an exchange other than MIAX Pearl Equities. Example codes from https://www.iso20022.org/market-identifier-codes Example Valid Values: "XASE" = NYSE American "XBOS" = NASDAQ BX "XCHI" = NYSE Texas "XCIS" = NYSE National "XISE" = NASDAQ ISE "XNAS" = NASDAQ "XNYS" = New York Stock Exchange "XPSX" = NASDAQ PHLX "ARCX" = NYSE Arca "BATS" = CBOE BZX Exchange "BATY" = CBOE BYX Exchange "EDGA" = CBOE EDGA Exchange "EDGX" = CBOE EDGX Exchange "IEXG" = Investor's Exchange "LTSE" = Long-Term Stock Exchange "MEMX" = Members Exchange "24EQ" = 24X Exchange (NOTE: new exchanges might not be listed in spec but will be supported)
378	ExecRestatementReason	No	Only present when 150=D 3 = Repricing of Order

FIX Tag	FIX Name	Req'd	Details
			5 = Reduction of OrderQty due to Self Trade Protection 6 = Reserve Order Replenishment
528	OrderCapacity	No	Copied from order. Note: In case session elects to "Override Capacity as Agency" regardless of the capacity on the order, this field will have the value "Agency".
1003	TradeID	Cond	The daily unique ID that identifies the trade at MIAX Pearl Equities. Only available on Fill (ExecType 1 or 2) messages.
1138	DisplayQty	No	Display size of the Reserve order after replenishment.
5700	LocateAccount	No	Copied from order.
7699	PurgeGroup	No	Copied from order.
8020	DisplayRange	No	Copied from order.
9303	RoutingInst	No	Copied from order. System Default if not provided.
9375	ContraBrokerMPID	No	Reserved for future use.
9400	RoutingStrategy	No	Copied from order. System Default for routable orders if not provided.
9479	DisplayIndicator	No	Copied from order. System default if not provided.
9528	OriginalOrderCapacity	No	Copied from the New Order - Single Request.
9481	RetailOrderIndicator	No	Copied from order. System default if not provided.
9483	CancelOrderIfNotNBBOSetter	Cond	Copied from order. System default if not provided.
9484	NBBOIndicator	Cond	Only present when ExecRestatementReason = 3 Y = NBBO Setter. F = NBBO First Joiner. S = NBBO Setter with Size J = NBBO First Joiner with Size N = None of the above values are applicable.
9485	CancelOrderIfNotNBBOSetterWithSize	Cond	Copied from order. System default if not provided.
9690	WorkingPrice	No	If entitled, present on Order Restated report (ExecType = D) due to repricing.
9730	TradeLiquidityIndicator	Cond	Please refer to MIAX Pearl Equities Liquidity Indicator Codes document (available on the MIAX website) for the list of codes. For other Execution reports (ExecType is not 1 or 2): Tag will not be sent.
9882	AdditionalTradeLiquidityIndicator	Cond	Please refer to MIAX Pearl Equities Liquidity Indicator Codes document (available on the MIAX website) for the list of codes.

FIX Tag	FIX Name	Req'd	Details
			For other Execution reports (ExecType is not 1 or 2): Tag will not be sent. When ExecType is 1 or 2, this tag may be present. This is a string type field of length 1.The length of this field can change in the future. 1st character: NBBO Setter/Joiner/First Joiner/Setter with Size/Joiner with Size/First Joiner with Size
9687	OrigSession	Cond	Identifies the type of session on which the order was received. Order's FirmCode will be appended after a "-". Format: "SessionType-FirmCode" Valid values for SessionType: "FOI" = Order received on FOI session "MEO" = Order received on MEO session e.g. FOI-FRM1, MEO-FRM2. If entitled, present along with *OrigCompID* on the drop copy only.
9688	OrigCompID	Cond	*SenderCompID* value from the NewOrderSingle message received on the FOI session or *Computer ID* value from the Login Request message received on the MEO session. If entitled, present along with *OrigSession* on the drop copy only.
	Standard Trailer	Yes	

Points to note:

- Order Rejects: If session level validations fails, FOI will send a session reject. Cancel and cancel/replace rejections are sent in the form of cancel reject message. Most other validation failures will result in reject via an Execution report message. If a validation failure does not fit into any of the above mentioned categories, MIAX Pearl Equities sends a Business reject message. When rejecting an order the FIX engine will send back an Execution Report (MsgType = 8) with execution type set to 'Rejected' (ExecType = 8).
- Cancel/Replace Responses: The MIAX Pearl Equities FIX Engine sends acknowledgements of cancels and cancel/replaces using Execution Report (MsgType='8') message.
- Unsolicited Cancel Reports: MIAX Pearl Equities can send unsolicited cancel reports under circumstances listed in MIAX Pearl Equities rule book. To do this MIAX Pearl Equities would send an Execution Report (MsgType='8') with ExecType='4' (Canceled).
- Order cancellation and Size Reduction due to Self Trade Protection: MIAX Pearl Equities will send an Execution Report (MsgType='8') with ExecType='D' (Restated) for order cancellation or size reduction due to Self Trade Protection. In the event of size reduction due to self trade protection, the OrderQty will

be updated to OrderQty = previous OrderQty – reduced qty, and the total reduced qty will be reported in tag 58 Text field in the form of 'ReducedQty:N'. The reducted qty will be carried over in the event of a subsequent cancel/replace and the text field will be reported too.

5.7 Business Reject (MsgType = j)

The Business Message Reject message is used to reject an application-level message which fulfills session-level rules and cannot be rejected via any other means. For example, receipt of a valid unsupported business level message type will result in a Business Reject.

Note that if the message fails session level checks (e.g. incorrect body length, required tag missing, etc.), a Session Level reject will be issued.

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = j
45	RefSeqNum	Yes	MsgSeqNum of rejected message
372	RefMsgType	Yes	MsgType of the FIX message being rejected
379	BusinessRejectRefID	Yes	RefID of the message being rejected. This is the *ClOrdID* in case an order message is being rejected.
380	BusinessRejectReason	Yes	Code to identify reason for Business rejection. Valid values: 0 = Other 1 = Unknown ID 2 = Unknown Security 3 = Unsupported Message Type 4 = System not available 5 = Required or conditional tag missing
58	Text	Cond	Required if BusinessRejectReason = 0
	Standard Trailer	Yes	

5.8 Trade Cancel/Correct (MsgType=UCC)

Trade Cancel/Correct message is to transmit trade cancellations and corrections such as (but not limited to)
- A trade cancellation (bust)
- A price/size correction on a trade

FIX Tag	FIX Name	Req'd	Details
	Standard Header	Yes	MsgType = UCC
20	ExecTransType	Y	1 = Trade Cancel 2 = Trade Correct
17	ExecID	Y	ExecID in the original trade, or a new ExecID for the new trade.
1003	TradeID	Y	Trade ID of the cancelled or corrected trade. Note: When TradeID is used in conjunction with CorrectionNum, Side and ExecTransType, this is a unique identifier for each corrected trade.

FIX Tag	FIX Name	Req'd	Details
9021	CorrectionNum	Y	Trade correction number. Used to identify version of the trade being corrected or canceled. Increments by 1 for each subsequent correction. New trades resulting from corrections may have a non-zero number.
37	OrderID	Y	From original trade.
11	ClOrdID	Y	From original trade.
42	OrigTime	Y	GMT date-time of the original trade.
60	TransactTime	Y	GMT date-time of the trade cancel/correct. In case of As of Trade, *TransactTime* Date will be different from *OrigTime* Date. As of Trades will be sent on drop copy only.
55	Symbol	Y	From original trade.
54	Side	Y	From original trade.
31	LastPx	Y	For Price/Size correction, it is the latest price. Else, the value in the trade being corrected or cancelled.
32	LastShares	Y	For Price/Size correction, it is the latest size. Else, the value in the trade being corrected or cancelled.
1	Account	N	If changed in correction, the latest corrected value. Else, the value supplied in the order.
9730	TradeLiquidityIndicator	N	Latest changes to Trade Liquidity Indicator. Format is the same as tag 9730 reported in FOI/FXD execution report.
9882	AdditionalTradeLiquidityIndicator	Cond	Latest changes to Additional Trade Liquidity Indicator. Format is the same as tag 9882 reported in FOI/FXD Execution Report.
9687	OrigSession	Cond	Identifies the type of session on which the order was received. Order's FirmCode will be appended after a "-". Format: "SessionType-FirmCode" Valid values for SessionType: "FOI" = Order received on FOI session "MEO" = Order received on MEO session e.g. FOI-FRM1, MEO-FRM2. If entitled, present along with *OrigCompID* on the drop copy only.

FIX Tag	FIX Name	Req'd	Details
9688	OrigCompID	Cond	*SenderCompID* value from the NewOrderSingle message received on the FOI session or *Computer ID* value from the Login Request message received on the MEO session. If entitled, present along with *OrigSession* on the drop copy only.
	Standard Trailer	Yes	

Points to note:

- Trade corrections or busts do not change the state or open shares of orders
- Only trade cancels and corrections of orders belonging to this session or entitled to the session are sent via this message
- Each correction will result in a Trade Cancel/Correct message (MsgType = UCC) to both sides, if eligible based on order entry session, MPID entitlement or session entitlement.
- Important: MIAX Pearl Equities may choose to retransmit Trade Cancel/Correct messages in response to an interruption of the FOI or FIX Drop service. MIAX Pearl Equities will coordinate with the firms before initiating these retransmissions. Firms can use a combination of TradeID, CorrectionNum, Side and ExecTransType as a unique key to know if a given message is a retransmitted message

6. Drop Copy

The MIAX Pearl Equities FIX Drop (FXD) is a messaging interface that provides real-time order activities of firms' MEO as well as FOI orders. It offers two types of FIX Drop Ports: Standard FIX Drop and FIX Order by Order Drop. Neither port types accept orders.

FXD supports entitlement by:

- MPIDs
- FIX order entry ports/sessions
- Binary order entry ports/sessions

FXD entitlements can be set up as below by Firm types

- Clearing Firm: One or more MPIDs of member firms that clear through the Clearing firm; one or more order entry sessions of member firms that clear through the Clearing firm
- Member Firm: One or more MPIDs of the firm; one or more order entry sessions of the firm

Auto Cancel on Disconnect (ACOD): In the event that a member's FXD session with the exchange is disconnected, orders submitted via the entitled order entry ports/sessions that are open on the Order Book can be cancelled automatically upon disconnect. After the protection triggers, a reconnect by the member firm with its FXD session resets this protection.

Members must select one of the following actions on a FXD session by session basis which will be enforced when the protection is triggered:

- Cancel All Open Orders: All orders that are open and were sent through order entry session(s) entitled on this FXD session will be cancelled upon this FXD session's disconnect. Additionally, any new orders or order modification requests received via the entitled order entry session(s) will be rejected. Order cancellation requests will continue to be accepted.
- Do Not Cancel All Open Orders: This will disable Auto Cancel on Disconnect and MIAX Pearl Equities will not cancel any open orders that were sent through the entitled order entry session(s) upon the FXD session's disconnect. Any new orders and order modification requests received via the entitled order entry session(s) will continue to be accepted. This is the default behavior for the session if the member does not opt in to ACOD.

When FXD detects a disconnect for any reason (whether due to graceful logout, a connection loss or loss of heartbeats), it will trigger the ACOD process (defined above).
The ACOD feature is provided on a best effort basis. Executions can occur while the ACOD event is being processed. As the technical circumstances initiating a disconnect may vary, Firms may contact Trading Operations to confirm the status of ACOD eligible open orders remaining at MIAX Pearl Equities that were sent via the order entry sessions entitled on the FXD session(s) that disconnected. The execution reports resulting from cancels or trades during the disconnect can also be received upon a subsequent reconnect by the Firm on the same day.

Firms can request to enable ACOD only on the FXD sessions that are entitled for their own order entry session(s).

Auto Cancel on System/Matching Engine Failure (ACOSF): In the event of a Matching Engine or FXD failure, members may request that their open orders submitted via order entry ports/sessions entitled on the FXD are cancelled automatically. Orders submitted via any of the member's other sessions will not be affected. Additionally, orders submitted to any Matching Engines that are not impacted will not be affected.

Members must select one of the following actions on a FXD session by session basis which will be enforced when the protection is triggered:

- Cancel All Open Orders: All open orders for the impacted Matching Engine(s) that were sent through order entry session(s) entitled on this FXD session will be cancelled upon system failure. Additionally, any new orders or order modification requests received via the entitled order entry session(s) will be rejected. Order cancellation requests will continue to be accepted.

- Do Not Cancel All Open Orders: This will disable Auto Cancel on System Failure and MIAX Pearl Equities will not cancel any open orders that were sent through the order entry session(s) entitled on this FXD session upon system failure. Any new orders and order modification requests received via the entitled order entry session(s) will continue to be accepted. This is the default behavior for the session if the member does not opt in to ACOSF.

The ACOSF feature is provided on a best effort basis. Executions can occur while the ACOSF event is being processed. As the technical circumstances initiating an ACOSF may vary, Firms may contact Trading Operations to confirm the status of ACOSF eligible open orders remaining at MIAX Pearl Equities. The execution reports resulting from cancels or trades during the failure can also be received upon a subsequent reconnect by the Firm on the same day.

Firms can request to enable ACOSF only on the FXD sessions that are entitled for their own order entry session(s).

6.1 Standard FIX Drop

Standard FIX Drop ports only send trade information and include following messages only
- Execution Reports (MsgType = 8), where ExecType(150) is Partially Filled(1) or Filled(2)
- Trade Cancel/Correct (MsgType = UCC) messages.

6.2 FIX Order by Order Drop

FIX Order by Order Drop ports send all order activities, including all Execution Reports (MsgType=8) and Trade Cancel/Correct (MsgType = UCC) messages and, if entitled, order rejects.

Appendix A: MIAX Pearl Equities Order Types

Order Type	FIX Tags	Description
Market Order	OrdType (40) =1 (market). Price (44) must not be specified.	An order to buy or sell that is to be executed at the best price obtainable.
Limit Order	OrdType (40) = 2 (limit). Price (44) must contain a price.	An order to buy or sell at a specified price or better.
IOC (immediate Or Cancel)	OrdType (40) = 1 (market) or 2 (limit) TimeInForce (59) = 3	A limit or market order that is to be executed in whole or in part as soon as such order is received. IOC orders are routable for execution at away markets. The portion not so executed is to be treated as cancelled.
ISO Intermarket Sweep Order (available under RegNMS)	ISO IOC order OrdType (40) = 2 ExecInst (18) = f TimeInForce (59) = 3 ISO RHO order OrdType (40) = 2 ExecInst (18) = f TimeInForce (59) = R	ISO IOC – Sweep the MIAX Pearl Equities Book to the price, cancel any remaining balance, and ignore all away market quotes. ISO RHO – Sweep the MIAX Pearl Equities Book to the price, post any remaining balance on the book, and ignore all away market quotes. ISO Orders will interact with all resting orders and quotes. ISO Orders are never routed out.
Post-Only Order	ExecBroker(76)="PO" OrdType (40) = 2 (limit) TimeInForce(59)=R(RHO)	Designates an order to trade as "Maker" while resting on the book. A Post-Only order can also trade as a "Taker" if it receives sufficient price improvement.
Midpoint Peg Order	OrdType (40) = P ExecInst (18) = M or m (not available to match when NBBO is locked)	A Midpoint Peg Order is pegged to the midpoint of the NBBO. A Midpoint Peg Order can be specified to be available/unavailable on the orderbook when the market is locked
Primary Peg Order	OrdType (40) = P ExecInst (18) = R or r (not available to match when NBBO is locked) PegOffset (211) = Positive or Negative Dollar Amount (Optional).	A Primary Peg Order is pegged to the same side of the NBBO. A Primary Peg Order can be specified to be available/unavailable on the orderbook when the market is locked. An offset amount can be specified.

Appendix B: Error Code Table

Order and cancel rejects will be identified with the below error code in the Text Tag in following format: 'Error Code': 'Description' E.g. 9: Invalid Price

FIX specification states the Text tag is a free format text string. MIAX Pearl Equities will provide as much information as possible but reserves the right to add new errors codes or change meaning as required.

Code	Description	Code	Description	Code	Description
0	Reserved for free form text	13	Invalid TimeInForce	26	Missing Symbol
1	Unknown Symbol	14	Invalid ExecBroker	27	Missing OrderQty
2	System Unavailable	15	Invalid AttributableIndicator	28	Missing Side
3	Invalid OnBehalfOfCompID	16	Invalid RoutingInst	29	Missing OrdType
4	Invalid ClOrdID	17	Invalid RoutingStrategy	30	Missing Price
5	Invalid OrigClOrdID	18	Invalid OnBehalfOfSubID	31	Missing TransactTime
6	Invalid Side	19	Invalid LocateReqd	32	Missing OrderCapacity
7	Invalid OrderQty	20	Invalid PriceSlidingAndRepriceFrequency	33	PriceOnMarketOrder
8	Invalid OrdType	21	Reserved	34	SessionNotAllowTestSymbol
9	Invalid Price	22	Invalid TradingCollarDollarValue	35	ExceedTestSymbolThrottle
10	Invalid TransactTime	23	Invalid DisplayIndicator	36	Invalid RetailOrderIndicator
11	Invalid OrderCapacity	24	Missing ClOrdID	37	Missing TimeInForce
12	Invalid ExecInst	25	Missing OrigClOrdID	38	Invalid Account

Appendix C: Contact List

Please visit <u>MIAX Pearl Equities website</u> for obtaining most up-to-date contact list and other such information.

Appendix D: Revision History

Revision Date	Version	Description
Jan 24, 2020	1.0	First official release.
Feb 06, 2020	1.1	Added LocateReqd (tag# 114) to Order Cancel/Replace Request. Indicated that FIX Drop (FXD) provides order activities for Firms FOI as well as MEO orders.
Apr 02, 2020	1.2	SendingTime (tag# 52) in the Message Header is the time of message transmission from FOI. Added a note for AttributableIndicator(tag# 9482) in New Order – Single message that if it is not specified in the order, the session setting will be used. In the Order Cancel/Replace Request message, Price (tag# 44) is now a required field. Only limit orders can be cancel/replaced, market orders don't rest in the book. Cleaned up a few reason codes in Execution Report message and error code table in Appendix B.
Jun 15, 2020	1.3	Updated the ContraBroker (tag# 375) code in Execution Report for NASDAQ to "XNAS". Added a note for Execution Report about reduction in order quantity due to self trade protection.
Aug 10, 2020	1.3.a	Added a note to clarify that an Execution Report (MsgType='8') with ExecType='D' (Restated) will be sent for order cancellation or size reduction due to Self Trade Protection. LastPx (tag# 31) and LastShares (tag# 32) in Execution Report will indicate the match price and the number of shares that would have matched if the order had not been prevented from execution due to Self Trade Protection when ExecRestatementReason = 5.
Sept 28, 2020	1.4	Updated the TradeLiquidityIndicator field values in the Execution Report message to indicate if the executed order was displayed or non-displayed. Also added reserved values for future use.
Nov 09, 2020	1.5	Added OrderID in Order Cancel Reject. Noted in the Overview section Net Notional Trade Protection as an additional Cumulative Risk Protection provided to orders entered via FOI.
Jan 13, 2021	1.6	Added additional liquidity indicators in Execution Report.
Feb 26, 2021	2.0	Added support for MinQty and Reserve orders in New Order – Single, Order Cancel/Replace Request and Execution Report messages. Added a note for TradeLiquidityIndicator (tag# 9730) to refer to the MIAX Pearl Equities Liquidity Indicator Codes document for the list of codes.
May 12, 2021	2.1	Added support for Primary Auction (PAC) orders in New Order – Single, added support for pending replace state for an order.

Sept 27, 2021	2.1a	Updated Price field in Order Cancel/Replace Request. Added Routing Inst (tag# 9303) and Routing Strategy (tag# 9400) in Execution Report message.
Mar 21, 2022	2.1b	Updated the language for Order Cancel/Replace request to include Min Qty and Max Floor field in the list of fields that can be changed.
July 07, 2022	2.2	Added Primary Peg Order Type, Peg Offset, Parent Group SelfTradeProtection, LocateAccount, OriginalOrderCapacity and PurgeGroup.
Sep 15, 2022	2.2a	Updated the language with regard to ClOrdID uniqueness from per-MPID to per-Session, within a matching engine.
Dec 09, 2022	2.2b	Noted for SendingTime tag (tag# 52) in the Standard Message Header that it must be within a configurable interval defined by Regulatory Circular, otherwise the order will be rejected. Updated the ExecInst tag value requirement when OrdType = P (Pegged) in New Order – Single message.
Jan 24, 2023	2.2c	Added AdditionalTradeLiquidityIndicator (tag# 9882) to Execution Report and Trade Cancel/Correct messages
Mar 06, 2023	2.3	Added support for ACOD and ACOSF for the FIX drop (FXD). Added ContraBrokerMPID (tag# 9375) in Execution Report message. Added support to send order rejects on the FIX drop (FXD), if entitled.
May 16, 2023	2.3a	Added OrigSession (tag# 9687) and OrigCompID (tag# 9688) in Execution Report, Order Cancel Reject and Trade Cancel/Correct messages.
Jun 12, 2023	2.3c	Updated the language for AdditionalTradeLiquidityIndicator (tag# 9882) in Execution Report for the 1st character of this field as "NBBO Setter/Joiner".
Jul 06, 2023	2.4	Added CancelOrderIfNotNBBOSetter (tag# 9483) to New Order – Single and Execution Report messages. Added NBBOSetter (tag# 9484) to the Execution Report message.
Sept 25, 2023	2.5	Added OrderID (tag# 37) to Order Cancel Request message to support cancel by Exchange OrderID. Renamed the field NBBOSetter (tag# 9484) in the Execution Report message to NBBOIndicator (tag# 9484) and added a new value "F" for that field. Updated the description for AdditionalTradeLiquidityIndicator (tag# 9882) field in Execution Report message to indicate it can have a new value "First Joiner" The OrigClOrdID (tag# 41) in the Cancel Request is changed to be conditional and the description is updated. The OrigClOrdID (tag# 41) in the Order Cancel Reject is not a required field. Updated the description for the ClOrdID (tag #11) and OrigClOrdID (tag #41) fields in the Execution Report message.

Jan 24, 2024	2.5a	Updated the description for LocateAccount (tag# 5700) field in New Order – Single and Order Cancel/Replace Request messages to make this field required if the member opts into the Validate Locate Account Risk Protection. Added clarification in the Price (tag# 44) field in New Order – Single message.
Feb 09, 2024	2.5b	Updated the description for TradingCollarDollarValue (tag# 9478) field in New Order – Single message to remove the text indicating this tag can only be specified for Market orders.
Aug 22, 2024	2.6	Updated the Hours of operation for MIAX Pearl Equities Exchange to support Early and Late Trading. Added ExpireTime (tag# 126) to New Order – Single, Order Cancel/Replace Request and Execution Report Messages. Added CancelOrderIfNotNBBOSetterWithSize (tag# 9485) to New Order – Single and Execution Report messages. Added support to modify the TimeInForce and ExpireTime in the Order Cancel/Replace Request.Added new values in TimeInForce (tag# 59): 0 – Day, 4 – FOK, 5 – GTX, 6 – GTT to New Order – Single Report Messages. Added new values "S" and "J" to NBBOIndicator (tag# 9484) and updated the description for existing values "Y" and "F" in the Execution Report message.
Jul 15, 2025	2.6a	Added a new value in the ContraBroker (tag# 375) in Execution Report for 24X Exchange. Updated the ContraBroker (tag# 375) description in Execution Report for NYSE Chicago to NYSE Texas.

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