



US Options Risk Management Specification

Version 1.4.4

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1 Introduction

1.1 Overview

Options Risk Management has been designed to assist BZX Options, EDGX Options, and C2 Options customers in managing the risk of over-executing. Customers can design a risk profile that defines execution limits as a function of time or absolute limits. These rules can be applied to unique Risk Roots (see section 1.2 below), or as Firm-level limits. When these limits are reached, additional executions will be prevented, outstanding orders will be cancelled, new orders rejected, and customers can control when they are willing to trade again.

Risk profiles will apply to both single leg and complex orders. For information on how risk will be applied on complex orders see the [Us Options Complex Book Process Specification](#).

1.2 Risk Root

All symbol-level rules are based on the Risk Root. The Risk Root is defined as follows for each Options environment:

BZX = OSI Root

EDGX = OSI Root

C2 = Underlying (**EDGX effective 6/11/18 and BZX effective 6/25/18**)

For example, a corporate action can result in multiple OSI roots (XYZ, XYZ1, XYZ2), while sharing the same underlying symbol (XYZ). For markets that use OSI root as the Risk Root, individual symbol-level rules would be needed for XYZ, XYZ1, and XYZ2. In markets where the underlying is the Risk Root only a single symbol-level rule for underlying XYZ would be necessary or allowed.

1.3 Certification

Options Exchange customers must certify with the [Cboe Trade Desk](#) prior to using these Risk Management features.

1.4 Risk Limit Types

Risk limits are defined by Risk Root or at the Firm level. For each Firm or Risk Root a collection of limits may be defined. These rules work in conjunction until one of the limits is reached, at which point trading will stop, open orders will be cancelled, and any new orders received will be rejected. Both the cancel and the reject will carry a specific reason code that allows customers to identify whether an Risk Root risk limit, Firm risk limit, or a risk lockout by CustomGroupID has occurred.

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Limit Type	Description																																			
Rate Based Notional	<p>Notional is computed as the sum of the products of premium multiplied by number of contracts. Full executions of all contracts for an order will not be avoided to prevent exceeding notional rate limits. For example, if the customer's notional rate limit is \$25 per second and 2 executions occur, one for 5 contracts at \$3, and one for 7 contracts at \$2, then the notional would be computed as:</p> $(5 * \$3) + (7 * \$2) = \$29$ <p>Both executions will occur, followed by cancellations of pending orders and rejects of new orders.</p> <p>Rate based notional limits are defined by the two parameters <i>notional value</i> and <i>number of milliseconds</i>. Any time the notional value executed exceeds the notional value specified within the specified number of milliseconds, the limit is triggered.</p>																																			
Rate Based Volume	<p>Volume is computed as the sum of the number of contracts executed. When the total number of contracts executed exceeds the specified value within the specified number of milliseconds, the limit is triggered. Full execution of all contracts for an order will not be avoided to prevent exceeding volume rate limit. For example, if a customer specifies a limit of 20 contracts per second and receives an execution for 10 contracts followed by a second execution for 15 contracts (10 + 15 = 25 contracts) within a single second, both executions will occur followed by cancellations of pending orders and rejects of new orders.</p>																																			
Rate Based Count	<p>Count is computed as the number of executions. Premium and number of contracts have no bearing on this computation. If a customer specified a limit of 10 executions per second, the 10th execution within a single second will trigger the rate limit and prevent additional executions. Cancellations will be issued and rejects of new orders will occur.</p>																																			
Rate Percentage of Quote	<p>Percentage of Quote is computed as the sum of the overall percentage of executions as a percentage of order volume outstanding for each order in a particular OSI Risk Root during the specified time period. Note that executions resulting from IOC orders will be included in the Percentage of Quote calculation.</p> <p>For example: An Options Exchange customer specifies a Percentage of Quote limit of 200% with four (4) resting orders in 2 different series quoted in a given OSI Risk Root (XYZ) for 100 contracts. Executions are ordered by time and include the aggregated Percentage Of Quote after each execution:</p> <p>Sell 80 XYZ1 – Trades with Order 1 (<i>Total POQ = 80%</i>) Buy 50 XYZ1 – Trades with Order 2 (<i>Total POQ = 130%</i>) Sell 60 XYZ2 – Trades with Order 3 (<i>Total POQ = 190%</i>) Buy 10 XYZ2 – Trades with Order 4 (<i>Total POQ = 200%</i>)</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr style="background-color: #008000; color: white;"> <th>Series XYZ1</th> <th>Bids Size</th> <th>Offer Size</th> <th>Trade Size</th> <th>POQ</th> </tr> </thead> <tbody> <tr> <td>Order 1</td> <td>100</td> <td></td> <td>80</td> <td>80%</td> </tr> <tr> <td>Order 2</td> <td></td> <td>100</td> <td>50</td> <td>50%</td> </tr> <tr style="background-color: #008000; color: white;"> <th colspan="5">Series XYZ2</th> </tr> <tr> <td>Order 1</td> <td>100</td> <td></td> <td>60</td> <td>60%</td> </tr> <tr> <td>Order 2</td> <td></td> <td>100</td> <td>10</td> <td>10%</td> </tr> <tr> <td colspan="4"></td> <td style="text-align: right;">200%</td> </tr> </tbody> </table> <p>The <i>Percentage of Quote</i> is computed as: 80% + 50% + 60% + 10% = 200%</p>	Series XYZ1	Bids Size	Offer Size	Trade Size	POQ	Order 1	100		80	80%	Order 2		100	50	50%	Series XYZ2					Order 1	100		60	60%	Order 2		100	10	10%					200%
Series XYZ1	Bids Size	Offer Size	Trade Size	POQ																																
Order 1	100		80	80%																																
Order 2		100	50	50%																																
Series XYZ2																																				
Order 1	100		60	60%																																
Order 2		100	10	10%																																
				200%																																

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Absolute Notional	The absolute notional behaves similarly to rate based notional limits with the exception that time is not considered. If X' dollars in notional have been executed the limit is reached. Cancels are issued and new orders are rejected until the customer has a chance to assess and decides to reset.
Absolute Volume	Similar to rate based volume with the exception that time is not considered. If X' contracts have been executed, the limit is reached. Cancels are issued and new orders are rejected until the customer has a chance to assess and decides to reset.
Absolute Count	The absolute count behaves similarly to rate based count limits with the exception that time is not considered. If X' executions have been executed the limit is reached. Cancels are issued and new orders are rejected until the customer has a chance to assess and decides to reset.
Absolute Percentage of Quote	The absolute percentage of quote is similar to the rate based percentage of quote with the exception that time is not considered. If X' percentage has been executed, the limit is reached. Cancels are issued and new orders are rejected until the customer has a chance to assess and decides to reset.

1.4.1 Limit Execution Details

While these risk management tools are designed for and generally used for protection with regards to *posted* liquidity, the same risk configurations can impact the activity of remove and/or routed flow. All Risk Root level risk limits are checked in an atomic fashion inside each matching engine. As soon as a limit is breached, all resting orders in all series relating to that Risk Root will be cancelled immediately.

The table that follows describes the different scenarios that may be encountered and should help customers to understand what to expect in the context of risk violations.

Execution Type	
Matched	Routed
Rate Based & Absolute Count	
If a customer specifies a limit of 10 trades, the 11 th matched trade will not occur within the specified time interval.	If there are multiple outstanding orders <i>that have been routed away</i> ALL may execute. While Cboe will apply routed executions to your profile, your theoretical limit is equal to the number of matched executions plus open away orders. Example: Suppose your limit is 10 executions per second and you have 8 that have occurred plus 3 open orders that have been routed to an away exchange. If all three execute at the away exchanges, your risk limit will have been reached at 11 executions instead of 10.

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Rate Based & Absolute Volume				
<p>Incoming orders may execute through a resting order's risk limit if the remaining limit is less than the total quantity of an order.</p> <p>Example: Suppose your limit is 10 contracts while displaying a single order for 15 contracts on book. An incoming order for 12 contracts executes with 12 of your 15 contracts and the remaining 3 contracts are cancelled back.</p>	<p>Similar to the limits for counts, the theoretical limit is equal to the current execution volume plus open away aggregate order size.</p>			
Rate Based & Absolute Notional				
<p>Incoming orders may execute through your resting order's risk limit if the remaining limit is less than the total notional value of the order.</p> <p>Example: Suppose your limit is \$1,000 per minute and you have currently executed \$980. You have a single order on the book for 3 contracts at \$7. If this order is hit, Cboe will execute all 3 contracts for a total notional executed of \$1,001.</p>	<p>Routed executions will always be open to the potential for exceeding your limit by orders that have been routed to an away exchange.</p> <p>Example: Suppose your limit is \$1,000 and you have executed \$950. Furthermore assume there is \$100 in notional open orders that have been routed to an away exchange. You may reach \$1,050 before your limit is triggered.</p>			
Rate Based & Absolute Percentage of Quote				
<p>Incoming orders may execute through your resting order's risk limit if the remaining limit percentage is less than 100%.</p> <p>Example: Suppose your Percentage Of Quote limit is 200% per second. Four orders are quoted in a given Risk Root (XYZ) with the following quote sizes and executions. Executions are ordered by time along with the aggregated Percentage Of Quote after each execution:</p> <p>Sell 80 XYZ1 – Trades with Order 1 (POQ = 80%) Buy 50 XYZ1 – Trades with Order 2 (POQ = 130%) Sell 60 XYZ2 – Trades with Order 3 (POQ = 190%) Buy 100 XYZ2 – Trades with Order 4 (POQ = 290%)</p>	<p>Routed executions will always be open to the potential for exceeding your limit by orders that have been routed to an away exchange.</p> <p>Example: Suppose your limit is 200% and you have executed 190% of your percentage of quote. Furthermore assume there is an order for 50 contracts that has been routed to an away exchange. You may exceed your 200% limit if more than 5 out of 50 (10%) contracts are executed at the away exchange.</p>			
Series XYZ1	Bid Size	Offer Size	Trade Size	POQ
Order 1	100		80	80%
Order 2		100	50	50%
Series XYZ2	Bid Size	Offer Size	Trade Size	POQ
Order 1	100		60	60%
Order 2		100	100	100%
				290%
<p>The <i>Percentage of Quote</i> is computed as: $80 + 50\% + 60\% + 100\% = 290\%$ All orders within the four orders in the given Risk Root (XYZ) will execute in full, triggering risk, followed by a</p>				

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cancellation of all open orders in the given Risk Root and rejecting new orders within the Risk Root.
If there are any order modifications to quantity (up or down) or price, percentage of quote calculations having resulted in executions on the original order will be retained and the modified order will be treated as a new order.

Example: An Options Exchange customer specifies a Percentage of Quote limit of 200% with two (2) resting orders quoted in the given Risk Root (XYZ) for 100 contracts, followed by a modify to Order 1 to refresh order size following an execution. Executions are ordered by time and include the aggregated Percentage Of Quote after each execution:

Sell 80 XYZ1 – Trades with Order 1 (POQ = 80%)

Buy 50 XYZ1 – Trades with Order 2 (POQ = 130%)

Modify Order 1 – Increase size back to 100 (POQ = 130%)

Sell 100 XYZ1 – Trades with Order 1B (POQ = 230%)

Series XYZ1	Bids Size	Offer Size	Trade Size	POQ
Order 1	100		80	80%
Order 2		100	50	50%
Order 1B	100		100	100%
				230%

The *Percentage of Quote* is computed as:

$$80\% + 50\% + 100\% = 230\%$$

1.4.2 Supported Order Types

All order types are supported. Any order of any kind submitted to a Cboe Options Exchange that has been executed either fully or partially will decrement remaining values in a particular risk rule.

1.5 Cancel, Rejects and Resets

When a resting order or inbound order is executed and a risk profile limit is reached or when a self-imposed lockout is received, resting orders are cancelled and inbound orders are rejected. In both cases the BOE *Text* field (58) will carry either a value of '**s: RiskMgmtSymLevel**', '**f: RiskMgmtFirmLevel**', or '**f: RiskMgmtCustomGroupIDLevel**'.

When this is seen by a customer, it indicates that any order still in flight, and any new orders issued, will be rejected. Once a customer has analyzed the situation and decides to commence trading, they must issue an order that has a special tag to clear the risk trigger or self-imposed lockout. The tag is located in the BOE *RiskReset* field (7692). This field must be filled with one of the following values:

The single character values are preferred. When using the single characters the ordering of the characters does not matter. For example, a value of 'SF' is identical to a value of 'FS'.

RiskReset Value	Risk Root Reset	Firm-Level Reset	CustomGroupID Reset
'S'	Y	N	N
'F'	N	Y	N
'SF'	Y	Y	N
'C'	N	N	Y
'CS'	Y	N	Y
'CSF'	Y	Y	Y

For more information on the *RiskReset* field, refer to the [US Options BOE Specification](#) or the [US Options FIX Specification](#).

Note that a reset will reset all active rules within the profile for the given Risk Root or Firm. Individual rules cannot be reset on their own. The example that follows demonstrates this behavior.

Suppose that a customer has the following three rules in their profile for all contracts on MSFT:

1. 500 contracts per second Rate Based Volume limit
2. 20,000 contracts per minute Rate Based Volume limit
3. \$100,000 Absolute Notional limit

Suppose that at a particular instant in time the current state of the rules is as follows:

1. 400 contracts have been executed in the active second
2. 19,000 contracts have been executed in the active minute
3. \$25,000 of notional value has been executed.

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Next, an inbound order from another customer is received that triggers an execution for 200 contracts against the customer owning the described risk profile. The customer owning the risk profile receives cancels for all remaining resting orders in MSFT and their order handler will receive a reject with a *Text* field reason of '**s: RiskMgmtSymLevel**'.

The customer owning the risk profile issues a reset. At this point in time, all rules are reset. This means that the active state for all three rules is set back to ZERO, including the Absolute Notional rule. The absolute value executed of \$25,000 is lost and \$100,000 is again available for execution.

1.5.1 Risk Reset Limits

Risk resets are restricted to one reset per second per Risk Root. Additionally, only one firm-level or *CustomGroupID* reset will be passed through per second. These restrictions are designed to safeguard the trading platform from excessive risk messaging.

1.6 Ports and Profiles

Risk management profiles are associated with Executing Firm IDs (EFIDs) assigned by Cboe. If a customer desires a specific profile for a collection of ports, then it is up to that customer to use the proper value in the 'onBehalfOf' field of their order.

That being said, the flexibility exists to allow for a customer to have two different profiles on a single port, multiple ports on a single profile, or one profile per port. Customers will have to design their profiles and work with the Cboe Trade Desk to activate the proper Executing Firm IDs on the desired ports.

1.7 Self-imposed Order Lockout

Customers may initiate a self-imposed order lockout in conjunction with a mass cancel or purge request for all resting and in-flight orders. Customers who issue mass cancel or purge requests using the *MassCancelInst* field (7700) may optionally configure a Lockout condition as part of the cancel operation. Alternately, customers can use a legacy method of issuing mass cancel or purge requests using the *MassCancel* field (7693) and optionally the *MassCancelLockOut* (7697) to configure a lockout. Customers are encouraged to use the *MassCancelInst* method as the legacy *MassCancel* method will be deprecated in the future with notice (see [US Options BOE Specification](#) or [US Options FIX Specification](#) for an overview on the two methods of specifying mass cancel operations with lockouts).

A self-imposed order lockout may be issued on a BOE/FIX port at either the EFID (Firm) level or the Risk Root level. Purge Ports support both of these and add the ability to impose a lockout for a *CustomGroupID* (7699). The self-imposed lockout can be released using the existing *RiskReset* field in BOE (7692).

1.8 Manual Firm-Level Risk Resets

Customers can optionally configure whether a Firm-level risk trigger can be reset automatically. When Manual Resets are **disabled**, a customer will not be able to reset Firm-level risk via their FIX or BOE order entry sessions. Attempts to reset Firm-level risk over a FIX or BOE order entry session when sending *RiskReset* field (7692) containing “F” will result in a reject with a *Text* field reason of "A: AutomaticRiskResetsDisabled".

Default behavior will be **disabled** which will require a customer to manually reset all Firm Level Risk trips by contacting the Cboe Trade Desk (913-815-7001). Changes to the default configuration can be submitted through the [Logical Port Request Form](#).

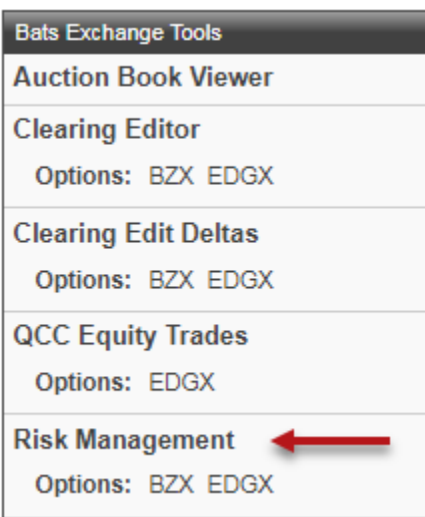
Risk Root-level risk and *CustomGroupID* resets will be unaffected by this configuration.

2 Risk Management Profile

Customers are provided the ability to upload risk profiles through the Customer Web Portal. The Web Portal is accessed through the public website at <http://markets.cboe.com>. To be applicable for the current trading day, profile files must be uploaded prior to 9AM ET. Profiles uploaded after 9AM ET will not be applied until the next trading day.

2.1 Customer Web Portal

Customers can request a login to the Customer Web Portal from the Cboe Trade Desk. After logging into their Customer Portal account, users with appropriate access will be able to select the **Risk Management** link under Options Tools in the lower left menu of their account page.



Selecting this link will take the user to the tool defined in Section “[Using the Risk Management Profile Tool](#)”.

2.2 File Format

The file format used for uploading a new profile or downloading a copy of an active file is identical. Each line of the file represents a rule containing a comma separated list of fields. The fields are described in the example that follows:

```
executing_firm_id,    limit_type,    risk_root,    limit_value,    time_limit,  
firm_level_limit
```

- `executing_firm_id` – As discussed in the Ports and Profiles section, this is a value assigned by Cboe that is passed through on every order in the ‘onBehalfOf’ field. It controls the designated clearing relationship as well as the risk management profile that applies to this order.
- `limit_type` – The limit type is one of the following six values:
 1. `rate_ntn1` – A rate based notional limit.

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- 2. `rate_vol` - A rate based volume limit.
 - 3. `rate_count` - A rate based count limit.
 - 4. `rate_pctqt` - A rate based percentage of quote limit.
 - 5. `abs_ntnl` - An absolute notional limit.
 - 6. `abs_vol` - An absolute volume limit.
 - 7. `abs_count` - An absolute count limit.
 - 8. `abs_pctqt` - An absolute percentage of quote limit.
- `risk_root` - The Risk Root for the series, such as 'MSFT'. Customers may optionally define default controls where explicit Risk Root controls are not specified and an asterisk "*" is input in the place of a Risk Root symbol. If a Risk Root has one or more non-default risk rules of any type, then all specified default risk rules will not apply to that Risk Root, even if the defined non-default rule type is different than the default rule type. For example, if the following risk rules are defined:

	A	B	C	D	E	F
1	BATS	<code>rate_count</code> *		10	1000	F
2	BATS	<code>rate_vol</code>	ABC	100	1000	F
3	BATS	<code>rate_pctqt</code>	XYZ	500	500	F

The default `rate_count` rule will not apply to Risk Roots ABC or XYZ because they have a Risk Root level rule defined. In order for a `rate_count` risk rule to be applied to ABC or XYZ you would need to add explicit, non-default rows for each.

- `limit_value` - This value must be an integer value. Floating point values are not accepted. When the limit type is a notional type, this represents whole dollars. When the limit type is a volume type, this represents cumulative contracts traded in a Risk Root. When the limit is a count type, this represents an execution count.
- `time_limit` - This field is ignored when the limit type is an absolute type. For rate types, this represents the number of milliseconds in the window. Values of less than 100 milliseconds will be treated as 100 milliseconds. In other words, the minimum time frame is 1/10th of a second.
- `firm_level_limit` - This field is optional. If present and the value is 'T' then it is assumed that you are requesting a Firm level rule. The Risk Root column should be blank in this case. If this column is present and has a value of 'T', and a Risk Root is specified, the rule will be rejected. Conversely, if a Risk Root is left blank and this field is not present or has a value other than 'T', the Firm level rule will be rejected. Please note that the `rate_pctqt` and `abs_pctqt` types are not valid at the Firm level.

2.3 Multiple Rules

Multiple Firm rules and multiple rules per Risk Root are allowed. There is a limit of 8 rules per Risk Root per EFID, and one Firm level rule per Risk Limit Type per EFID. An example use of multiple rules is shown below.

A customer may decide that they are comfortable with a notional value of \$100 per second. However, they are not comfortable with this rate as a sustainable long term rate. The five minute value that a customer is comfortable with may be \$5,000 per five minutes. This rate is substantially slower than

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\$100 per second. This combination of rules would allow for a maximum burst execution rate limit while maintaining a longer term control at a much lower rate. Finally, a customer may decide that in addition to these two rules, they never want a sum total of more than 10,000 executions without having a chance to analyze what's happening. A third rule, an absolute count rule, may also be introduced.

2.4 Using the Risk Management Profile Tool

Profiles uploaded **after 9AM ET** will not be applied until the next trading day. A download of your active rules will always be available. The screen below shows a sample of this configuration screen that is available through the Customer Web Portal.

Risk Management | Bats BZX Options

Download Risk File



All Executing Firms ▾  [Download Current Trading Session](#) |  [Download Next Trading Session](#)

Clear Risk Rules

All Executing Firms ▾

Upload Risk File

No file chosen

 [Upload Specification](#) |  [Example Upload CSV](#)

Prior to 9AM ET the upload section will apply to current day. Uploads after 9AM ET will be applied to the next trading day. Note that no dates are contained in the file and you cannot stage future profiles beyond the next trading session. You can only replace the active profile with a new one for the next trading session. Once a profile is activated, it stays active permanently until a new profile is loaded.

3 Contact Details

If you have any questions or would like to begin using Risk Management, please contact your account manager or any of the teams below:

Sales

sales@cboe.com

Phone: 212.378.8560

Cboe Trade Desk

tradedesk@cboe.com

Phone: 913.815.7001

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Revision History

Document Version	Date	Description
1.0.0	10/08/10	Initial Version 1.0.0.
1.1.0	06/28/11	Added support for Firm level risk checks. Added Limit Netting.
1.1.1	08/30/11	Updated limit type definitions under File Format section for Limit Netting. Updated number of OSI and Firm rules allowed.
1.1.2	11/16/11	Removed support for Limit Netting. Added support for call/put and front/trailing month options to the Risk Management Profile File Format.
1.1.3	01/18/12	Cleaned up the ordering of Section File Format .
1.1.4	03/05/12	Clarification added to <code>osi_root</code> definition in Section 2.2 File Format.
1.1.5	05/08/12	Corrected cut-off time for Profile uploads to note uploads after 7AM ET will not be applied until the next trading day. Removed references indicating profiles could not be uploaded between 9AM – 4PM ET. Upload support during this timeframe will be made available <i>(effective 5/11/12)</i> .
1.1.6	05/14/12	Profile uploads will be applicable to current day if received by 9AM ET <i>effective 5/18/12</i> .
1.1.7	06/06/12	Specification updated to reflect that limits will be applied on a best efforts basis vs. a precise basis <i>(effective 6/22/12)</i> . Various formatting updates.
1.1.8	10/21/13	Added support for <i>Percentage of Quote and Self-imposed Order LockOut</i> functionality. Updated to reflect that symbol-level rules are atomic per unit rather than best efforts.
1.1.9	12/15/15	Removed OSI Root spilt over 4 matching units along with call/put and front/trailing level limits. Updated <i>Percentage of Quote</i> functionality. Added support for Manual Firm Level Risk Resets <i>(Effective 01/28/16 in EDGX and 02/04/16 in BZX)</i>
1.2.0	02/19/16	Bats branding/logo changes.
1.2.1	06/07/2016	Added functionality for default OSI Root rules effective 06/17/16.
1.2.2	08/17/16	Bats branding/formatting updates.

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1.3.0	01/27/17	Added single character <i>RiskReset</i> values and ability to reset by <i>CustomGroupID</i> .
1.3.1	07/21/17	Updated Self-Imposed Lockout section to present the <i>MassCancelInst</i> method of specifying mass cancel operations with lockout.
1.4.0	09/01/17	Added support for C2's transition onto Bats Technology platform. Added Risk Root definition.
1.4.1	10/17/17	Cboe branding/logo changes.
1.4.2	01/17/18	Added default risk rule example.
1.4.3	03/21/18	Updated OSI Root to Underlying symbology for BZX Options (effective 6/25/18) and EDGX (effective 6/11/18) Options.
1.4.4	06/06/18	Updated number of Firm Level rules allowed per EFID. Clarified that IOC order executions will count towards Percentage of Quote calculations.