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# 1 Overview
With the near instantaneous execution of orders in electronic trading systems, it is possible for prices to move sharply within a short period of time. Exchanges worldwide, including ICE continue to work on developing new and better ways to address rapid price movement without interfering with the price discovery process.

With the next trading system release, planned in March 2012, ICE will introduce its version of circuit breaker functionality called Interval Price Limit (IPL), which in essence, is a time based reasonability limit. Prices will not be allowed to move more than a pre-determined amount (Interval Price Limit) away from the current market price (reference price or anchor price) within a pre-determined period (the Recalculation Time). These upper and lower limits will prevent trading beyond these price bands. The bands will remain constant for the Recalculation Time period independent of the price moves with each transaction within that period and will be recalculated at the beginning of the next period. The IPL is designed to protect the market from price spikes caused by cascading stops or multiple limit or market orders moving the market in one direction in a small period of time.

This document describes the IPL functionality.

2 Interval Price Limits Functionality

The IPL functionality will prevent large price moves within a given period of time. It will protect the market from price spikes caused not only by cascading stops but also multiple limit or market orders moving the market in one direction. IPL will prevent bids higher than the upper IPL and offers below the lower IPL. When IPL limits are hit, the market will go into a hold state and process orders as described below. The IPL Hold will allow the market(s) to continue to function and trade while preventing further price movements beyond the IPL bands for a set period of time (Recalculation Time).

The following section outlines IPL configuration parameters and their impact on market behavior.

2.1 IPL Configurable values

The values that can be configured for IPL are the Amount, Recalculation time and Hold Duration. These values are enabled at the product level.

IPL Amount - It is a preset value that is used to determine upper and lower bands for each period. This IPL amount is added and subtracted from the reference or Anchor Price of the market at the beginning of each period.

For the most active contract month, the Anchor Price is determined by the most recent trade price. For all other months, it is determined using the anchor price of the most active contract and the current spread differential between the most active month and the specific contract month.

Example: Cocoa Futures has an IPL amount of 100. At the beginning of the period Mar12 futures has an Anchor Price of 2900. For this period the Upper IPL will be 3000 (2900 + 100) and the Lower IPL will be 2800 (2900 - 100).

IPL Recalculation Time – The frequency in which the new upper and lower IPL amounts are recalculated.
Example: Cocoa Futures has IPL of 100 and IPL Recalculation time of 15 seconds. At T0, Anchor Price for Mar12 is 2900 resulting in upper/lower IPL of 3000/2800. After 15 seconds elapse a new upper and lower value will be calculated for the next period (T1) from the current Anchor Price (e.g. Anchor Price of 2975 would result in new Upper 3075 and Lower 2875 IPL for next interval).

**IPL Hold Period** - When a bid or offer attempts to breach IPL Amount, the market will go into a HOLD state for a preset IPL Hold Period. This period is in seconds.

During the IPL Hold period:

1. No new IPL will be recalculated
2. Trading outside the IPL will be prevented
3. Trading will be permitted to continue within IPL range.

### 2.2 Triggering a Hold

A bid will trigger a Hold if it attempts to either rest or transact on a resting offer above the upper IPL. An offer will trigger a Hold if it attempts to rest or transact on a resting bid below the lower IPL. Market, Limit and Stop order types can trigger a Hold. Once a Hold is triggered, subsequent attempts to breach the IPL during the IPL Hold Period, in the same market or other markets in the same product, will not trigger another Hold.

When the trading engine detects an IPL breach, it will send out a product-level Hold notification.

**Example:** Upper IPL for this time period is 50.00, and current anchor price is 49.90. Offers rest in the market for 5 @ 49.95, 5 @ 50.00 and 5 @ 50.05. A buyer places a market order for 20 lots. Trades will occur at 49.95 and 50.00. The attempted trade at 50.05 will be rejected and a Hold will be issued.

When one month within a product triggers a Hold, all contracts within that product are also in a Hold and bound by their respective IPL at that time.

When a Hold is triggered, a hold notification alert will be sent to all participants that subscribe to that product. The alert will include direction in which IPL was breached, the markets that were impacted, duration of the hold and IPL price levels beyond which trading is prevented.

### 2.2.1 WebICE

WebICE will display the following message when a HOLD is triggered:
2.2.2 iMPact Multicast Feed

On the iMPact Multicast Feed, the start of hold notification alert will be sent using "Interval Price Limit Notification Message", with the message type “V”, The IPLHoldType will be set to “S” to signify “IPL Hold Start.” The message will also include direction in which IPL was breached, duration of the hold and IPL price levels beyond which trading is prevented.

2.2.3 FIX Order Routing

There are no corresponding messages sent via the FIX Order Routing interface to signify the start of a hold period.

2.3 Hold Period

During a Hold Period, all resting limit and stop orders remain active in the platform. The affected futures contract continues to trade, but price movement is restricted to the IPL range that was in effect at the start of the Hold Period.

Traders can cancel, make inactive, and amend resting orders, and can float new orders. New orders to buy at a price above the IPL high (in the case of an upward move) or sell at prices below the IPL low (in the case of a downward move) will be rejected during the Hold Period, and will generate an immediate reject message to the sender. Any new orders entered during the IPL Hold Period can execute at any price within the IPL range and any unfilled portion will be rejected to the sender.

For stop orders that are elected but not completely filled during the hold, the platform will review the limit price on the order and act as follows:

- If the customer-set limit price is within the IPL range, no change is made to the order terms, and it remains executable at the customer-set limit.

- If the limit price on a sell stop is below the IPL low (in the case of a downward move), the platform will temporarily adjust the limit to the lower IPL price, and the order will remain executable at the
new, temporary limit during the hold. If the order remains unfilled at the end of the hold, the platform will reset the limit to the original limit price, and the order will remain executable at that price at the start of the next IPL Recalculation Period. (For buy stops, the same logic applies in the opposite direction.)

Example: Trades in Cocoa moved the market down to the lower IPL of 2300, which elected a sell stop at 2300 which had a sell limit price of 2275. The limit price of 2275 is beyond the lower IPL for this period. Therefore, the limit of this elected stop is adjusted up to the IPL low price of 2300 and will rest in the market at this price, until it is filled or until the Hold Period ends.

Implied functionality will remain active during IPL Hold Period however, implied prices may have an effect on trade results

Un-tradable derived price through IPL (direct trade)

Within a Hold, or outside of a Hold, there may be times where for a brief moment an implied price in an IPL enabled market will derive "through" the IPL. An implied offer below lower IPL OR an implied bid above upper IPL will prevent trading in the market in the opposite direction until the derived price is removed, either by a trade in the spread that implied the price, or a trade in the secondary market from which it was implied.

Example of implied through IPL

Mar12 Cocoa has IPL enabled and a lower IPL of 2800 for this period. The market trades lower and hits the IPL down. A Hold is initiated and the market is offered at 2800. Assume the Mar12/May12 spread is trading around -100, and that May12 is also at IPL down (2900) and offered at 2900. An offer in the Cocoa Mar12/May12 spread is entered at -101. This spread price implies into an offer in Mar12 at 2799 (1 tick below lower IPL of 2800). This is considered a direct trade in the Mar12 outside IPL, and therefore prevented. This implied price will prevent valid prices of 2800 and higher from trading until any of the following occurs.

1. Spread is satisfied (traded completely) or withdrawn, or
2. May12 offer at 2900 is satisfied (traded completely) or withdrawn, or
3. IPL Hold ends and new values are calculated causing the 2799 to become tradable.

Indirect match outside IPL

There will also be times where bids below lower IPL OR offers above upper IPL, during a hold, will imply into other months or spread markets at valid trade prices. A trade attempt in the other markets for which a valid price is implied is permitted, and will result in a transaction in an IPL market outside the IPL boundary. This is only permitted since it was an indirect match. Any trade attempt directly in the month outside IPL will be rejected.

Example of indirect match outside IPL (into spread)

Mar12 Cocoa has hit an IPL down, is in a HOLD and has lower IPL band of 2800. The best bid/offer in Mar12 is 2795/2800. The bid in Mar12 of 2795 is unhittable directly in the market. This bid price, along with an offer in May12 at 2900 (valid price inside IPL), imply a spread bid in Mar12/May12 at -105. To prevent locking of this spread, a spread transaction at -105 is permitted since a direct trade is not occurring in Mar12 at 2795.

Example of indirect match outside IPL (leg market)
Mar 12 Cocoa has hit an IPL down, is in a HOLD and has lower IPL band of 2800. The best bid/offer in Mar 12 is 2795/2800. The bid in Mar 12 of 2795 is unhittable directly in the market. This bid price, along with an offer in Mar 12/May 12 at -105, imply a bid in May 12 at 2900. To prevent locking of the May 12, a transaction is permitted in May 12 at 2900, resulting a deal in Mar 12 at 2795.

A system indicator of "Y" will be present on these indirect match trades outside IPL.

### 2.3.1 WebICE

WebICE will display the following rejection for order outside IPL:

![WebICE rejection message](image)

WebICE will display the following message when unfilled portion of a new order is withdrawn:

![WebICE withdrawal message](image)

WebICE will display the following message when elected stop's limit price is changed:

![WebICE stop price change message](image)
2.3.2 iMpact Multicast Feed

Trading activity that occurs within the IPL range will continue to be broadcast out over the iMpact Multicast Feed.

2.3.3 FIX Order Routing

When an order is rejected due to price outside IPL, the Execution report (MsgType=8) will include OrdRejReason "9" and Text "TE_IplOrderRejectionError" or "Outside of interval price limit".

A canceled execution report will be sent for any unfilled portion of the order quantity with Text "Interval Price Limit" or "Outside of interval price limit".

The change to elected stop order’s limit price will be sent with a new Execution Report (MsgTyp = 8). The ExecType (tag 150) on the message will be set to "0" (New) and with a Text (tag 58) "Limit Price has been temporarily set at IPL Price. Order will be reinstated at original limit price or cancelled after Hold Period.", indicating a change in price of the order:

2.4 End of Hold

When a Hold Period expires, an alert will be sent to participants.

New upper and lower IPLs are then set for the next interval, based on the current Anchor Price.

Example: IPL value is 100 pts in Cocoa, with Upper IPL 3000, and lower IPL 2800 for previous period. An IPL down occurs at 2800 and a Hold is initiated. For the next 30 seconds (theHold Period) no adjustments are made to the IPL bands. Assume the market remains trading at 2800 during hold. When the Hold Period ends, the anchor of 2800 is used to calculate new upper and lower IPL levels of 2900/2700.

As noted above, previously altered limit prices on Stop-Limit will be reinstated and receive priority vs. new orders in the market based on their Stop election time. When the Hold Period ends, the order’s original limit price will be reinstated, and have priority based on its election time. This will be ahead of any other new orders put into system. However, if the user alters this order the original limit price will not be reinstated when the hold ends.

Example of priority for elected stops, and reinstatement of original limit price

1. Lower IPL is 50
2. The following sell stops are in the market (listed in time priority)
   • # 1 - Sell stop 5 lots @ 51 with 49.00 limit
   • # 2 - Sell stop 5 lots @ 51 with 48.95 limit
   • # 3 - Sell stop 5 lots @ 50.90 with 48.90 limit
3. Resting bids 1 @ 51, 1 @ 50.90, 1 @ 49, 1 @ 48.95 and 1 @ 48.90
4. Market order to sell for 2 lots trades at 51 and 50.90
5. These trades elect stops above in order #1, then #2, then #3.
6. None of the stops are able to execute, as the best bid (49) is below the IPL of 50. A hold is triggered.
7. All 3 stops are Held at 50 (lower IPL) during the HOLD period.
8. After the HOLD period ends, new IPL levels are calculated, and the stops are placed back into the market the same priority as how they were elected (1, 2 then 3). Assume that the new lower IPL is below 48.90.
   • # 1 trades 1 lot @ 49 and rests 4 @ 49.00
   • # 2 trades 1 lot @ 48.95 and rests 4 @ 48.95
   • # 3 trades 1 lot at 48.90 and rests 4 @ 48.90

Note: Any edit by user of an adjusted elected stop order during the IPL hold will result in the order NOT being placed back at its original limit price after hold ends. These edits include (Price, Qty, Account, Memo, Status (Inactivate/Activate)).

It should be noted that Market Supervision staff will have the ability to prematurely end the Hold period. In this case a Hold end notification will also be sent.

2.4.1 WebICE

WebICE will display the following message at the end of the HOLD period:

The HOLD has ended in Cocoa Futures markets at 12:33:54

2.4.2 iMpact Multicast Feed

On the iMpact Multicast Feed, the end of hold notification alert will be sent using "Interval Price Limit Notification Message", with the message type “V”. The IPLHoldType will be set to "E" to signify “IPL Hold End.”

2.4.3 FIX Order Routing

For FIX order routing the reinstatement of the stop order's original limit price will be sent with a new Execution Report (MsgType = 8). The ExecType (tag 150) on the message will be set to "0" (New) and with a Text (tag 58) "Price updated due to IPL".