



# Best Practices for Exchange Volatility Control Mechanisms

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### About FIA

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## I. Introduction

A global pandemic, war, economic sanctions, political unrest, unanticipated policy decisions, financial fragility, and their associated news cycles have one thing in common: they can all cause extreme and sudden market volatility.<sup>1</sup> Faced with this volatility and the importance of managing risk, market participants require robust, exchange-provided Volatility Control Mechanisms (“VCMs”) designed to ensure the market can process a volatility event without compromising market integrity, reliability, and utility. This paper considers VCMs as defined by CPMI-IOSCO in 2018, which seek to minimize disruption caused by trigger events such as obvious erroneous orders, large aggressive orders and positive feedback loops triggered by large price movement (i.e., Flash Crash).<sup>2</sup> This paper also considers VCMs designed to address high market volatility (i.e., stressed market conditions).

FIA has engaged with derivatives exchanges, market participants, and international regulators for over a decade on the development of best practices to mitigate market disruptions, including the use of VCMs. For these VCMs to be relevant across asset classes and remain effective, FIA believes they should be principles-based rather than a prescriptive set of requirements which can become obsolete as markets and participants evolve. FIA has observed that the availability of exchange VCMs proved critical in preserving the integrity and reliability of markets during recent market crises.

The objective of this paper is to offer best practices for the design of derivatives exchange VCMs.<sup>3</sup> It was produced in consultation with exchanges leading in the development of market integrity controls and rulesets designed to mitigate market disruptions and maintain open and transparent price discovery on their marketplaces. It is not intended to provide an exhaustive or comprehensive list of VCMs. It will, however, cover a range of tools such as pre-trade limits on order prices, daily price limits, circuit breakers, and other ex-ante and ex-post controls, that interrupt markets for predetermined time intervals. It will also touch on other exchange rulesets that provide participants with remedial measures for prices resulting from error trade events. FIA acknowledges there are other exchange tools that assist in maintaining orderly markets, such as quantity limits, messaging programs and throttles, and kill switches, among others. While this paper solely addresses VCMs, and no other risk mitigation tools, FIA believes it is important for exchanges to have a combination of tools that monitor for these types of events and take appropriate action when needed.

## II. Overarching Design of Volatility Control Mechanisms

The objective of volatility controls is not to prevent volatility altogether; volatility typically does not weaken the integrity of markets, nor does it lessen investor protection. Volatility is a natural byproduct of price discovery and efficient markets, as new information is incorporated into prices. Volatility controls “should be designed to avoid market disruptions without unduly interfering with that market’s price discovery function”<sup>4</sup> and “to preserve the efficient and orderly functioning of financial markets.”<sup>5</sup>

Volatility controls should be designed to mitigate the impact of extreme short-term volatility driven by events such as operational errors or temporary supply and demand imbalances, but without impeding the ability of an instrument to reach a new equilibrium price level based on healthy market dynamics. In a volatility event, exchanges should focus on keeping markets trading, and trading interruptions should be used sparingly.

Exchanges typically design and deploy several different, complementary controls working in tandem to ensure markets operate in an efficient and orderly manner across all trading hours. Because there are different triggering events that may impact volatility on electronic trading platforms (such as fat-finger order entry quantity and pricing errors, message frequency aberrations, and micro- and macro-economic events), there is no panacea. No single control can accomplish the goal of preserving orderly markets, and no one control is in all cases more effective than another.

In addition to designing VCMs to mitigate the impact of different types of triggering events, exchanges should regularly test and review these controls. This involves regularly assessing the efficacy of the controls, including a review of thresholds or parameters, the frequency of a control being triggered, and whether the controls meet their purpose, as well as incorporating feedback from market participants or other stakeholders.

During stressed markets, exchanges may potentially amend the price band parameters which trigger a VCM, and they should regularly review and validate the criteria used to determine whether markets are stressed. Stressed market conditions are characterized by significant short-term changes in price and volume and can be caused by a variety of occurrences including economic releases. The conditions and criteria that must be met to determine whether a market is “stressed” should be transparent and readily available to market participants, enabling them to independently calculate and anticipate the triggering of these stressed market condition price controls.

Information pertaining to VCMs should be made available to market participants in a transparent manner. Exchanges should publish information on how the controls operate and the thresholds that would result in the controls being triggered. These criteria should be publicly disclosed and replicable. Many exchanges have webpages dedicated to volatility controls that include detailed descriptions of the controls, technical specifications, explanatory videos, and frequently asked questions. Exchanges should also notify participants when a VCM is triggered.

### Best Practices on the Design of VCMs:

- VCMs should be designed to avoid unduly disrupting markets and interfering with price discovery
- Exchanges should focus on keeping markets trading and trading interruptions should only be triggered sparingly
- Multiple VCMs may be necessary to address different types of triggering events
- Design features of a VCM should be based on the specific characteristics of the market or the prevailing market environment, such as time of day effects
- Some VCMs or combination of VCMs may not be appropriate for all markets
- Information on VCMs, including parameters, thresholds and triggers applicable in normal and stressed markets, as well as how they operate in practice, should be publicly available and replicable
- Exchanges should regularly review their VCMs
- Any changes to VCM criteria should be promptly communicated to market participants
- Exchanges should notify the marketplace when a market-wide VCM is triggered
- VCMs should be active across all trading hours, but parameters may be adjusted for different trading sessions or hours

### III. Volatility Control Mechanism Triggers

This section provides a brief overview of the factors that trigger or activate the VCMs most frequently implemented by exchanges globally. At a high level, all VCMs are triggered by price movement. In some instances, the VCM blocks the entry of an order and in others the VCM interrupts continuous trading of the market – but in all cases the triggering event is based on extreme price movement.

The most basic forms of VCMs are price bands on orders and daily price limits by product. These tools strive to ensure that markets work in an efficient, orderly, and predictable manner during volatile market conditions. Both tools block the entry of orders outside of a designated price range. Order-based price bands when used in isolation may not provide adequate protection against extreme volatility events. To provide additional protection, exchanges may utilize functionality to temporarily interrupt continuous trading upon the triggering of a pre-defined price movement.

Exchanges utilize several different control mechanisms to interrupt continuous trading. This interruption may be facilitated by either introducing a temporary pause or by moving to an auction process. In both instances the interruption encourages greater participation by allowing participants an equivalent and adequate period of time to evaluate the market, digest new information, update prices on orders, and remove or add liquidity. When an interruption is introduced, it should be brief, but long enough to allow market participants sufficient time to react to new information and for the market to attract more liquidity. The optimal duration of the interruption is not necessarily the shortest interval possible, but rather the time needed to balance these considerations so when continuous trading resumes, prices and liquidity better reflect market conditions at the time.

### IV. Volatility Control Mechanisms in Action

This section describes the various VCMs that exchanges generally use and provides details as to how these VCMs respond to the triggers previously mentioned. As noted above, not all VCMs may be appropriate for all markets or products and exchanges may use a variety of VCMs.

#### i. Price Bands on Orders

The purpose of price bands or price collars on orders is to prevent erroneous orders, such as limit bids at prices well above the market or limit offers at prices well below the market, from entering the market and resulting in trades at aberrant prices. With price bands, each order submitted to an exchange's trading platform is subject to a price validation control. Orders with prices outside of a pre-defined band, collar, or validation range will be held or rejected by the exchange.

Price bands can vary from product to product. They should be dynamic and regularly recalculated to allow price discovery to continue whenever possible. Price bands are generally based on the reference price plus or minus a fixed or variable increment, whichever is deemed to be suitable for the market and/or asset class. The size of the fixed increment, or the relative percentage of price range, should be reviewed regularly and calibrated based on historical intraday price statistics as well as current market conditions.

Price bands typically allow a wide range of prices to be traded above or below a particular product's reference price. In certain situations, price bands may become stale (too narrow) and no longer reflective of the current market; this is more likely to happen in illiquid products such as options or in stressed market conditions. In this situation, some exchanges may modify the price bands to permit a wider band of prices to be traded using theoretical prices or another interpolated mechanism if no last trade price is available. While the width of price bands need not necessarily be symmetrical, if one side of a price band is adjusted then the other side of the band should be adjusted by an equivalent amount (i.e., a "sliding band"). Exchanges should conduct regular price band reviews to ensure they are recalculating bands with sufficient frequency.

When price bands are in use, they should be active across all trading hours. However, the size of the band may vary during different trading sessions.

### Best Practices on Price Bands:

- Price controls, or pre-trade order price validations, should be designed to prevent erroneous orders from entering the market
- Price bands should be dynamic and regularly recalculated to allow price discovery to continue whenever possible
- Exchanges should have the ability to modify price bands as market conditions warrant
- When price bands are used, they should be active across all trading hours, but the size of the band may vary during different trading sessions

### ii. Daily Price Limits

Daily price limits, where implemented, represent the maximum price range permitted for each contract during a prescribed time interval (i.e., daily or trading session). Both the daily price limits and the actions taken when limits are reached can vary from product to product. Some markets may have a hard daily price limit (i.e., prices cannot trade above or below the limit) and other markets may temporarily interrupt trading (short or long duration market pause) until the price limit can be expanded to a higher/lower interval. Not all contracts have daily price limits.

Generally, daily price limits are calibrated or determined by the exchange using historical price statistics (such as averages or quantiles) and the specifics of the contract. Daily price limits apply to up and down price movements, and may not necessarily be symmetric such that a limit down value can be different from a limit up value. Daily price limits should apply across all trading hours, including overnight trading, although the size of the limits applicable to different trading sessions may vary.

To allow for continued price discovery in volatile markets, contracts with hard daily price limits may also have provisions for an “expanded daily limit.” An expanded limit goes into effect when one or more contract months settle at an upper or lower price limit. The expanded daily limit remains in effect until one or more of the contract months settle below a high limit or above a low limit, at which time the contract reverts to the original hard daily price limit.



### Best Practices on Daily Price Limits:

- Daily price limits may not be appropriate for all contracts
- Where daily price limits are used, they should be applied across all trading hours, although the size of the limits applicable to different trading sessions may vary
- Daily price limits should be designed to address the specific needs of a particular contract, taking into consideration the dynamics of the contract, the interconnectedness with other related contracts, and hedging needs of participants, among many factors

### iii. Mechanisms to Interrupt Continuous Trading

Short duration market pauses are one of the VCMs used to prevent market prices from moving “too far, too fast” by placing limits on the amount a market can move within a preset time period. This control usually analyses price moves within a very short timeframe, typically no more than a few seconds. If the price move within this timeframe exceeds predefined parameters, such as the fixed price band value, the market is paused or held, again, typically for no more than a few seconds.

Long duration market pauses (commonly referred to as circuit breakers or dynamic circuit breakers) are a VCM that provides another layer of protection from extreme volatility events. Except for the timing or duration component, circuit breakers function similarly to short duration market pauses. While circuit breaker functionality varies, they typically assess market moves over a longer time period (e.g., price moves over a rolling one-hour period or over the course of a trading session) and involve longer market pauses than short duration market pauses (e.g., a few minutes versus a few seconds). The price moves required to trigger a circuit breaker event are also usually wider than price moves for short duration market pauses (e.g., 5%+ of previous settlement price).

Short and long duration market pause triggering parameters are configurable by the exchange and can be tailored for each contract or group of contracts. These parameters should be transparent and readily accessible to market participants.

When a short or long duration market pause is triggered, in addition to pausing the market, there are a variety of potential additional parameters that an exchange can set to determine more specifically how the pause functions. Some examples include:

- a) apply a pause where no orders are allowed,
- b) apply trading constraints over a defined time period where orders and matching beyond a specific price level are restricted, or
- c) apply a pre-open state where orders are submitted or cancelled but no matching takes place.

Interrupting continuous trading by transitioning to an auction state is another VCM an exchange can use if prices are outside a pre-defined range. During the call phase of the auction, orders can be submitted to the order book without order matching and an indicative price can be displayed. This decelerates trading allowing market participants sufficient time to react to new information and for the market to attract more liquidity.

Exchanges have different procedures for resuming continuous trading after the activation of an interruption mechanism. In instances where a market pause is implemented, markets transition to a pre-open state where the exchange rebuilds its order book by collecting orders from market participants in advance of resuming order matching at a specified time. In markets that have moved to an auction state, the call phase can establish a re-opening price based on a trade where buyers on the bid and sellers on the ask are matched.

Regardless of the specific operating model, exchanges should give due consideration to the design of the trade resumption mechanism to foster robust price formation, enhance market transparency, and strengthen confidence. Although sometimes necessary, interruptions to continuous trading can interfere with the price discovery function. As such, an appropriate degree of care and deliberation should be applied to the design of the procedures for resumption of trading. Exchanges should incorporate features that facilitate greater participation and incentivize liquidity to boost confidence in price formation during periods of excessive volatility, such as providing indicative prices or order balance information which could attract the liquidity needed to re-establish a healthy market.

### Best Practices for Mechanisms that Interrupt Continuous Trading:

- Controls should be highly configurable and designed based on the market characteristics of each contract or group of contracts to which they will be applied
- Controls should be designed in coordination with other market controls to ensure that they function properly in tandem
- The duration of the interruption should be configured in a way to avoid a potential market disrupting event without unduly interfering with price discovery
- The mechanisms utilized by exchanges to resume continuous trading should incorporate features designed to foster robust price formation, enhance market transparency, and strengthen investor confidence
- Information about the controls and the type of market interruption applied should be transparent and readily accessible to participants
- When these controls apply, they should be active during all trading hours

## V. Post-Trade Remediation – Exchange Error Trade Policies

In addition to pre-trade controls, exchanges typically also provide other forms of recourse to market participants where trades occur at erroneous price levels, including exchange error trade policies. Exchange rulebooks typically provide the exchange with the authority to review and adjust or cancel trades that are executed at clearly erroneous prices.

Exchange rules will describe the exchange’s authority to adjust or cancel trades where, in its absolute and sole discretion, it believes a price adjustment or cancellation is necessary to mitigate market disrupting events caused by a participant’s error. These error trade policies should be designed to balance market participants’ need for trade certainty with the adverse effects of trades being executed at prices inconsistent with prevailing market conditions.

The ultimate goal of any error trade policy should be to promote a marketplace

where all trades stand as executed. Where this is not possible, a price adjustment is the preferred action. Adjusting the price of an erroneous trade is typically less disruptive than a cancellation, as an adjustment only impacts the value of the erroneous trade, and not the overall position and any ensuing trading decisions made by the impacted market participants. However, it is recognized that there may be exceptional circumstances when erroneous trades have to be cancelled to retain market integrity.

### Best Practices for Exchange Error Trade and Price Adjustment Policies:

- Erroneous trading ranges and error trade rules and policies should be transparent and readily accessible to participants
- The time period during which a trade is subject to review should be limited to preserve trade certainty
- Exchange policy should favor adjusting, rather than cancelling, potential error trades
- The trade review outcome should be consistent and predictable

## VI. Conclusion

To ensure the orderly functioning of markets, exchanges should adopt a principles-based approach to the management of extreme market volatility, especially during periods of significant stress. By instituting multiple layers of pre-trade, including volatility, controls and continuously monitoring the criteria and their effectiveness, exchanges can strike the right balance between protecting the market from erroneous or disruptive activity and facilitating genuine price discovery for market participants who wish to manage their risk, even during times of broader market volatility.

## VII. Appendix A: List of Contributing Derivatives Exchanges

Derivatives Exchange Name	Derivatives Exchange Description
CFE	Cboe Futures Exchange offers futures contracts based on various indices, such as volatility, variance and corporate bond indices. The CFE is owned and operated by Cboe Global Markets, Inc.
CME	CME Group operates 4 derivatives exchanges; CME, CBOT, NYMEX and COMEX offering different types of derivatives contracts over a wide range of asset classes such as financials, energy or agricultural.
Eurex	Eurex deals primarily with European-based derivatives, offering interest rate derivatives, equity derivatives, dividend derivatives, foreign exchange derivatives, commodity derivatives, and property derivatives.
ICE	Intercontinental Exchange Group operates 6 derivatives exchanges: ICE Futures US, ICE Futures Europe, ICE Futures Singapore, ICE Futures Abu Dhabi, ICE Endex and ICE NGX. These exchanges provide a wide range of derivatives contracts over several asset classes, primarily in energy, financials and agricultural.
LME	The LME Exchange operates a global metal market offering different types of derivatives contracts on industrial metals such as aluminium, copper, zinc and nickel. The LME Exchange is owned by Hong Kong Exchanges and Clearing Ltd.
Nasdaq	Nasdaq operates the Nasdaq Options Market (NOM), Nasdaq BX (BX Options), Nasdaq PHLX (PHLX) Options markets, Nasdaq ISE (ISE), Nasdaq GEMX (GEMX), Nasdaq MRX (MRX) as well as Nasdaq Nordic Derivatives Market

## VIII. Appendix B: Examples

### a. Short Market Duration Pause

Below is an example of a CME short market duration pause called Velocity Logic event.

On April 20, 2022, at 9:30 AM CT, there was a rally in June 2022 Crude Oil futures. The Velocity Logic<sup>6</sup> in Crude Oil futures at this time was set to trigger upon a \$0.50 move in one millisecond. An attempted trade of \$102.32 exceeded those parameters, thus triggering a five-second pre-open period. The market re-opened at 9:30:05 am, at a price of \$102.45, and trading then resumed.



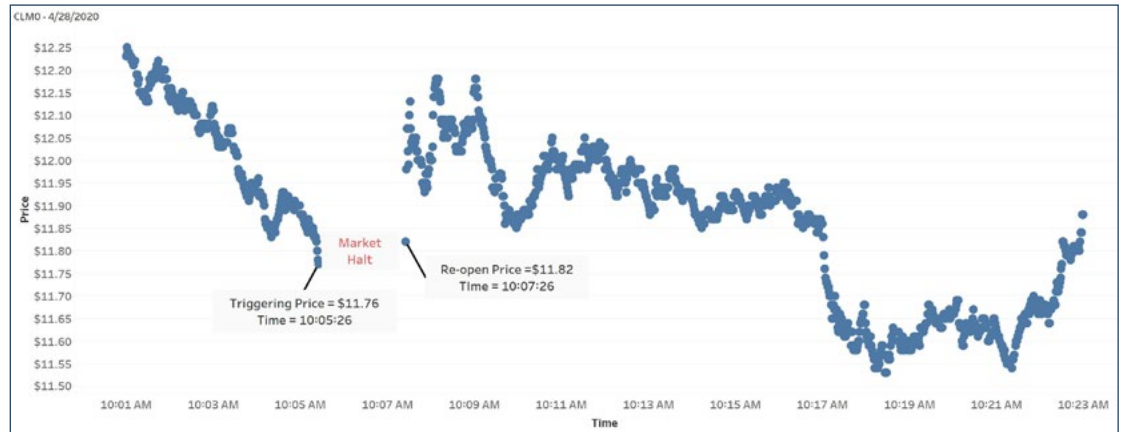
### b. Long Market Duration Pause

Below is an example from a CME Dynamic Circuit Breakers (DCB) event.

On April 28, 2020, the prior day settlement in June 2020 Crude Oil futures was \$12.80. The DCB parameters at that time were set at 15% of the prior day's settlement, which made the DCB value for April 28 equal to \$1.92. Thus, if an order would cause a market price to be \$1.92 greater than the low price of the previous rolling one-hour window or \$1.92 less than the high price of the previous rolling one-hour window, the market would be paused. At 10:05:26 AM CT, an order was entered that would have traded at \$11.76. The high price over the previous one-hour period was \$13.69. When the DCB value of \$1.92 was applied to that high price, the lower bounds at which the DCB would trigger equaled any trade at price below \$11.77 (\$13.69 minus \$1.92). This potential trade of \$11.76 therefore triggered a DCB. Following the trigger of the DCB, a two-minute trading pause and pre-open period commenced. The market resumed trading at 10:07:26 at a price of \$11.82 and subsequently traded higher.



# Best Practices for Exchange Volatility Control Mechanisms



## IX. Appendix C: Exchange Rules (provided by the relevant Exchanges)

VCMs Disclosures	
<b>CME</b>	<p>The CME Group Client Systems Wiki provides comprehensive information and documentation describing aspects of exchange systems that are relevant to market participants, including information about mechanisms used to address extraordinary market volatility.</p> <p>See <a href="https://www.cmegroup.com/confluence/display/EPICSANDBOX/Market+Integrity+Controls">https://www.cmegroup.com/confluence/display/EPICSANDBOX/Market+Integrity+Controls</a>; <a href="https://www.cmegroup.com/education/demos-and-tutorials/understanding-velocity-logic.html">https://www.cmegroup.com/education/demos-and-tutorials/understanding-velocity-logic.html</a>; <a href="https://www.cmegroup.com/education/articles-and-reports/understanding-price-limits-and-circuit-breakers.html">https://www.cmegroup.com/education/articles-and-reports/understanding-price-limits-and-circuit-breakers.html</a>;</p> <p>CME also provides VCMs thresholds see, <a href="https://www.cmegroup.com/globex/files/globex-product-reference-sheet.xls">https://www.cmegroup.com/globex/files/globex-product-reference-sheet.xls</a></p> <p>Following the triggering of a volatility control mechanism, the CME Group exchanges communicate with market participants and the trading public using a market data feed. These public messages inform market participants that an instrument (or group of instruments) is subject to a volatility control measure or has transitioned out of the volatility control measure.</p>
<b>ICE</b>	<p>Each of the ICE Futures Exchanges consolidates their policy and FAQ documents regarding market controls and other information on their public website. The resources can be found at the below links:</p> <p>ICE Endex: <a href="https://www.theice.com/endex/market-resources">https://www.theice.com/endex/market-resources</a></p> <p>ICE Futures Abu Dhabi : <a href="https://www.theice.com/futures-abu-dhabi/market-resources">https://www.theice.com/futures-abu-dhabi/market-resources</a></p> <p>ICE Futures Europe: <a href="https://www.theice.com/futures-europe/market-resources">https://www.theice.com/futures-europe/market-resources</a></p> <p>ICE Futures Singapore: <a href="https://www.theice.com/futures-singapore/market-resources">https://www.theice.com/futures-singapore/market-resources</a></p> <p>ICE Futures U.S.: <a href="https://www.theice.com/futures-us/market-resources">https://www.theice.com/futures-us/market-resources</a></p> <p>ICE NGX : <a href="https://www.theice.com/ngx/resources">https://www.theice.com/ngx/resources</a></p>



<p><b>CFE</b></p>	<p>Cboe Futures Exchange, LLC (“CFE”) describes its volatility control mechanisms and parameters in the CFE Rulebook. See <a href="https://cdn.cboe.com/resources/regulation/rule_book/cfe-rule-book.pdf">https://cdn.cboe.com/resources/regulation/rule_book/cfe-rule-book.pdf</a>.</p>
<p><b>Eurex</b></p>	<p>VCMs are supported by Eurex in all futures markets and implemented via a volatility auction model. Once the trigger conditions are satisfied, continuous trading is interrupted by a volatility auction call phase lasting several minutes and concluded by a volatility auction price as a result of the order-book uncrossing at the end of the auction call phase. Trigger conditions are based on price bands verified and updated on a daily base taking market prices of previous business days into account. More detailed information can be found on Eurex Webpage, Functional Reference § 7.5 (see <a href="https://www.eurex.com/resource/blob/3470806/362c351541e687c629c5cd-d4ce862fec/data/T7_Release_11.1_-_Functional_Reference_v.11.1.2.pdf">https://www.eurex.com/resource/blob/3470806/362c351541e687c629c5cd-d4ce862fec/data/T7_Release_11.1_-_Functional_Reference_v.11.1.2.pdf</a> )</p>
<p><b>Nasdaq (Nasdaq Nordic)</b></p>	<p>VCMs are supported in Nasdaq Nordic Equity Derivatives markets and would result, once triggered in a volatility auction as documented in Chapter 13 of the Market Model document available at: <a href="https://www.nasdaq.com/market-regulation/nordics/derivatives-rules">https://www.nasdaq.com/market-regulation/nordics/derivatives-rules</a></p> <p>For liquid index futures a sliding window method is applied during continuous trading while for less liquid index futures the model is based on static/dynamic thresholds method.</p>

Price Bands	
CME	Price bands on CME Group's electronic trading platform, Globex, are dynamically calculated for each product based on the last price ("fair value"), plus or minus a fixed band value. The band values are publicly available on CME Group's website. <sup>7</sup> On CME Globex, the price bands for Light Sweet Crude Oil futures are currently set at \$0.50. If the fair value of a particular Crude Oil futures contract is \$80.00, bids above \$80.50 and offers below \$79.50 would be rejected by the trading platform.
ICE	<p><b><u>Reasonability Limits</u></b></p> <p>ICE Futures maintains Reasonability Limits (RL) to prevent 'fat finger' type errors. These are hard limits above or below an Exchange set anchor price. Orders with bids above the Reasonability Limit or offers below the Reasonability Limit will not be accepted.</p> <p>ICE Futures also determines parameters above or below an Exchange set anchor price for each Contract within which a trade alleged as an error trade may not be cancelled. Such parameters are known as a no cancellation range (NCR).</p> <p>Product-level RL and NCR parameters for ICE Futures can be located at each of the Exchange Resource Centers, at the above-mentioned websites.</p>
CFE	CFE Rule 513A (Risk Controls) describes the price reasonability checks that are in place for CFE products, and the product rule chapter in the CFE Rulebook for the applicable CFE product includes the default price reasonability check parameters for that product. See <a href="https://cdn.cboe.com/resources/regulation/rule_book/cfe-rule-book.pdf">https://cdn.cboe.com/resources/regulation/rule_book/cfe-rule-book.pdf</a> . CFE also publishes a Risk Management Specification on its public website regarding how CFE clearing firms and trading privilege holders may set risk controls on CFE. See <a href="https://cdn.cboe.com/resources/membership/CBOE_FUTURES_EXCHANGE_RISK_MANAGEMENT_SPECIFICATION.pdf">https://cdn.cboe.com/resources/membership/CBOE_FUTURES_EXCHANGE_RISK_MANAGEMENT_SPECIFICATION.pdf</a>
Eurex	Price bands and corresponding price band validations are supported for all Eurex markets. Basically, Eurex distinguish between "Price Reasonability Checks" and "Extended Price Range Validations. More details can be found in the Functional Reference, § 6 (see <a href="https://www.eurex.com/resource/blob/3470806/362c351541e687c629c5cdd4ce862fec/data/T7_Release_11.1_-_Functional_Reference_v.11.1.2.pdf">https://www.eurex.com/resource/blob/3470806/362c351541e687c629c5cdd4ce862fec/data/T7_Release_11.1_-_Functional_Reference_v.11.1.2.pdf</a> )
Nasdaq (Nasdaq Nordic)	Price band validations are applied on both futures, forwards and options based on a dynamic reference price which is updated based on a set of rules as described in the market model chapter 13:  <a href="https://www.nasdaq.com/market-regulation/nordics/derivatives-rules">https://www.nasdaq.com/market-regulation/nordics/derivatives-rules</a>

Price Limits	
CME	<p>Many of the CME Group agricultural products have hard daily price limits. The limits are revised twice per year and published to the marketplace through a CME Group Special Executive Report.<sup>8</sup> In determining the limits, the exchange analyzes and averages historical price information (e.g., prices averaged over a 45-day period) and multiplies that average by a percentage (e.g., 7% for Corn futures). The percentages were established by evaluating historical daily percentage price changes by product to capture, on average, daily price movements 99% of the time. That newly calculated limit will apply until the limit is revised during the subsequent revision cycle.</p> <p>The expanded limits are approximately 50% higher than daily limits. If the futures contract settles below a high limit or above a low limit, the following day the futures contract will revert to the original hard daily limit. Notably, on CME Group's markets, hard daily limits do not apply to contracts during the delivery months, which helps ensure proper price convergence as the contract nears expiry.</p> <p>CME's U.S. equity futures contracts, for example, have a range of safeguards, some of which are coordinated with cash equity markets. During overnight hours, CME Group U.S. Equity futures have a 7% hard price limit. If the market prices reach that 7% limit, up or down, the market remains open but trades cannot take place outside of the price limit. CME Group also applies a dynamic circuit breaker to its U.S. equity futures contracts. During overnight hours, if the market moves beyond 3.5%, up or down, within an hour, trading is paused for two minutes. Dynamic circuit breakers are discussed in further detail below. During daytime trading hours, CME Group U.S. equity futures circuit breakers are coordinated with cash equity market circuit breakers at 7%, 13%, and 20%. If the 7% or 13% breakers are triggered, the markets are paused for 15 minutes; if the 20% breaker is triggered, the markets are closed for the trading day.</p>



ICE	<p><b><u>Daily Price Limits</u></b></p> <p>ICE Futures U.S. currently has Daily Price Limits (DPLs) on three futures contracts, Cotton No. 2<sup>®</sup>, FCOJ-A and Canola futures. The DPL represents the maximum price move from the previous settlement price permitted for each futures contract during a single trading session. While trading will not be halted in any product if a DPL is hit, the contract cannot trade above or below the limit. This may result in a market that is “locked” limit up/down, which cannot trade because bids/offers are outside of the applicable DPL. Each contract also has provisions for expanded daily price limits which are applied on days following a trading day where the market settled at the limit.</p> <p>Detailed descriptions of the daily price limits can be found in the respective contract rule chapters:</p> <p>Cotton Rule 10.09: <a href="https://www.ice.com/publicdocs/rulebooks/futures_us/10_Cotton.pdf">https://www.ice.com/publicdocs/rulebooks/futures_us/10_Cotton.pdf</a></p> <p>FCOJ Rule 13.08: <a href="https://www.ice.com/publicdocs/rulebooks/futures_us/13_FCOJ.pdf">https://www.ice.com/publicdocs/rulebooks/futures_us/13_FCOJ.pdf</a></p> <p>Canola Rule 12.02(c): <a href="https://www.ice.com/publicdocs/rulebooks/futures_us/12_Canola_Rules.pdf">https://www.ice.com/publicdocs/rulebooks/futures_us/12_Canola_Rules.pdf</a></p>
CFE	<p>CFE describes any price limits in place for CFE products in the product rule chapter in the CFE Rulebook for the applicable product. See <a href="https://cdn.cboe.com/resources/regulation/rule_book/cfe-rule-book.pdf">https://cdn.cboe.com/resources/regulation/rule_book/cfe-rule-book.pdf</a>. For example, CFE Rule 1202(i)(i) describes the price limits in place for Cboe Volatility Index (“VIX”) futures during extended trading hours. CFE price limit parameters are also posted on the CFE public website. See <a href="https://www.cboe.com/us/futures/product_info/product_level_system_parameters/">https://www.cboe.com/us/futures/product_info/product_level_system_parameters/</a></p>

Trading Interruptions – Short Market Pauses	
CME	<p>Velocity Logic has two iterations, Velocity Logic Narrow (“VLN”) and Velocity Logic Wide (“VLW”). VLN analyzes market movements within a rolling single millisecond—should markets move more than the range of the price bands within that time, Velocity Logic triggers a brief, five-second trading halt. VLW functions in the same manner, except that it analyzes a rolling one-second timeframe, and requires a price move of three times the price band range before triggering a five-second trading halt.</p> <p>Importantly, on CME Globex, markets are not fully closed during trading halts triggered by Velocity Logic. Rather, the relevant market enters a “pre-open” state, in which users can cancel resting orders and submit bids and offers, although trade matches will not occur. Throughout this five-second pre-open period, the exchange publishes a dynamically updated indicative opening price (“IOP”). In this manner, price discovery can continue even while the relevant market is in its pre-open state, and orderly trading can resume after a brief pause during which market participants can adjust their strategies to account for the market’s direction.</p>

<p>ICE</p>	<p><b><u>Interval Price Limits</u></b></p> <p>Interval Price Limits act as a temporary circuit breaker feature on the electronic platform, to diminish the likelihood and extent of short-term price spikes or aberrant market moves. While it is designed to be in force throughout each trading day, it is expected that the protections will be actively triggered only in the case of extreme price moves over very short periods of time. The IPL regime uses three customizable parameters for each futures product:</p> <p style="padding-left: 40px;"><u>IPL Recalculation Time</u>: A pre-set length of time during which the price of a contract month may not move up or down more than the IPL Amount (defined below) from the contract price at the start of the period. This starting price is referred to as the “anchor price”. The IPL Recalculation Time continuously resets for the length of time applicable to the particular futures contract.</p> <p style="padding-left: 40px;"><u>IPL Amount</u>: The maximum number of points that a contract month is permitted to move up or down during each IPL Recalculation Time for the contract. The anchor price plus/minus the IPL amount effectively creates an IPL range for the contract for the IPL Recalculation Time.</p> <p style="padding-left: 40px;"><u>IPL Hold Period</u>: When the platform determines that the next trade in the contract month will be at a price that is outside the active IPL range, the platform triggers a Hold Period, during which the price of the contract is not permitted to trade outside the IPL range that was in place at the start of the IPL Hold Period. The length of the Hold Period is pre-set. When a Hold Period is triggered, the platform will issue an alert notifying users that a Hold Period has begun and specifying the time the Hold Period will end.</p> <p>IPL parameters can be changed without prior notice, at the sole discretion of the Exchange, based on prevailing market conditions.</p> <p>A detailed description of the Interval Price Limit Functionality can be found at the below address:</p> <p><a href="https://www.ice.com/dashboards/traders/securedocs/IPL_Circuit_Breaker.pdf">https://www.ice.com/dashboards/traders/securedocs/IPL_Circuit_Breaker.pdf</a></p> <p>Product level IPL parameters for ICE Futures can be located at each of the Exchange Resource Centers, at the above-mentioned websites.</p>
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CFE	N/A
<b>Trading Interruptions – Long Market Pauses and others</b>	
CME	<p>CME Group, for example, deploys Dynamic Circuit Breakers (“DCB”). In Crude Oil futures, a DCB event is currently triggered by a price move of 10% of the prior day’s settlement price in a one-hour period. If a DCB event is triggered, trading is halted for two minutes. As with Velocity Logic, during a DCB trading halt, the market enters a “pre-open” state in which bids and offers are permitted to be entered, but no trade matching occurs. Details about DCB can be found on the CME Group client systems wiki, here: <a href="https://www.cmegroup.com/confluence/display/EPICSANDBOX/Dynamic+Circuit+Breakers">https://www.cmegroup.com/confluence/display/EPICSANDBOX/Dynamic+Circuit+Breakers</a></p> <p>CME Group also utilizes “market-wide” circuit breakers that are designed to provide an automated, coordinated pause in trading among related futures, options, and their underlying equities products. U.S. market-wide circuit breakers tied to price declines in the S&amp;P 500 Index of 7%, 13%, or 20% during a single trading day are in place for equity related products. For example, these market-wide circuit breakers were triggered on three separate occasions in March 2020 during the start of the COVID-19 pandemic. More information is available in the equity futures and options product chapters, as well as on the CME Group website, here: <a href="https://www.cmegroup.com/trading/equity-index/sp-500-price-limits-faq.html">https://www.cmegroup.com/trading/equity-index/sp-500-price-limits-faq.html</a></p>



## Best Practices for Exchange Volatility Control Mechanisms

<p>ICE</p>	<p><b><u>Trading Halts</u></b></p> <p>For equity index futures, ICE Futures U.S. employs extended trading halts when the trading in the primary national securities markets have declared a trading halt due to extraordinary market volatility (NYSE Rule 7.12).</p> <p>NYSE Rule 7.12 can be found at the below address:</p> <p><a href="https://nyseguide.srorules.com/rules/adabe2b-07d5e100088ed005056881d2301">https://nyseguide.srorules.com/rules/adabe2b-07d5e100088ed005056881d2301</a></p> <p>Rules regarding ICE Futures U.S. trading halts subsequent to primary securities markets halts can be found in the relevant rule chapters for the affected product, for example:</p> <p><a href="https://www.ice.com/publicdocs/rulebooks/futures_us/23_MSCI_Index_Futures.pdf">https://www.ice.com/publicdocs/rulebooks/futures_us/23_MSCI_Index_Futures.pdf</a></p> <p><a href="https://www.ice.com/publicdocs/rulebooks/futures_us/25_NYSE_Index_Futures.pdf">https://www.ice.com/publicdocs/rulebooks/futures_us/25_NYSE_Index_Futures.pdf</a></p>
<p>CFE</p>	<p>CFE Rule 417A (Market-Wide Trading Halts Due to Extraordinary Volatility) describes CFE’s market-wide circuit breaker (“MWCB”) trading halt provisions, and the product rule chapter in the CFE Rulebook for each CFE product indicates whether and how that rule applies to that product. See <a href="https://cdn.cboe.com/resources/regulation/rule_book/cfe-rule-book.pdf">https://cdn.cboe.com/resources/regulation/rule_book/cfe-rule-book.pdf</a>. For example, CFE Rule 1202(i)(iii) indicates that VIX futures are subject to CFE’s MWCB trading halt provisions and how those provisions are applied to VIX futures.</p>
<p>Eurex</p>	<p>Eurex is supporting circuit breakers in all futures markets using a volatility interruption functionality to protect futures markets against large price movements. The time period applied for evaluating the trigger condition of a circuit breaker ranges from several seconds to extended periods.</p>



<h2>Post Trade Remediation</h2>	
<p>CME</p>	<p>CME’s Rule 588 provides that the exchange, namely its Global Command Center (“GCC”), may determine to review a trade based on its independent analysis of market activity or upon request from a market participant who was a user of the exchange’s electronic trading platform. For a market participant to request that a trade be reviewed as a potential error trade, the participant is required to contact the GCC via telephone within eight minutes after the execution of the trade at issue and advise that he/she wishes to invoke the error trade policy. When a trade is subject to review pursuant to Rule 588, the exchange promptly issues an alert to the marketplace indicating that the subject trade is under review.</p> <p>The GCC’s guiding principle in making its determinations is to let transactions stand wherever possible, even if at an adjusted price, rather than cancelling them. The reason for this principle is that market participants may already have taken further action in reliance on the potential error trade, for example via hedging. Predictability is a key facet of market integrity that can be undermined by cancelling trades, which the GCC’s principles-based approach to potential error trades seeks to protect.</p> <p>In reviewing a trade under Rule 588, the GCC first considers whether the trade price is within the Non-Reviewable Range<sup>9</sup>, which ordinarily mirrors the price bands in place for that specific contract. In applying the Non-Reviewable Range, the GCC determines the fair value market price for that contract at the time the trade occurred, as well as any other pertinent information, including but not limited to: (1) the last trade price in the contract; (2) a better bid or offer price on the electronic trading system; (3) a more recent price in a different contract month; (4) the price of the same or related contract established in another venue or another market; (5) the market conditions at the time of the trade; (6) the theoretical value of an option based on the most recent implied volatility; and (7) responses to a Request for Quote. If the GCC determines that the trade price was inside the Non-Reviewable Range, the trade stands. If the GCC determines that the trade price was outside the Non-Reviewable Range, the trade price is adjusted to a price that equals the fair value market price for that contract at the time the trade occurred, plus or minus the Non-Reviewable Range.</p> <p>Rule 588 also contains a provision for liability for losses. It provides that a market participant who enters an order that results in a price adjustment or cancellation shall be responsible for demonstrated claims of realized losses incurred by participants whose trade prices were adjusted or cancelled. A loss claim must be submitted to the Exchange on an Exchange claim form within five business days of the event giving rise to the claim. Eligible claims shall be forwarded by the Exchange to the party responsible for the order(s) that resulted in a trade cancellation or a price adjustment and to the clearing member through which the trade was placed. The Exchange may reject any claim that is not filed within five business days, and any such decision is final. To the extent liability is denied, the claimant may file a claim to arbitrate against the responsible party, pursuant to exchange Rule 622 (Claims Relating to Trade Cancellations or Price Adjustments).</p>

<p>ICE</p>	<p><b><u>Error Trade Policy</u></b></p> <p>In order to ensure fair and orderly market conditions, ICE Futures may cancel any order and may cancel any Trade executed in Exchange Trading System pursuant to the Error Trade Policy. In normal circumstances, the Exchange will only adjust prices or cancel trades on the basis that the price traded is not representative of market value.</p> <p>Additionally, there is a defined No Cancellation Range for each Contract, and trades executed within this price range will not, under normal circumstances, be cancelled or price adjusted. A component of market integrity is the assurance that once executed, except in exceptional circumstances, a trade will stand and not be subject to cancellation or price adjustment. Any trades that do not have an adverse effect on the market should not be able to be cancelled or price adjusted, even if executed in error.</p> <p>The Exchange will make the final decision on whether a trade price is adjusted, or a trade is cancelled or is allowed to stand.</p> <p>ICE Futures error trade policy can be located at each of the Exchange Resource Centers, at the above-mentioned websites.</p>
<p>CFE</p>	<p>CFE's error trade policy is described in Policy and Procedure III of the Policies and Procedures Section of the CFE Rulebook. See <a href="https://cdn.cboe.com/resources/regulation/rule_book/CFEPoliciesandProcedures.pdf">https://cdn.cboe.com/resources/regulation/rule_book/CFEPoliciesandProcedures.pdf</a>.</p>
<p>Nasdaq (Nasdaq Nordic)</p>	<p>The exchange rules for cancellations and price adjustments of erroneous transactions are described in section 4.5 of the Exchange Rules of Nasdaq Derivatives Markets available at:</p> <p><a href="https://www.nasdaq.com/market-regulation/nordics/derivatives-rules">https://www.nasdaq.com/market-regulation/nordics/derivatives-rules</a></p>
<p>Eurex</p>	<p>Eurex mistrade rules are defined in Eurex Trading Conditions §2.9. See <a href="https://www.eurex.com/resource/blob/311224/50a652c7d4e-7c562196ebd5543260b3f/data/trading_conditions_en_2023_07_31.pdf">https://www.eurex.com/resource/blob/311224/50a652c7d4e-7c562196ebd5543260b3f/data/trading_conditions_en_2023_07_31.pdf</a></p>

## Endnotes

- 1 The COVID pandemic of 2020, the Ukraine invasion and the subsequent energy crisis of 2022 shook global markets with sudden and extreme volatility setting new historical highs.
- 2 CPMI-IOSCO, [Mechanisms Used By Trading Venues To Manage Extreme Volatility And Preserve Orderly Trading \(2018\)](#)
- 3 Which would apply to, under MiFID II classification, Regulated Market (RM), Multilateral Trading Facility (MTF) and Organised Trading Facility (OTF)
- 4 17 C.F.R. Appendix B to Part 38.
- 5 MiFID
- 6 CME short duration market pause or Velocity Logic analyzes market movements within a rolling single millisecond, should markets move more than the range of the price bands within that time, Velocity Logic triggers a brief, five-second trading halt.
- 7 See <https://www.cmegroup.com/globex/files/globex-product-reference-sheet.xls>
- 8 E.g., <https://www.cmegroup.com/content/dam/cmegroup/notices/ser/2022/10/SER-9081.pdf>
- 9 See <http://www.cmegroup.com/rulebook/files/588h-globex-non-reviewable-trading-ranges.xls>.



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