**APPROVED**

By the Moscow Exchange Executive Board

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# Russian Market Volatility Index Methodology

1. **Overview**
	1. The Russian Market Volatility Index (the "Index") is calculated by Public Joint Stock Company Moscow Exchange MICEX-RTS (the "Exchange").
	2. The Exchange calculates the RVI Index in accordance with the Methodology (the "Methodology"). The full name of the Index is "Индекс волатильности российского рынка” in Russian and "Russian Market Volatility Index” in English. The Index code is “RVI”.
	3. The terms and definitions not expressly specified in the Methodology shall be understood in accordance with the laws of the Russian Federation, the Moscow Exchange Trading Rules for the Derivatives Market and the CCP NCC Clearing Rules for the Derivatives Market.
	4. The Methodology and any amendments or additions thereto shall be approved by the Exchange and shall come into effect on the date determined by the Exchange.
	5. Amendments and additions to the Methodology may be made once a quarter or less frequently. Information on changes introduced, including in the form of a new version of the Methodology, shall be disclosed by the Exchange not later than three business days prior to the effective date.
2. **Index Calculation**
	1. The Index is calculated every 15 seconds during the main trading session on the Derivatives Market of the Exchange, as well as during the additional trading sessions (if any) on the Market. The first value of the Index during additional trading sessions is calculated 5 (five) minutes after the beginning of the session. The first value of the Index during the Main Session shall be calculated 5 (five) minutes after the start of the Main Session if the pre-market session has not been opened. The final value of the Index is calculated at the end of each session.
	2. The Index is not calculated during the suspension of trading on the Derivatives Market of the Exchange, during the suspension of trading in the options included in the calculation of the indices; and during trading sessions of less than 5 minutes.
	3. Index values are expressed in points and calculated to two decimal places.
	4. The Index is calculated in order to obtain thirty-day volatility values.
	5. The Index shall be calculated based on two series of Options on the RTS Index Futures Contract, namely Options on the nearest Series and Options on the Series following the nearest Series (the "Nearby Option Series" and the "Next Option Series", respectively), which fulfil the following conditions:
* The Nearby Option Series and the Next Option Series are in a quarterly or monthly series, but not in a weekly series;
* the period until the expiry date (hereinafter referred to as the "Expiration Date")[[1]](#footnote-2) of the Nearby Option Series and the Next Option Series is not less than 7 (seven) days.
	1. Options with a strike multiple of 5,000 are used to calculate the Index.
	2. The Index is calculated according to the following formula:

$$RVI=100\*\sqrt{\frac{T\_{365}}{T\_{30}}\*\left|T\_{1}\*σ\_{1}^{2}\*\left(\frac{T\_{2}-T\_{30}}{T\_{2}-T\_{1}}\right)+T\_{2}\*σ\_{2}^{2}\*\left(\frac{T\_{30}-T\_{1}}{T\_{2}-T\_{1}}\right)\right|}$$

where:

**T365** - 365 days as a fraction of a calendar year (one year = 365 days);

**T30** - 30 days as a fraction of a calendar year (one year = 365 days);

**T1** - time to the expiration date of the nearby option series inclusive, as a fraction of a calendar year (one year = 365 days);

**T2** - time to the expiration date of the next option series inclusive, expressed as a fraction of a calendar year (year = 365 days);

**σ1** is the implied volatility of the nearby option series;

**σ2** is the implied volatility of the next option series.

* 1. The variance for the prices of the nearby and next option series is calculated using the formula:

$$σ\_{1}^{2}=\frac{2}{T\_{1}}\sum\_{i=-7}^{7}\frac{∆K\_{i}}{K\_{i}^{2}}\*Pr\left(K\_{i}\right)-\frac{1}{T\_{1}}\*\left(\frac{F\_{1}}{K\_{0}}-1\right)^{2}$$

$$σ\_{2}^{2}=\frac{2}{T\_{2}}\sum\_{i=-7}^{7}\frac{∆K\_{i}}{K\_{i}^{2}}\*Pr\left(K\_{i}\right)-\frac{1}{T\_{2}}\*\left(\frac{F\_{2}}{K\_{0}}-1\right)^{2}$$

where:

$∆K\_{i}$ – Strike level (the main strikes are used for the calculation of the Index, interim strikes are not used);

**T1** - time to the expiration date of the nearby Options series inclusive, as a fraction of a calendar year (one year = 365 days). It changes every 15 seconds;

**T2** - time to the expiration date of the next Options series inclusive, expressed as a fraction of a calendar year (year = 365 days). It changes every 15 seconds;

$K\_{i}$ - the ith strike. In this case $K\_{i}<K\_{i+1} $ (the main strikes are used to calculate the Index, the interim strikes are not used);

**F1, F2** - the current market price of the futures contracts underlying the nearby and next option series, respectively (only quarterly and monthly option series are considered).

 The current market price is calculated every second during Derivatives Market trading sessions in accordance with the Futures Contracts Settlement Price Methodology (Appendix 1 to the Moscow Exchange Derivatives Market Trading Rules).

$Pr\left(K\_{i}\right)$ – value for the ith strike, determined according to the following algorithm:

* + 1. If trades in the option with the ith strike were registered during the current main or additional trading session (the current session):

$$Pr\left(K\_{i}\right)=\left\{\begin{array}{c}Deal\left(K\_{i}\right) \rightarrow if ask\left(K\_{i}\right)\geq Deal\left(K\_{i}\right) and bid\left(K\_{i}\right)\leq Deal\left(K\_{i}\right), \\or no (bid/ask) is available for them;\\ask\left(K\_{i}\right)\rightarrow if ask\left(K\_{i}\right)\ne 0 and ask\left(K\_{i}\right)<Deal\left(K\_{i}\right);\\bid\left(K\_{i}\right)\rightarrow if bid\left(K\_{i}\right)>Deal\left(K\_{i}\right).\end{array}\right.$$

* + 1. If there have been no trades in the option with the ith strike during the current session:

$$Pr\left(K\_{i}\right)=\left\{\begin{array}{c}TheorPrice\left(K\_{i}\right)\rightarrow if ask\left(K\_{i}\right)\geq TheorPrice\left(K\_{i}\right) and \\bid\left(K\_{i}\right)\leq TheorPrice\left(K\_{i}\right), or no (bid/ask) is available; \\ask\left(K\_{i}\right)\rightarrow if ask\left(K\_{i}\right)\ne 0 и ask\left(K\_{i}\right)<TheorPrice\left(K\_{i}\right);\\bid\left(K\_{i}\right)\rightarrow if bid\left(K\_{i}\right)>TheorPrice\left(K\_{i}\right).\end{array}\right.$$

where:

$Deal\left(K\_{i}\right) $– the price of the last trade in the option with strike $K\_{i}$ in the current session;

$bid\left(K\_{i}\right)$ – best bid for the option with strike $K\_{i}$ at the end of the current session;

$ask\left(K\_{i}\right)$ – best bid for the option with strike $K\_{i}$ at the end of the current session;

$TheorPrice\left(K\_{i}\right)$ – the theoretical price of the option with strike $K\_{i}$, determined based on the quote of the underlying futures contract, и and the volatility curve at the time of calculation.

To determine $Pr\left(K\_{i}\right)$ at seven (7) strikes, the value of which is greater than the central strike, $Pr\left(K\_{i}\right)$ of call options is used.

To determine $Pr\left(K\_{i}\right)$ at seven (7) strikes, the value of which is less than the central strike, bids/asks for put options are used.

To determine $Pr\left(K\_{i}\right)$ for an option with a central strike, the quote of the futures contract is considered. If the quote of the futures contract is greater than the central strike of the option, $Pr\left(K\_{i}\right)$ of put options is used. Otherwise, $Pr\left(K\_{i}\right)$ of call options is used.

Under this Methodology, the central strike is defined as the strike price closest to the current market price of the underlying asset of the relevant options series, with the market price adjusted to the strike dimension by multiplying it by the lot size specified in the corresponding options contract specifications. If a few strikes have the same proximity to the current market price of the underlying asset, the greater strike price among the two equidistant options is designated as the central strike.

1. **Index Calculation Supervision**
	1. In the event of a technical failure during the calculation of the Index or a technical failure during the receipt of price data required for its calculation, recalculation of the previously calculated values is permitted. This recalculation shall be carried out within the shortest possible time from the moment of detection of the technical failure.
2. **Publication**
	1. Index values are published on the website of the Exchange at www.moex.com (the Exchange Website) within 2 (two) minutes from the moment of their calculation.
	2. Information subject to disclosure under this Methodology may also be disseminated by other means, including through information agencies that distribute MOEX market data.
1. The Expiration Date of an option is the last trading day for the given option series. [↑](#footnote-ref-2)