**APPROVED**

by the Executive Board

Moscow Exchange

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CEO Moscow Exchange

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# Methodology for calculation of the indicative foreign exchange rate

1. **General Provisions**
	1. The present Methodology for calculation of the indicative foreign exchange rate (the Methodology) establishes a procedure for calculation of the indicative foreign exchange rate (hereinafter the Indicative Exchange Rate) by Public Joint Stock Company Moscow Exchange MICEX-RTS (hereinafter the Moscow Exchange) used for calculation of equity indices of Moscow Exchange Group and (or) other indicators as required for conducting the on-exchange trading and executing transactions on the Exchange’s markets.
	2. The Indicative Exchange Rate is calculated by the Exchange on the basis of information about FX trading run by the Exchange (hereinafter Moscow Exchange Rate) and/or foreign exchange rates announced by the central bank of the quote currency state and transmitted on the bank’s official website (the Exchange Rate of the Central Bank of the Quote Currency State).
	3. The list of Indicative Exchange Rates calculated by the Exchange and parameters for their calculation are detailed in the Appendix 1 to this Methodology.
	4. The list of interbank market members (the Participants of the interbank market), whose announced quotes are used for the Indicative Foreign Exchange Rate calculation is included into the Appendix 2 here.
	5. This Methodology for calculation, amendments and supplements thereto shall be approved by the Moscow Exchange and become effective on the date determined by the Moscow Exchange.
	6. The Methodology as approved by the Executive Board (amendments and supplements thereto) shall be published on the website of the Moscow Exchange not later than 1 working day prior to its effective data, unless the Exchange resolves otherwise.
2. **Indicative Exchange rate calculation specifics**
	1. If this Methodology provides for the use of only the Moscow Exchange Rate in calculation the Indicative rate, the Indicative Exchange Rate value shall be equal to the Moscow Exchange Rate.
	2. If this Methodology provides for the use of only the Reuters Indicative Rate in calculation the Indicative rate, the Indicative Exchange Rate value shall be equal to the Reuters Indicative Rate.
	3. If the Moscow Exchange Rate and the Reuters Indicative Rate to be used for calculation of the Indicative Exchange Rate, the Indicative Exchange Rate value shall be equal to one of the said rates value subject to provisions in clauses 2.3.1 - 2.3.6 herein.
		1. From 10.00 am to 07.00 pm on the Exchange’s trading day the Indicative Exchange Rate shall be equal to the Moscow Exchange Rate, whereas for the rest of the time during the Exchange’s trading day it shall be equal to the Reuters Indicative Rate. The switch from the Reuters Indicative Exchange Rate to the Moscow Exchange Rate takes place starting from 10.00 am on the Exchange’s trading day after the relevant information about trading in the US dollar run by the Exchange becomes available. The switch from the Moscow Exchange Rate to the Reuters Indicative Exchange Rate takes place starting from 07.00 pm on the Exchange’s trading day after the relevant information on exchange rates published by Participants of the interbank market and disclosed by the information agency Thomson Reuters becomes available.
		2. If the Moscow Exchange Rate is not calculated on the trading day of the Moscow Exchange including for the reason of not holding trading in the US dollar by the Exchange, then the Reuters Indicative Exchange Rate shall be used for calculation of the Indicative Exchange Rate unless provided for otherwise by a resolution of the Moscow Exchange.
		3. If the information about trades in a relevant instrument from the list stated in Appendix 1 hereto (the Instrument) executed during the FX trading run by the Exchange is unavailable as at the moment of the Indicative rate calculation from 10.00 am to 07.00 pm on the Exchange’s trading day, then the Indicative Exchange Rate shall be deemed equal to its last value calculated by the Moscow Exchange.

If the information about trades in a relevant Instrument that were executed during the FX trading run by the Exchange is unavailable for 15 minutes as at the moment of the Indicative rate calculation from 10.00 am to 07.00 pm on the Exchange’s trading day, while actual data on rates disclosed by the Participants of the interbank market and published by Thomson Reuters is being available, the Indicative Exchange Rate shall be deemed equal to the Reuters Indicative Rate unless otherwise decided by the Exchange.

If the receipt of relevant information about trading during the FX trading run by the Exchange is resumed in the period of time from 10.00 am to 07.00 pm on the Moscow Exchange’s trading day, then the Indicative Exchange Rate shall be determined based on the Moscow Exchange Rate.

* + 1. To smooth out fluctuations of the Indicative Exchange Rate that occur in case of switching from the Reuters Indicative Exchange Rate to the Moscow Exchange Rate, the following smoothing algorithm shall be used:



where:

t – number of seconds that have passed after the moment when relevant market data duringteh FX trading run by the Exchange became available again;

t0 - 60;

– Moscow Exchange Rate;

– Reuters Indicative Exchange Rate;

– Indicative Exchange Rate.

* + 1. In case of switching from the Moscow Exchange Rate to the Reuters Indicative Exchange Rate the algorithm described in Clause 2.3.4. hereof shall be used provided that =, =, where t – number of seconds that have passed after the moment when relevant information about the Reuters Indicative Exchange Rate became available again.
		2. When switching from the Moscow Exchange Rate to the Reuters Indicative Exchange Rate at 7:00 pm MSK, the smoothing algorithm stated in Clause 2.3.4 hereof shall start to be applied t0 seconds prior 7:00 pm MSK.
	1. If the Reuters Indicative Rate is used for calculation of the Indicative Exchange Rate pursuant to this Methodology, the Indicative Exchange Rate shall be equal to that rate subject to provisions in clauses 2.4.1 - 2.4.2, unless the resolution of the Moscow Exchange prescribes otherwise.
		1. The Indicative Exchange Rate shall be equal to the Reuters Trade Rate on the day *d*, if on at least 10 trades in the Instrument used for the Reuters Trade Rate were executed on that day.
		2. If the requirement stated in clause 2.4.1 is not met, the Exchange is entitled to set the Indicative Exchange Rate for the trading day d to equal its previous value.
	2. If the Indicative Exchange Rate is calculated on the basis of the Exchange Rate of the Central Bank of the Quote Currency State, the Indicative Exchange Rate is set to equal such Exchange Rate of the Central Bank of the Quote Currency State.
1. **Moscow Exchange Rate calculation**
	1. The Moscow Exchange Rate is calculated based on trades executed during the FX trading run by the Exchange for a relevant Instrument.
	2. The Moscow Exchange Rate is calculated each second from 10.00 am to 11.50 pm MSK on the Moscow Exchange’s trading day.
	3. The Moscow Exchange Rate is calculated according to the following formula:



where:

Rtmicex – Moscow Exchange Rate at the moment t;

MAt – Moving Average at the moment t determined in accordance with Clause 3.4 herein.

* 1. The Moving Average at the moment t is calculated in accordance with the following formula:



where:

MAt – Moving Average at the moment t;

Ri – Price of the last trade at the moment i calculated after discarding outliers (the highs and lows) in accordance with Clause 3.5 herein;

M – averaging period expressed in seconds and determined in accordance with Appendix 1 herein.

* 1. The price of the last trade after discarding outliers (the highs and lows) at the moment t is calculated according to the formula:



where:

Rt – price of the trade after discarding outliers at the moment t;

Rt-1 – price of the last trade after discarding outliers at the moment t-1;

RAt – price of the last trade in a relevant Instrument at the moment t (without taking into account direct trades);

K – maximum deviation determined in accordance with Appendix 1 herein;

S – period for calculation of outliers expressed in seconds and determined in accordance with Appendix1 herein.

1. **Reuters Indicative Rate calculation**
	1. The Reuters Indicative Rate is calculated each second from 10.00 am to 11.50 pm MSK on the Moscow Exchange’s trading day.
	2. The Reuters Indicative Rate is calculated according to the following formula:



where:

Rtres – Reuters Indicative Rate at the moment t;

MAt – Moving Average at the moment t determined in accordance with Clause 4.3 herein.

* 1. The Moving Average at the moment t is calculated in accordance with the following formula:



where:

MAt – Moving Average at the moment t;

Ri – Average quotation after discarding outliers at the moment i, determined in accordance with clause 4.4 herein;

M – averaging period expressed in seconds and determined in accordance with Appendix 1 herein.

* 1. Average quote after discarding outliers at the moment d shall be determined using the following formula:



where:

Rt – average quote after discarding outliers at the moment t;

Rt-1 – average quote after discarding outliers at the moment t-1;

RAt – average quote before discarding outliers at the moment t, determined in accordance with clause 4.5 herein;

K – maximum deviation, determined in accordance with Appendix 1 herein;

S – period for calculation of outliers expressed in seconds and determined in accordance with Appendix1 herein.

* 1. Average quote before discarding outliers at the moment t shall be determined using the formula:

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where:

RAt – average quote before discarding outliers at the moment t;

n – number of Participants of the interbank market included on the List indicated in clause 1.4. herein at the moment of Reuters Indicative Rate Calculation;

RMbt – average quote of the Participant b at the moment of time t, determined in accordance with clause 4.6 herein.

* 1. Average quote of the Participant b at the moment of time t shall be determined using the formula:

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where:

RMbt – average quote of Participant b at the moment of time t;

Bidbt – average bid quote of Participant b at the moment of time t;

Askbt – average ask quote of Participant b at the moment of time t.

* 1. If Bidbt and/or Askbt, is not available in Thomson Reuters system at the moment of time t, the average quote by Participant b at the moment of time t (RMbt) is not calculated.
	2. If a Participant has not made available bid and/or ask quotes used for Reuters Indicative Rate calculation in the period of more than 15 minutes, the quotes of such Participant will not be used for Reuters Indicative Rate calculation till the Participant resumes publishing the quotes.
	3. If quotes announced by less than three Participants are used at the moment of Reuters Indicative Rate calculation, the Reuters Indicative Rate will not be calculated and equals the last calculated Reuters Indicative Rate value.
	4. If Thomson Reuters has not published quotes due to failure of communication systems or otherwise, Reuters Indicative Rate shall be equal to the last calculated Reuters Indicative Rate.
	5. If the Moscow Exchange has not received quotes from Thomson Reuters during the period of more than one hour, the Moscow Exchange shall have the right for the main (additional) session of the relevant market to set the fixed (flat) Reuters Indicative Rate, equal one of the following а) exchange rate announced by the Bank of Russia; b) exchange rate value obtained based on the other sources, established at interbank currency market effective at the moment of the Moscow Exchange’s decision on setting the fixed (flat) Reuters Indicative Rate; c) exchange rate value established in the course of trading on the Russian and global exchanges effective at the moment the Moscow Exchange’s decision on setting the fixed (flat) Reuters Indicative Rate.
1. **Exchange Rate of the Central Bank of the Quote Currency State**
	1. The Exchange Rate of the Central Bank of the Quote Currency State is set by the central bank of the state where the quote currency is the domestic currency on the basis of information on trades in the relevant foreign currency, and published on the Central Bank’s official website.
	2. To determine the rate of the U.S. dollar against the Ukraine Hryvnia (the USD/UAH exchange rate), the average weighted USD/UAH rate is used. Such average weighted USD/UAH exchange rate is determined on the interbank currency market at 16:00 Kiev time and published by the National Bank of Ukraine on its website at <http://www.bank.gov.ua/control/uk/publish/article?art_id=9628619&cat_id=9628618>.
	3. If the aforesaid average weighted USD/UAH exchange rate is not available (due to also suspending/cancelling of its publication by the National Bank of Ukraine), the official USD/UAH exchange rate is used that was set for the next trading day by the Bank on the current trading day and was published on the Bank’s website at <http://www.bank.gov.ua/control/uk/curmetal/detail/currency?period=daily> (the National Bank’s rate).
	4. If the National Bank’s rate is not available as at 18:00 MSK (due to also suspending/cancelling of its publication by the National Bank of Ukraine), the official USD/UAH exchange rate is used that was set for the current trading day by the Bank on the previous trading day and was published on the Bank’s website at <http://www.bank.gov.ua/control/uk/curmetal/detail/currency?period=daily>.
2. **Disclosure of the Indicative Exchange Rate**
	1. The Moscow Exchange daily publishes on its website the last Indicative Exchange Rate calculated upon closure of the main session during which FX trading is run according to the main session results.

Appendix 1

to the Methodology for calculation of

the indicative foreign exchange rate

# List of Indicative Exchange Rates and calculation parameters

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| --- | --- | --- | --- | --- | --- |
| **Indicative Exchange Rate** | **Rates used for Indicative Exchange Rate calculation**  | **Instrument** | **Maximum deviation K** | **averaging period M** | **Period for calculation of outliers S** |
| Indicative USD/RUB Exchange Rate | Moscow Exchange Rate | USDRUB\_TOM | 0.0005 | 60 | 60 |
| Indicative EUR/RUB Exchange Rate | Moscow Exchange Rate | EURRUB\_TOM | 0.0005 | 60 | 60 |
| Reuters Indicative Exchange Rate | EURRUBTNOR | 0.0005 | 60 | 60 |
| Indicative GBP/USD Exchange Rate | Reuters Indicative Exchange Rate | GBP | 0.0005 | 60 | 60 |
| Indicative AUD/USD Exchange Rate | Reuters Indicative Exchange Rate | AUD | 0.0005 | 60 | 60 |
| Indicative USD/JPY Exchange Rate | Reuters Indicative Exchange Rate | JPY | 0.0005 | 60 | 60 |
| Indicative USD/CHF Exchange Rate | Reuters Indicative Exchange Rate | CHF | 0.0005 | 60 | 60 |
| Indicative USD/UAH Exchange Rate | The Exchange Rate of the Central bank of the Quote Currency State | UAH | - | - | - |
| Indicative USD/CAD Exchange Rate | Reuters Indicative Exchange Rate | CAD | 0.0005 | 60 | 60 |
| Indicative USD/TRY Exchange Rate | Reuters Indicative Exchange Rate | TRY | 0.0005 | 60 | 60 |

Appendix 2

to the Methodology for calculation of

the indicative foreign exchange rate

**List of Participants of the interbank market publishing quotes used for Reuters Indicative Exchange Rate, Interbank Market Rate and the Exchange Rate of the Central Bank of the Quote Currency State**

1. The list of Interbank Market Participants whose quotes are used for calculating the Reuters Indicative EUR/RUB Exchange Rate includes all those participants.
2. The list of Participants of the interbank market publishing quotes used for Reuters Indicative AUD/USD Exchange Rate calculation is as follows:
* The Royal Bank of Scotland US
* Den Norske Bank
* Rabobank
* Barclays Bank Plc London
* Toronto Dominion Bank
* Societe Generale
* Kaspi Bank
* Brown Brothers NYC
* Commerzbank
* The Royal Bank of Scotland UK
* Commonwealth Bank Australia
* Nordea
* Hilal Bank
* CIBC TORONTO
* Bank of New York
* Bank of Tokyo Mitsubishi
* Bank of China
1. The list of Participants of the interbank market publishing quotes used for Reuters Indicative GBP/USD Exchange Rate calculation is as follows:
* Nedbank Johannesburg
* Den Norske Bank
* The Royal Bank of Scotland US
* Commerzbank
* Rabobank
* Barclays Bank Plc London
* Windsor Brokers
* Kaspi Bank
* Allied Irish Bank Dublin
* Brown Brothers NYC
* The Royal Bank of Scotland UK
* Commonwealth Bank Australia
* Okobank Finland
* Nordea
* Banca Acros
1. The list of Participants of the interbank market publishing quotes used for Reuters Indicative USD/JPY Exchange Rate calculation is as follows.
* Allied Irish Banks plc
* Banca Akros
* Brown Brothers Harriman & Co.
* DBS Bank Ltd
* Den Norske Bank
* Kaspi Bank
* Nordea Bank
* Rabobank Group
* SEB Group
* Societe Generale Group
* The Commonwealth Bank of Australia
* The Royal Bank of Scotland Group
* UBS Investment Bank
1. The list of Participants of the interbank market publishing quotes used for Reuters Indicative USD/CHF Exchange Rate calculation is as follows.
* Banca Akros
* Brown Brothers Harriman & Co.
* Commerzbank
* Danske Bank
* Den Norske Bank
* HSBC
* Kaspi Bank
* Nordea Bank
* Rabobank Group
* Societe Generale Group
* The Bank of New York Mellon
* The Commonwealth Bank of Australia
* The Royal Bank of Scotland Group
* UBS Investment Bank
* WGZ Bank
* Zürcher Kantonalbank
1. The list of the Interbank Market Participants whose quotes are to be used for calculating the USD/CAD Indicative Exchange Rate includes all Participants whose quotes are used to calculate the Reuters Indicative USD/CAD Exchange Rate.
2. The list of the Interbank Market Participants whose quotes are to be used for calculating the Reuters USD/TRY Indicative Exchange Rate includes fall those Participants.
3. The list of the Interbank Market Participants whose quotes are to be used for calculating the USD/UAH exchange rate being the Exchange Rate of the Central Bank of the Quote Currency State includes any appropriate Participants.