

**RAFI™ Multi-Factor Index Series**  
**RAFI™ Dynamic Multi-Factor Indices**  
**RAFI™ Multi-Factor Indices**  
**RAFI™ Factor Indices**

Introduction .....	1
1. Index Specifications .....	1
1.1 Short Name and Identifier .....	2
1.2 Initial Value .....	2
1.3 Distribution .....	2
1.4 Levels and Calculation Frequency .....	2
1.5 Decision-Making Bodies .....	3
1.6 Publication .....	3
1.7 Historical Data .....	3
2. Construction Methodology .....	3
2.1 Starting Universe .....	3
2.2 Country Assignment .....	4
2.3 Eligible Securities .....	4
2.4 Fundamental Weights .....	5
2.5 RAFI Value Factor Index Construction .....	6
2.6 RAFI Low Volatility Factor Index Construction .....	7
2.7 RAFI Quality Factor Index Construction .....	8
2.8 RA Momentum Factor Index Construction .....	8
2.9 RAFI Size Factor Index Construction .....	9
2.10 RAFI Multi-Factor Index Construction .....	9
2.11 RAFI Dynamic Multi-Factor Index Construction .....	10
2.12 Turnover Control Mechanism .....	11
2.13 Momentum Trade Filtering .....	11
2.14 Application of Liquidity Limit .....	12
2.15 Rebalance .....	12
2.16 Extraordinary Adjustment .....	13
3. Calculation of the Index .....	13
3.1 Index Formula .....	13
3.2 Accuracy .....	14
3.3 Adjustments .....	14
3.4 Dividends and Other Distributions .....	14
3.5 Corporate Actions .....	14
3.6 Calculation of the Index in the Event of a Market Disruption .....	17
4. Definitions .....	17
5. Appendix .....	20
5.1 RAFI Multi-Factor Index Series Information .....	20
5.2 Calculation of Z-score .....	21
5.3 Contact Data .....	21
5.4 Calculation of the Index—Change in Calculation Method .....	21

This document contains the underlying principles and regulations regarding the structure and operation of the RAFI™ Multi-Factor Index Series (the “Index Series”). RAFI™ Indices, LLC (“RAFI Indices”) has engaged Solactive AG as the benchmark administrator. Solactive AG shall make every effort to implement regulations. RAFI Indices does not offer any explicit or tacit guarantee or assurance, neither pertaining to the results from the use of any Index nor the Index value at any certain point in time nor in any other respect. The Index is calculated and published for RAFI Indices by Solactive AG and Solactive AG strives to the best of its ability to ensure the correctness of the calculation. There is no obligation for RAFI Indices—irrespective of possible obligations to issuers—to advise third parties, including investors and/or financial intermediaries, of any errors in the Index. The publication of the Index by RAFI Indices is no recommendation for capital investment and does not contain any assurance or opinion of RAFI Indices regarding a possible investment in a financial instrument based on an Index.

## Introduction

This document is to be used as a guideline with regard to the composition, calculation, and management of the Index Series. Any changes made to the guideline are initiated by the Committee specified in section 1.5. The Index Series is calculated and published for RAFI Indices by Solactive AG.

### 1. INDEX SPECIFICATIONS

The Index Series is owned by RAFI Indices, a wholly owned subsidiary of Research Affiliates Global Holdings. Solactive AG is the index calculator and benchmark administrator.

The RAFI Multi-Factor Index suite aims to provide diversified exposures through allocations to value, low volatility, quality, momentum, and size. In addition, the Index Series uses the Research Affiliates’ Fundamental Index™ methodology, which weights companies based on fundamental measures of company size (as measured by accounting variables) rather than their market capitalization.

See Appendix 5.1 for available indices and their return calculations (price, total return, and net return) and published currency. Each of the indices listed below may be referred to herein as “Index” and collectively as “Indices.”

RAFI Dynamic Multi-Factor Indices:

- RAFI Dynamic Multi-Factor Global Index
- RAFI Dynamic Multi-Factor Developed Index
- RAFI Dynamic Multi-Factor Developed ex-U.S. Index
- RAFI Dynamic Multi-Factor Emerging Markets Index
- RAFI Dynamic Multi-Factor U.S. Index
- RAFI Dynamic Multi-Factor Europe Index

RAFI Multi-Factor Indices:

- RAFI Multi-Factor Global Index
- RAFI Multi-Factor Global AUD Hedged Index
- RAFI Multi-Factor Global ex-Switzerland Index
- RAFI Multi-Factor Developed Index
- RAFI Multi-Factor Developed GBP Hedged Index
- RAFI Multi-Factor ex-Low Volatility Developed Index
- RAFI Multi-Factor Developed ex-U.S. Index
- RAFI Multi-Factor Emerging Markets Index
- RAFI Multi-Factor ex-Momentum Emerging Markets Index
- RAFI Multi-Factor U.S. Index

#### RAFI Value Factor Indices:

- RAFI Value Factor Global Index
- RAFI Value Factor Developed Index
- RAFI Value Factor Developed ex-U.S. Index
- RAFI Value Factor Developed Eurozone Fossil Fuels Capped Index
- RAFI Value Factor Emerging Markets Index
- RAFI Value Factor U.S. Index

#### RAFI Low Volatility Factor Indices:

- RAFI Low Volatility Factor Global Index
- RAFI Low Volatility Factor Developed Index
- RAFI Low Volatility Factor Developed ex-U.S. Index
- RAFI Low Volatility Factor Emerging Markets Index
- RAFI Low Volatility Factor U.S. Index

#### RAFI Quality Factor Indices:

- RAFI Quality Factor Global Index
- RAFI Quality Factor Developed Index
- RAFI Quality Factor Developed ex-U.S. Index
- RAFI Quality Factor Emerging Markets Index
- RAFI Quality Factor U.S. Index

#### RAFI Size Factor Indices:

- RAFI Size Factor Developed Index
- RAFI Size Factor Developed ex-U.S. Index
- RAFI Size Factor U.S. Index

#### RA Momentum Factor Indices:

- RA Momentum Factor Global Index
- RA Momentum Factor Developed Index
- RA Momentum Factor Developed ex-U.S. Index
- RA Momentum Factor Emerging Markets Index
- RA Momentum Factor U.S. Index

#### 1.1 Short Name and Identifier

See Appendix 5.1 for Index Series name and identifiers.

#### 1.2 Initial Value

All Indices are based on an index level of 1,000 at the close of trading on the base date. Please see Appendix 5 for a complete list of indices and base dates.

#### 1.3 Distribution

Each Index is published via the price marketing services of Boerse Stuttgart AG and is distributed to all affiliated vendors. Each vendor decides on an individual basis as to whether he will distribute/display the Index via his information systems.

#### 1.4 Levels and Calculation Frequency

The level of an Index is calculated on each Business Day based on the prices on the respective Exchanges on which the Index Components are listed. For each update, the most recent prices of all Index Components are used. Prices of Index Components not listed in the Index Currency are converted using spot foreign exchange rates quoted by Reuters. The daily index closing value is calculated using WM/Reuters closing spot rates from 4:00 pm London time. Should there be no current price available on Reuters, the most recent price or the Trading

Price on Reuters for the preceding Trading Day is used in the calculation. The Index is calculated continuously every Business Day from 9:00 am to 10:30 pm, CET, with updates every 15 seconds. In the event that data cannot be provided to Reuters or to the pricing services of Boerse Stuttgart AG the Index cannot be distributed. Any incorrect calculation is adjusted on a retrospective basis. Please note that at the time of the calculation and publication of the Index, the prices used for the calculation may already have changed.

### 1.5 Decision-Making Bodies

A Committee composed of staff from Solactive AG, is responsible for any amendments to the rules (in this document referred to as the "Committee" or the "Index Committee"); provided that the starting universe for the composition of an Index and its relevant specifications are established by RAFI Indices. The future composition of any Index is determined on the Selection Days according to the procedure outlined in Section 2 of this document. The Committee shall decide about the future composition of the Index in the event that any Extraordinary Events should occur and the implementation of any necessary adjustments. Notwithstanding the above, Solactive AG may consult RAFI Indices for decisions regarding the composition of an index.

Members of the Committee can recommend changes to the guideline and submit them to the Committee for approval.

Internal quality controls are performed in constructing the model portfolios used by RAFI Indices. In the event that data issues arise and are identified in the model portfolio construction process, the Committee shall be informed to determine the appropriateness of the data treatment, alternative data source, and the materiality of the change. All changes, in this regard, shall be approved by the Committee.

### 1.6 Publication

All specifications and information relevant for calculating the Index are made available on the <http://www.solactive.de> web page and sub-pages.

### 1.7 Historical Data

Historical data prior to the index base date (outlined in Section 1.2) is based on simulated past performances derived using the index rules outlined in this manual. The backtested index levels have been calculated by reinvesting dividends paid by index components using the standard formula instead of the Laspeyres formula as stated in this index manual (the calculation formulas are explained on the Solactive website under <https://www.solactive.com/news/documents/>). Simulated past performances rely on data by third party data vendors, which may have been adjusted, restated, or corrected ex post. The backtested index levels are not adjusted for any ex post adjustments.

## 2. CONSTRUCTION METHODOLOGY

### 2.1 Starting Universe

The model portfolio construction process starts with a universe of equity securities. Constituents of this universe must meet and pass minimum liquidity and investability (capacity) requirements. The RAFI Global Equity universe consists of all common equity securities traded on primary exchanges, and preferred shares in countries where preferred shares are economically equivalent to common, issued by companies that are assigned to countries classified by RAFI Indices as developed and emerging markets.

DEVELOPED MARKETS*			EMERGING MARKETS*		
Americas	EMEA	Asia	Latin America	EMEA	Asia
Canada	Austria	Australia	Brazil	Czech Rep	China
United States	Belgium	Hong Kong	Chile	Egypt	India
	Denmark	Japan	Colombia	Greece	Indonesia
	Finland	New Zealand	Mexico	Hungary	South Korea
	France	Singapore	Peru	Poland	Malaysia
	Germany			Qatar	Philippines
	Ireland			Russia	Taiwan
	Israel			South Africa	Thailand
	Italy			Turkey	
	Netherlands			UAE	
	Norway				
	Portugal				
	Spain				
	Sweden				
	Switzerland				
	United Kingdom				

\*As of February 2017, there are 23 developed market countries and 23 emerging market countries eligible for inclusion.

## 2.2 Country Assignment

RAFI Indices assigns companies to countries and promulgates that assignment to securities. The starting rules for country assignment are based on country of primary listing, domicile, and incorporation. If a company's primary listing is on a stock exchange in the same country as the company is domiciled and incorporated, then the company is assigned to that country. If the country of domicile is different from the country of incorporation and the primary listing is in the country of domicile, then the company is assigned to the country of primary listing and domicile. If the country of primary listing is different from the country of domicile and the country of primary listing is in the country of incorporation, then the company is assigned to the country of primary listing and incorporation. If the country of domicile is the same as the country of incorporation, but is different from the country of primary listing, then the company is assigned to the country of domicile and incorporation. If the country of primary listing, domicile, and incorporation all differ, and for exceptions to these rules, country assignment is based on other factors including domicile of parent company, management location, source of sales, trading volume, and reporting currency.

## 2.3 Eligible Securities

The eligible securities for each country or regional Index Series are determined by sorting companies in descending order by fundamental weight defined in Section 2.4, and then selecting companies by cumulative free-float adjusted fundamental weight defined in Section 2.4.1, from the 12 region and size groups in 2.

Companies ranked in the top 86% of cumulative adjusted fundamental weight within each region, as specified in Table 1, constitute the large/mid company universe. Companies ranked in the top 98% of cumulative adjusted fundamental weight, excluding those companies ranked in the top 86%, within each region, as specified in Table 1, constitute the small company universe. All retained companies form the RAFI All World Universe as specified in Table 2, which are used to construct the single factor indices for value, low volatility, quality, momentum, and size.

### 2.3.1 Six Regions and Weights

The six regions are defined in Table 1 below. The region weight is determined by renormalizing the fundamental weight adjusted for free-float, defined in Section 2.4.1, of the eligible securities.

<b>Table 1</b>
United States
Japan
United Kingdom
Developed Europe excluding UK
Other Developed Markets
Emerging Markets

### 2.3.2 12 Region and Size Groups

<b>Table 2</b>	
<b>RAFI All World Universe</b>	<b>RAFI Single Factor Construction</b>
US Large/Mid	RAFI Factor Global, Developed, & US for Value, Low Volatility, Quality, and Momentum
Japan Large/Mid	RAFI Factor Global, Developed, & Developed ex US for Value, Low Volatility, Quality, and Momentum
UK Large/Mid	RAFI Factor Global, Developed, Developed ex US, & Europe for Value, Low Volatility, Quality, and Momentum
Developed Europe, excluding UK Large/Mid	RAFI Factor Global, Developed, Developed ex US, & Europe for Value, Low Volatility, Quality, and Momentum
Other Developed Markets Large/Mid	RAFI Factor Global, Developed, & Developed ex US for Value, Low Volatility, Quality, and Momentum
Emerging Markets Large/Mid	RAFI Factor Global & EM for Value, Low Volatility, Quality, and Momentum
US Small	RAFI Size Factor Developed & US
Japan Small	RAFI Size Factor Developed & Developed ex US
UK Small	RAFI Size Factor Developed, Developed ex US & Europe

Developed Europe, excluding UK Small	RAFI Size Factor Developed, Developed ex US & Europe
Other Developed Markets Small	RAFI Size Factor Developed & Developed ex US
Emerging Markets Small	None

### 2.3.3 Country Groups

Country groups consist of major nations or small-country groups within each of the six regions. This definition does not determine universe selection, but is utilized in RAFI Low Volatility Factor Index Construction and RA Momentum Factor Index Construction described in Sections 2.6 and 2.8, respectively.

United States	Japan	United Kingdom	Developed Europe, ex UK	Other Developed Markets	Emerging Markets
US	Japan	UK	Austria Belgium Denmark Finland France Germany Ireland Italy Netherlands Norway Portugal Spain Sweden Switzerland	Australia Canada <b>Asia Pacific</b> Israel Hong Kong New Zealand Singapore	Brazil China India Russia South Africa South Korea Taiwan <b>Americas</b> Chile Colombia Mexico Peru <b>EMEA</b> Czech Republic Egypt Greece Hungary Poland Qatar Turkey UAE <b>Asia Pacific</b> Indonesia Malaysia Philippines Thailand

## 2.4 Fundamental Weights

Fundamental weights are calculated using four accounting measures from company financial statements.

1. De-levered sales are calculated as company sales averaged over the past five years multiply by the ratio of average equity to average assets.
2. Cash flow is the company operating cash flow averaged over the past five years.
3. Dividend plus buybacks are calculated using the average dividends paid and share buybacks over the past five years.
4. Book value is the most recent company book value.

Each of the four accounting measures is normalized with respect to their region and size groups as specified in Table 2. An aggregate fundamental weight is calculated for each company by averaging the normalized accounting measures for each of the four accounting measures. This is the fundamental weight of the company. Similarly, company market capitalization weight is calculated by renormalizing the full market capitalization of companies.

### 2.4.1 Free-Float Adjustment

The entire stock in any given company is not always available to equity investors. Therefore, a company free float factor is calculated. The company free float factor is defined as the ratio of the total market capitalization of the shares of the company in free float to the total market capitalization of the company. This measure of free float is equivalent to the aggregation of the security level free float factors across all the security lines of the company's stock. The company level free float factor is applied as an adjustment to the company's fundamental weight. Adjusted fundamental weight is calculated by renormalizing the free-float adjusted fundamental weight. Adjusted market capitalization weight is calculated by renormalizing the free float adjusted market capitalization of companies.

## 2.5 RAFI Value Factor Index Construction

The RAFI Value Factor Index consists of companies with a high ratio of company fundamental weight to its market capitalization weight. For each of the 12 region and size groups in Table 2, the ratio of fundamental weight to market capitalization weight for each stock is calculated as defined in Section 2.4. Stocks are then ranked in descending order by the ratio, the top 25% by cumulative adjusted fundamental weight as defined in Section 2.4.1 are selected for inclusion, subject to a minimum of 15 stocks. Selected companies are then re-weighted by their adjusted fundamental weight subject to the application of liquidity limit Rule 2.14 and maximum stock weight of 5% for all regions, except for the UK region at 15%. The minimum stock weight is 0.05%. Stocks below the minimum weight are removed and the excess weights are distributed across the remaining stocks in the index.

The RAFI Value Factor Index is rebalanced quarterly using a quarterly staggered approach described in Section 2.15.1. At each staggered quarterly rebalance, the processes as defined in Sections 2.12 and 2.13 are applied to limit turnover.

### 2.5.1 RAFI Value Factor Developed Eurozone Fossil Fuels Capped Index Construction

The RAFI Value Factor Developed Eurozone Fossil Fuels Capped Index consists of companies with a high ratio of company fundamental weight to its market capitalization weight, while limiting the exposure to companies deemed by Vigeo Eiris, (a third party ESG data and ratings provider), as having major involvement in the fossil fuels industry.

Eligible securities are Large/Mid securities as defined in Section 2.3 from the following eligible countries, which are a subset of the Developed Europe ex-UK country group defined in Section 2.3.3.

<b>Developed Eurozone</b>
Austria
Belgium
Finland
France
Germany
Ireland
Italy
Netherlands
Portugal
Spain

For the Developed Eurozone Large/Mid region/size group the ratio of fundamental weight to market capitalization weight for each stock is calculated as defined in Section 2.4. Stocks are then ranked in descending order by the ratio, the top 25% by cumulative adjusted fundamental weight as defined in Section 2.4.1 are selected for inclusion, subject to a minimum of 15 stocks. Selected companies are then re-weighted by their adjusted fundamental weight subject to the application of liquidity limit Rule 2.14 and maximum stock weight of 10%. The minimum stock weight is 0.05%. Stocks below the minimum weight are removed and the excess weights are distributed across the remaining stocks in the index.

If the aggregate fossil fuel weight is greater than 80% of the fossil fuel weight of an equivalent cap-weighted portfolio's aggregate fossil fuel weight, constituents' weights are adjusted down such that the aggregate weight in fossil fuel companies is equal to 80% of the cap-weighted portfolio's aggregate weight in fossil fuel companies. If the aggregate fossil fuel weight is already equal to or below the 80% threshold of an equivalent cap-weighted portfolio's aggregate fossil fuel weight, then no fossil fuel adjustment is made. The fossil fuel adjustment is determined as follows:

1. Determining the Fossil Fuels Reduction Rate:

Let  $FF\_wt = \sum_{i \in ff} (wt_i)$ , where  $FF\_wt$  is the total fossil fuel weight in the index, with  $i =$  the  $i$ th company.

Let  $FF\_capwt = \sum_{i \in ff} (capwt_i)$ , the total fossil fuel weight in the cap-weighted portfolio.

If  $\frac{FF\_wt}{0.8 \times FF\_capwt} > 1$ , then  $reduction\_rate = \frac{FF\_wt - (0.8 \times FF\_capwt)}{FF\_wt}$

Otherwise,  $reduction\_rate = 0$

For example, if the total fossil fuel weight in the RAFI Value Factor Eurozone Headline Portfolio is 40%, and the total fossil fuel weight in cap-weighted portfolio is 10%, then the reduction rate is 80% =  $[40\% - (0.8 \times 10\%)]/40\%$ .

2. Reducing Fossil Fuels Exposure by the Reduction Rate:

If a company is classified as a fossil fuel company, then its weight is capped at the minimum of:

$wt_{i \in ff} * (1 - reduction\_rate)$ , liquidity limit (Section 2.14), and 10% maximum stock weight

The excess weight from the capping of fossil fuel companies are proportionally distributed across the non-fossil fuel companies in the index.

The RAFI Value Factor Developed Eurozone Fossil Fuels Capped Index is rebalanced quarterly using a quarterly staggered approach described in Section 2.15.1. At each staggered quarterly rebalance, the processes as defined in Sections 2.12 and 2.13 are applied to limit turnover.

## 2.6 RAFI Low Volatility Factor Index Construction

The RAFI Low Volatility Factor Index consists of companies with low risk measure calculated as the variance of a company's daily excess return over five years explained by global, local country groups, and global industry excess returns. For each of the 12 region and size groups in Table 2, a risk measure for each stock is calculated as defined in Section 2.6.1. Stocks are then ranked in ascending order of risk measure, the top 25% by cumulative adjusted fundamental weight as defined in Section 2.4.1 are selected for inclusion, subject to a minimum of 15 stocks. Selected companies are then re-weighted by their adjusted fundamental weight subject to the application of liquidity limit Rule 2.14 and maximum stock weight of 5%, except for the UK region at 15%. The minimum stock weight is 0.05%. Stocks below the minimum weight are removed and the excess weights are distributed across the remaining stocks in the index

The RAFI Low Volatility Factor Index is rebalanced quarterly using a quarterly staggered approach described in Section 2.15.1. At each staggered quarterly rebalance, the processes as defined in Sections 2.12 and 2.13 are applied to limit turnover.

### 2.6.1 Risk Measure Calculation

Risk measure is calculated as the variance (Var) of a stock's excess return that is explained by a three-factor regression model using three market indices: Global Cap-Weighted Index, Country Group Cap-Weighted Index, and Global Industry Cap-Weighted Index. Country group is defined in Section 2.3.3.

$$er_{i,t} = \hat{\alpha}_i + \hat{\beta}_{i,Global}(er_t^{Global}) + \hat{\beta}_{i,Country\_group}(er_{i,t}^{Country\_group}) + \hat{\beta}_{i,Industry}(er_{i,t}^{Industry}) + \varepsilon_{i,t}$$

$$Risk\ Measure_i = \frac{R^2 \times Var_{er_{i,t}}}{Var_{er_t^{Global}}}$$

The three-factor model is a linear regression model of the company's stock excess return  $er_{i,t} = (r_{i,t} - cr_{i,t})$ . The excess return is the daily local currency return minus the return investing in local currency for the business days that are common to each component of regression. The three factors are currency hedged excess return of a cap-weighted global market index ( $er_t^{Global}$ ), currency hedged excess return of a cap-weighted local country group index ( $er_{i,t}^{Country\_group}$ ), and currency hedged excess return of a cap-weighted industry index ( $er_{i,t}^{Industry}$ ).  $R^2$  is the coefficient of determination from the linear regression specified above.

Excess return is defined as the total daily return of the security in local currency including dividend minus the cash rate of the currency of the security, which is either the short-term Treasury bill rate or the short-term interbank rate.

The linear regression is calculated over the five-year estimation period. A minimum of 510 daily return observations are required for the calculation of the company level risk metric and therefore for the company to be eligible for inclusion in the index.

## 2.7 RAFI Quality Factor Index Construction

The RAFI Quality Factor Index consists of companies that are high in Profitability and low in Investment Spending. For each of the 12 region and size groups in Table 2, a quality measure for each stock is calculated as defined in Section 2.7.1 below. Stocks are then ranked in descending order by quality measure, the top 25% by cumulative adjusted fundamental weight as defined in Section 2.4.1 are selected for inclusion, subject to a minimum of 15 stocks. Selected companies are then re-weighted by their adjusted fundamental weight subject to the application of liquidity limit Rule 2.14 and maximum stock weight of 5% for all regions, except for UK region at 15%. The minimum stock weight is 0.05%. Stocks below the minimum weight are removed and the excess weights are distributed across the remaining stocks in the index.

The RAFI Quality Factor Index is rebalanced quarterly using a quarterly staggered approach described in Section 2.15.1. At each staggered quarterly rebalance the processes as defined in Sections 2.12 and 2.13 are applied to limit turnover.

### 2.7.1 Quality Measure Calculation

Quality measure is the average of Profitability minus the average of Investment. Profitability is the average of the z-scores of ROA, ROE, and operating profitability. Investment is the average of the z-scores of asset growth and book growth. The outliers of the variables are winsorized prior to the z-score calculation described in Appendix 5.2. The five variable definitions are described below. To avoid foreign exchange impact during the security selection process, the below variables are calculated using the fundamental data in the company's reporting currency.

1. ROA is calculated as the ratio of net income before extraordinary items to assets.
2. ROE is calculated as the ratio of net income before extraordinary items to equity book value.
3. Operating profitability is the ratio of operating income minus interest to equity book value.
4. Asset growth is the ratio of current year assets minus previous year assets to previous year assets.
5. Book growth is the ratio of current book value minus previous year book value to previous year book value.

## 2.8 RA Momentum Factor Index Construction

The RA Momentum Factor Index consists of companies with high momentum. For each of the 12 region and size groups in Table 2, a momentum measure for each stock is calculated as defined in Section 2.8.1 below. Stocks are then ranked in descending order by momentum measure, the top 50% by cumulative adjusted capitalization weights as defined in Section 2.4.1 are selected for inclusion, subject to a minimum of 15 stocks. Selected companies are then re-weighted by their adjusted capitalization weight subject to the application of liquidity limit Rule 2.14 and maximum stock weight of 5% for all regions, except for the UK region at 15%. The minimum stock weight is 0.05%. Stocks below the minimum weight are removed and the excess weights are distributed across the remaining stocks in the index.

The RA Momentum Factor index is rebalanced fully each quarter as defined in Section 2.15.2. At each quarterly rebalance, the process as defined in Section 2.13 is applied to limit turnover.

### 2.8.1 Momentum Measure Calculation

Momentum measure is the average of the z-scores for standard momentum, idiosyncratic momentum, and fresh momentum. A company's stock excess return  $er_{i,t} = (r_{i,t} - cr_{i,t})$  is used in calculating momentum. The excess return is the company's daily local currency return minus the return investing in cash for the day. The outliers of the calculated momentums are winsorized prior to the z-score calculation described in Appendix 5.2.

1. Standard momentum is momentum investing based on a stock's recent excess return, which is the past 12 month excess return excluding the most recent month

return. The time period for excess return is from trading day  $-365$  calendar days to trading  $-30$  calendar days.

$$Mom_i = er_{t-365D,t-30D}$$

- Idiosyncratic momentum accounts for a stock's market exposure by comparing its standard momentum to the beta-forecasted value. Note that market returns are hedged market returns on the cap-weighted market index, defined in Section 2.3.3, for the given company, and  $\beta_i$  is the corresponding factor sensitivity on that market. The time period for local excess return and the regression calculation for  $\beta_i$  is from trading day  $-365$  calendar days to trading  $-30$  calendar days. Country group is defined in Section 2.3.3.

$$iMom_i = \frac{1 + Mom_i}{1 + \beta_{i,Country\_group}(er_{i,t}^{Country\_group})} - 1$$

- Fresh momentum is the reversal adjusted measure that indicates if the momentum of a stock is building or diminishing by comparing standard momentum to the previous year's momentum.

$$fMom_i = \frac{Momentum}{Previous\ Year's\ Performance} = \frac{1 + Mom_i}{1 + er_{t-2Y,t-1Y}} - 1$$

## 2.9 RAFI Size Factor Index Construction

The RAFI Size Factor Index is the equal weight of the Small Value, Small Quality, Small Low Volatility, and Small Momentum factor portfolios for all regions, except for Emerging Markets. The construction methodology is defined in Sections 2.5 through 2.8 above. After the aggregation, liquidity limit Rules 2.14 is applied to the stock weights. The minimum stock weight is 0.05%. Stocks below the minimum weight are removed and the excess weights are distributed across the remaining stocks in the index. As noted, Emerging Market Small is excluded.

The RAFI Size Factor Index follows the rebalance schedule of the single factor construction in Sections 2.5 through 2.8, wherein the Index is set to equal weight of the individual factor sleeves at each quarter.

## 2.10 RAFI Multi-Factor Index Construction

The RAFI Multi-Factor Index takes an equally weighted allocation to value, low volatility, quality, momentum, and size factor indices for all regions, except for Emerging Markets where the size factor is excluded. Since a size factor is excluded in Emerging Markets, the RAFI Multi-Factor Global Index utilizes a Developed Markets size factor. Individual factor construction methodology is defined in Sections 2.5 through 2.9. Multi-factor Indices comprised of multiple regions (for example, RAFI Multi-Factor Global Index) are the aggregation of the respective single factor sleeves from each region, (defined in Table 2), determined by multiplying the single factor equal weight to its region weight determined in Section 2.3.1. After the aggregation, liquidity limit Rules 2.14 is applied to the stock weights. The minimum stock weight is 0.002%. Stocks below the minimum weight are removed and the excess weights are distributed across the remaining stocks in the index.

At each quarterly rebalance, the factor allocation is rebalanced back to 20% for all regions, except for Emerging Markets, which is 25% due to the exclusion of the size factor index. The RAFI Multi-Factor Index follows the same rebalance timeline as that of its underlying factor indices described in Section 2.15.

### 2.10.1 RAFI Multi-Factor ex-Momentum Emerging Markets Index Construction

The RAFI Multi-Factor ex-Momentum Emerging Markets Index takes an equally weighted allocation to value, low volatility and quality factor indices for the Emerging Markets region. Individual factor construction methodology is defined in Sections 2.5 through 2.7. Single factor indices in the Emerging Markets region are equally weighted and liquidity limit Rules 2.14 is applied to the stock weights. The minimum stock weight is 0.002%. Stocks below the minimum weight are removed and the excess weights are distributed across the remaining stocks in the index.

At each quarterly rebalance, the factor allocation for value, low volatility and quality is rebalanced back to equal weight, for the emerging markets region. The RAFI Multi-Factor ex-Momentum Emerging Markets Index follows the same rebalance timeline as that of its underlying factor indices described in Section 2.15.

### 2.10.2 RAFI Multi-Factor Global ex-Switzerland Index Construction

The RAFI Multi-Factor Global ex-Switzerland Index takes an equally weighted allocation to value, low volatility, quality, momentum, and size factor indices for the Global region. Since a size factor is excluded in Emerging Markets, the RAFI Multi-Factor Global ex-Switzerland Index utilizes a Developed Markets size

factor. Individual factor construction methodology is defined in Sections 2.5 through 2.9. The RAFI Multi-Factor Global ex-Switzerland Index is the aggregation of the respective single factor sleeves from each region, (defined in Table 2), determined by multiplying the single factor equal weight to its region weight determined in Section 2.3.1.

After the aggregation, stocks that are assigned by RAFI to the Switzerland country group are excluded from the index. In addition, companies identified by the Swiss Association for Responsible Investments (SVVK-ASIR) are excluded from the index at each annual reconstitution. More information regarding the SVVK-ASIR can be found here: <http://www.svvk-asir.ch/en/about-us/>.

After applying the exclusions, liquidity limit Rules 2.14 is applied to the stock weights. The minimum stock weight is 0.002%. Stocks below the minimum weight are removed and the excess weights are distributed across the remaining stocks in the index.

At each quarterly rebalance, the factor allocation is rebalanced back to 20% for all regions. The RAFI Multi-Factor Global ex-Switzerland Index follows the same rebalance timeline as that of its underlying single factor indices described in Section 2.15.

#### 2.10.3 RAFI Multi-Factor Global AUD Hedged Index Construction

The RAFI Multi-Factor Global AUD Hedged Index is designed to earn the returns of the RAFI Multi-Factor Global Index while shielding investors from changes in the Australian dollar exchange rate relative to other currencies in the index. Weights for the currency hedge are determined and currency exposures are hedged on a monthly basis on the last business day of each month. Foreign exchange forward contracts are sold to eliminate the risk of currency fluctuations. Forward spot rates are calculated using WM/Reuters closing spot rates from 4:00pm London time. A complete description of the hedging methodology can be found here: <https://www.solactive.com/wp-content/uploads/2018/01/Currency-Hedge-General-Methodology.pdf>.

#### 2.10.4 RAFI Multi-Factor Developed GBP Hedged Index Construction

The RAFI Multi-Factor Developed GBP Hedged Index is designed to earn the returns of the RAFI Multi-Factor Developed Index while shielding investors from changes in the British pound exchange rate relative to other currencies in the index. Weights for the currency hedge are determined and currency exposures are hedged on a monthly basis on the last business day of each month. Foreign exchange forward contracts are sold to eliminate the risk of currency fluctuations. Forward spot rates are calculated using WM/Reuters closing spot rates from 4:00pm London time. A complete description of the hedging methodology can be found here: <https://www.solactive.com/wp-content/uploads/2018/01/Currency-Hedge-General-Methodology.pdf>

#### 2.10.5 RAFI Multi-Factor ex-Low Volatility Developed Index Construction

The RAFI Multi-Factor ex-Low Volatility Developed Index takes an equally weighted allocation to value, quality, momentum and size factor indices for the Developed Markets region. Individual factor construction methodology is defined in Sections 2.5, 2.7, 2.8 and 2.9. Single factor indices in the Developed Markets region are equally weighted and liquidity limit Rules 2.14 is applied to the stock weights. The minimum stock weight is 0.002%. Stocks below the minimum weight are removed and the excess weights are distributed across the remaining stocks in the index.

At each quarterly rebalance, the factor allocation for value, quality, momentum and size is rebalanced back to equal weight, for the Developed Markets region. The RAFI Multi-Factor ex-Low Volatility Developed Index follows the same rebalance timeline as that of its underlying factor indices described in Section 2.15.

### 2.11 RAFI Dynamic Multi-Factor Index Construction

The RAFI Dynamic Multi-Factor Index dynamically allocates to value, low volatility, quality, momentum, and size factor indices for all regions, except for Emerging Markets where the size factor is excluded. Since a size factor is excluded in Emerging Markets, the RAFI Dynamic Multi-Factor Global Index utilizes a Developed Markets size factor. The dynamic allocation is calculated in Section 2.11.1 below. Dynamic multi-factor Indices comprised of multiple regions (for example, RAFI Dynamic Multi-Factor Global Index) are the aggregation of the respective single factor sleeves from each region, (defined in Table 2), determined by multiplying the single factor Dynamic Allocation to its region weight determined in Section 2.3.1. After the aggregation, liquidity limit Rules 2.14 is applied to the stock weights. The minimum stock weight is 0.002%. Stocks below the minimum weight are removed and the excess weights are distributed across the remaining stocks in the index.

At each quarterly rebalance, the dynamic allocation is determined for each individual factor component. The RAFI Dynamic Multi-Factor follows the rebalance timeline as that of its underlying factor indices described in Section 2.15.

#### 2.11.1 Dynamic Allocation

Dynamic allocation starts with the equal weight defined in Section 2.10 above plus an active weight, which is based on that factor's momentum and long-term reversal signal relative to the other four factors.

$$\text{Dynamic Allocation} = \text{Equal\_Weight} + \frac{\text{Average}(\text{factor momentum z-score}, \text{factor reversal z-score})}{\text{scaler}}$$

Where the factor momentum is the factor's recent total return, which is the past twelve month return minus most recent month return. The time period for total return is from trading day  $-365$  calendar days to trading  $-30$  calendar days.

$$\text{Mom}_f = R_{t-365D, t-30D}$$

Where factor reversal is calculated as the factor's past five year cumulative return minus past one year return.

$$\text{Reversal}_f = R_{t-5Y, t-1Y}$$

Z-scores of factor momentum and reversal are calculated as standardization across the five factors with a floor to the standard deviation to limit active bets when signals are very similar across factors. See Appendix 5.2 for z-score calculation. The computed z-scores are averaged and adjusted by a scaler. The scaler converts the average z-scores to active weights. Active weights are capped at maximum of 15% and minimum of -15%.

### 2.11.2 RAFI Dynamic Multi-Factor Europe Index

Single factor indices for the RAFI Dynamic Multi-Factor Europe Index are not calculated and disseminated daily by the index calculator. The index sponsor calculates internal single factor sleeves using the same rules defined in Sections 2.5–2.8 to determine the factor allocation for the index.

### 2.12 Turnover Control Mechanism

The turnover control mechanism is applied to the RAFI Value Factor indices, RAFI Low Volatility Factor indices, RAFI Quality Factor indices, and RA Momentum Factor indices.

For the RAFI Value, Low Volatility, and Quality Factor indices, at each quarterly staggered rebalance described in Section 2.15.1, calculate the respective signal (value, low volatility, and quality) using the construction methodology described in Sections 2.5, 2.6, and 2.7. Within each region and size group, categorize the eligible securities by a preferred set and non-preferred set of companies. The preferred set of companies is identified by taking the drifted tranche, which is being rebalanced, sorting those companies by their respective signal (value, low volatility, and quality) and taking the cumulative 90% of the tranche's weight. The non-preferred set of companies consists of all other securities within each region and size group sorted by their respective signal (value, low volatility, and quality). Using their adjusted fundamental weight as determined in Section 2.4.1, first select the eligible securities in the preferred set and then select from the non-preferred set until 25% of adjusted fundamental weight has been selected from each region and size group. The selected companies are then weighted by the adjusted fundamental weight.

For the RA Momentum Index, at each quarterly rebalance described in Section 2.15.2, calculate the momentum signal using the construction methodology described in Section 2.8. Within each region and size group, categorize the eligible securities by a preferred set and non-preferred set of companies. The preferred set of companies is identified by taking the drifted portfolio, which is being rebalanced, sorting those companies by their momentum signal, and taking the cumulative the 80% weight. The non-preferred set of companies consists of all other securities within each region and size group sorted by their momentum signal. Using their adjusted market capitalization weight as determined in Section 2.4.1, first select the eligible securities in the preferred set and then select from the non-preferred set until 50% of adjusted market capitalization weight has been selected from each region and size group. The selected companies are then weighted by the adjusted market capitalization weight.

### 2.13 Momentum Trade Filtering

Momentum trade filtering reduces turnover by not trading against stocks' momentum.

Momentum trade filtering is applied only to RAFI Value, Low Volatility, and Quality indices. During each quarterly staggered rebalance defined in Section 2.15.1, securities constituting the new and current tranches of each factor portfolio are ranked by standard momentum calculated in Section 2.8.1. Stocks in the top 25% by adjusted fundamental weight as defined in Section 2.4.1 will keep the higher of either their price-drifted weights or the new target weights (no selling of high momentum stocks). Similarly, the bottom 25% by adjusted fundamental weight

are assigned the lower of either their price-drifted weights or the new target weights (no buying of low momentum stocks). All other securities are rebalanced back to their adjusted fundamental weight as determined in Section 2.4.1.

#### 2.14 Application of Liquidity Limit

The following liquidity limits are applied to the eligible securities.

Let  $FV_i$  be the RAFI fundamental value of the  $i^{\text{th}}$  company. The free-float adjusted fundamental weight, as defined in Section 2.4.1,  $FW_i$  for company  $i$  is:

$$FW_i = (FV_i * Free\_Float_i) / \sum_{i=1}^N (FV_i * Free\_Float_i)$$

Let  $ADTV_i$  be the maximum of the 30-day and 90-day median daily traded value in USD as of the last business day of January. The liquidity weight  $LW_i$  for company  $i$  is:

$$LW_i = ADTV_i / \sum_{i=1}^N ADTV_i$$

The 30-day median traded value will be used where there is less than 90 days of historical data. Where there is less than 30 days of historical data, the stock will have a RAFI fundamental value of zero. Where there are multiple lines of equity capital in a company, the traded value will be the aggregation of all lines in the aforementioned company.

The liquidity ratio ( $LR$ ) is defined as the ratio of adjusted fundamental weight to liquidity weight. The liquidity ratio for company  $i$  is:

$$LR_i = FW_i / LW_i$$

Where the liquidity ratio is more than four, the new fundamental value is calculated as:

$$\widehat{FV}_i = 4 \times LW_i \times \sum_{i=1}^N FV_i$$

After the fundamental values are updated for all companies using the above formula, new adjusted fundamental weights and liquidity ratios are calculated. The process is repeated until all liquidity ratios attain a value not exceeding four. Note that this process will only modify the fundamental values of stocks that exceed the liquidity limit.

#### 2.15 Rebalance

Within the RAFI Multi-Factor Indices, value, low volatility, and quality are reconstituted annually and rebalanced on a quarterly staggered basis. Momentum is reconstituted and fully rebalanced quarterly. Rebalance effective date is subject to change due to holidays, natural disaster, etc., in which a notice will be distributed to subscribers.

##### 2.15.1 Quarterly Staggered Rebalance

For all indices except for the RA Momentum Factor indices, the model portfolio is split into four equal parts (tranches) and each tranche has equal weight at the March rebalance. Each tranche is a full-fledged model portfolio and is rebalanced once a year to target weights determined for that quarter. Per the schedule below, a single tranche is rebalanced at the end of the last trading day of March, June, September, and the third Friday of December, and effective on the next corresponding trading day. Tranche weights are set to equal (25% each) in the March rebalance.

For example, for the RAFI Value factor portfolio, in the initial launch, the four tranches (A, B, C, and D tranches) are identical portfolios. The headline portfolio will consist of 25% of each of the four tranches and, as such, the headline portfolio is the same as the underlying tranches in the initial launch. At the first quarter rebalance, tranche A is replaced, but tranches B, C, and D are not

rebalanced and are drifted till the next rebalance. The headline portfolio will change reflecting the update to the rebalanced tranche A. Then, at the next quarter rebalance, tranche B is replaced and the other three tranches are not and are drifted until the next rebalance.

Through this method of staggered rebalance, the quarterly rebalance diversifies risk and decreases market impact. Instead of concentrating contra-trading into one single market event, staggered rebalance diversifies rebalance points and increases investment capacity in a meaningful way.

Index	Rebalance Announcement	Distribution of Preliminary Files	Rebalance Schedule	Effective Date
RAFI March Tranche	Provide to subscribers	Five trading days prior to effective date	End of March quarterly rebalance	FTD <sup>‡</sup> April
RAFI June Tranche			End of June quarterly rebalance	FTD <sup>‡</sup> July
RAFI September Tranche			End of September quarterly rebalance	FTD <sup>‡</sup> October
RAFI December Tranche			3rd Friday of December quarterly rebalance	FTD <sup>‡</sup> after 3rd Friday of December

<sup>‡</sup>FTD=First Trading Day.

### 2.15.2 Quarterly Rebalance

For RA Momentum Factor indices, the model portfolio is fully rebalanced at the end of the last trading day of March, June, September, and third Friday of December, and effective on the next corresponding trading day. The strategy is not available for license as a standalone index, but is used in the construction of the RAFI Dynamic Multi-Factor and RAFI Multi-Factor indices.

### 2.16 Extraordinary Adjustment

An extraordinary adjustment, if applicable, is triggered and applied in compliance with the rules set forth in the Solactive Guideline for Extraordinary Corporate Actions.

## 3. CALCULATION OF THE INDEX

### 3.1 Index Formula

The Index Value on a Business Day at the relevant time is calculated in accordance with the following formula:

$$\text{Index}_t = \sum_{i=1}^n \frac{(x_{i,t} \times p_{i,t} \times f_{i,t})}{D_t}$$

With:

$x_{i,t}$  = Number of Index Shares of the Index Component  $i$  on Trading Day  $t$

$p_{i,t}$  = Price of Index Component  $i$  on Trading Day  $t$

$f_{i,t}$  = Foreign exchange rate to convert the Price of Index Component  $i$  on Trading Day  $t$  into the Index Currency

$D_t$  = Divisor on Trading Day  $t$

The initial Divisor on the Base Date is calculated according to the following formula:

$$D_t = \frac{\sum_{i=1}^n (p_{i,t} \times f_{i,t} \times x_{i,t})}{100}$$

After the close of trading on each Rebalancing Day  $t$  the new Divisor is calculated as follows:

$$D_{t+1} = \frac{\sum_{i=1}^n (p_{i,t} \times f_{i,t} \times x_{i,t+1})}{\text{Index}_t}$$

This Divisor is valid starting the immediately following Business Day.

### 3.2 Accuracy

The value of the Index will be rounded to 12 decimal places.

Trading Prices and foreign exchange rates will be rounded to 6 decimal places.

Divisors will be rounded to 6 decimal places

### 3.3 Adjustments

Indices need to be adjusted for systematic changes in prices once these become effective. This requires the new Number of Index Shares of the affected Index Component and the Divisor to be calculated on an ex ante basis.

Following the Committee's decision the Index is adjusted for distributions, capital increases, and stock splits.

This procedure ensures that the first ex quote can be properly reflected in the calculation of the Index. This ex ante procedure assumes the general acceptance of the Index calculation formula as well as open access to the parameter values used. The calculation parameters are provided by the Index Calculator.

### 3.4 Dividends and Other Distributions

Dividend payments and other distributions are included in the Index. They cause an adjustment of the Divisor. The new Divisor is calculated as follows:

$$D_{t+1} = D_t \times \frac{\sum_{i=1}^n (p_{i,t} \times f_{i,t} \times x_{i,t}) - (x_{i,t} \times y_{i,t} \times g_{i,t})}{\sum_{i=1}^n (p_{i,t} \times f_{i,t} \times x_{i,t})}$$

With:

- $p_{i,t}$  = Price of Index Component  $i$  on Trading Day  $t$
- $f_{i,t}$  = Foreign exchange rate to convert the Price of Index Component  $i$  on Trading Day  $t$  into the Index Currency
- $x_{i,t}$  = Number of Index Shares of the Index Component  $i$  on Trading Day  $t$
- $y_{i,t}$  = Distribution of Index Component  $i$  with ex date  $t+1$  multiplied by the Dividend Correction Factor
- $g_{i,t}$  = Foreign exchange rate to convert the amount of the distribution of Index Component  $i$  on Trading Day  $t$  into the Index Currency
- $D_t$  = Divisor on Trading Day  $t$
- $D_{t+1}$  = Divisor on Trading Day  $t+1$

### 3.5 Corporate Actions

### 3.5.1 Principles

Following the announcement by an issuer of Index Components of the terms and conditions of a corporate action the Index Calculator determines whether such corporate action has a dilutive, concentrative, or similar effect on the price of the respective Index Component.

If this should be the case the Index Calculator shall make the necessary adjustments that are deemed appropriate in order to take into account the dilutive, concentrative, or similar effect and shall determine the date on which this adjustment shall come into effect.

Amongst other things the Index Calculator can take into account the adjustment made by an Affiliated Exchange as a result of the corporate action with regard to option and futures contracts on the respective share traded on this Affiliated Exchange.

### 3.5.2 Capital Increases

In the case of capital increases with ex date  $t+1$  the Index is adjusted as follows:

$$x_{i,t+1} = x_{i,t} \times \frac{p_{i,t}}{p_{i,t+1}}$$

With:

$x_{i,t+1}$  = Number of Index Shares of Index Component  $i$  on Trading Day  $t+1$

$x_{i,t}$  = Number of Index Shares of Index Component  $i$  on Trading Day  $t$

$$p_{i,t+1} = \frac{p_{i,t} + s \times B}{1 + B}$$

With:

$p_{i,t+1}$  = Hypothetical Price of Index Component  $i$  on Trading Day  $t+1$

$p_{i,t}$  = Price of Index Component  $i$  on Trading Day  $t$

$s$  = Subscription Price in the Index Component currency

$B$  = Shares received for every share held

$$D_{t+1} = D_t \times \frac{\sum_{i=1}^n (p_{i,t} \times f_{i,t} \times x_{i,t}) + \sum_{i=1}^n [(x_{i,t+1} \times p_{i,t+1} \times f_{i,t}) - (x_{i,t} \times p_{i,t} \times f_{i,t})]}{\sum_{i=1}^n (p_{i,t} \times f_{i,t} \times x_{i,t})}$$

With:

$D_{t+1}$  = Divisor on Trading Day  $t+1$

$D_t$  = Divisor on Trading Day  $t$

$p_{i,t}$  = Price of Index Component  $i$  on Trading Day  $t$

$f_{i,t}$  = Foreign exchange rate to convert the Price of Index Component  $i$  on Trading Day  $t$  into the Index Currency

$x_{i,t}$  = Number of Index Shares of the Index Component  $i$  on Trading Day  $t$

$p_{i,t+1}$  = Hypothetical price of Index Component  $i$  on Trading Day  $t+1$

$x_{i,t+1}$  = Number of Index Shares of the Index Component  $i$  on Trading Day  $t+1$

### 3.5.3 Share Splits

In the case of share splits with ex date on Trading Day  $t+1$  it is assumed that the prices change in ratio of the terms of the split. The new Number of Index Shares is calculated as follows:

$$x_{i,t+1} = x_{i,t} \times B$$

With:

$x_{i,t+1}$  = Number of Index Shares of the affected Index Component on Trading Day  $t+1$

$x_{i,t}$  = Number of Index Shares of the affected Index Component on Trading Day  $t$

$B$  = Shares after the share split for every share held before the split

### 3.5.4 Stock Distributions

In the case of stock distributions with ex date on Trading Day  $t+1$  it is assumed that the prices change according to the terms of the distribution. The new Number of Index Shares is calculated as follows:

$$x_{i,t+1} = x_{i,t} \times (1 + B)$$

With:

$x_{i,t+1}$  = Number of Index Shares of the affected Index Component on Trading Day  $t+1$

$x_{i,t}$  = Number of Index Shares of the affected Index Component on Trading Day  $t$

$B$  = Shares received for every share held

### 3.6 Calculation of the Index in the Event of a Market Disruption

#### 3.6.1 Recalculation

Solactive AG makes the greatest possible efforts to accurately calculate and maintain the Indices. However, the occurrence of errors in the index determination process cannot be ruled out. In such cases Solactive AG adheres to its publicly available Correction Policy.

#### 3.6.2 Market Disruption

In periods of market stress Solactive AG calculates the Indices following predefined and exhaustive arrangements set out in its publicly available Disruption Policy.

## 4. DEFINITIONS

**“Index Universe”** in respect of a Selection Day are companies that fulfill the criteria in Section 2, Construction Methodology.

**“Index Component”** is each share currently included in an Index.

**“Number of Shares”** is in respect of an Index Component and any given Business Day the number or fraction of shares included in the Index. It is calculated for any Index Component as the ratio of (A) the Percentage Weight of an Index Component multiplied by the Index value and the Divisor, and (B) its Trading Price (converted into the index currency according to the principles laid out in Section 1.4 of this document).

**“Percentage Weight”** of an Index Component is the ratio of its Trading Price multiplied by its Number of Shares divided by the Index value.

**“Dividend Correction Factor”** is calculated as 1 minus the applicable withholding tax rate and/or other applicable tax rate currently prevalent in the respective country.

In particular an **“Extraordinary Event”** is

- a merger
- a takeover bid
- a delisting
- the nationalisation of a company
- insolvency

The Trading Price for this Index Component on the day the event came into effect is the last available market price for this Index Component quoted on the Exchange on the day the event came into effect (or, if a market price is not available for the day the event came into effect, the last available market price quoted on the Exchange on a day specified as appropriate by the Index Calculator), as determined by the Index Calculator, and this price is used as the Trading Price of the particular Index Component until the end of the day on which the composition of the Index is next set.

In the event of the insolvency of an issuer of an Index Component the Index Component shall remain in the Index until the next Rebalancing Day. As long as a market price for the affected Index Component is available on a Business Day, this shall be applied as the Trading Price for this Index Component on the relevant Business Day, as determined in each case by the Index Calculator. If a market price is not available on a Business Day the Trading Price for this Index Component is set to zero. The Committee may also decide to eliminate the respective Index Component at an earlier point in time prior to the next Rebalancing Day. The procedure in this case is identical to an elimination due to and Extraordinary Event.

An Index Component is **“delisted”** if the Exchange announces pursuant to the Exchange regulations that the listing of, the trading in or the issuing of public quotes on the Index Component at the Exchange has ceased immediately or will cease at a later date, for whatever reason (provided delisting is not because of a Merger or a Takeover bid), and the Index Component is not immediately listed, traded or quoted again on an exchange, trading, or listing system, acceptable to the Index Calculator.

**“Insolvency”** occurs with regard to an Index Component if (A) all shares of the respective issuer must be transferred to a trustee, liquidator, insolvency administrator, or a similar public officer as result of a voluntary or compulsory liquidation, insolvency or winding-up proceedings, or comparable proceedings affecting the issuer of

the Index Components, or (B) the holders of the shares of this issuer are legally enjoined from transferring the shares.

A “Takeover Bid” is a bid to acquire, an exchange offer or any other offer or act of a legal person that results in the related legal person acquiring as part of an exchange or otherwise more than 10% and less than 100% of the voting shares in circulation from the issuer of the Index Component or the right to acquire these shares, as determined by the Index Calculator based on notices submitted to public or self-regulatory authorities or other information considered by the Index Calculator to be relevant.

With regard to an Index Component a “**Merger**” is

1. a change in the security class or a conversion of this share class that results in a transfer or an ultimate definite obligation to transfer all the shares in circulation to another legal person;
2. a merger (either by acquisition or through forming a new structure) or a binding obligation on the part of the issuer to exchange shares with another legal person (except in a merger or share exchange under which the issuer of this Index Component is the acquiring or remaining company and which does not involve a change in security class or a conversion of all the shares in circulation);
3. a takeover offer, exchange offer, other offer or another act of a legal person for the purposes of acquiring or otherwise obtaining from the issuer 100% of the shares issued that entails a transfer or the irrevocable obligation to transfer all shares (with the exception of shares which are held and controlled by the legal person); or
4. a merger (either by acquisition or through forming a new structure) or a binding obligation on the part of the issuer of the share or its subsidiaries to exchange shares with another legal person, whereby the issuer of the share is the acquiring or remaining company and it does not involve a change in the class or a conversion of the all shares issued, but the shares in circulation directly prior to such an event (except for shares held and controlled by the legal person) represent in total less than 50% of the shares in circulation directly subsequent to such an event.

The “**Merger Date**” is the date on which a Merger is concluded or the date specified by the Index Calculator if such a date cannot be determined under the law applicable to the Merger.

“**Nationalisation**” is a process whereby all shares or the majority of the assets of the issuer of the shares are nationalised or are expropriated or otherwise must be transferred to public bodies, authorities, or institutions.

“**Exchange**” is, in respect of Index and every Index Component, the respective primary exchange where the Index Component has its primary listing. The Committee may decide to declare a different stock exchange the “Exchange” for trading reasons, even if the company is only listed there via a Stock Substitute.

“**Stock Substitute**” includes in particular American Depository Receipts (ADR) and Global Depository Receipts (GDR).

With regard to an Index component (subject to the provisions given above under “Extraordinary Events”) the “**Trading Price**” in respect of a Trading Day is the closing price on this Trading Day determined in accordance with the Exchange regulations. If the Exchange has no closing price for an Index Component, the Index Calculator shall determine the Trading Price and the time of the quote for the share in question in a manner that appears reasonable to him.

A “**Trading Day**” is in relation to the Index or an Index Component a Trading Day on the Exchange (or a day that would have been such a day if a market disruption had not occurred), excluding days on which trading may be ceased prior to the normal Exchange closing time. The Index Calculator is ultimately responsible as to whether a certain day is a Trading Day with regard to the Index or an Index Component or in any other connection relating to this document.

A “**Business Day**” is a day on which the US market or UK market is open for trading (see Appendix 5.1 for relevant indices).

The “**Index Calculator**” is Solactive AG or any other appropriately appointed successor in this function.

The “**Benchmark Administrator**” is Solactive AG or any other appropriately appointed successor in this function.

The “**Index Currency**” is in USD.

“**Market Capitalization**” is with regard to each of the shares in the Index Universe on a Selection Day or Rebalancing Day the value published as the Market Capitalization for this day.

As at the date of this document Market Capitalization is defined as the value of a company calculated by multiplying the number of shares outstanding of the company by its share price.

“**Rebalancing Day**” is provided by the Index Sponsor (see Section 2, Construction Methodology).

“**Selection Day**” is the last business day of February, May, August, and November where the Index Sponsor provides the new constituents and weights of the Index (see Section 2, Construction Methodology).

“**Index Sponsor**” is RAFI Indices, LLC.

An “**Affiliated Exchange**” is with regard to an Index Component an exchange, a trading or quotation system on which options and futures contracts on the Index Component in question are traded, as specified by the Index Calculator.

A “Market Disruption Event” occurs if

1. one of the following events occurs or exists on a Trading Day prior to the opening quotation time for an Index Component:
  - a. Trading is suspended or restricted (due to price movements that exceed the limits allowed by the Exchange or an Affiliated Exchange, or for other reasons):
    - i. across the whole Exchange; or
    - ii. in options or futures contracts on or with regard to an Index Component or an Index Component that is quoted on an Affiliated Exchange; or
    - iii. on an Exchange or in a trading or quotation system (as determined by the Index Calculator) in which an Index Component is listed or quoted; or
  - b. An event that (in the assessment of the Index Calculator) generally disrupts and affects the opportunities of market participants to execute on the Exchange transactions in respect of a share included in the Index or to determine market values for a share included in the Index or to execute on an Affiliated Exchange transaction with regard to options and futures contracts on these shares or to determine market values for such options or futures contracts; or
2. trading on the Exchange or an Affiliated Exchange is ceased prior to the usual closing time (as defined below), unless the early cessation of trading is announced by the Exchange or Affiliated Exchange on this Trading Day at least one hour before
  - a. the actual closing time for normal trading on the Exchange or Affiliated Exchange on the Trading Day in question or, if earlier.
  - b. the closing time (if given) of the Exchange or Affiliated Exchange for the execution of orders at the time the quote is given.

“Normal exchange closing time” is the time at which the Exchange or an Affiliated Exchange is normally closed on working days without taking into account after-hours trading or other trading activities carried out outside the normal trading hours; or

3. a general moratorium is imposed on banking transactions in the country in which the Exchange is resident if the above-mentioned events are material in the assessment of the Index Calculator, whereby the Index Calculator makes his decision based on those circumstances that he considers reasonable and appropriate.

## 5. APPENDIX

### 5.1 RAFI Multi-Factor Index Series Information

Index Name	Total Return Ticker	Price Return Ticker	Net Return Ticker	Market Hours	Currency	Base Date	Launch Date
<b>Global</b>							
RAFI Dynamic Multi-Factor Global Index	RADMFGTL	RADMFGPL	RADMFGLN	US	USD	3/31/2017	3/31/2017
RAFI Multi-Factor Global Index	RAQMFGTL	RAQMFGPL	RAQMFGLN	US	USD	3/31/2017	3/31/2017
RAFI Multi-Factor Global Index (AUD)	N/A	N/A	RAMGNAUD	US	AUD	3/31/2017	3/31/2017
RAFI Multi-Factor Global AUD Hedged Index	N/A	N/A	RAMGADHN	US	AUD	3/31/2017	12/4/2017
RAFI Multi-Factor Global ex Switzerland Index	RAMFGXST	RAMFGXSP	RAMFGXSN	US	USD	10/31/2017	11/3/2017
RAFI Value Factor Global Index	RADMFGVT	RADMFGV	RADMFGVN	US	USD	3/31/2017	3/31/2017
RAFI Low Volatility Factor Global Index	RADMFLGT	RADMFLGV	RADMFLGN	US	USD	3/31/2017	3/31/2017
RAFI Quality Factor Global Index	RADMFGQT	RADMFGQ	RADMFGQN	US	USD	3/31/2017	3/31/2017
RA Momentum Factor Global Index	N/A	N/A	N/A	US	USD	3/31/2017	3/31/2017
<b>Developed</b>							
RAFI Dynamic Multi-Factor Developed Index	RADMFDLT	RADMFDLP	RADMFDLN	US	USD	3/31/2017	3/31/2017
RAFI Dynamic Multi-Factor Developed Index (GBP)	N/A	N/A	RADMFDNG	US	GBP	3/31/2017	3/31/2017
RAFI Dynamic Multi-Factor Developed Index (EUR)	N/A	N/A	RADMFDNE	US	EUR	3/31/2017	3/31/2017
RAFI Multi-Factor Developed Index	RAQMFDLT	RAQMFDLP	RAQMFDLN	US	USD	3/31/2017	3/31/2017
RAFI Multi-Factor Developed Index (GBP)	N/A	N/A	RAMDNGBP	US	GBP	3/31/2017	3/31/2017
RAFI Multi-Factor Developed GBP Hedged Index	N/A	N/A	RAMDGBPH	US	GBP	3/31/2017	7/9/2018
RAFI Multi-Factor ex Low Volatility Developed Index	N/A	N/A	RAMDXLVN	US	USD	3/31/2019	3/31/2019
RAFI Value Factor Developed Index	RADMFDVT	RADMFDV	RADMFDVN	US	USD	3/31/2017	3/31/2017
RAFI Low Volatility Factor Developed Index	RADMFLDT	RADMFLDV	RADMFLDN	US	USD	3/31/2017	3/31/2017
RAFI Quality Factor Developed Index	RADMFDQT	RADMFDQ	RADMFDQN	US	USD	3/31/2017	3/31/2017
RAFI Size Factor Developed Index	RADMFDST	RADMFD S	RADMFD SN	US	USD	3/31/2017	3/31/2017
RA Momentum Factor Developed Index	N/A	N/A	N/A	US	USD	3/31/2017	3/31/2017
<b>Developed ex-U.S.</b>							
RAFI Dynamic Multi-Factor Developed ex US Index	RADMFXUT	RADMFXUP*	RADMFXNT	US	USD	11/30/2016	1/31/2017
RAFI Multi-Factor Developed ex US Index	RAQMFXT	RAQMFXP	RAQMFXT	US	USD	11/30/2016	1/31/2017
RAFI Value Factor Developed ex US Index	RADMFXVT	RADMFXUV	RADMFXUN	US	USD	11/30/2016	1/31/2017
RAFI Low Volatility Factor Developed ex US Index	RADMFXLT	RADMFXUL	RADMFXLN	US	USD	11/30/2016	1/31/2017
RAFI Quality Factor Developed ex US Index	RADMFXQT	RADMFXUQ	RADMFXQN	US	USD	11/30/2016	1/31/2017
RAFI Size Factor Developed ex US Index	RADMFXST	RADMFXUS	RADMFXSN	US	USD	11/30/2016	1/31/2017
RA Momentum Factor Developed ex US Index	N/A	N/A	N/A	US	USD	11/30/2016	1/31/2017
<b>Europe</b>							
RAFI Dynamic Multi Factor Europe Index	RADMFEUT	RADMFEUP	RADMFEUN	US	EUR	6/29/2018	6/29/2018
RAFI Dynamic Multi Factor Europe Index (USD)	N/A	N/A	RADMEUNU	US	USD	6/29/2018	6/29/2018
<b>Eurozone</b>							
RAFI Value Factor Developed Eurozone Fossil Fuels Capped Index	N/A	N/A	N/A	EUR	EUR	3/31/2019	3/31/2019
<b>United States</b>							
RAFI Dynamic Multi-Factor US Index	RADMFUST	RADMFUSP*	RADMFUNT	US	USD	11/30/2016	1/31/2017
RAFI Dynamic Multi-Factor US Index (GBP)	N/A	N/A	RADMFUNG	US	GBP	11/30/2016	1/31/2017
RAFI Dynamic Multi-Factor US Index (EUR)	N/A	N/A	RADMFUN E	US	EUR	11/30/2016	1/31/2017
RAFI Multi-Factor US Index	RAQMFUST	RAQMFUSP	RAQMFUNT	US	USD	11/30/2016	1/31/2017
RAFI Value Factor US Index	RADMFUVT	RADMFUUV	RADMFUVN	US	USD	11/30/2016	1/31/2017
RAFI Low Volatility Factor US Index	RADMFULT	RADMFULV	RADMFULN	US	USD	11/30/2016	1/31/2017
RAFI Quality Factor US Index	RADMFUQT	RADMFUUQ	RADMFUQN	US	USD	11/30/2016	1/31/2017
RAFI Size Factor US Index	RADMFSST	RADMFUSS	RADMFU SN	US	USD	11/30/2016	1/31/2017
RA Momentum Factor US Index	N/A	N/A	N/A	US	USD	11/30/2016	1/31/2017
<b>Emerging Markets</b>							
RAFI Dynamic Multi-Factor Emerging Markets Index	RADMFEUT	RADMFEUP*	RADMFEUN	US	USD	11/30/2016	1/31/2017
RAFI Dynamic Multi-Factor Emerging Markets Index (GBP)	N/A	N/A	RADMFEUNG	US	GBP	11/30/2016	1/31/2017
RAFI Dynamic Multi-Factor Emerging Markets Index (EUR)	N/A	N/A	RADMFEUNE	US	EUR	11/30/2016	1/31/2017
RAFI Multi-Factor Emerging Markets Index	RAQMFEMT	RAQMFEMP	RAQMFENT	US	USD	11/30/2016	1/31/2017
RAFI Multi-Factor ex Momentum Emerging Markets Index	RAMFEXMT	RAMFEXMP	RAMFEXMN	US	USD	9/29/2017	9/29/2017
RAFI Value Factor Emerging Markets Index	RADMFEVT	RADMFEV	RADMFEVN	US	USD	11/30/2016	1/31/2017
RAFI Low Volatility Factor Emerging Markets Index	RADMFELT	RADMFEML	RADMFE LN	US	USD	11/30/2016	1/31/2017
RAFI Quality Factor Emerging Markets Index	RADMFEQT	RADMFEQ	RADMFEQN	US	USD	11/30/2016	1/31/2017
RA Momentum Factor Emerging Markets Index	N/A	N/A	N/A	US	USD	11/30/2016	1/31/2017

\* Index is calculated on a real time basis

## 5.2 Calculation of Z-score

Z-score is a commonly used method for normalizing data in order to combine it with other data. The calculation of the Z-score is shown below, where  $X_i$  is the variable,  $\mu_i$  is the mean of the variable, and  $\sigma_i$  is the standard deviation of the variable.

$$Z_i = \frac{X_i - \mu_i}{\sigma_i}$$

The variable calculated z-score is set to a maximum of 3 and minimum of -3.

## 5.3 Contact Data

For all questions relating to methodology and licensing and access, please contact RAFI Indices at [info@rafi.com](mailto:info@rafi.com) or call 1-866-695-9900 or 949-325-8700.

## 5.4 Calculation of the Index—Change in Calculation Method

The application by the Index Calculator of the method described in this document is final and binding. The Index Calculator shall apply the method described above for the composition and calculation of the Index. However it cannot be excluded that the market environment, supervisory, legal, financial, or tax reasons may require changes to be made to this method. The Index Calculator may also make changes to the terms and conditions of the Index and the method applied to calculate the Index, which he deems to be necessary and desirable in order to prevent obvious or demonstrable error or to remedy, correct or supplement incorrect terms and conditions. The Index Calculator is not obliged to provide information on any such modifications or changes. Despite the modifications and changes the Index Calculator will take the appropriate steps to ensure a calculation method is applied that is consistent with the method described above.

## Disclaimer

The material contained in this document is for information purposes only. This material is not intended as an offer or solicitation for the purchase or sale of any security or financial instrument, nor is it advice or a recommendation to enter into any transaction. RAFI Indices, LLC, its affiliates, agents, and each of their respective officers, directors, employees, agents, representatives and licensors (collectively "RI") does not make any warranties, express or implied, to anyone regarding the information provided herein, including, without limitation, any warranties with respect to the timeliness, sequence, accuracy, completeness, currentness, merchantability, quality or fitness for a particular purpose or any warranties as to the results to be obtained by any third-party in connection with the use of the information. Nothing contained in this material is intended to constitute legal, tax, securities or investment advice, nor an opinion regarding the appropriateness of any investment, nor a solicitation of any type. The general information contained in this material should not be acted upon without obtaining specific legal, tax and investment advice from a licensed professional. Investors should be aware of the risks associated with data sources and quantitative processes used to create the content contained herein or the investment management process. Errors may exist in data acquired from third party vendors, the construction or coding of indices or model portfolios, and the construction of the spreadsheets, results or information provided. RI takes reasonable steps to eliminate or mitigate errors, and to identify data and process errors so as to minimize the potential impact of such errors, however RI cannot guarantee that such errors will not occur. Use of this material is conditioned upon, and evidence of, the user's full release of RI from any liability or responsibility for any loss or damage, direct, indirect or consequential, arising from or related to (i) any inaccuracy or incompleteness in, errors or omissions in the information or (ii) any decision made or action taken by any third party in reliance upon this information. RI shall not be liable to anyone for loss of business revenues, lost profits or any indirect, consequential, special or similar damages whatsoever, whether in contract, tort or otherwise, even if advised of the possibility of such damages.

Any applicable financial instruments are not sponsored, promoted, sold or supported in any other manner by RAFI Indices, LLC or Solactive AG nor does RAFI Indices, LLC or Solactive AG offer any express or implicit guarantee or assurance either with regard to the results of using the Index and/or Index trade mark or the Index Price at any time or in any other respect. The Index is calculated and published by RAFI Indices, LLC and Solactive AG. RAFI Indices, LLC and Solactive AG use their best efforts to ensure that the Index is calculated correctly. Irrespective of their obligations towards Licensee, neither RAFI Indices, LLC nor Solactive AG has any obligation to point out errors in the Index to third parties including but not limited to Licensee, investors and/or financial intermediaries of the financial instrument. Neither publication of the Index nor the licensing of the Index or Index trade mark for the purpose of use in connection with the financial instrument constitutes a recommendation by RAFI Indices, LLC or Solactive AG to invest capital in said financial instrument nor does it in any way represent an assurance or opinion of RAFI Indices, LLC or Solactive AG with regard to any investment in the financial instrument. Separately, data contained in the indices is sourced from internal and external research which may be based on data from Bloomberg.

The trademarks Fundamental Index™, RAFI™, Research Affiliates Equity™, RAE™ and the Research Affiliates™ trademark and corporate name and all related logos are the exclusive intellectual property of Research Affiliates, LLC and in some cases are registered trademarks in the U.S. and other countries. Various features of the Fundamental Index™ methodology, including an accounting data-based non-capitalization data processing system and method for creating and weighting an index of securities, are protected by various patents, and patent-pending intellectual property of Research Affiliates, LLC. (See all applicable US Patents, Patent Publications, Patent Pending intellectual property and protected trademarks located at [https://www.researchaffiliates.com/en\\_us/about-us/legal.html](https://www.researchaffiliates.com/en_us/about-us/legal.html), which are fully incorporated herein.) Any use of these trademarks, logos, patented or patent pending methodologies without the prior written permission of Research Affiliates, LLC, is expressly prohibited. Research Affiliates, LLC, reserves the right to take any and all necessary action to preserve all of its rights, title, and interest in and to these marks, patents or pending patents.

RAFI Indices, LLC is a wholly owned subsidiary of Research Affiliates Global Holdings, LLC and does not offer or provide investment advice or offer or sell any securities, commodities or derivative instruments or products. Any such business may only be conducted through registered or licensed entities and individuals permitted to do so within the respective jurisdiction and only in conjunction with the legally required disclosure documents and subject to the all legally required regulatory filings.

© 2018 RAFI Indices, LLC. All rights reserved. Duplication or dissemination prohibited without prior written permission.



620 Newport Center Drive,  
Suite 900  
Newport Beach, CA 92660  
Main: +1 949.325.8700  
[www.rafi.com](http://www.rafi.com)