Definition of Air Quality Index[1] (Effective from January 2021)

Macao Air Quality Index is based on the data obtained from the automatic monitoring network. The sub-index of pollutants, including respirable suspended particulate (PM_{10}), fine suspended particulate ($PM_{2.5}$), nitrogen dioxide (NO_2), ozone (O_3), sulphur dioxide (SO_2) and carbon monoxide (CO), is calculated using the real-time concentrations and related influences to human health. The highest sub-index will be taken as the air quality index of the station. If the index exceeds 100, the major pollutant will also be indicated.

Different people have different degree of susceptibility to air pollution. The table below shows the different suggested precautionary actions for sensitive population groups[3] and general public at different air quality levels[2]:

Air Quality		Suggested Precautionary Actions	
Index	**Level[4,5,6]**	**Sensitive Population Groups (People with existing heart or respiratory illnesses, pregnant woman, children and elderly)**	**General Public**
0 - 50	Good	No response action is required.	No response action is required.
51 - 100	Moderate	Advised to **reduce[7]** outdoor strenuous activities.	No response action is required.
101 - 200	Bad	Advised to **reduce to the minimum[7]** outdoor strenuous activities, and the time of staying outdoor, especially in areas with heavy traffic.	Advised to **reduce[7]** outdoor strenuous activities, and the time of staying outdoor, such as areas with heavy traffic.
201 - 300	Very Bad	Advised to **avoid[7]** outdoor activities, and staying outdoor, especially in areas with heavy traffic.	Advised to **reduce to the minimum[7]** outdoor strenuous activities, and the time of staying outdoor, such as areas with heavy traffic.
301 - 400	Severe		
401 - 500	Harmful		

Calculation method of the sub-index of individual pollutant is given by (piecewise linear function):

$$I = \frac{I_{high} - I_{low}}{C_{high} - C_{low}}(C - C_{low}) + I_{low}$$

where,

I	=	sub-index of individual pollutant
C	=	average concentration of individual pollutant (μg/m^3)
C_{low}	=	Breakpoint of lower or equal to concentration C (μg/m^3) or (mg/m^3)
C_{high}	=	Breakpoint of higher or equal to concentration C (μg/m^3) or (mg/m^3)
I_{low}	=	Corresponding sub-index breakpoint of C_{low}
I_{high}	=	Corresponding sub-index breakpoint of C_{high}

The Air quality index will be defined as the highest sub-index among the pollutants, i.e.

Air quality index = Max（I_{PM10}, $I_{PM2.5}$, I_{SO2}, I_{NO2}, I_{O3}, I_{CO}）

The following table shows the concentration of air pollutants and their corresponding sub-index breakpoint value:

Index	Respirable suspended particulate (PM_{10}) μg/m^3	Fine suspended particulate ($PM_{2.5}$) μg/m^3	Sulphur dioxide (SO_2) μg/m^3	Nitrogen dioxide (NO_2) μg/m^3	Ozone (O_3) μg/m^3	Carbon monoxide (CO) mg/m^3
Realtime	**Running average of the most recent 24-hours**			**Hourly average**	**Running average of the most recent 8-hours**	
Daily Review	**24-hour average (01h-24h) of the Day**			**The highest hourly average of the Day**	**The highest 8-hour average of the Day**	
0	0	0	0	0	0	0
50	50 (8)	25 (8)	20 (8)	100 (10)	80 (11)	5
100	100 (9)	50 (9)	50 (9)	200 (8, 9)	160 (9, 12)	10 (9)
200	250	115	150	700	240 (13)	17
300	350	150	475	1200	400	34
400	420	250	800	2000	600	46
500	500	350	1600	2500	800	57

Remarks：

1. This definition document follows the World Health Organization Air Quality Guidelines (WHO AQG);
2. The classification of the air quality levels and its related content are defined with reference to the classification of countries and regions including China, Hong Kong, the United States, the United Kingdom and Canada;
3. With reference to the WHO AQG, sensitive population groups are those whose health status or specific characteristics make them especially likely to experience adverse health effects following exposure to pollutants, such as: people with existing heart or respiratory illnesses, pregnant woman, children and elderly.
4. The concentration value of all pollutants corresponding to the "good" air quality level are equal to or lower than the “Air quality guideline” in the WHO AQG (i.e. the most stringent guide values, Remarks 8, 10, 11). When the air quality level is "good", there is no suggested response action required for both sensitive population groups and the general public;
5. When the air quality level is "moderate", it means that the concentration of some pollutants are higher than the most stringent guide value, the health risks increase;
6. When the air quality level is "bad", it means that the concentration of some pollutants are higher than the Macau Ambient Air Quality Standards (Remark 9);
7. The terms "reduce", "reduce to a minimum" and "avoid" are used to express the different extent of curtailment of the outdoor activities. "Reduce" refers to a lowering of the intensity or duration of these activities, while "avoid" means to refrain from such activities completely. To "reduce to the minimum" is to cut down to only those activities that are essential.
8. Select the “Air quality guidelines” in the WHO AQG (i.e. the most stringent guide values) for respirable suspended particles (PM_{10}), fine suspended particles ($PM_{2.5}$), nitrogen dioxide (NO_2) and sulfur dioxide (SO_2);
9. Refer to the reference concentration values for atmospheric pollutants in “Macau Environmental Quality Standards - Ambient Air Quality Standards (experimental)”, of which PM_{10}, $PM_{2.5}$ and SO_2 select “Interim target-2” guide values in the WHO AQG; Select “Interim target-1” guide value for Ozone (O_3); Select “Air quality guideline” for NO_2;
10. Select 50% of the NO_2 “Air quality guideline” in the WHO AQG (i.e. the most stringent guide value);
11. Select 80% of the O_3 “Air quality guideline” in the WHO AQG (i.e. the most stringent guide value);
12. Select the O_3 “Interim target-1” guide value in the WHO AQG;
13. Select the O_3 “High levels” guide value in the WHO AQG;
14. In addition to the concentration values mentioned in remarks 8 to 13, for the selection of the rest of the concentration breakpoints, refer to the National Environmental Protection Standard of the People's Republic of China "AQI Technical Regulation on Ambient Air Quality Index" (HJ633-2012).