

How is AQI Calculated?

National Air Quality Index (AQI) — Central Pollution Control Board (CPCB)
Ministry of Environment, Forest & Climate Change, Government of India

The Air Quality Index (AQI) transforms complex air quality data of various pollutants into a single number (index value), nomenclature, and colour. There are six AQI categories, namely Good, Satisfactory, Moderately Polluted, Poor, Very Poor, and Severe. Each category is decided based on ambient concentration values of air pollutants and their likely health impacts (known as health breakpoints). AQ sub-index and health breakpoints are evolved for eight pollutants (PM₁₀, PM_{2.5}, NO₂, SO₂, CO, O₃, NH₃, and Pb) for which short-term (up to 24-hourly averaging period) National Ambient Air Quality Standards are prescribed.

The Six AQI Categories

Good	Satisfactory	Moderately Polluted	Poor	Very Poor	Severe
0–50	51–100	101–200	201–300	301–400	401–500

Calculation Methodology

- 1 The sub-indices for individual pollutants at a monitoring location are calculated using its 24-hourly average concentration value (8-hourly in case of CO and O₃) and the health breakpoint concentration range. The worst sub-index is the AQI for that location.
- 2 All eight pollutants may not be monitored at all locations. Overall AQI is calculated only if data are available for a minimum of three pollutants, out of which one should necessarily be either PM_{2.5} or PM₁₀. Otherwise, data are considered insufficient for calculating AQI. Similarly, a minimum of 16 hours' data is considered necessary for calculating a sub-index.
- 3 The sub-indices for monitored pollutants are calculated and disseminated even if data are inadequate for determining the overall AQI. The individual pollutant-wise sub-index provides the air quality status for that pollutant.
- 4 The web-based system is designed to provide AQI on a real-time basis.
- 5 For manual monitoring stations, an AQI calculator is developed wherein data can be fed manually to obtain the AQI value.

Sub-Index Formula

The sub-index (I_p) for a given pollutant concentration (C_p) is a linear function calculated within its breakpoint band:

$$I_p = [(I_{Hi} - I_{Lo}) / (BP_{Hi} - BP_{Lo})] \times (C_p - BP_{Lo}) + I_{Lo}$$

- I_p = sub-index for pollutant p
- C_p = truncated concentration of pollutant p
- BP_{Hi} / BP_{Lo} = breakpoint concentration greater than / less than or equal to C_p
- I_{Hi} / I_{Lo} = AQI value corresponding to BP_{Hi} / BP_{Lo}

Example: the PM_{2.5} sub-index is 51 at a concentration of 31 µg/m³, 75 at 45 µg/m³, and 100 at 60 µg/m³. The overall AQI is the maximum (worst) sub-index among all monitored pollutants, and that pollutant is termed the 'dominant pollutant'.

AQI Breakpoints for the Eight Pollutants

Units are µg/m³ unless otherwise noted. Averaging period shown in the header row.

AQI Category (Range)	PM ₁₀ 24-hr	PM _{2.5} 24-hr	NO ₂ 24-hr	O ₃ 8-hr	CO 8-hr (mg/m ³)	SO ₂ 24-hr	NH ₃ 24-hr	Pb 24-hr
Good (0–50)	0–50	0–30	0–40	0–50	0–1.0	0–40	0–200	0–0.5
Satisfactory (51–100)	51–100	31–60	41–80	51–100	1.1–2.0	41–80	201–400	0.6–1.0

AQI Category (Range)	PM ₁₀ 24-hr	PM _{2.5} 24-hr	NO ₂ 24-hr	O ₃ 8-hr	CO 8-hr (mg/m ³)	SO ₂ 24-hr	NH ₃ 24-hr	Pb 24-hr
Moderately Polluted (101–200)	101–250	61–90	81–180	101–168	2.1–10	81–380	401–800	1.1–2.0
Poor (201–300)	251–350	91–120	181–280	169–208	10.1–17	381–800	801–1200	2.1–3.0
Very Poor (301–400)	351–430	121–250	281–400	209–748*	17.1–34	801–1600	1201–1800	3.1–3.5
Severe (401–500)	430+	250+	400+	748+*	34+	1600+	1800+	3.5+

* When the 8-hourly average of O₃ exceeds 208 µg/m³, the 1-hourly average value is used instead for computing the sub-index.

Source: Central Pollution Control Board (CPCB), Ministry of Environment, Forest & Climate Change, Government of India — National Air Quality Index. Official document: https://airquality.cpcb.gov.in/ccr_docs/How_AQI_Calculated.pdf. Breakpoint values per CPCB Table 3.1 (AQI Scale 0–500). This file is a faithfully reproduced reference copy.