LIMIT OF DETECTION

Lowest measurable concentration is called **limit of detection** (LOD). This quantity is estimated for each application and is determined for each device before shipping to our customers. For every GasEYE analyzer we determine the limit of detection during a 12 hour cycle in a climate chamber. The analyzer is placed on a test gas cell and a zero sample is introduced. A zero sample is either nitrogen or dry air to purge out the constituent of interest. The climate chamber temperature is then varied between -20°C to +55°C and the concentration signal is logged, as well as other important analyzer parameters. Based on the concentration reading during the temperature cycle the limit of detection is calculated using the following equation:

$$LOD = 1.96 * standard\ deviation(gas\ concentration)$$

Limit of detection is usually quantified in *ppm x meter* units. This allows to easily recalculate the limit of detection for arbitrary path length. For example: Limit of detection for standard carbon monoxide application at room temperature is LOD 0.2 ppm x m. If the process path length is 2.5 meters the actual limit of detection at this distance will be:

$$LOD\ (@\ 2.5\ meters) = \frac{LOD}{Process\ path\ length} = \frac{0.2\ ppm\ x\ m}{2.5\ m} = 0.08\ ppm$$

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