

## Commercial and Residential

### Carbon Monoxide Safety Standards and Exposure Limits

PPM CO in Air	Air Quality, Workplace and Residential CO Exposure Limits
9 ppm	EPA National Ambient Air Quality Standard (NAAQS) over 8 hour TWA
25 ppm	ACGIH Threshold Limit Value (TLV) and Cal/OSHA PEL over 8 hour TWA
35 ppm	EPA NAAQS over 1 hour and NIOSH Recommended Exposure Limit (REL) over 8 hour TWA
50 ppm	OSHA Permissible Exposure Limit (PEL) over 8 hour TWA
70 ppm	NFPA 720 and UL 2034 Residential CO Alarm Activation within 1 to 4 hours TWA
150 ppm	NFPA 720 and UL 2034 Residential CO Alarm Activation within 10-50 minutes TWA
200 ppm	Cal/OSHA and NIOSH Ceiling Limit (C)
400 ppm	NFPA 720 and UL 2034 Residential CO Alarm Activation within 4-15 minutes TWA
1200 ppm	NIOSH Immediately Dangerous to Life or Health value (IDLH)

**Sources:** American Conference of Governmental Industrial Hygienists (ACGIH), California Division of Occupational Safety and Health (Cal/OSHA), Environmental Protection Agency (EPA), National Fire Protection Association (NFPA), National Institute for Occupational Safety and Health (NIOSH), Occupational Safety and Health Administration (OSHA), and Underwriters Laboratories (UL).

TWA is the time-weighted average CO concentration. The EPA standards may not be exceeded more than once per year. For Cal/OSHA and NIOSH compliance, the Ceiling limit may not be exceeded at any time.

All workplaces, including offices, banks, schools, restaurants, etc. should install Commercial CO Detectors (e.g. Defender CD8110 or CD8180) to help protect employees and customers from carbon monoxide poisoning. The CO detector should, at the minimum, activate audible and visual alarm signals before the OSHA PEL is reached.

Standard residential carbon monoxide alarms listed to UL 2034 are intended for use in ordinary indoor locations of family living units, and are typically not designed to measure compliance with commercial workplace standards.