Carbon Monoxide Levels Chart

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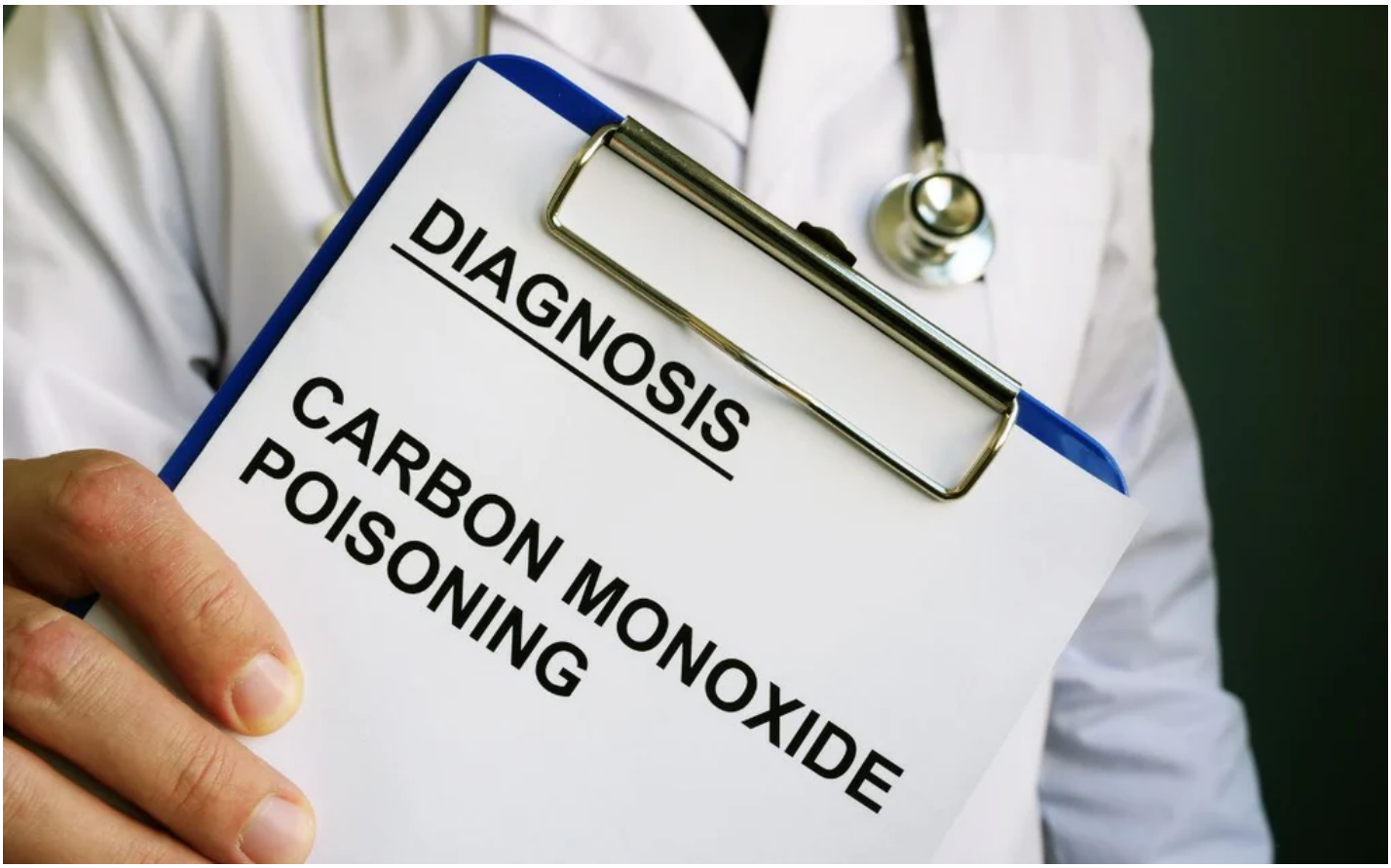

Carbon monoxide exposure is the most common method of death by poisoning in the world.

The effects of carbon monoxide poisoning are well understood. CO gas competes with oxygen to bind with hemoglobin in the blood leading to a reduction of oxygen in the brain. Even low carbon monoxide levels over long periods can have an impact on brain chemistry.

While the exact short and long term carbon monoxide levels recommended by ASHRAE, OSHA, NIOSH and other organizations differ, the consensus is that

- 9 ppm (parts-per-million) is the maximum indoor safe carbon monoxide level over 8 hours
- 200 ppm or greater will cause physical symptoms and is fatal in hours
- 800 ppm of CO or greater in the air is fatal within minutes

Click the links below to see each organization's safe carbon monoxide levels and exposure limits:

1. OSHA: Occupational Safety and Health Association
2. ASHRAE: American Society of Heating, Refrigerating and Air-Conditioning Engineers
3. NIOSH: National Institute for Occupational Safety and Health
4. ACGIH: American Conference of Governmental Industrial Hygienists
5. EPA: Environmental Protection Agency
6. WHO: World Health Organization
7. UL, CSA, ANSI: Underwriters Laboratories

What is an acceptable level of carbon monoxide?

For indoor settings, the acceptable level of carbon monoxide is stated by WHO which recommends 9-10ppm for no more than 8 hours. 25-35ppm for no more than 1 hour and 90-100 ppm for no more than 15 minutes.

Below we provide an easy to use reference for carbon monoxide levels chart.

CARBON MONOXIDE LEVELS CHART

0 ppm	**Recommended Safe Level**	
6 ppm	WHO 24 Hour Average	
9 ppm	ASHRA 8 Hour Average EPA 8 hour 8 Hour Average NAAQS 8 Hour Average WHO 8 Hour Average	**Physical Symptoms** physical symptoms may include headache, fatique, dizziness and/or nausia.
25 ppm	ACGIH 8 Hour Average	
30 ppm	WHO 1 Hour Average	
35 ppm	NIOSH 8 Hour Average NAAQS 1 Hour Average	Physical symptoms after 6-8 hours.
50 ppm	OSHA 8 hour Average (PEL)	
30-69 ppm	UL 30 Day Alarm	
87 ppm	WHO 15 Minute Average	
70-149 ppm	UL 1-4 Hour Alarm	
200 ppm	NIOSH 15 minute STEL	Physical symptoms after 2-3 hours.
150-399 ppm	UL 10-50 Minute Alarm	Physical symptoms in 1-2 hours. Life threatening 3 hours.
400+ ppm	UL 4 Minute Alarm	Physical symptoms in 45 minutes. Unconscious in 2 hours. Fatal in 2-3 hours.
800 ppm		Physical symptoms in 20 minutes. Fatal within 1 hour.
1,600 ppm		Physical symptoms in 5-10 minutes. Fatal within 25-30 minutes.
3,200 ppm		
6.400 ppm		Physical symptoms in 1-2 minutes. Fatal within 10-15 minutes.
12,800 ppm		Fatal within 1-3 minutes.

Download a copy of the chart here.

OSHA Carbon Monoxide Exposure Limits

The Occupational Safety and Health Association OSHA sets standards for working conditions in the US including safe carbon monoxide levels.

The OSHA personal exposure limit (PEL) for CO is 50 parts per million (ppm). OSHA standards prohibit worker exposure to more than 50 parts of CO gas per million parts of air averaged during an 8-hour time period. The 8-hour PEL for CO in maritime operations is also 50 ppm. Maritime workers, however, must be removed from exposure if the CO concentration in the atmosphere exceeds 100 ppm. The peak CO level for employees engaged in roll-on roll-off operations during cargo loading and unloading is 200 ppm.

ASHRAE Carbon Monoxide Exposure Limits

The American Society of Heating, Refrigerating and Air-Conditioning Engineers ASHRAE is a voluntary world-wide organization that sets standards for members focused on building systems, energy efficiency, indoor air quality, refrigeration and sustainability. The ASHRAE Standard 62.1-2016, "Ventilation for Acceptable Indoor Air Quality" agrees with the US Environmental Protection Agency and the World Health Organization limit of 9 ppm over an 8 hour exposure.

NIOSH Carbon Monoxide Levels Exposure Limits

The National Institute for Occupational Safety and Health NIOSH is the US federal agency responsible for conducting research and making recommendations for the prevention of work-related injury and illness. The Occupational Safety and Health Act of 1970 established NIOSH as a research agency focused on the study of worker safety and health, and empowering employers and workers to create safe and healthy workplaces.

NIOSH recommends no more than 35 ppm time weighted average TWA exposure limit. In addition, NIOSH recommends no more than 200 ppm short term exposure limit STEL for 15 minutes.

ACGIH Carbon Monoxide Levels Exposure Limits

The American Conference of Governmental Industrial Hygienists ACGIH is a non-profit organization that advances occupational and environmental health.

The ACGIH recommends a Threshold Limit Value – Time-Weighted Average (TLV-TWA) 50 ppm with a TLV- short term exposure limit of 400 ppm. A TLV-TWA is defined as the concentration of a hazardous substance in the air averaged over an 8-hour workday and a 40-hour workweek to which it is believed that workers may be repeatedly exposed, day after day, for a working lifetime without adverse effects.

EPA Carbon Monoxide Levels Exposure Limits

The United States Environmental Protection Agency EPA sets national ambient air quality standards (NAAQS) under authority of the Clean Air Act (42 U.S.C. 7401 et seq.). NAAQS is applied for outdoor air throughout the country.

The NAAQS standard for carbon monoxide in outdoor air is 9 ppm over 8 hours and 35 ppm over 1 hour not to be exceeded more than once a year.

WHO Carbon Monoxide Levels Exposure Limits

The World Health Organization WHO suggests maximum carbon monoxide levels both in response to their mandate for outdoor clean air and to help countries develop indoor air quality building standards. In indoor environments, space heaters fueled with oil, gas or kerosene, gas stoves, combustion appliances and tobacco smoking are known to cause significant emissions of carbon monoxide. The WHO recommended limits are:

- 9-10 ppm for no more than 8 hours
- 25-35 ppm for no more than 1 hour
- 90-100 ppm for no more than 15 minutes

UL, CSA, ANSI CO Levels Exposure Limits

Underwriters Laboratories UL is the largest and best known independent, not-for-profit testing laboratory in the world. It conducts product evaluations to confirm that the products meet the “UL” standard in electrical safety, fire testing, medical device testing, EMC testing and more.

American National Standards Institute ANSI works in close conjunction with Underwriters Laboratories, and many of the standards are listed as ANSI/UL. UL also has a close association and shares product ratings with the CSA Group which is accredited by the Standards Council of Canada.

The ANSI/UL 2034, ANSI/UL 2075 and CSA 6.19-01 “Standard for Safety for Single and Multiple Station Carbon Monoxide Alarms” requirements are purchased by manufacturers before submitting their devices for testing. They are not normally available to the public. However, UL-certified CO alarms meet a different range of standards that balance the responsiveness of the alarm with the requirement that they not generate nuisance alarms due to background CO caused by outdoor pollution, the normal use of fuel burning appliances or other vapors like methane or ammonia.

The alarm thresholds, set by CO concentration measured in parts per million (ppm), are: no alarm below 30 ppm until after 30 days; 70 ppm for one to four hours (but not less than one hour); 150 ppm for 10 to 50 minutes; 400 ppm for four to 15 minutes.

Carbon Monoxide Meters

CM-503

A useful and inexpensive solution for measuring CO is a Portable Carbon Monoxide Detector. Designed for personal use, this battery operated CO detector quickly tells you if CO levels are high in the house, basement, garage, RV or cabin cruiser boats with inboard motors.

Shop Now: CO Monitoring Solutions

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