

UL 2034

ISBN 0-7629-274-9

Single and Multiple Station  
Carbon Monoxide Alarms

**OCTOBER 29, 1996**  
(Title Page Reprinted: March 8, 2005)



**ANSI/UL 2034-2005**

1

**UL 2034**

**Standard for Single and Multiple Station Carbon Monoxide Alarms**

First Edition – April, 1992

**Second Edition**

**October 29, 1996**

The most recent designation of ANSI/UL 2034 as an American National Standard (ANSI) occurred on March 1, 2005. The ANSI approval for this standard does not include Supplements SA or SB, Appendices A through E, or the Superseded Requirements.

This ANSI/UL Standard for Safety, which consists of the Second Edition with revisions through March 8, 2005, is under continuous maintenance, whereby each revision is ANSI approved upon publication. Comments or proposals for revisions on any part of the Standard may be submitted to UL at any time. Proposals should be submitted via a Proposal Request in UL's On-Line Collaborative Standards Development System (CSDS) at <http://csds.ul.com>.

An effective date included as a note immediately following certain requirements is one established by Underwriters Laboratories Inc.

Revisions of this Standard will be made by issuing revised or additional pages bearing their date of issue. A UL Standard is current only if it incorporates the most recently adopted revisions, all of which are itemized on the transmittal notice that accompanies the latest set of revised requirements.

**ISBN 0-7629-274-9**

**COPYRIGHT © 1992, 2005 UNDERWRITERS LABORATORIES INC.**

## INTRODUCTION

### 1 Scope

1.1 These requirements cover electrically operated single and multiple station carbon monoxide (CO) alarms intended for protection in ordinary indoor locations of dwelling units, including recreational vehicles, mobile homes, and recreational boats with enclosed accommodation spaces and cockpit areas.

1.1 revised November 14, 2001

1.2 Carbon monoxide alarms covered by these requirements are intended to respond to the presence of carbon monoxide from sources such as, but not limited to, exhaust from internal-combustion engines, abnormal operation of fuel-fired appliances, and fireplaces. Carbon monoxide alarms are intended to alarm at carbon monoxide levels below those that cause a loss of ability to react to the dangers of carbon monoxide exposure. See Table 38.1, Part A, Alarm – carbon monoxide concentration and response time.

1.2 revised November 14, 2001

1.2.1 Carbon monoxide alarms covered by this standard are not intended to alarm when exposed to long-term, low-level carbon monoxide exposures or slightly higher short-term transient carbon monoxide exposures, possibly caused by air pollution and/or properly installed/maintained fuel-fired appliances and fireplaces. See Table 38.1, Part B, False alarm resistance specifications.

Added 1.2.1 effective October 1, 1998

1.3 These requirements, where applicable, also cover all remote accessories that may be connected to or are intended to be employed with a single or multiple station carbon monoxide alarm. See 34.2.1.

1.3 revised October 15, 1997

1.4 This standard does not cover the following:

- a) Single and multiple station smoke alarms that are covered by the Standard for Single and Multiple Station Smoke Alarms, UL 217, or the Standard for Smoke Alarms, ULC-S531.
- b) Smoke alarms of the nonself-contained type that are intended for connection to a household or industrial system control unit. These are included in the Standard for Smoke Detectors for Fire Protective Signaling Systems, UL 268, or the Standard for Smoke Detectors, Fire Alarm, ULC-S529.
- c) Mechanically operated single and multiple station fire alarm devices that are specified in the Standard for Single and Multiple Station Heat Detectors, UL 539, or the Standard for Heat Actuated Fire Detectors, Fire Alarm, ULC-S530.
- d) Heat alarms whose requirements are covered in the Standard for Heat Detectors for Fire Protective Signaling Systems, UL 521, or the Standard for Lined Building Protection Fire Hose, ULC-530.
- e) Carbon monoxide gas detectors intended for use in hazardous locations as defined in the U.S. Coast Guard Electrical Engineering Regulations.

1.4 revised June 2, 1999

## 37.5 External wiring

37.5.1 An open or ground fault in the loop wiring connected from a single station carbon monoxide alarm to additional remote alarms that prevent operation for alarm signals from any of the interconnected alarms, shall not cause an alarm signal but shall result in an audible trouble signal. A short or double ground fault in the leads resulting in an audible trouble signal or an alarm signal is not prohibited.

37.5.1 revised November 14, 2001

37.5.2 An open, ground fault, or short in extra-low voltage circuit wiring among multiple station interconnected alarms or any wiring extending to a remote signaling device is not required to be indicated by a trouble signal if the fault does not prevent operation of any of the interconnected units as a single station alarm. A ground fault shall prevent operation for alarm only if the interconnected wiring is to be made in accordance with Class 1 requirements of the National Electrical Code, ANSI/NFPA 70, or the Canadian Electrical Code, Part I (CSA Standard C22.1). The installation wiring diagram shall indicate the type of connections to be employed.

37.5.2 revised November 14, 2001

37.5.3 An open, ground fault, or short in the extra-low voltage circuit conductors extending between the output of a separate power supply and an alarm, which prevents operation of the alarm, shall result in de-energization of the alarm "power-on" light.

37.5.3 revised October 15, 1997

## 38 Sensitivity Test

### 38.1 General

38.1.1 A carbon monoxide alarm shall operate (alarm signal) at or below the test points specified in Part A of Table 38.1 when using the test equipment described in 38.2.1. These test points are based on plotted limits for the 10 percent COHb curve Figure 38.1. If the alarm employs a variable sensitivity setting, test measurements are to be made at maximum and minimum settings. For this test, three carbon monoxide concentrations (70, 150, and 400 ppm) are to be used as specified in Part A of Table 38.1.

38.1.1 revised November 14, 2001

*38.1.2 Revised and relocated as 38.1.4 October 15, 1997*

38.1.3 A carbon monoxide alarm shall not operate (alarm signal) below the test points specified in Part B of Table 38.1, when using the test equipment described in 38.2.1. If the alarm employs a variable sensitivity setting, test measurements are to be made at maximum and minimum settings. For this test, at least two carbon monoxide concentrations (70 and 30 ppm) are to be used as specified in Part B of Table 38.1.

38.1.3 revised November 14, 2001

38.1.4 A single station carbon monoxide alarm employing a secondary power supply shall operate within the limits specified in 38.1.1 when operating from the secondary power supply.

38.1.2 revised and relocated as 38.1.4 October 15, 1997

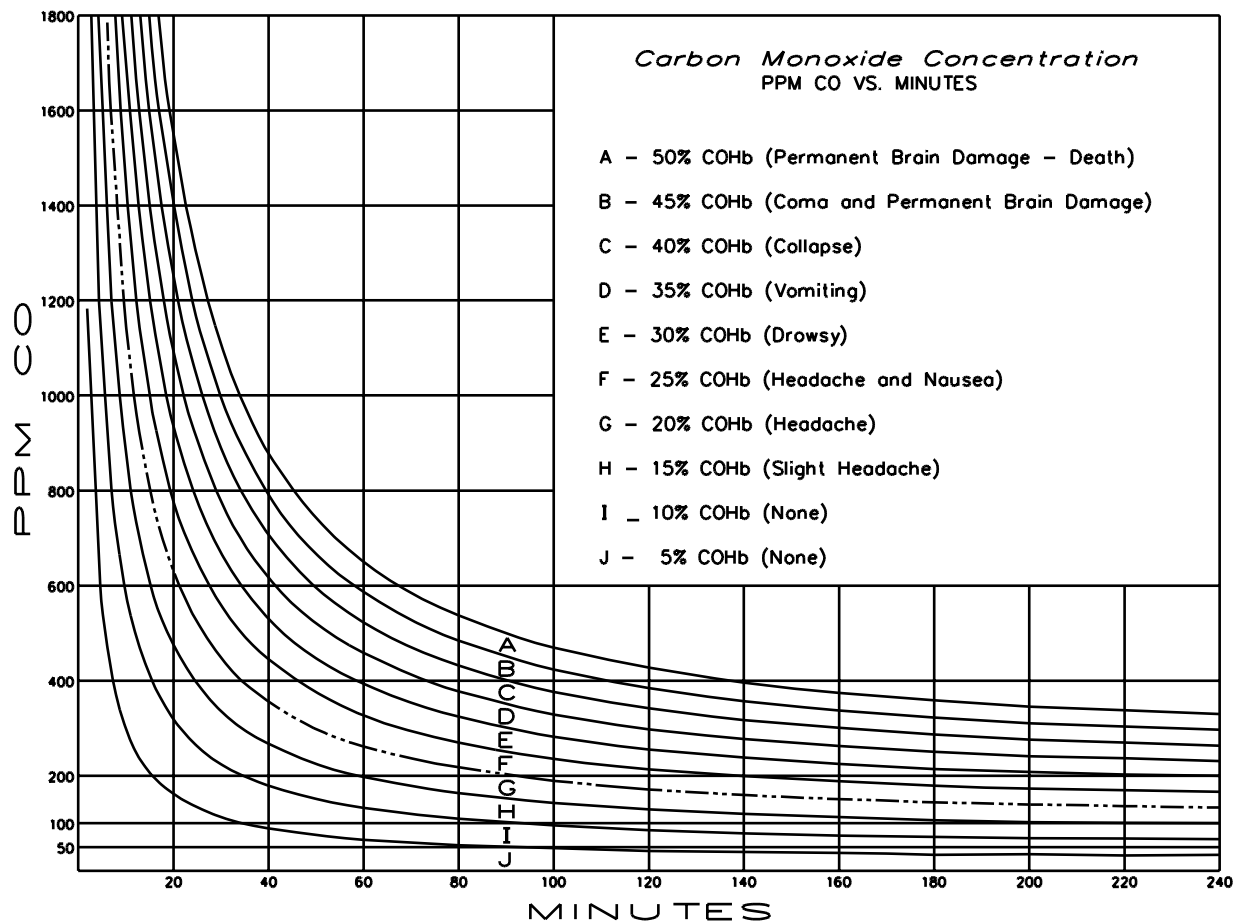
**Table 38.1**  
**Carbon monoxide concentration versus time for alarm test points based on 10 percent**  
**Carboxyhemoglobin (COHb)**

Table 38.1 revised November 14, 2001

<b>A. Carbon monoxide concentration and response time</b>	
Concentration, ppm	Response time, minutes
70 ±5	60 – 240
150 ±5	10 – 50
400 ±10	4 – 15
<b>B. False alarm – carbon monoxide concentration resistance specifications</b>	
Concentration, ppm	Exposure time, (no alarm)
30 ±3	30 days
70 ±5	60 minutes

**Figure 38.1**  
**Carbon monoxide concentration (ppm CO) versus time (minutes)**

Figure 38.1 revised October 15, 1997



S3506

Equation For determining estimated percent COHb in blood<sup>a</sup>

$$\%COHb_t = \%COHb_0[e^{-(t/2398B)}] + 218[1 - e^{-(t/2398B)}] [0.0003 + (\text{ppm CO}/1316)]$$

in which:

$\%COHb_t$  is the percentage of COHb at time  $t$ ,

$\%COHb_0$  is the percentage of COHb in the blood at time 0,

$t$  is the time in minutes, and

$B$  is 0.0404 (heavy work effort).

<sup>a</sup> A proposal for evaluating human exposure to carbon monoxide contamination in military vehicles, Steinberg, Nielson, March 1977, AMCMS Code 672716.H700011; Coburn, R.F., Forster, R.E., & Kane, P.G. Considerations for the physiological variables that determine the blood carboxyhemoglobin concentration in man. Journal of Clinical Investigation, 1965, 44 1899-1910.