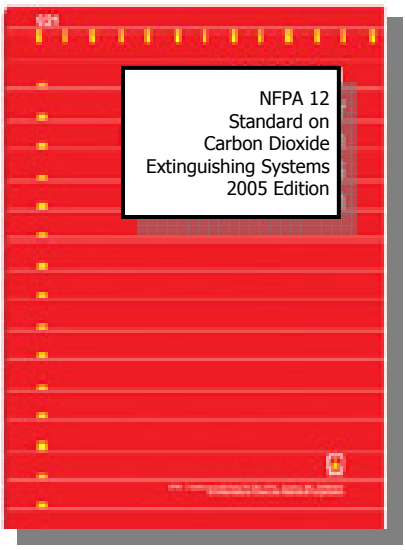
Overview of NFPA 12 (2005 Edition)

PURPOSE:
Explain what impact the changes in the 2005 edition of NFPA-12 will have on the design and installation of a CO_2 system, plus cover the paragraphs that will affect these changes.



REASON FOR CHANGES:
Continuing effort to improve/enhance **"LIFE SAFETY"** of both **new** and **existing** CO_2 fire suppression systems.

Code changes will impact:
- Manufacturers
- Designers
- Installers
- Service
- End-users/Owners

Application / System types affected:
- Total Flood CO_2 systems applied to Normally Occupied Spaces
- Total Flood CO_2 systems applied to Occupiable Spaces
- Local Application Systems
- Any system where the discharge of CO_2 agent will expose personnel to hazardous concentrations of CO_2.

The following information covers the changes that were made in the standard that will affect the design and installation of new systems and what changes are required to all the existing CO_2 system to comply with the 2005 edition of NFPA 12.

CHAPTER 1 ADMINISTRATION

1.3 Retroactivity.

1.3.4 ***EXISTING*** systems (Normally Occupied, Occupiable, Local Application if exposing personnel) ***shall be*** upgraded to meet the requirements for:
- Safety Signs (4.3.2)
- Lock-out Valves (4.3.3.6 & 4.3.3.6.1)
- Pneumatic Time Delays (4.5.6.1)
- Pneumatic Pre-Discharge Alarms (4.5.6.1)

1.3.5* These upgrades **shall be** completed by August 7, 2006

A.1.3.5 *Exposure to CO_2 discharge poses a hazard to personnel; therefore, additional safety features for all new and for retrofitting of existing systems are provided in Section 4.3.*

The installation of the safety signs per 4.3.2 does not require any modifications to the installation and should be accomplished immediately.

A.1.3.5 *The addition of supervised lock-out , pneumatic pre-discharge alarms and pneumatic time delays, require that the system flow calculations be verified and be in accordance with this standard.*
- *Added equivalent pipe length to the system due to adding the lock-out valve and pneumatic time delay.*
- *Added agent required due to adding the pneumatic siren.*

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CHAPTER 3 DEFINITIONS

3.3 General Definitions.

3.3.5 Normally Occupied. An enclosure where, under normal circumstances, persons are present.
Examples:

- Control Rooms
- Computer Rooms
- Data Centers
- IT Equipment Rooms / Centers
- Telecommunication Rooms
- Laboratory Rooms
- Libraries / Museums

3.3.6* Normally Unoccupied.
An area or space not normally occupied by people but could be "entered occasionally" be brief periods.

A.3.3.6 Normally Unoccupied.
A normally unoccupied enclosure is one that is occasionally visited by personnel.
Examples:

- *Transformer Bays*
- *Switch-houses*
- *Pump Rooms*
- *Vaults*
- *Engine Test Stands*
- *Cable Vaults*
- *Cable Spreading Rooms*
- *Utility Tunnels*
- *Microwave Relay Stations*
- *Flammable Liquid Storage Areas*
- *Enclosed Energy Systems*
- *Shipboard Cargo Holds*
- *Robotic Paint Spray Areas*
- *Computer Room Sub-Floors*

3.3.7 Occupiable.
See 3.3.5, Normally Occupied.
(An enclosure where, under normal circumstances, persons are present.)

3.3.11 Unoccupiable.
An enclosure that cannot be occupied due to dimensional or other physical constraints.
Examples:

- Electrical cabinets
- Sub-floors
- Exhaust plenums

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CHAPTER 4 GENERAL INFORMATION

4.1 Restrictions for Normally Occupied Enclosure.

4.1.1* CO_2 total flooding fire-extinguishing systems shall not be installed in normally occupied enclosures except as permitted in 4.1.2 through 4.1.4.

A.4.1.1 . . . *Total Flooding CO_2 systems are not intended to be acceptable substitutes for Halon 1301 total flooding systems used for normally occupied enclosures. Some examples of normally occupied enclosures with surface fire hazards that should be considered for other types of clean fire-extinguishing agents are:*

- *Offices*
- *Computer Rooms*
- *Control Rooms*
- *Data Centers*
- *Libraries*

When verifying "equivalent levels of fire protection" the designer should consider . . . Examples include the following:

- *Fast-growth fires*
- *High-energy output fires*
- *Deep-seated fires*
- *Agent storage temperature limits*
- *Ambient temperature of hazard*
- *Design capabilities for unclosable openings*
- *Design capabilities for extended discharge systems*
- *Contamination to product, surrounding area, or environment*
- *Requirements for continued operations in areas where persistent ignition sources may be present*
- *Undefined reaction of fire suppression agent to the hazard*

4.1.2 New Installations. Total Flooding CO_2 systems shall be permitted to be **installed in normally occupied enclosures** where there are no suitable fire-extinguishing agents that can be used to provide an equivalent level of fire protection to that of CO_2.

4.1.2.1 If it is determined that CO_2 is to be used for a given application, the designer / installer shall provide supporting documentation to the AHJ to verify that CO_2 is the most appropriate fire suppression agent for the application.

4.1.4 Existing Systems. Existing total flooding CO_2 systems shall be permitted in **normally occupied enclosures** equipped with system lock-out valves, pneumatic predischarge alarms, and pneumatic time delays specified in 4.5.6.

4.3.2 Signs.

4.3.2.1 Warning signs should be affixed in conspicuous location . . .

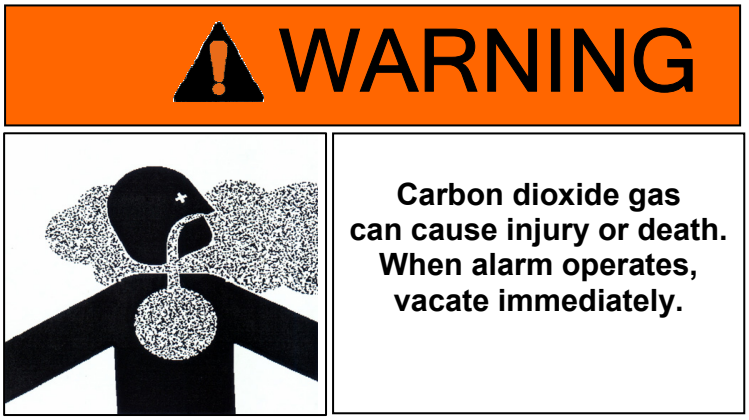
- in every protected space
- at every entrance to protected spaces
- in spaces near the protected spaces where it is determined CO_2 could migrate, creating a hazard to personnel . . .
- at each entrance to CO_2 storage rooms and where CO_2 can migrate or collect in the event of a discharge from a safety device of a storage container.

4.3.2.2 . . . the safety sign

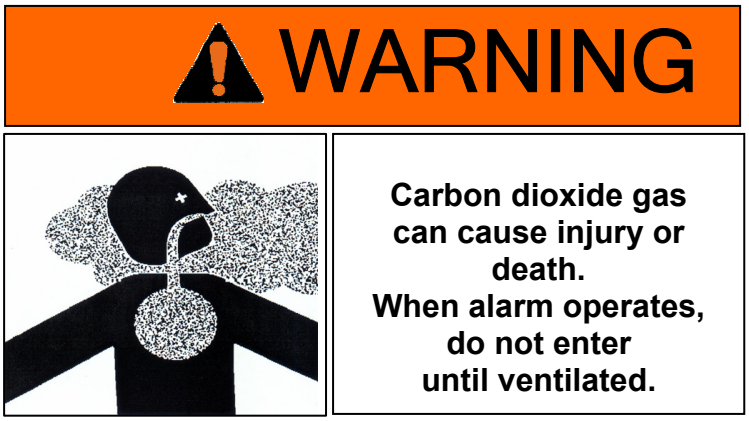
- format
- color
- Letter style of signal words
- message panel letting
- lettering size
- safety symbols

shall be in accordance with MNBV / ANSI Z535, *Standard for Environmental and Facility Safety Signs.*

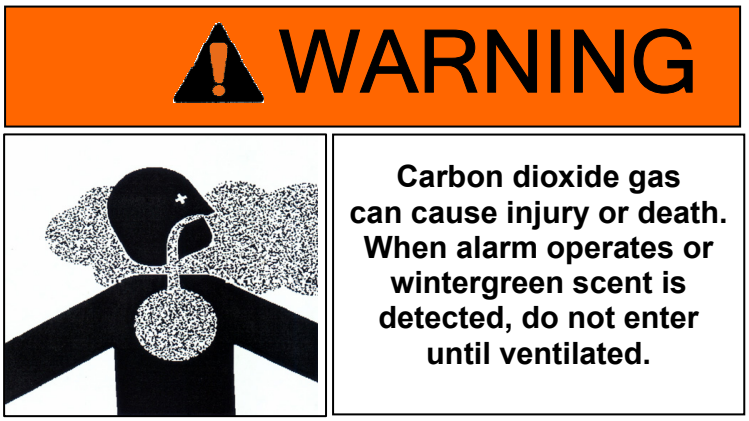
4.3.2.3.1 The sign in Figure 4.3.2.3.1 shall be used in every protected space.



4.3.2.3.2 The sign in Figure 4.3.2.3.2 shall be used in every entrance protected space.



4.3.2.3.3 The sign in Figure 4.3.2.3.3 shall be used in every entrance protected space for systems provided with a wintergreen odorizer.



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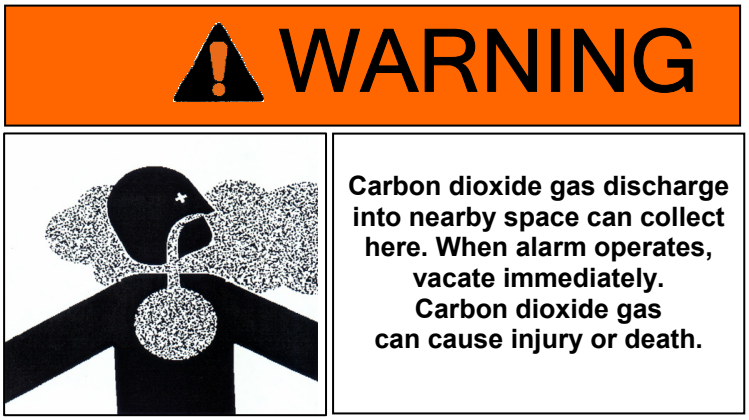
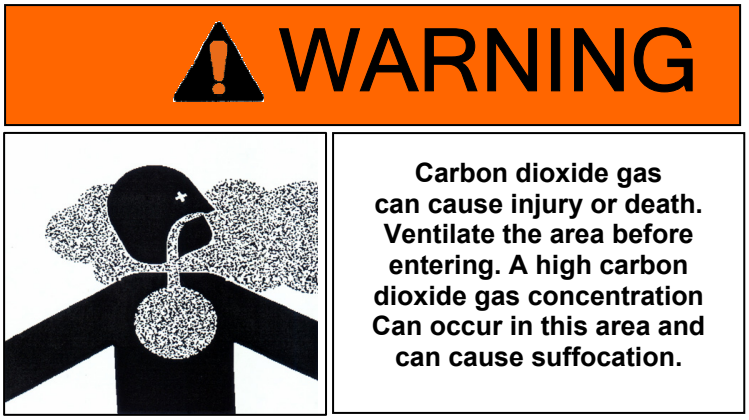
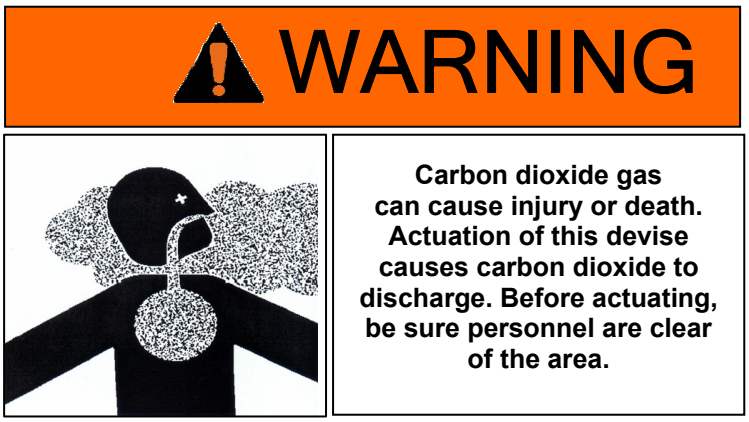
4.3.2.3.4 The sign in Figure 4.3.2.3.4 shall be used in every nearby space where CO_2 could accumulate to hazardous levels.



4.3.2.3.5 The sign in Figure 4.3.2.3.5 shall be used outside each entrance to CO_2 storage rooms.



4.3.2.3.6.2 The sign in Figure 4.3.2.3.6.2 shall be used at each manual actuation station.



4.3.3.1.1* Visual and audible devices shall be located at the entrance to each occupiable space protected by a CO_2 system and at the entrance to each space where CO_2 could migrate, creating a hazard to personnel. Provisions shall be made to prohibit entry of unprotected personnel . . . Persons who are not properly trained in the use of and equipped with SCBA shall not remain in spaces where concentration exceeds 4%.

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Such provisions shall include one or more of the following:

- Addition of distinctive odor (oil of wintergreen) to the discharging CO_2 agent (Olfactory device).
- Provide automatic alarms at the entry to and within such spaces, which alarms are activated by CO_2 or O_2 detectors.
- Establishment and enforcement of confined space entry procedure for such areas.

4.3.3.1.2 The visual alarms required by 4.3.3.1.1 shall be permitted to serve this purpose if they are left operating until the space is ventilated and the safety of the atmosphere for entry by unprotected persons has been verified.

4.3.3.6 A lock-out valve shall be installed on all systems except where dimensional constraints prevent personnel from entering the protected space.

4.3.3.6.1 Lock-out valves shall be installed on all systems where CO_2 could migrate, creating a hazard to personnel.

4.5.4.11 Discharge Pressure Switch.
4.5.4.11.1 A discharge pressure switch shall be installed between the CO_2 supply and the lock-out valve.

4.5.4.11.2 The discharge pressure switch shall provide an alarm initiating signal to the releasing panel to operate electric/electronic alarm appliances.

4.5.5.2 . . . The lock-out required by 4.3.3.6 shall be supervised . . .

4.5.6* Predischarge Alarms.

A.4.5.6 Refer to *NFPA 72, National Fire Alarm Code*, for guidance for installation of referenced visual alarms. The public mode for visual appliance operation should be used.

4.5.6.1* A pneumatic predischarge alarm and pneumatic time delay shall be provided for the following:
1) All total flooding systems protecting normally occupied and occupiable enclosures

2) Local application systems protecting normally occupied and occupiable enclosures where the discharge will expose personnel to hazardous concentrations of CO_2

Exception: For occupiable hazard areas where the provision of a time delay could result in unacceptable risk to personnel or unacceptable damage to critical pieces of equipment, time delay need not be provide. Provisions shall be made to ensure that the CO_2 system is locked out at any time that personnel are present in the protected area or space.

A.4.5.6.1 *Examples of hazard areas where the provision of a time delay could result in unacceptable risk to personnel or unacceptable damage to critical pieces of equipment are:*

- *Combustion gas turbines*
- *Engine test cells*

. . . These are normally unoccupied spaces. When such spaces are occupied by personnel, the system must be locked out to prevent discharge of CO_2 without the benefit of a predischarge alarm or time delay.

Where pneumatic time delays are not provided . . . documented procedural control . . . should be enforced (lock-out / tag-out)

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Items Required to Comply w/ NFPA 12 (2005 Edition)