



Regional regulations on usage and handling of CO₂ and HFC-152a

Kris Taddonio, U.S. EPA



Purpose

- Identify areas of regulatory concern for use of CO₂ and HFC 152a as MAC refrigerants
- Determine how others have resolved concerns (example: fire protection, beverage industry)

Method

- Searched United States Code & Code of Federal Regulations
- Searched State Codes
 - Looked for regulatory references to CO₂, Flammable gas/liquids, Compressed Gas, & Hazardous Materials
- Communicated with:
 - All Environmental Protection Agency regions
 - Environmental Protection Agency headquarters authorities
 - Federal regulatory bodies (Occupational Safety & Health Administration, Department of Transportation)
 - State agencies (health, environmental, workplace safety)
 - California Certified Unified Program Agency (CUPAs)

CO₂ Regulatory Concerns

- State bans on toxic refrigerants
- Occupational exposure limits
- Accumulator requirements

Concern #1: State bans on toxic refrigerants

- Statutory law
- 1950's & 1960's
- Eleven states

“[Motor vehicle] air conditioning equipment... shall not contain any refrigerant which is toxic”

-Connecticut General Statutes 14-106

States that ban toxic refrigerants

State	Statute
Connecticut	§ 14-106
Idaho	§ 49-959
Indiana	§ 9-19-2-1
Kansas	§ 8-1747
Louisiana	§ 32:375 & § 40:1846(f)
Maryland	§ 22-410
North Dakota	§ 39-21-45
Oklahoma	§ 47-12-410
Utah	§ 41-6-154.10
Virginia	§ 46.2-1088
Washington	§ 46.37.470

State bans on toxic refrigerants

- CO₂ permissible by statutory amendment
- State agencies may propose amendment or state legislators may introduce amendment

Concern #2: Occupational Exposure Limits

- Determined by the Occupational Safety and Health Administration
- Short-term exposure may not exceed 30,000 parts per million
- Long-term exposure may not exceed 5,000 parts per million averaged over an 8-hour workday.

Reference: 29 CFR 1910:1000, Occupational Safety and Health Standards for Air Contaminants.

Occupational Exposure Limits

- MAC servicing industry
- Easily monitored with CO₂ detectors in other industries
 - fire protection
 - beverage industry

Concern # 3: Accumulator Requirements

- Set by the Department of Transportation
- *"Accumulators installed in motor vehicles... fabricated with a burst pressure of not less than five times their charged pressure at 70 ° F., when shipped, are not subject to the requirements of this subchapter."*
- *Accumulators not conforming "...may only be transported subject to the approval of the Associate Administrator [of Hazardous Materials Safety, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation]."*

Reference: 49 CFR 173.306

Implications

- Unless accumulators can withstand 5 times their charged pressure at 70 ° F, Department of Transportation shipping and labeling requirements apply.
- Requirements for compressed gas cylinders include hydrostatic testing every 5 years, preparation of material safety data sheets, and proper labeling.
- Exemptions for non-conforming containers have been granted in the past.

Reference:

<http://hazmat.dot.gov/exempapp/exemptions/reqexemp.htm>

Additional CO₂ Regulations

SNAP Listing (Environmental Protection Agency)

- *Refrigerant alternatives must be evaluated*
- *Carbon dioxide currently under review*

Additional CO₂ Regulations

Shipping (Department of Transportation)

- Shipments must conform to the requirements set forth in CFR 49: 171-179: Hazardous Materials Transportation. [i]
- The manufacturer, importer, or distributor who ships carbon dioxide must ensure that each container is properly labeled and tagged.
- The manufacturer, importer, or distributor is also responsible for providing a material safety data sheet to the purchaser. [ii]

References:

[i] 49 CFR 171-179: Hazardous Materials Transportation

[ii] 29 CFR 1910.1200 Hazard Communication for Toxic and Hazardous Substances.

Additional CO₂ Regulations

Shipping Information

	Carbon Dioxide	Carbon Dioxide, Refrigerated Liquid
Proper Shipping Name:	Carbon Dioxide	Carbon Dioxide, Refrigerated Liquid
Hazard Class:	2.2	2.2
Identification Number:	UN 1013	UN2187
Shipping Label:	Nonflammable Gas	Nonflammable Gas

Additional CO₂ Regulations

Storage (*Occupational Safety & Health Administration*)

- All compressed gases in cylinders, portable tanks, rail tank cars, or motor vehicle cargo tanks must be in accordance with Compressed Gas Association Pamphlet P-1-1965.

Reference: 29 CFR 1910-101: Occupational Safety and Health Standards for Hazardous Materials, General Requirements for Compressed Gasses.

Additional CO₂ Regulations

Worker Safety (*Occupational Safety & Health Administration*)

- Hazardous material regulations require that employers:
 - give employees access to information on carbon dioxide
 - provide adequate training and personal protective equipment,
 - use approved handling methods,
 - ensure containers have pressure relief devices, and
 - inspect equipment regularly

Reference: 29 CFR 1910:1000 Occupational Safety and Health Standards for Air Contaminants

Additional CO₂ Regulations

Information Requirements

(Occupational Safety & Health Administration)

- Employers must explain the labeling system and the material safety data sheet to the employees
- Employees
 - Must be informed that the Occupational Safety and Health Administration mandates they receive information
 - Must be made aware of operations in their work area where carbon dioxide is present.
 - Must be told where the written hazard communication for carbon dioxide is and where the material safety data sheet is located.

Reference: 29 CFR 1910:1200. Hazard Communication for Toxic and Hazardous Substances

Additional CO₂ Regulations

Personal Protective Equipment

(Occupational Safety & Health Administration)

- Employers must provide employees with protective equipment to use while handling carbon dioxide.
- CO₂ Material Safety Data sheets provide information on the proper equipment to use.

Reference: 29 CFR 1910:132: Occupational Safety and Health Standards for Personal Protective Equipment, General Requirements

Additional CO₂ Regulations

Training Requirements (OSHA) [i]

- Employees must be trained in the methods and observations used to detect the presence or release of a carbon dioxide in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous chemicals when being released, etc.);
- Employees must be trained in the physical and health hazards of the carbon dioxide in the work area;
- Employees must be trained in measures to protect themselves from carbon dioxide hazards, including appropriate work practices, emergency procedures, and personal protective equipment to be used.

[i] 29 CFR 1910:1200 Hazard Communication for Toxic and Hazardous Substances

Additional CO₂ Regulations

Approved handling methods (OSHA)

- Workers should handle carbon dioxide cylinders, portable tanks, rail tank cars, or motor vehicle cargo tanks in accordance with Compressed Gas Association Pamphlet P-1-1965.^[i]

[i] 29 CFR 1910-101(a)(c) Occupational Safety and Health Standards for Hazardous Materials, General Requirements for Compressed Gasses

Additional CO₂ Regulations

Pressure relief devices (OSHA)

- Compressed gasses must have pressure relief devices installed and maintained in accordance with Compressed Gas Association Pamphlets S-1.1-1963 and 1965 addenda and S-1.2-1963.

29 CFR 1910.101(c) Occupational Safety and Health Standards for Hazardous Materials, General Requirements for Compressed Gasses, Safety Relief Devices

Additional CO₂ Regulations

Equipment inspection (OSHA)

- Employers are required to determine that CO₂ cylinders are in a safe condition to the extent that this can be determined by visual inspection.
- Other inspections shall be conducted as prescribed in the Hazardous Materials Regulations of the Department of Transportation (49 CFR parts 171-179 and 14 CFR part 103).
- Where those regulations are not applicable, visual and other inspections shall be conducted in accordance with Compressed Gas Association Pamphlets C-6-1968 and C-8-1962.

Reference: 29 CFR 1910-101(a)(c) Requirements for Compressed Gases, Inspection, Handling, and Safety Relief Devices.

Additional CO₂ Regulations

Reporting (EPA & Local Agencies)

- Facilities with more than 10,000 lbs of CO₂ on site must submit a material safety data sheet and provide annual inventory updates to the proper authorities. [i]
 - State Emergency Response Commission,
 - Local Emergency Planning Committee
 - Local fire department.
- Reporting forms and instructions must be obtained from the State Emergency Response Commission. A full list of state contacts is available at:<http://yosemite.epa.gov/oswer/ceppoweb.nsf/content/tier2.htm?openDocument>

[i] U.S. EPA "*The Emergency Planning and Community Right-to-Know Act*" publication number 550-F-00-004.

Additional CO₂ Regulations

Reporting - CA (*Certified Unified Program Agency/CUPA*)

- Companies with more than 500 pounds, 55 gallons, or 200 cubic feet (at standard temperature and pressure*) of carbon dioxide on-site at any time during the year must submit a Hazardous Material Business Plan.
- CUPAs can exercise statutory authority (25503.5c.2 CHSC) to establish a higher container thresholds.
 - * Standard temperature=0 degree C, standard pressure= 1 atmosphere, California Health & Safety Code 25503.5a

Additional CO₂ Regulations

- Hazardous Material Business Plans must provide:
 - a listing or inventory of hazardous materials and wastes present
 - amounts handled
 - where hazardous materials are handled and stored (including a site map)
 - emergency response procedures in case of a release
 - employee training for hazardous materials
- Bakersfield Example
 - Bakersfield raised the threshold for CO₂ to 600 cubic feet.
 - Intended to take the typical soda fountain (50# cylinder @ 8.5 cf/lb = 425cf) out of the program. [i]

[i] Howard Wines, Bakersfield, California Certified Unified Program Agency ("Email correspondence," June 7, 2005)