

Guide to OSHA Standard 1910.110 -- Storage and Handling of Liquefied Petroleum Gases¹

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The Impact of Safety on Florida Agriculture

Florida agriculture, including forestry and fishing, made an annual economic impact of \$53 billion in 1998. More than 81,000 people work on the 40,000 farms in the state, and more than 50,000 are employed in other activities related to agriculture. The state's agricultural enterprises range from large citrus, vegetable and cattle operations to small family-operated farms.

From 1989 to 1998, there were approximately 240 deaths related to agriculture in Florida, according to data compiled by the Deep-South Agricultural Health and Safety Center. In addition, agriculture has one of the highest injury and death rates among U.S. industries.

Safety in Florida agriculture is challenging because:

- the state's agricultural enterprises are diverse,

- safety knowledge among workers varies,
- manual labor is used extensively,
- the climate creates year-round heat stress.

Therefore, it is vital to assist the public in learning about OSHA documents related to agriculture. More related information is available at the following Web sites:

Florida AgSafe:

<http://www.flagsafe.ufl.edu/>

OSHA Regulations:

<http://www.osha.gov/comp-links.html>

Contents of OSHA Standard 1910.110

Briefly, the main section headings in the standard are given here. A detailed list of contents, including a list of tables in the standard, is given under "Summary of Standard 1910.110."

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- Section 1910.110(a) -- Definitions
- Section 1910.110(b) -- Basic Rules
- Section 1910.110(c) -- Cylinder Systems
- Section 1910.110(d) -- Systems Utilizing Containers Other than DOT Containers
- Section 1910.110(e) -- Liquefied Petroleum Gas as a Motor Fuel
- Section 1910.110(f) -- Storage of Containers Awaiting Use or Resale
- Section 1910.110(g) -- [Reserved]
- Section 1910.110(h) -- Liquefied Petroleum Gas Service Stations
- Section 1910.110(i) -- Scope

NOTE: Some sections of OSHA standards are labeled "Reserved." This label implies either that information has been deleted from the previous version of the standard or that additions to the standard are anticipated. Because standards often reference other standards, it is important that paragraph numbers remain consistent.

Where to Get OSHA Standard 1910.110

The standard is available through the World Wide Web. Start at the OSHA Web site:

<http://www.osha.gov/>

or proceed directly to the Compliance area of the site:

<http://www.osha.gov/comp-links.html>

and click on "OSHA Regulations (Standards - 29 CFR)".

Summary of Standard 1910.110

OSHA Standard 1910.110 is useful for any facility in which liquefied petroleum gases are stored. These gases, often referred to as LPG or LP-Gas, include the following, either in pure form or in

mixtures: propane, propylene, butanes (normal butane or iso-butane), and butylenes.

The standard specifies every aspect of storing, transferring, and transporting LP-gases. Particular concerns of the standard are prevention of excess pressure in storage containers, safety devices, regulators, and electrical installations and other potential sources of ignition.

The detailed list of contents below is a good guide to the standard.

1910.110(a) -- Definitions

1910.110(b) -- Basic Rules

(b)(1) -- Odorizing Gases

(b)(2) -- Approval of Equipment and Systems

(b)(3) -- Requirements for Construction and Original Test of Containers

(b)(4) -- Welding of Containers

(b)(5) -- Markings on Containers

(b)(6) -- Location of Containers and Regulating Equipment

(b)(7) -- Container Valves and Container Accessories

(b)(8) -- Piping - Including Pipe, Tubing, and Fittings

(b)(9) -- Hose Specifications

(b)(10) -- Safety Devices

(b)(11) -- Vaporizer and Housing

(b)(12) -- Filling Densities

(b)(13) -- LP-Gas in Buildings

(b)(14) -- Transfer of Liquids

(b)(15) -- Tank Car or Transport Truck Loading or Unloading Points and Operations

(b)(16) -- Instruction of Personnel

(b)(17) -- Electrical Equipment and Other Sources of Ignition

(b)(18) -- Fixed Electrical Equipment in Classified Areas

(b)(19) -- Liquid-level Gaging Device

(b)(20) -- Requirements for Appliances

1910.110(c) -- Cylinder Systems

(c)(1) -- Application

(c)(2) -- Containers Shall Be Marked in Accordance with DOT Regulations

(c)(3) -- Description of a System

(c)(4) -- Containers and Regulating Equipment Installed Outside of Buildings or Structures

(c)(5) -- Containers and Equipment Used Inside of Buildings or Structures

(c)(6) -- Container Valves and Accessories

(c)(7) -- Safety Devices

(c)(8) -- Reinstallation of Containers

(c)(9) -- Permissible Product

1910.110(d) -- Systems Utilizing Containers Other than DOT Containers

(d)(1) -- Application

(d)(2) -- Design Pressure and Classification of Storage Containers

(d)(3) -- Container Valves and Accessories, Filler Pipes, and Discharge Pipes

(d)(4) -- Safety Devices

(d)(5) -- Reinstallation of Containers

(d)(6) -- Capacity of Containers

(d)(7) -- Installation of Storage Containers

(d)(8) -- Protection of Container Accessories

(d)(9) -- Drips for Condensed Gas

(d)(10) -- Damage from Vehicles

(d)(11) -- Drains

(d)(12) -- General Provisions Applicable to Systems in Industrial Plants (Of 2,000 Gallons Water Capacity and More) and to Bulk Filling Plants

(d)(13) -- Container-charging Plants

(d)(14) -- Fire Protection

(d)(15) -- [Reserved]

(d)(16) -- Lighting

(d)(17) -- Vaporizers for Internal Combustion Engines

(d)(18) -- Gas Regulating and Mixing Equipment for Internal Combustion Engines

1910.110(e) -- Liquefied Petroleum Gas as a Motor Fuel

(e)(1) -- Application

(e)(2) -- General

(e)(3) -- Design Pressure and Classification of Fuel Containers

(e)(4) -- Installation of Fuel Containers

(e)(5) -- Valves and Accessories

(e)(6) -- Piping - Including Pipe, Tubing, and Fittings

(e)(7) -- Safety Devices

(e)(8) -- Vaporizers

(e)(9) -- Gas Regulating and Mixing Equipment

(e)(10) -- [Reserved]

(e)(11) -- Stationary Engines in Buildings

(e)(12) -- Portable Engines in Buildings

(e)(13) -- Industrial Trucks Inside Buildings

(e)(14) -- Garaging LP-Gas-Fueled Vehicles

1910.110(f) -- Storage of Containers Awaiting Use or Resale

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(f)(2) -- General

(f)(3) -- [Reserved]

(f)(4) -- Storage Within Buildings Not Frequented by the Public (Such as Industrial Buildings)

(f)(5) -- Storage Within Special Buildings or Rooms

(f)(6) -- Storage Outside of Buildings

(f)(7) -- Fire Protection

1910.110(g) -- [Reserved]

(g)(1) -- Application

(g)(2) -- Construction and Marking of Containers

(g)(3) -- Capacity of a System

(g)(4) -- Description of a System

(g)(5) -- Location of Containers and Systems

(g)(6) -- Container Valves and Accessories

(g)(7) -- Safety-Relief Devices

(g)(8) -- System design and line pressure.

(g)(9) -- System Enclosure and Mounting

(g)(10) -- Piping - Including Pipe, Tubing, and Fittings

(g)(11) -- Appliances

(g)(12) -- General Precautions

(g)(13) -- Charging of Containers

(g)(14) -- Fire Extinguisher

1910.110(h) -- Liquefied Petroleum Gas Service Stations

(h)(1) -- Application

(h)(2) -- Design Pressure and Classification of Storage Containers

(h)(3) -- Container Valves and Accessories

(h)(4) -- Safety-relief Valves

(h)(5) -- Capacity of Liquid Containers

(h)(6) -- Installation of Storage Containers

(h)(7) -- Protection of Container Fittings

(h)(8) -- Transport Truck Unloading Point

(h)(9) -- Piping, Valves, and Fittings

(h)(10) -- Pumps and Accessories

(h)(11) -- Dispensing Devices

1910.110(i) -- Scope

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(i)(2) -- Inapplicability

(i)(3) -- Retroactivity

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- Table H-24. Wall Thickness of Copper Tubing
- Table H-25. Wall Thickness of Aluminum Alloy Tubing
- Minimum Required Rate of Discharge for Safety Relief Valves
- Air Conversion Factors
- Table H-26. Container and Vaporizer Safety Relief Valves Start-to-Discharge Settings

- Minimum Distances between Storage Containers and Vaporizer-Burners
- Table H-27. Maximum Permitted Filling Density
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- Table H-29. Volume Correction Factors
- Typical Densities for Two Fuel Gases
- Table H-30. Relief Valve Settings
- Table H-31. Minimum Design Pressures for Containers
- Table H-32. Design Pressure for Specific Container Type
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- Table H-34. Minimum Design Pressure of Containers
- Recommended Distances between Containers