



# Roll-Over Protective Structures (ROPS) for Tractors Used in Agricultural Operations -- OSHA Standard 1928.51 <sup>1</sup>

Carol J. Lehtola, Charles M. Brown, and William J. Becker<sup>2</sup>

## The Impact of Safety on Florida Agriculture

Florida agriculture, including forestry and fishing, made an annual economic impact of \$55 billion in 1998, according to the Florida Department of Agriculture and Consumer Services. 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:

- Florida 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 federal occupational safety and health (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>>

## Overview

This document, a condensation of Section 1928.51 of the Occupational Safety and Health Act (Chapter 29, Code of Federal Regulations, or 29 CFR), is not intended to be totally inclusive but rather to highlight the information and requirements in the

---

1. This document is ABE293, one of a series of the Agricultural and Biological Engineering Department, Florida Cooperative Extension Service, Institute of Food and Agricultural Sciences, University of Florida. Original publication date December 2000. Reviewed February 2008. Visit the EDIS Web Site at <http://edis.ifas.ufl.edu>.

2. Carol J. Lehtola, assistant professor and Extension Agricultural Safety Specialist; Charles M. Brown, coordinator information/publication services; William J. Becker, professor emeritus; Agricultural and Biological Engineering Department, Institute of Food and Agricultural Sciences, University of Florida, Gainesville, 32610.

The Institute of Food and Agricultural Sciences (IFAS) is an Equal Opportunity Institution authorized to provide research, educational information and other services only to individuals and institutions that function with non-discrimination with respect to race, creed, color, religion, age, disability, sex, sexual orientation, marital status, national origin, political opinions or affiliations. U.S. Department of Agriculture, Cooperative Extension Service, University of Florida, IFAS, Florida A. & M. University Cooperative Extension Program, and Boards of County Commissioners Cooperating. Millie Ferrer, Interim Dean

complete OSHA standard that owners and managers of agricultural businesses should understand. Refer to the OSHA Web site given above for the complete standard and for court interpretations of the standard.

## Contents of OSHA Standard 1928.51

- Section 1928.51(a) -- Definitions as Used in this Subpart
- Section 1928.51(b) -- General Requirements
- Section 1928.51(c) -- Labeling
- Section 1928.51(d) -- Operating Instructions

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.

### Section 1928.51(a) -- Definitions as Used in this Standard

**Agricultural tractor** -- A two- or four-wheel-drive type vehicle, or track vehicle, of more than 20 engine horsepower, designed to furnish the power to pull, carry, propel, or drive implements that are designed for agriculture. All self-propelled implements are excluded.

**Low profile tractor** -- A wheeled tractor possessing the following characteristics:

- The front wheel spacing is equal to the rear wheel spacing, as measured from the centerline of each right wheel to the centerline of the corresponding left wheel.
- The clearance from the bottom of the tractor chassis to the ground does not exceed 18 inches.
- The highest point of the hood does not exceed 60 inches, and
- The tractor is designed so that the operator straddles the transmission when seated.

**Tractor weight** -- Includes the protective frame or enclosure, all fuels, and other components required for normal use of the tractor. Ballast shall be added as necessary to achieve a minimum total weight (tractor and ballast) of 110 lb. (50.0 kg.) per maximum power take-off horsepower at the rated engine speed or the maximum, gross vehicle weight specified by the manufacturer, whichever is the greatest. Front-end weight shall be at least 25 percent of the tractor test weight. In case power take-off horsepower is not available, 95 percent of net engine flywheel horsepower shall be used.

### Section 1928.51(b) -- General Requirements

Agricultural tractors manufactured after October 25, 1976, shall meet the following requirements:

**1928.51(b)(1) -- Roll-Over Protective Structures (ROPS).** A roll-over protective structure (ROPS) shall be provided by the employer for each tractor operated by an employee. Except as provided in paragraph (b)(5) of this section, ROPS used on wheel-type tractors shall meet the test and performance requirements of:

- the American Society of Agricultural Engineers (ASAE) Standard S306.3-1974 entitled "Protective Frame for Agricultural Tractors -- Test Procedures and Performance Requirements" and Society of Automotive Engineers (SAE) Standard J334-1970, entitled "Protective Frame Test Procedures and Performance Requirements" (formerly codified in 29 CFR 1928.52);

or

- ASAE Standard S336.1-1974, entitled "Protective Enclosures for Agricultural Tractors -- Test Procedures and Performance Requirements" and SAE J168-1970, entitled "Protective Enclosures -- Test Procedures and Performance Requirements" (formerly codified in 29 CFR 1928.53)(1);

or

- 1926.1002 of the OSHA construction standards. These ASAE and SAE standards are incorporated by reference and have been approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51.

Copies may be obtained from either the American Society of Agricultural Engineers, 2950 Niles Road, Post Office Box 229, St. Joseph, MI 49085, or the Society of Automotive Engineers, 485 Lexington Avenue, New York, NY 10017. Copies may be inspected at the OSHA Docket Office, U.S. Department of Labor, 200 Constitution Ave., NW., Room N2634, or at the Office of the Federal Register, 800 North Capitol St., NW., Suite 700, Washington, D.C. ROPS used on track-type tractors shall meet the test and performance requirement of 1926.1001 of this title.

Footnote (1). In March 1977, the American Society of Agricultural Engineers merged S306 and S336, along with Standard 305, entitled "Operator Protection for Wheel Type Agricultural Tractors," into ASAE S383, which addresses ROPS for wheeled agricultural tractors.

#### **1928.51(b)(2) -- Seatbelts**

(i) -- Where ROPS are required by this section, the employer shall:

(A) -- Provide each tractor with a seatbelt which meets the requirements of this paragraph;

(B) -- Ensure that each employee tightens the seatbelt sufficiently to confine the employee to the protected area provided by the ROPS.

(ii) -- Each seatbelt shall meet the requirements set forth in Society of Automotive Engineer Standard SAE J4C, 1965 Motor Vehicle Seat Belt Assemblies (2), except as noted hereafter:

Footnote(2). Copies may be obtained from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, Pa. 15096.

(A) -- Where a suspended seat is used, the seatbelt shall be fastened to the movable portion of the seat to accommodate the ride motion of the operator.

(B) -- The seatbelt anchorage shall be capable of withstanding a static tensile load of 1,000 pounds (453.6 kg) at 45 degrees to the horizontal equally divided between the anchorages. The seat mounting shall be capable of withstanding this load plus a load equal to four times the weight of all applicable seat components applied at 45 degrees to the horizontal in a forward and upward direction. In addition, the seat mounting shall be capable of withstanding a 500 pound (226.8 kg) belt load plus two times the weight of all applicable seat components both applied at 45 degrees to the horizontal in an upward and rearward direction. Floor and seat deformation is acceptable provided there is not structural failure or release of the seat-adjusting mechanism or other locking device.

(C) -- The seatbelt webbing material shall have a resistance to acids, alkalies, mildew, aging, moisture, and sunlight equal to or better than that of untreated polyester fiber.

#### **1928.51(b)(3) -- Protection from Spillage.**

Batteries, fuel tanks, oil reservoirs, and coolant systems shall be constructed and located or sealed to assure that spillage will not occur which may come in contact with the operator in the event of an upset.

**1928.51(b)(4) -- Protection from Sharp Surfaces.** All sharp edges and corners at the operator's station shall be designed to minimize operator injury in the event of an upset.

**1928.51(b)(5) -- Exempted Uses.** Paragraphs (b)(1) and (b)(2) of this section do not apply to the following uses:

(i) -- "Low profile" tractors while they are used in orchards, vineyards, or hop yards where the vertical clearance requirements would substantially interfere with normal operations, and while their use is incidental to the work performed therein.

(ii) -- "Low profile" tractors while used inside a farm building or greenhouse in which the vertical clearance is insufficient to allow a ROPS equipped tractor to operate, and while their use is incidental to the work performed therein.

(iii) -- Tractors while used with mounted equipment which is incompatible with ROPS (e.g., cornpickers, cotton strippers, vegetable pickers and fruit harvesters).

**1928.51(b)(6) -- Remounting.** Where ROPS are removed for any reason, they shall be remounted so as to meet the requirements of this paragraph.

### **Section 1928.51(c) -- Labeling**

Each ROPS shall have a label, permanently affixed to the structure, which states:

**1928.51(c)(1)** -- Manufacturer's or fabricator's name and address;

**1928.51(c)(2)** -- ROPS model number, if any;

**1928.51(c)(3)** -- Tractor makes, models, or series numbers that the structure is designed to fit; and

**1928.51(c)(4)** -- That the ROPS model was tested in accordance with the requirements of this subpart.

### **Section 1928.51(d) -- Operating Instructions**

Every employee who operates an agricultural tractor shall be informed of the operating practices contained in Appendix A of this part and of any other practices dictated by the work environment. Such information shall be provided at the time of initial assignment and at least annually thereafter.

### **Appendix A -- Employee Operating Instruction**

According to OSHA regulations, tractor drivers must be instructed in the following nine points:

1. Securely fasten your seat belt if the tractor has a ROPS.

2. Where possible, avoid operating the tractor near ditches, embankments, and holes.

3. Reduce speed when turning, crossing slopes, and on rough, slick, or muddy surfaces.

4. Stay off slopes too steep for safe operation.

5. Watch where you are going, especially at row ends, on roads, and around trees.

6. Do not permit others to ride.

7. Operate the tractor smoothly -- no jerky turns, starts, or stops.

8. Hitch only to the drawbar and hitch points recommended by tractor manufacturers.

9. When tractor is stopped, set brakes securely and use park lock if available.