

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

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## The Impact of Safety on Florida Agriculture

Agriculture, including forestry and fishing, made an annual economic impact of \$150 billion in Florida in 2020, according to the University of Florida's Institute of Food and Agricultural Sciences (UF/IFAS). More than 137,000 people work on the 47,400 farms in the state while forest-based employment is reported as 124,000, and fishery workers are estimated at 4,000. When processing and distribution are included, the number of workers supported by Florida agriculture is over 2 million (EIAP, 2021). The state's agricultural enterprises range from large citrus, vegetable, and cattle operations to small family-operated farms.

The Bureau of Labor Statistics (BLS) reports, the Agriculture, Forestry, and Fishing (AgFF) industry was the most hazardous industry in the United States, with a work-related fatality rate of 20.5 per 100,000 full-time equivalents (BLS, 2022a). This is more than six times the average for all industries: 3.4 fatalities per 100,000 workers. For Florida in 2019, the state's annual work-related fatality rate for AgFF was 13.5 deaths per 100,000 FTEs (BLS, 2022b). However, this does not include many types of incidents that may occur on agricultural worksites or nearby roadways that are

agricultural related but result in the death of those who are not agricultural workers (Gorucu, 2021).

Safety in Florida agriculture is challenging because:

- Florida agricultural enterprises are diverse,
- Safety knowledge among workers varies,
- Manual labor is used extensively,
- Climate creates year-round risks and hazards.

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 websites:

- Florida Agricultural Safety and Health Program: <https://abe.ufl.edu/agsafety/>
- OSHA Regulations: <https://www.osha.gov/laws-regs>

## Overview

This following is 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

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

The purpose of this article is to summarize the [OSHA standard \(1928.51\)](#) on Roll-over Protective Structures for agricultural tractors. The targeted audience are extension agents, equipment dealers, agricultural equipment operators.

## 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.
- 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:

#### 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 ASAE or SAE. Copies may be inspected at the OSHA Docket Office or at the Office of the Federal Register. ROPS used on track-type tractors shall meet the test and performance requirement of 1926.1001 of this title. (Addresses may be found in Appendix A.)

#### SEATBELTS

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

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

- Ensure that each employee uses such seatbelt while the tractor is moving; and
- 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 (copies may be obtained from SAE; see Appendix A), except as noted hereafter:

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

## 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 into contact with the operator in the event of an upset.

## 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.

## EXEMPTED USES

ROPS and seatbelts do not apply to the following uses:

- “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.

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

## REMOUNTING

Where ROPS are removed for any reason, they shall be remounted so as to meet the requirements.

## Section 1928.51(c)–Labeling

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

- Manufacturer's or fabricator's name and address;
- ROPS model number, if any;
- Tractor makes, models, or series numbers that the structure is designed to fit; and
- 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 safe operating practices contained in 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.

## EMPLOYEE OPERATING INSTRUCTIONS

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

- Securely fasten your seat belt if the tractor has a ROPS.
- Where possible, avoid operating the tractor near ditches, embankments, and holes.
- Reduce speed when turning, crossing slopes, and on rough, slick, or muddy surfaces.
- Stay off slopes too steep for safe operation.
- Watch where you are going, especially at row ends, on roads, and around trees.
- Do not permit others to ride.

- Operate the tractor smoothly—no jerky turns, starts, or stops.
- Hitch only to the drawbar and hitch points recommended by tractor manufacturers.
- When tractor is stopped, set brakes securely and use park lock if available.

## References

BLS. 2022a. “Number and Rate of Fatal Work Injuries, by Industry Sector-2020.” Accessed on October 5, 2022. <https://www.bls.gov/charts/census-of-fatal-occupational-injuries/number-and-rate-of-fatal-work-injuries-by-industry.htm>.

BLS. 2022b. “Fatal Injury Rates by State of Incident and Industry, 2020.” Accessed on October 5, 2022. <https://www.bls.gov/iif/oshwc/cfoi/staterate2019.htm>.

Economic Impact Analysis Program (EIAP). 2021. *Florida’s Agriculture and Food System: Fast Facts 2021*. Institute of Food and Agricultural Sciences (UF/IFAS): Gainesville, FL.

Gorucu S. 2021. *2010–2019 Florida Agricultural Deaths Summary*. UF/IFAS Extension, Gainesville, FL. doi. org/10.32473/edis-AE559-2021.

## Appendix A—Addresses

1. American Society of Agricultural Engineers, 2950 Niles Road, Post Office Box 229, St. Joseph, MI 49085
2. Society of Automotive Engineers, 400 Commonwealth Dr., Warrendale, PA, USA
3. OSHA Docket Office, U.S. Department of Labor, 200 Constitution Ave., NW., Room N-3653, Washington, D.C.
4. Office of the Federal Register, 8601 Adelphi Road, College Park, MD 20740-6001