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## 29 C.F.R. § 1928.52

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### Protective frames for wheel-type agricultural tractors—test procedures and performance requirements.

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(a) *Purpose.* The purpose of this section is to establish the test and performance requirements for a protective frame designed for wheel-type agricultural tractors to minimize the frequency and severity of operator injury resulting from accidental upsets. General requirements for the protection of operators are specified in 29 CFR 1928.51.

(b) *Types of tests.* All protective frames for wheel-type agricultural tractors shall be of a model that has been tested as follows:

(1) *Laboratory test.* A laboratory energy-absorption test, either static or dynamic, under repeatable and controlled loading, to permit analysis of the protective frame for compliance with the performance requirements of this standard.

(2) *Field-upset test.* A field-upset test under controlled conditions, both to the side and rear, to verify the effectiveness of the protective system under actual dynamic conditions. Such testing may be omitted when:

(i) The analysis of the protective-frame static-energy absorption test results indicates that both  $FER_{IS}$  and  $FER_{IR}$  (as defined in paragraph (d)(2)(ii) of this section) exceed 1.15; or

(ii) The analysis of the protective-frame dynamic-energy absorption test results indicates that the frame can withstand an impact of 15 percent greater than the impact it is required to withstand for the tractor weight as shown in Figure C-7.

(c) *Descriptions—(1) Protective frame.* A protective frame is a structure comprised of uprights mounted to the tractor, extending above the operator's seat. A typical two-post frame is shown in Figure C-1.

(2) *Overhead weather shield.* When an overhead weather shield is available for attachment to the protective frame, it may be in place during tests provided it does not contribute to the strength of the protective frame.

(3) *Overhead falling object protection.* When an overhead falling-object protection device is available for attachment to the protective frame, it may be in place during tests provided it does not contribute to the strength of the protective frame.

(d) *Test procedures—(1) General.* (i) The tractor weight used shall be that of the heaviest tractor model on which the protective frame is to be used.

(ii) Each test required under this section shall be performed on a new protective frame. Mounting connections of the same design shall be used during each such test.

(iii) Instantaneous deflection shall be measured and recorded for each segment of the test; see paragraph (e)(1)

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(i) of this section for permissible deflections.

(iv) The seat-reference point (“SRP”) in Figure C-3 is that point where the vertical line that is tangent to the most forward point at the longitudinal seat centerline of the seat back, and the horizontal line that is tangent to the highest point of the seat cushion, intersect in the longitudinal seat section. The seat-reference point shall be determined with the seat unloaded and adjusted to the highest and most rearward position provided for seated operation of the tractor.

(v) When the centerline of the seat is off the longitudinal center, the frame loading shall be on the side with the least space between the centerline of seat and the protective frame.

(vi) Low-temperature characteristics of the protective frame or its material shall be demonstrated as specified in paragraph (e)(1)(ii) of this section.

(vii) Rear input energy tests (static, dynamic, or field-upset) need not be performed on frames mounted to tractors having four driven wheels and more than one-half their unballasted weight on the front wheels.

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