



26 July 2004

OSHA Docket
C-DAC
Negotiated Rulemaking Committee Meetings
Docket: S030 Safety Standards For Cranes And Derrick

Public Comment
OSHA/DOL
Washington DC

Fall Protection to be added to new Crane regulation:

Written testimony to support public testimony on 7704:

Note: I have provided testimony at each OSHA hearing related to fall hazards and fall protections since OSHA came into existence. My cv is attached.

Fall Deaths :

While overall fatalities have been steadily decreasing, fall deaths have steadily increased 5-10% per year since 1990 with the exception of 2002 (OSHA statistics and BLS). Many deaths occur as a result of assembly and use of cranes and related equipment from my experience as an expert witness in tort and third party litigation. Falls are the leading cause of death in construction.

Fall Hazard :

Any potential to free falls six feet or more and impact on a lower level

Falls six feet and less in construction give rise 1% of fall deaths whereas falls up to ten feet give rise to nine percent of fall deaths (OSHA statistics). To prevent fall collisions on cranes, a six foot trigger height is recommended and using fall arrest systems rigged and capable of stopping falls in that distance.

Fall Protection : Proposed definition:

A hierarchy consisting of

1. Elimination of hazard (sequence and design),



2. Prevention (floors, railings),
3. Arrest (harness systems including restraint).

Fall Protection Anchorages : Proposed definition:

“Anchorage shall be certified by a Registered Professional Engineer (RPE) skilled in fall protection structural engineering”.

These RPE’s are qualified persons capable of providing as-built drawings which have been followed through construction and represent the authorized design for the confidence of the workforce especially in the realm of horizontal lifeline systems meeting current OSHA regulations. Such qualified persons work almost daily in the field of statics, dynamics, suspended cables and topology of interconnected system parts. They are typically structural engineers.

The need for structural engineer is related to prior schooling in principles of fall protection such as compatibility of components, multiple persons in the system, dynamic force, dynamics a limit to ensure no collisions, overhead location, edge and cutting consideration, rescue from fallen position, wear and tear. Note: A worker falling with a shock-absorbing lanyard in the center of a steel cable line produces an end force of up to 10,000 lb at the anchors, which is not obvious to a person without test data, engineering calculations and the ability to comprehend this information and apply it with adequate safety factors. (ref Introduction to Fall Protection by J. Nigel Ellis, 3rd edition, ASSE, Chapter 7)

Fixed Ladders :

“Fixed ladders shall be protected above 20 ft and shall have positive means of arrest; otherwise Sub-part X shall apply”.

The A14.3-2002 standard has returned to 20 ft in 1102 and abandoned the 24 ft rule.

Use of cages shall be an optional addition to fixed ladders for acrophobic reasons and limited conscious resting who are otherwise positively protected from falling.

The need for positive fall protection (Cal OSHA terminology) is to eliminate the tower crane operator deaths from fall impalement by impacting the adjoining extensions and rails of the offset ladder below. Fixed ladder extensions and rails are addressed below. The limited use of cages is addressed in www.triodyne.com



Safety Briefs Vol 25 No. 4 April 2004. It is time to categorize ladder cages appropriately to the level of safety they provide and recommend or require ladder climbing protection systems which provide positive means of arrest.

Grab Bars and Grabrails and fixed ladder extensions and side rails :

“Grab bars and extension rails shall have horizontal members spaced up to 12 inches apart to optimize grip during a fall”.

This requirement has been adopted by the Corps of Engineers in the latest EM-385-1-1 standard on 1103 (see Appendix J, Fixed Ladders) for extension side rails and also roof hatches. Ref: www.hq.usace.army.mil/soh/hqusace_soh.htm

Calculations by Triodyne (www.triodyne.com) Safety Briefs Vol 16 No. 4 April 2002, show the near impossibility of the worker using his grip to stop a fall on a vertical surface such as a side rail, extension side rail or grab bar. Grip strength for moving ropes has been tested by Rigging for Rescue (www.riggingforrescue.com) and shown to vary from 10-50 lbs in belay holding capability far short of body weight (1996).

Holding grab bars and rungs horizontally is powerful for suddenly arresting a fall when the footing leaves the ladder (DSC website www.FallSafety.com - cursor down the page; look for and click Grab Safe for Ladders and cursor down to press “here” to play video of Grab Safe for fixed ladders.

PS Doors.com makes these additions to ladders for bolting or welding to provide horizontal grab bars for fixed ladder extensions. They also make a roof hatch safety product with horizontal grab bars.

Second Means of Escape from workstations :

“Crane operators shall have two means of escape including the primary means of access”.

Means of Escape for the crane operator is required in ANSIB30.3 (Tower Cranes) and is a basic requirement of the Life Safety Code NFPA 101. Other ANSIB30 crane codes, including B30.2 also require a second means of escape for other types of cranes for the elevated operator.



I request incorporation by reference earlier requests for consideration of means of egress from cranes by J. Nigel Ellis, RTC, Research & Trading Corporation for 1910.179 proposed rulemaking; also 1910.33-39 Subpart E Means of Egress and Emergency Action Plans preambles (8-76, 9-83, 1-90) related to use of windows for means of escape.

Climbing a tower crane or hoist :

Propose for raising or lowering the crane or hoist:

“All crew members shall be provided in advance with an effective means fall protection where a fall hazard may occur. A written fall protection plan using conventional fall protection shall be available in addition to a crane/hoist raise procedure”.

“All braces shall be secured from falling by adequately bolting to the tower structure”.

Raising the crane or hoist to a different level requires a crew to engage pawls, reeve cables, add braces at points of support with the building, by rapidly moving up and down the inside and outside of the tower or shaft. This work is often done at night or before dawn to maximize day production but adds to the falling hazard. Braces secured with #9 wire will fall if the crane jolts. This stop climbing or inside climbing work is done on an irregular basis and workers are frequently untrained. In addition the work is typically noisy and without effective two-way communication, misunderstandings and lack of coordination can occur causing hoisting failure and fatal injury. Fall protection must anticipate the possibility of a falling or collapsing crane.

Note: The requirement for fall protection will also apply to the addition of a jib to a crane on site or in a shop or removal and storage.

Definition of Fall Protection Equipment and its use in the standard: Clarification that work positioning equipment shall be supplemented with a fall arrest system. Also if a free fall can occur with fall restraint equipment then a fall arrest system shall be employed additionally or in substitution. This will avoid confusion and the need for interpretations later

Thank you for your consideration



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