Steel Erection Safety Requirements

An Online Continuing Education Course for Engineers

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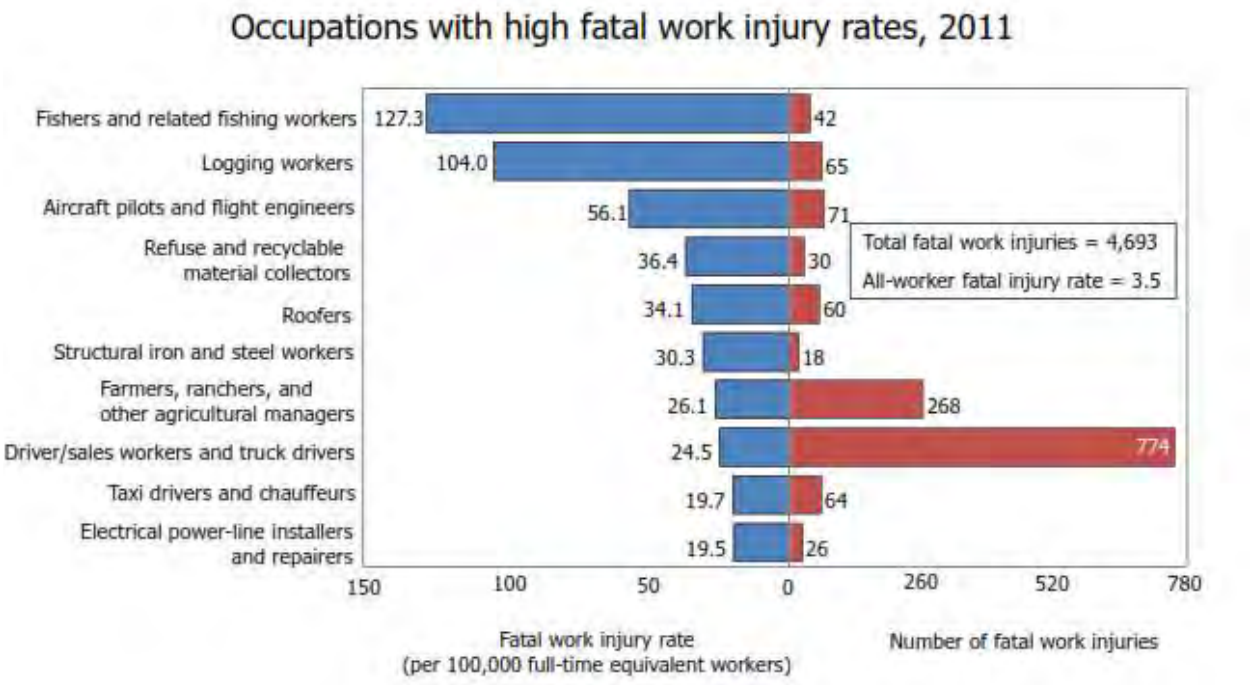
Introduction

Steel erection is dangerous business. Per the chart below, eighteen (18) structural iron and steel workers were killed on the job in the U.S. in 2011. The fatal work injury rate of 30.3 deaths per 100,000 full time workers makes it one of the most dangerous occupations in the country.

However, steel erection used to be even more dangerous. In 2001, the fatality rate for structural iron and steel workers was 57.7 deaths per 100,000 full time workers.



In an effort to address the high rate of injuries and deaths, the Occupational Safety and Health Administration (OSHA) revised the steel erection standard (29 CFR 1926 Subpart R) on July 18th, 2001. The revised standard was the result of years of joint efforts between the steel erection industry, industry experts and OSHA. This negotiated rule established new performance criteria not just for the physical steel erection, but also for fall protection, employee safety training, rigging practices and crane safety. The rule became effective on Jan. 18, 2002.

An analysis of OSHA data shows that steel erection accidents resulting in fatalities are often caused by the following factors:

- **Collapses while landing or placing a load**-most were the result of placing loads on unsecured or unbridged joists.
- **Collapses while connecting joists or trusses**-most were the result of prematurely disconnecting the crane before the piece was secure.
- **Workers struck by objects during miscellaneous activities**-most were the result of walking or working under a load.
- **Workers struck by objects and then falling**-most were the result of being struck while landing a load or making a connection, by a tool slipping, or by a piece of decking being blown off a pile when fall protection was not provided or used.
- **Improper use or failure of fall protection**-most were the result of employee failure to use available fall protection systems even though the worker was wearing a belt (and in some cases lifelines were rigged).
- **Unsecured or unstable decking**-most were the result of stepping onto or working on unsecured decking that slipped out of place when fall protection was not provided or used.
- **Plumbing, bolting, welding and cutting**-most were the result of of the worker not being tied off while at the work station (whether or not fall protection was provided).
- **Walking/standing on the beam/joist (i.e. moving point-to-point)**-most were slips or falls where fall protection was not provided or used.

The rule outlines procedures for several practices that were not addressed in the previous standard. It establishes procedures for multiple rigged lifts, detailed requirements for daily crane inspections, rigging inspections, rigger qualifications and connecting methods. The most notable change is that it establishes a height of 15 feet as the new action level for fall protection.

The standard is divided into several sections:

- Scope of coverage.
- Definitions.
- Site layout, site-specific erection plan and construction sequence.
- Hoisting and rigging.
- Methodology.
- Fall protection.
- Training requirements.

Scope of Coverage

Most people would initially expect that the standard only covers ironworkers. This is not the case. Beyond what most would consider steel erection, activities covered under the standard also include erecting ornamental iron, window walls, stone and other siding systems, etc.

Definitions

This section lists definitions for the numerous terms discussed in the standard. Terms that necessitate close scrutiny include connector, competent person, qualified person, controlled decking zone, fall restraint system, multiple lift rigging and controlled load lowering.

Site Layout, Site-Specific Erection Plan and Construction Sequence

This section is one of the more significant additions to the rule, relative to the previous standard. It requires that the controlling contractor provide "adequate access roads into and through the site for the safe delivery and movement of…" cranes, derricks, materials, etc. The controlling contractor is also responsible for providing "a firm, properly graded, drained area, readily accessible to the work with adequate space for the safe storage of materials and the safe operation of the erector's equipment." This section also stipulates certain written notifications regarding the concrete in the footings, and anchor bolt modifications.

Hoisting and Rigging

This section establishes inspection requirements for cranes, operator responsibilities and multiple lift rigging procedures. It also discusses those times when it is permitted to work under a suspended load, and how to pre-plan the routes for suspended loads. A very important addition here states that "a qualified rigger (a rigger who is also a qualified person) shall inspect the rigging prior to each shift in accordance with 1926.251." Clearly, the intent is to require that the rigger be an individual with a high degree of expertise, as found in the definition of a qualified person in section 1926.751.

Methodology

These sections deal with the actual methodology of erecting beams, columns, joists, decking and systems-engineered buildings. Pay attention to the requirements for roof and deck openings discussed under 1926.754 (e)(2), particularly paragraph (iii) which states that "metal decking holes and openings shall not be cut until immediately prior to being permanently filled with the equipment.…" The other option is that they be immediately covered. The requirements for covers are listed here and are identical to those found in the fall protection standard (Subpart M).

Fall Protection

This is the most important section of the standard because it deals with controlling the greatest hazard faced by employees during steel erection. This section should be reviewed in detail. Briefly, here are the basic requirements:

1. Fall protection action level of 15 feet for all work except connecting and working within a controlled decking zone (CDZ).
2. Acceptable protection includes safety net systems, guardrail systems, personal fall arrest systems, positioning device systems or fall restraint systems.
3. The criteria for fall protection equipment is identical to 1926.502, the fall protection standard, which is incorporated by reference therein.
4. Perimeter safety cables on multi-story buildings must be installed on the final perimeter as soon as the decking has been installed.
5. Connectors and employees working in CDZs have different fall protection requirements. A CDZ consists of an area not more than 90 feet wide and 90 feet deep from any leading edge, and is marked by the use of control lines or equivalent. Access to a CDZ is limited only to those employees engaged in leading edge work. There are specific training requirements for employees working in a CDZ.
6. The "Custody of Fall Protection" paragraph states that the fall protection installed by the steel erector can only be left on the building if the controlling contractor has inspected, and accepted control and responsibility for that fall protection system.

Training Requirements

This section outlines the specific training that must be given to employees who are exposed to falls, as well as special training programs for multiple rigged lifts, connectors and employees who work in controlled decking zones. A qualified person, as defined in section 1926.751, must provide this training.

Subpart R – Steel Erection

The full standard is included in the pages that follow.

Note Regarding Slip Resistance of Skeletal Structural Steel

In January, 2006, OSHA revoked a provision within the Steel Erection Standard which addresses slip resistance of skeletal structural steel because the test methods it referenced aren't ready. The relevant provisions of the 2001 final rule are 29 CFR 1926.754(c)(3) and appendix B of subpart R of part 1926. Paragraph (c)(3) of S shes a slip-resistance requirement for the painted structural steel member installed after Ju

"There continues eliability of the resistance testing devices," a

The standard was ulemaking Advisory Committee, which workers were slipping and falling when worki t were wet from rain or condensation.

The standard was cl Circuit by the Steel Coalition and the Re OSHA entered into a settlement agreemen dence on the progress that has been made o greed to evaluate the evidence and issue a se of the inadequate test methods.