SUBJECT: Steel Erection Directive

Purpose: To describe MNOSHA's enforcement policy for the application of Safety Standards for Steel Erection, 1926.750-761(Subpart R)

Scope: This instruction applies MNOSHA-wide.

Cancellations: The instruction issued March 1, 2004, replaced and canceled CPL 2.6, Steel Erection, dated February 22, 1999, which was an interim policy prior to enactment of the current final rule. Change 1, August 15, 2006, removes references to the slip resistance provision [1926.754(c)(3)], which was revoked.

References:
1. 29 CFR 1926.750-761 (Subpart R)
2. Federal OSHA's CPL 02-01-034, "Inspection Policy and Procedures for OSHA's Steel Erection Standards for Construction"
3. Federal OSHA's CPL 02-01-048, "Clarification of OSHA's enforcement policies relating to floors/nets and shear connectors; Cancellation of CPL 02-01-046 (Sept. 30, 2009)"

Back ground: The new Steel Erection standard is the most comprehensive safety standard to deal with the unique issues involving steel erection. There had been many calls from everyone dealing in steel erection activities to revise the existing Subpart R. On January 26, 1988, Federal OSHA announced an intent to develop a revised standard, which was separate from the then new Subpart M, Fall Protection. In 1992 it announced a Notice of Proposed Rule Making (NPRM), which also addressed recommendations and continued requests for negotiated rulemaking by various affected stakeholders. Accordingly, OSHA received more than 225 submissions and 60 nominations for membership to the Steel Erection Negotiated Rulemaking Advisory committee (SENRAC). SENRAC began negotiations in 1994 and met 11 times as a full committee. The eventual Final Rule, issued in January 18, 2001, is the direct result of the cooperative efforts of a wide range of employers, businesses, labor unions, trade associations, state and federal government, and other interested parties, to develop a rule which provides a sound basis to more effectively reduce the risks of death or serious injury to workers engaged in steel erection, through a standard that is easier to comply with and to understand.

Effective Date: Federal OSHA adopted the new Subpart R on January 18, 2001 and delayed the effective date until January 18, 2002. Minnesota OSHA also adopted the extended effective date of January 18, 2002. An additional delay in enforcement of the standard to March 19, 2002, by Federal OSHA was also observed by Minnesota OSHA.

Action : OSHIs will follow the guidelines set forth in this instruction in addressing steel erection, as it applies to construction, alteration, and/or repair.

Steel Erection Checklist: To assist OSHIs who conduct inspections of worksites on which steel erection activity takes place, a non-mandatory checklist was developed by MNOSHA staff (see Appendix A to this instruction). The checklist is a summary of Subpart R, on which the most common problem areas may be more quickly located. *OSHIs must always refer to the complete Subpart R text to make final determinations concerning violative conditions or recommendations.*

Federal Compliance Directive CPL 02-01-034**:** This is Federal OSHA's inspection policy and procedures for steel erection inspections, effective March 22, 2002. This document should be used by MNOSHA personnel as a resource as needed for more guidance or information which may not be already described in the MNOSHA policy. It includes many definitions, inspection tips, a large questions and answers section, and illustrations. However, this directive has been revised to clarify OSHA's enforcement policy on the requirements regarding: (1) fully planked or

decked floors or nets, and (2) the use of pre-installed shear connectors during steel erection. The Directive can be found on the Federal OSHA website (www.osha.gov) under Steel Erection.

OSHI use of PPE: *Where potential inspection areas may require the use of PPE such as body harnesses and lanyards, OSHI use of PPE must be cleared in advance with their immediate supervisor.*

Review of Major Elements of Subpart R.

Steel erection definition and scope: means the construction, alteration or repair of steel buildings, bridges, and other structures, including the installation of metal decking and all planking used in the process of erection. Steel erection activities now include some previously excluded activities, such as the installation of metal stairs, metal roofing, metal sided pole buildings, billboards, conveyor systems, and others. See 1926.750 (a) and (b) for a more comprehensive list of examples.

Limitations: Steel erection does not cover electrical transmission towers, communication and broadcast towers, or tanks, and the placement of reinforcing steel rods (rerod). Actual tank construction is covered under 1926.105, and 1926.104 sets the criteria for body belts, lanyards and lifelines used for fall protection during tank, communications, and broadcast tower erection. Paragraphs (b), (c), and (f) of 1926.107 provide definitions for the pertinent terms.

Interface with other Standards. Steel erection activities are seldom conducted within the confines of the steel erection standards alone. Often steel erectors will be working off some form of scaffold, ladder or ladder system, aerial lifts, and other configurations. OSHI's must cite the most applicable vertical standard. The most probable common item noted would be work from an elevation. Steel connectors commonly use scaffolds supported or suspended to facilitate their work. If those connectors are working from unguarded scaffolds, which have a working platform greater than 10 feet above the next lower elevation, and the erectors are not tied off, then there would exist a violation under the scaffold guidelines. Similarly, connectors working from an aerial lift must be tied off using aerial lift guidelines, at all elevations. However, OSHI's are again reminded that the only provisions of Subpart M, Fall Protection, which may apply directly are under 1926.502, Criteria.

Structural steel assembly (SSA), Detail Work, Finishing Work: Structural Steel Assembly is commonly also called "connector work." It includes the installation of steel joists, girders, purlins, columns, beams, trusses, splices, seats, metal decking, girts, and all bridging, and cold formed metal framing which is integrated with the structural steel framing of a building. Some of the preceding items can be made of material other than steel; for example, a fiberglass open web joist can be included if it is part of structural steel framing process. However, pre-cast concrete panels and their erection are not considered steel erection and remain covered under Subpart M. Another item to clarify a structural steel assembly or connection process from "detail" or "finishing" work is that the material being connected must be attached to a crane as defined in Subpart N, and not to come-alongs or other similar portable hand or powered hoists. Thus, the installation of metal stairs is often done with the assistance of come-alongs, and it qualifies as steel erection activity, under detail work, but it is not considered structural steel assembly or connector work. The installation of store fronts, such as in a mall setting, often done from the grade level by workers simply carrying the pieces and setting them into place is finishing work. The installation of ornamental steel is usually finishing work. Another clarification to note is that the laying down of metal decking, whether a crane is used or not used, is always considered to be SSA. The clarification between SSA, detail, or finishing work is extremely important. OSHI's must be able to differentiate the levels of work processes before they can apply the correct standards. ***Note**: There is a lot of activity which is considered steel erection; however there is significantly less activity which is considered structural steel assembly.*

Roofing Work: The installation of metal roof deck or the integrated system, including the metal banding, insulation, and screw down clips, is covered by Subpart R. The OSHI must consult with their Director/Supervisor for determinations when they encounter metal roof process employers who have chosen to follow Subpart M guidelines in lieu of Subpart R.

Application of Training Requirements: Training is emphasized in new Subpart R under 1926.761 as a supplement to 1926.21. Under 1926.761 training required for all personnel must be done by a qualified person. Specific training is required for fall hazards, multiple lift procedures, connector procedures, controlled decking zone procedures. Under 1926.21, training in the recognition and avoidance of any new hazards, including unique, site-specific hazards, would be required. This could include refresher training. OSHIs may cite 1926.761 paragraphs alone, or if the situation dictates it, include 21**.** ***Note: none of the required training under 1926.761 has to be documented, nor does the employer have to keep a record of employee training.***

Application of Fall protection requirements:

Fall Protection for employees engaged in steel erection activities falls into three categories; those who are doing structural steel assembly, those doing decking, and those doing everything else such as detail, ornamental, or finishing work. *Fall protection requirements for any type of steel erection activity start at heights greater than 15 feet.* OSHI's must first identify the type of steel erection activity in order to apply the correct rule.

NOTE: There is no longer a 25 foot rule in steel erection.

Fall protection requirements are listed under 1926.760. They include the usual guard rail systems, safety net systems, personal fall arrest systems, positioning device systems, and something not utilized officially before: ***restraint systems.*** All fall protection equipment, including equipment used for restraints, must comply/conform with 1926.502. Appendix G of Subpart R also lists the requirements for equipment used in fall protection.

Fall restraint system application: There is currently little detailed information available on fall restraint system application. Fall restraint systems are defined as a fall protection system which prevents the user from falling any distance. The restraint system, unlike fall arrest systems*, can utilize body belts* or harnesses. Restraint systems must be looked at using the case-by-case approach. Because of the very limited information and experience factor available concerning restraint systems, OSHI's must consult with their Supervisors when responding to questions from stakeholders or encountering restraint systems issues in the field. There is some mention of restraint systems in the preamble to Subpart R, page 5204, but the Fall Protection Standard Subpart M, does not address restraints. There are two Federal interpretations (November 2, 1995) which state *that OSHA has no specific standards for restraint systems, but recommends at a minimum, that fall restraint systems should have the capacity to withstand at least twice the maximum expected force that is needed to restrain a person from exposure to the fall hazard. In determining this force, consideration should be given to site-specific factors such as the force generated by the person walking, leaning, or sliding down the working surface*. The restraint system can allow the person to come within inches of the perimeter edge as long as it prevents the employee from falling over the edge.

Restraint systems are best utilized on horizontal surfaces only. Calculations for anchorages and energy generated from bodies falling, rolling, sliding, on inclined surfaces are very difficult to effectively conduct and monitor. MNOSHA policy is that the restraint system cannot be utilized for a person already in the danger zone, such as those working on a steep sloped roof who may be installing structural or ornamental steel, or the steep sloped roof deck itself. Workers in those situations should be utilizing positioning or fall arrest systems. MNOSHA will recognize the 2x safety factor for horizontal or nearly horizontal surfaces only.

Fall Protection During Structural Steel assembly (SSA):

Connectors: All workers involved in steel erection activity at heights which are greater than 15 feet to the next lower level must be provided fall protection, including SSA workers. *Connectors are covered under all of the provisions of 1926.760 except for (c).* However, SSA workers, connectors, have the option of using the personal fall protection system, consisting of personal fall arrest, positioning device, or restraint systems, after the 15 foot height is exceeded, up to two stories or 30 feet, whichever is less, to the level below. Basically, the employer must provide the fall protection system but the connectors can opt not to use it at those elevations. While passive fall protection, such as safety nets or guardrails would be preferred and would eliminate this enforcement problem, the employer does retain the option of choosing fall protection systems to use. The connectors must have completed connector training in accordance with 1926.761. After 30 feet, fall protection is required for everyone. It must be used 100% of the time, including those instances when moving from point to point.

Metal decking operations: Earlier it was mentioned that metal decking workers are considered part of SSA. *Deckers are covered under all of the provisions of 1926.760 except for (b).* After 15 feet and up to two stories, or 30 feet, whichever is less, deckers can utilize a Controlled Decking Zone (CDZ) system, with the leading edge provisions. This CDZ is fairly similar to the CAZ in subpart M. However, unlike the connectors listed above, the employer does not have to provide fall protection between the 15 and 30 foot elevations if the deckers are using the CDZ properly. After fall exposures of more than 30 feet, including leading edge, deckers must be provided and be using fall protection 100% of the time. An especially important item to note for the CDZ, final deck attachments and installation of shear connectors cannot be done while employees are using the CDZ fall protection system for deck installation.

Perimeter Safety Cables: On multi-story structures, perimeter safety cables or guardrails shall be installed as soon as the metal decking has been installed. However, steel erection fall protection starts at heights greater than 15 feet. If only steel erection activity is present then guardrails are not required until heights are greater than 15 feet. The metal decking is considered installed once all the primary tack down welds are completed and the edges trimmed. ***NOTE: There may be some confusion as to what constitutes a guardrail for this discussion. In the past, Federal OSHA and MNOSHA allowed a single strand of flagged ½" wire rope installed at 42 inches, to be considered a guardrail where only steel erection activity was taking place. New subpart R allows the single strand only as a tie-off line. Now even if the only activity taking place is steel erection, the employer must install the complete guardrail meeting the requirements of Criteria in 1926.502 once the metal deck has been installed. Please refer to the July 17, 2002 Federal interpretation for more clarification.***

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For the MNOSHA Management Team

Distribution: OSHA Compliance and WSC Director

Attachments: Appendix A – Non-mandatory Steel Erection Checklist

NOTICE: Minnesota OSHA Directives are used exclusively by MNOSHA personnel to assist in the administration of the OSHA program and in the proper interpretation and application of occupational safety and health statutes, regulations, and standards. They are not legally binding declarations and they are subject to revision or deletion at any time without notice.

Appendix A

Non-Mandatory
Steel Erection Checklist

General Contractor_____
Steel Erection Contractor_____
Engineer of record_____
Y/N Site access, roads, drainage, space adequate- 1926.752 (c)
Y/N Fall Protection responsibility/custody- 1926.760(e)
Y/N Concrete cure strength/written notice- 1926.752 (a) & (b)
Y/N Site-specific erection plan available when using alternate means? 1926.752 (e)

Hoisting and Rigging. 1926.753
Y/N Safety latches operable on hooks ? 1926.753 (c) (5)
Crane operator's name_____Pre-shift inspection done?
Qualified rigger's name_____Pre-shift inspection done?
Y/N Lift Plan adequate for the work done?- 1926.753 (d)
Y/N Crane inspections done as per 1926.550 (a)(5) and 1926.753 (c) (1)?
Y/N Rigging inspected daily? 1926.753 (c) (2)

Column/Base Connections. 1926.755
Y/N Four Bolts – 1926.755 (a)(1)
Y/N Plumbed up and resting on shim pack- 1926.755 (a)(3)
Y/N Repairs to rods/bolts approved by project structural engineer- 1926.755 (b)(1) name_____
Y/N Written Notice of repairs to erectors? 1926.755 (b)(2)
Y/N Are perimeter column splices 48 inches above decks? 1926.756 (e)(1)
Y/N Pre-punched holes/devices for guard rail cables? 1926.756 (e)(2)

Column/Joist Connections. 1926.756
Y/N Double connection at joist process? 1926.756 (c)(2)
Y/N Two bolts or more per connection, wrench tight- 1926.756 (a)(1)
Y/N Solid web diagonal bracing at least one bolt per connection- 1926.756 (b)
Y/N Column connections must resist 300 pound eccentric loading- 1926.756(d)

Open Web Steel Joists. 1926.757
Y/N Vertical stabilizer plate/attachment point if no diagonal braces- 1926.757(a)(1) (i),(ii)
Y/N Load not released until each end of joist is field bolted, joist chords stabilized? 1926.757(a)(1)(iii), 2)(ii)
Y/N Structure must be stable before any joists are landed- 1926.757 (a)(5) & (6)
Y/N Bridging terminus point established before bridging is installed? 1926.757(a)(10) also see Tables A&B
Y/N Only one employee allowed on steel joists until all bridging is installed and anchored where spans are within the limits of Tables A & B- 1926.757 (c)(3), where spans exceed limits see 1926.757 (d)

Systems-Engineered Metal Buildings. 1926.758
NOTE:
All requirements of Subpart R apply except for 1926.755 column anchorage and 1926.757 joist erection. The engineering design of the system is normally the responsibility of the manufacturer of the systems-engineered building.

Decking/Assembly Process
Y/N Is there a fully decked/planked floor or nets within two stories or 30 feet, whichever is less, directly below

the work process? 1926.754 (b)(3)
Y/N More than 4 floors or 48 feet of unfinished bolting or welding above the foundation or uppermost permanently secured floor? 1926.754 (b)(2)
Y/N More than 8 floors between the erection floor and the upper-most permanent floor ? 1926.754 (b)(1)
Y/N Are employees walking on shear connectors (Nelson Studs) without conventional PPE? 1926.754 (c)
Y/N Is decking laid tightly and immediately secured upon placement? 1926.754 (e)(5)
Y/N Are holes/openings covered adequately? 1926.754 (e)(1),(2),(3)
Y/N Are employees using Controlled Decking Zone procedures correctly? 1926.760 (c)

Multiple lifts 1926.753 (e)
Y/N Special rigging assembly used? Components certified ? 1926.753(e)(1),(2), (3)
Y/N Up to 5 pieces per lift allowed, each piece must be spaced at least 7 feet apart- 1926.753 (e)(4)
Y/N All affected employees trained in procedures per 1926.761 (c)(1)

Falling Object Protection. 1926.759 (a) & (b)
Y/N Are all loose materials, tools, equipment secured?
Y/N Controlling employer shall bar other processes below steel erection unless overhead protection is provided for the employees working below---this does not mean just using Hard Hats!

Fall Protection Hi Lites 1926.760
All fall protection requirements start at heights greater than 15 feet for any steel erection activity!
Y/N Perimeter guard rail cables installed at final edges as soon as decking is installed? 1926.760(a)(2)
Y/N Has fall protection custody been adequately maintained? 1926.760 (e)
Y/N Connectors must be provided fall protection,etc. at heights over 15 feet. 1926.760 (b)(1)(2)(3)
Y/N Connectors must use fall protection,etc. at heights greater than 30 feet. Connectors must be using a crane for it to be called connecting work!
Deckers using a CDZ can work up to 30 feet, or 2 levels, whichever is less without being provided or using fall protection. 1926.760 (c)
Y/N Is the CDZ being utilized correctly? Look for size, no more than 90 feet wide x 90 feet deep from the leading edge—see also Appendix D
Fall Restraint systems are allowed. See definitions and preamble for Subpart R.
Criteria. Fall protection equipment (including restraints) shall conform to 1926.502, see also Appendix G in Subpart R.

Training Hi Lites. 1926.761
Fall hazard training shall be provided by qualified persons to all employees exposed to fall hazards. Additional specialized training must be given to multiple lifts, connectors, CDZ workers. See also Appendix A. Third party training is allowed but inquire about what it involved and how verified.
NOTE: Written training records are not required!

Qualified vs. Competent person. See 1926.751 and 1926.32. It is not the same. The competent person has authority, while authority is not mentioned for the qualified person.