OREGON OCCUPATIONAL SAFETY AND HEALTH DIVISION
DEPARTMENT OF CONSUMER AND BUSINESS SERVICES

PROGRAM DIRECTIVE

Program Directive: A-251
Issued: August 1, 2002
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SUBJECT: Steel Erection Standards for Construction

PURPOSE: This instruction describes Oregon OSHA's inspection policy and provides clarification to ensure uniform application by field personnel of the steel erection standards for construction.

SCOPE: This instruction applies all of Oregon OSHA.

REFERENCES:

1926.750-761, Divison3/R Steel Erection

OAR 437-003-0045, Divison3/R, Additional Definitions

OAR 437-003-1752, Divison3/R, Written Notifications

OAR 437-003-0752, Divison3/R, Site-Specific Erection Plan

OAR 437-003-0753, Divison3/R, Tag lines

OAR 437-003-1754, Divison3/R, Roof and floor holes and openings

OAR 437-003-0761, Divison3/R, Additional training requirements

1926.21, Division 3/Subdivision C, General Safety and Health Provision

1926.250, Division3/Subdivision H, Materials Handling, Storage, Use and Disposal

1926.500-502, Division 3/Subdivision M, Fall Protection

1926.1427, Division 3/Subdivision CC, Cranes and derricks in Construction- Operator qualification and certification

Federal Register, Vol. 66, No. 12, January 18, 2001, pages 5196-5280, Final Rule; Safety Standards for Steel Erection

Federal Register, Vol. 66, No. 137, July 17, 2001, pages 37137-37139,

Final Rule; Delay of Effective Date

The Field Inspection Reference Manual (FIRM)

House Bill 3010, ORS 654.035.

CANCELLATIONS: All interpretations (including letters of interpretation and memoranda) of the previous version of Subpart R issued prior to April 18, 2002.

COMPLIANCE OFFICER GUIDE & INSPECTION TIPS: This section assists Oregon OSHA staff in the practical aspects of conducting enforcement inspections under the Steel Erection rule. The suggestions below should be considered helpful hints.

The steel erection standard addresses a wide range of issues related to steel erection safety. The standard not only addresses fall protection for steel erection activities, but places a heavy emphasis on maintaining the structural integrity of the building during the erection process.

OPENING CONFERENCE: Consider obtaining the information outlined below at the opening conference and during the initial observations of the steel erection site. A number of the tips suggest asking for various documents. This does not mean that those documents are required by the standard. ***While it is advisable to obtain the documents mentioned below, the only documents an employer is required to have are those specified in Subpart R or other standards***.

A. During the opening conference with the controlling contractor, consider doing the following:

1. Ask for a copy of the site specific erection plan.

2. View a copy of the blueprints and consult with someone knowledgeable in blueprint reading (engineer). Note the name of the structural engineer of record from the blueprints.

3. Ask for a copy of the written notification to the steel erector that the concrete in the footings, piers and walls and the mortar in the masonry piers and walls have attained the required strength [1926.752(a)(1)]. You will also want to

find out when the concrete was poured, how long after the pour they waited before allowing steel erection to begin, and what compressive strength of concrete was required.

4. Ask if there have been any changes to anchor bolts. Ask for a copy of the written notifications of repairs, replacements, and modifications.

5. Determine if they provided written notification of any repairs, replacements, and modifications to the anchor bolts of the steel erector prior to the erection of columns [1926.752(a)(2)] and [1926.755(b)]. Were these repairs, replacements and modifications performed with approval of the project structural engineer of record? If so, obtain a copy. Is this included in the site specific erection plan?

6. Was the fall protection provided by the steel erector left in the area where steel erection activity has been completed for use by other trades?

a. If yes, ask the following: Did you or your authorized representative direct the steel erector to leave the fall protection in place? Have you or your authorized representative inspected and accepted control and responsibility of the fall protection prior to authorizing persons other than steel erectors to work in the area? The answer to both of these questions must be yes to be in compliance with 1926.760(e).

b. If no, the controlling contractor is not required to take any further action with regard to this section.

B. During the opening conference with the steel erector, consider doing the following:

1. Determine if they are using open web joists (also known as bar joists).

2. Determine the current stage of the erection process.

3. Ask for a copy of the lift procedure (if kept).

4. Determine who are the competent person and qualified rigger.

STANDARD SECTIONS:

The following is a section-by-section description of observations the staff should make and questions to ask while performing a steel erection inspection and consultation.

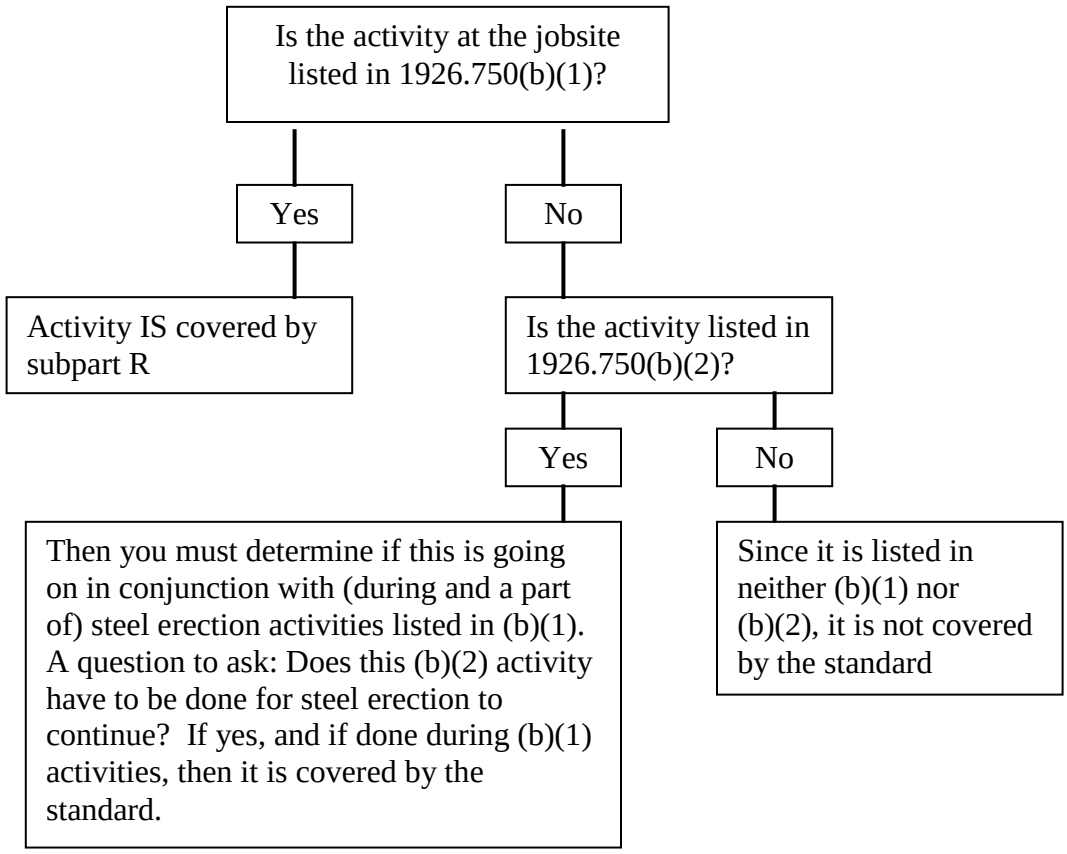
A. SCOPE - 1926.750

1. Subpart R does **NOT** cover precast concrete, electrical transmission towers, communication and broadcast towers, or tanks.

NOTE: Subpart R does apply to the construction of the steel structure that supports a tank.

2. Determine if the activity being inspected is covered by Subpart R. The first question to ask is: Does this activity fall within the definition of steel erection found in 1926.751, and the scope found in 1926.750(a)? You must first determine that steel erection is actually being performed before considering if a certain activity is covered by Subpart R. A list of steel erection activities is found in 1926.750(b)(1), however, the type of structure being erected must be considered when determining if the listed activity is covered by Subpart R. An example of a listed activity that would not be covered is a standing seam metal roof applied to a wooden stick-framed structure. The metal roofing is a decking activity listed in 1926.750(b)(1), but the wooden stick-framed building does not fit the definition of steel erection or fall within the scope of Subpart R. **Keep in mind that the scope, 1926.750(a), says that the requirements of this subpart apply to employers engaged in steel erection, and not employers engaged in an activity listed in 1926.750(b)(1).**

3. Paragraph 750(b)(2) lists a number of activities that are covered by Subpart R when they occur during and are a part of the steel erection activities described in paragraph (b)(1). When steel erection is occurring, but the activity is listed only in 1926.750(b)(2), then you must determine if it is going on in conjunction with (during and a part of) steel erection activities listed in 1926.750(b)(1). Questions to ask: Does this (b)(2) activity have to be done for the steel erection to continue? Are there design or process constraints, shared attachment points, erection sequence requirements or other compelling reason? The following flowchart may help:



NOTE: Paragraph 1926.750(b)(2) lists a number of activities that are covered by Subpart R when they occur during and are a part of the steel erection activities described in paragraph (b)(1).

Paragraph (b)(2) explicitly states that coverage depends on whether an activity occurs during and is a part of steel erection. For example, there are standing seam metal roofing systems that incorporate a layer of insulation under the metal roof. In the installation process, a row of insulation is installed, which is then covered by a row of metal roofing. Once that row of roofing is attached, the process is repeated, row by row, until the roof is completed. The installation of the row of insulation is a part of the installation of the metal roofing (which is steel erection), and so the installation is covered by Subpart R.

SITE LAYOUT, SITE SPECIFIC ERECTION PLAN AND CONSTRUCTION SEQUENCE 1926.752:

This section of the standard sets forth Oregon OSHA's requirements for a written site-specific erection plan, communication between the controlling contractor and the steel erector prior to the beginning of steel erection, and pre-planning by the steel erector to minimize overhead exposure during hoisting operations.

A. Determine the following:

1. Did the controlling contractor provide adequate road access on the site for the delivery and movement of derricks, cranes, trucks, steel erection materials, and other equipment? (Note: This requirement does not apply to roads outside of the construction site.) [1926.752(c)(1)]

2. Did the controlling contractor provide means and methods for pedestrian and vehicular control? [1926.752(c)(1)]

3. Did the controlling contractor provide a firm, properly graded, drained area, readily accessible to the work with adequate space for the safe storage of materials and safe operation of the erectors' equipment? [1926.752(c)(2)]

4. Did the controlling contractor either bar other construction processes below steel erection or provide overhead protection for the employees below? (This relates only to protection from falling objects other than materials being hoisted. **No one is allowed below materials being hoisted other than riggers or connectors.)** [1926.759(b)]

B. A site-specific erection plan is required at all steel erection sites [437-003-0752]. The plan must describe the procedures the steel erector will use to maintain structural stability during the erection process, as required by 1926.754(a). In addition, when it is necessary for employee(s) to walk or work on beams or other loads suspended by a crane, the site-specific erection plan must describe the procedures and work practices that will be used to protect employees from the hazards associated with this activity.

C. When the following conditions exist, the methods for providing alternative worker protection must also be included in the site-specific erection plan as required by 1926.752(e). The employer may use Appendix A as a framework for the plan.

1. When safety latches on hooks are being deactivated or made inoperable. [1926.753(c)(5)]

2. When joists (which span more than 60 feet) at or near columns are not being set in tandem with all bridging installed. [1926.757(a)(4)]

3. When bundles of decking are being placed on steel joists before all bridging has been installed and anchored and all joist bearing ends attached. [1926.757(e)(4)]

HOISTING AND RIGGING 1926.753:

The requirements of 1926.753 supplement the existing crane and rigging standards in subdivision CC and 1926.251. The requirements of Subpart R cover every type of crane.

A. Questions to ask the steel erector:

1. Who is the qualified rigger?

2. Did they do a pre-shift inspection of the rigging?

3. Who is the competent person assigned to inspect the crane?

B. Questions to ask the crane operator and/or qualified rigger:

1. Is the operator qualified and certified in accordance with 1926.1427?

2. Do they have load charts, an operator manual, or a riggers' handbook?

3. Has the heaviest anticipated lift been calculated?

4. Is the rigger qualified?

C. Paragraph 1926.753(c)(2) requires the qualified rigger to inspect the below-hook rigging before each shift. Section 1926.251 inspection procedures apply for each type of rigging equipment to be used during the shift. In addition, paragraph 1926.753(c)(5)(i) allows the safety latch on hoisting hooks to be deactivated when the qualified rigger makes a determination that it is safer for the connectors during the placement of purlins and single joists. (Note that a safety latch is required to be used only where: (1) the manufacturer has equipped the hook with a latch; or (2) when working under suspended loads per 1926.753(d).)

1. Safety latches may be deactivated only for the hoisting and placing of single joists and purlins.

2. Refer to the site-specific erection plan for equivalent protection.

3. Talk to the qualified rigger.

D. Paragraph 1926.753(d) addresses the hazards associated with overhead loads. Specifically, these hazards include failure of the lifting device, which would create a crushing hazard, and items falling from the load, which creates a struck-by and crushing hazard, among others. Given the nature of the loads used in steel erection, either of these events could result in serious injury or death.

1. See if employees are exposed to overhead loads. The standard requires routes for suspended loads to be preplanned. Work must be scheduled so that employees are not required to work under suspended loads. (The exception being connectors doing initial connection, or riggers hooking or unhooking of the load. These employees may work under the load.)

E. Multiple Lift Rigging Procedure Paragraph 1926.753(e)(1) lists the prerequisite conditions for multiple lift procedures (a multiple lift rigging assembly, maximum of 5 pieces of steel per lift, only beams or similar structural members allowed, only by specifically trained employees, and the crane manufacturer must allow).

1. If the steel erector is performing multiple lifts:

a. Request a copy of their multiple lift procedure (if kept).

b. Determine the number of pieces being lifted (no more than 5 are allowed). Only one piece per choker.

c. Check for certification of the multiple lift rigging assembly from the qualified rigger (whether a manufacturer supplied rigging or the qualified rigger assembled it) and inspect the rigging equipment.

d. Review the rigging chart and the total load calculation with the qualified rigger.

e. Check the crane for controlled load lowering capability and that multiple lifts are within the manufacturer's specifications.

f. Ensure the rigged pieces are 7 feet or more apart.

2. The multiple lift rigging assembly must be specifically designed for the structural steel members to be lifted. The design must incorporate the maximum anticipated load for each component part as it will be used in the assembly.

3. On a manufacturer-assembled rig, check for a tag or other means to certify the limits of the rig.

4. On a qualified rigger-assembled rig, check that the qualified rigger certified (in writing) the maximum loading of the assembly and its component parts.

STRUCTURAL STEEL ASSEMBLY 1926.754:

A. Paragraph 1926.754(a): This paragraph requires that structural stability is maintained throughout the structural steel erection process. While guying or bracing is not specifically required, the steel erector must outline in their site specific erection plan how they will maintain structural stability during the erection process. (See also 1926.755(a)(4) guying or bracing of columns.)

1. 437-003-0752. Review the site specific erection plan with the erector to determine how they are ensuring structural stability.

2. Look for plumb cables, guying, or bracing and see if any apparent problems exist.

3. Check to see that permanent floors are being installed so that there are not more than eight stories between the erection floor and the uppermost permanent floor [1926.754(b)(1)].

4. Check to see that there is not more than four floors or 48 feet, whichever is less, of unfinished bolting or welding above the foundation or uppermost permanently secured floor [1926.754(b)(2)].

5. For systems engineered metal buildings, check to see if the erector has first erected a braced bay before erecting additional frames or end walls. A braced bay is two frames with a sufficient number of purlins, girts and eave struts in place, and cable bracing or wind cross bracing installed.

B. Paragraph 1926.754(c)(1): Shear connectors and similar devices. The standard requires that, where used, shear connectors must be field-installed rather that shop-installed.

1. Check steel beams for shear connectors. There should not be any shear connectors on beams without the decking or other walking/working surface in place, unless based on feasibility, special circumstances required shop installed shear connectors and was specified due to design, quality control or other issues. (See Q&A # 19).

2. Ask the steel erector if they field-install shear connectors and what procedures are followed.

C. Paragraph 1926.754(d): Plumbing-up.

1. Look for plumbing-up equipment especially if bundles of decking or other construction loads have been loaded on floor beams. Guy wires (steel cable) and turnbuckles are generally used to plumb structures. Check for proper installation see if the wire rope components (U-clips) were installed according to the manufacturer's requirements. If there are no plumb cables, ask the competent person how they are ensuring structural stability without them. Check the site-specific erection plan.

D. Paragraph 1926(e)(1)(i) prohibits using bundle packaging and strapping for hoisting unless approved for lifting. This hazard usually occurs while unloading trucks, when the metal decking bundles are tightly packed together and the rigging is difficult to attach. Sometimes workers will attempt to lift the bundles of decking using the banding straps.

1. Ask the steel erector or observe if these straps are marked as approved for lifting.

E. Paragraph 1926.754(e)(1)(iii)-(iv) (requirements for landing metal decking bundles). Generally, the competent person or foreman will layout specific locations for placing bundles of decking for easy installation.

1. Look for metal decking landed on joists. Ensure that bridging is installed and all joist ends are attached. Check the placement of the decking bundles. Check for structural framing stability, e.g., guy wires, bracing. Refer to 1926.757(e)(4) for specific requirements.

2. Look for metal decking landed on solid web framing members. Check placement and support of bundles. Check the site specific erection plan to see if decking bundles and other construction loads have been addressed to meet the structural stability requirements of .1926.754(a).

F. Paragraph 1926.754(e)(2): Roof and floor holes and openings.

1. Look for any "decking holes" and "openings" on the site. Framed openings in metal decking must have structural members turned down to facilitate continuous decking. Any openings (as defined in the standard) that do exist because of constructability or design constraints must be covered or guardrails erected around the openings as soon as they are created (437-003-1754).

G. Paragraph 1926.754(e)(3): Covers for roof and floor openings. Look for any covers on the site. If covers exist:

1. Are they strong enough? (Twice the weight of employees, material, or equipment. Skylight fixtures generally do not meet this strength requirement.)

2. Are they secured?

3. Are they painted or marked visibly with "HOLE" or "COVER"?

H. Paragraph 1926.754(e)(4) covers decking gaps around columns.

1. Check to see that any gaps are filled with material strong enough to provide fall protection for personnel and prevent objects from falling through.

I. Paragraph 1926.754(e)(5) covers the installation of metal decking.

1. Check to see if metal decking panels are secured as soon as they are placed. This is not required in a controlled decking zone. Up to 3,000 square feet of unsecured decking is allowed. See 1926.760(c)(5)

2. Check to see that the panels are fully supported and do not hang over the ends of the supporting members. **This is extremely important in a controlled decking zone where up to 3,000 square feet of unsecured decking is allowed and fall protection is not required.**

COLUMN ANCHORAGE 1926.755:

A. Paragraph 1926.755(a) contains column anchorage and stability requirements to ensure that columns remain stable during the erection process.

B. Paragraph 1926.755 (a)(1) requires 4 anchor rods or bolts on all columns. However, this requirement does not include posts. The standard defines these terms as follows: A column is a load-carrying vertical member that is part of the primary skeletal framing system. A post is a structural member that is essentially vertical, that: (1) is axially loaded (a load presses down on the top end) and weighs 300 pounds or less, or (2) is not axially loaded, but is laterally restrained by the above member. Posts typically support stair landings, wall framing, mezzanines and similar structures.

1. Determine whether a vertical member is a column. If it is, check to see that it has the required 4 anchor rods or bolts. A post can have less than 4.

C. Paragraph 1926.755 (a)(2) requires that the column anchor rod (anchor bolt) assembly, including the column-to-base plate weld and the column foundation be able to withstand a specified load.

1. If the anchor bolts appear to be unusually small, too short or there is evidence of repair, modification or failure, ask to see the design criteria.

D. Paragraph 1926.755 (a)(3) is intended to ensure that the column is properly set.

1. If leveling nuts are used, make sure the weight of the column rests on all 4 nuts. If shims are used, look for loose shims or instances where only a few shims are supporting the load.

2. If more than one tier is erected, determine when the base plates will be grouted and if the leveling nuts and/or shim packs are adequate to transfer the load to the foundation.

E. Paragraph 1926.755 (a)(4) requires that a competent person evaluate the columns to determine whether guying or bracing is needed. If guying or bracing is needed, it must be provided. **All columns need to be evaluated; in some instances the 4 anchor bolts or rods may not provide sufficient stability.**

1. Ask the contractor who their competent person is and ask the competent person if and how this evaluation was performed. The competent person needs to consider all erection forces, such as wind reactions and reactions by erection equipment.

2. See if column guying is addressed in the site specific erection plan.

F. Paragraph 1926.755 (b) requires that all anchor bolt or rod repairs be approved by the project structural engineer of record and that all such repairs be communicated in writing to the steel erector. Check for bent anchor bolts. Straightening a bolt will weaken it and that is considered a modification.

1. Ask for a copy of the notification when it is suspected that anchorage bolts or rods have been damaged, repaired, replaced, or field-modified.

BEAMS AND COLUMNS 1926.756:

A. Paragraph 1926.756(a)(1) requires two bolts or the equivalent to be drawn up wrench-tight at each connection of a solid web structural member before the hoisting cables are released.

1. Check to see that the bolts are the same size and strength as shown in the erection drawings.

2. If two bolts are not used, check to see that the initial connection method being used is specified by the structural engineer of record (SER). This method must be the equivalent of two bolts in providing support for the solid web member and stability to the structural frame.

B. Paragraph 1926.756 (c)(1): Double connections at columns and/or at beam webs over columns.

1. Ask the steel erector's representative or competent person if the structure's design includes double connections at columns and/or beam webs over columns. If the answer is yes, you should observe the double connection operation.

2. Ask the employer the following questions on how the connectors are being protected during this type operation:

a. Are the connectors able to maintain at least 1 bolt and nut at least wrench-tight at a common connection hole at all times? Among the ways of doing this are to use clipped end connections or staggered connections.

b. If not, is the erector using seats or equivalent connection devices that were supplied with the member?

c. If a seat or equivalent device is used, is it attached to both the supporting member and the first member before the nuts on the shared bolts are removed?

d. If a seat or equivalent device is used, has it been adequately bolted or welded to both a supporting member and the first member before the nuts on the shared bolts are removed to make the double connection?

C. Paragraph 1926.756 (d) specifies the strength requirements for a column splice.

1. Determine if the splice is bolted or welded. Welded column splices are not as stable as bolted splices during erection.

2. If a need arises, such as in a full penetration welded splice, determine if the initial column connection (the bolted connection at the web of the column) was designed to resist a minimum eccentric gravity load of 300 pounds located 18 inches from the extreme outer face of the column in each direction at the top of the column shaft, ask the project structural engineer of record. See if lugs, flange plates or other erection aids have been provided to meet the strength requirements. If shims or tapered wedges are used, check to see that a spot weld or other means has been used to keep them from being forced out, falling out of the splice until the column is framed, or tied in or final welding has been done.

3. The perimeter columns must extend a minimum of 48 inches above the finish floor and have holes or other devices attached to them at 42 to 45 inches above the finish floor, and at the midpoint, to permit the installation of perimeter safety cables. If this requirement is not met, and the employer claims that constructability does not allow meeting the requirement, ask the employer why constructability does not allow this and what the employer is doing in the meantime to provide protection to the employees exposed to the perimeter.

OPEN WEB STEEL JOISTS 1926.757:

Some of the most serious risks facing the ironworker are encountered during the erection of open web steel joists, particularly from landing loads on unbridged joists and improperly placing loads on joists. **Open web steel joists are very unstable until they have been properly connected to the supporting structure and the required bridging installed.** Some joists require installing erection bridging before releasing the joist from the crane. Whenever erection bridging is required, it is always bolted, diagonal bridging.

A. Questions to ask the steel erector and the ironworkers with regard to steel joists:

1. What type of joists are you installing?

2. What's the elevation?

3. Are you installing joists in bays? If so, how many joists per bay and how many bays?

4. What are the spans of the joists and are there different types of joists being installed?

5. Are you familiar with the Steel Joist Institute or Oregon OSHA's requirements for the safe installation of steel joists?

6. Can I see the steel erection drawings and can you explain the joist pattern?

7. Can I see a copy of your site specific erection plan?

8. How are you bracing and bridging the joists? Diagonal or horizontal?

9. What bridging is required? What type of bridging is being used?

10. When is the erection bridging installed and who is installing it?

11. How much erection bridging is required by the plans?

12. At what point during the installation process is the erection bridging installed?

13. Is all the erection bridging designated in the drawings being installed? If not, why not?

14. How are you lifting the joists?

15. How are the joists rigged? Is a qualified rigger being used?

16. Is the erection bridging installed before or after releasing the joist from the crane?

17. How are the joists released from the crane? (Open hooks? Remote release? Ironworker walks the joists? From an aerial lift?)

18. Are the joist connections bolted or welded? If welded, do welds meet the standard's requirements [1926.757(b)]?

19. Are joists in bays of 40 feet or more bolted? If not, why not? If the employer claims that constructability does not allow field-bolting, what is the basis for making that claim?

20. What type of fall protection is being used during joist installation and during the installation of erection bridging?

21. Are you setting joists in tandem?

22. How are you securing your joists? Are both sides of the seat at one end of the joist secured?

23. Have there been any stability problems? Problems with anchor bolts or wall pockets?

24. Have there been any change orders? May I see the change log (if kept)?

25. Are you field-bolting your joists at the columns?

26. Are the columns framed in at least two directions?

27. When landing joists, how are you securing them against accidental displacement?

28. What kind of bridging terminus points are you using? Please identify them.

29. Are you placing any loads on the joists? If so, what are they (e.g., bundles of bridging or deck or joists)? How much load is being placed on the joists and across how many joists is the load spread?

SYSTEMS-ENGINEERED METAL BUILDINGS 1926.758:

A. When performing an inspection on a systems engineered metal building, be aware that all the requirements in Subpart R apply to these structures except for 1926.755 (column anchorage) and 1926.757 (steel joist erection).

1. Review the site specific erection plan with the erector to see if they are using the building manufacturer's erection guidelines or relying on their own methods for erection stability.

2. Check column base plates for 4 anchor bolts or rods [1926.758(b)].

3. Check for any double connections on the structure and ensure that either a seat or similar connection device is being used for double connections.

4. If joists are being installed, observe the operation to ensure that joists are fully bolted or welded prior to release of the hoisting cable, allowing an employee on the joists or placing any construction load on the joist.

FALLING OBJECT PROTECTION 1926.759:

A. Under paragraph 1926.759(b), when it is necessary to have work performed below ongoing steel erection activities (other than hoisting), effective overhead protection must be provided to those workers to prevent injuries from falling objects. No work under hoisting is allowed.

B. If this protection is not provided, work by other trades is not permitted below steel erection work. The controlling contractor must institute measures to keep employees out of the area below the steel erection activities.

1. Check the site for unsecured materials, tools and equipment that are not in use [1926.759(a)].

2. If you see workers below where steel erection activities are being performed, ask some employees if they know of tools or other materials that have fallen from the worksite above. If they have, look into what falling hazards are present and what has and is being done to protect the employees.

FALL PROTECTION
1926.760:

A. General Requirements.

1. The fall protection requirements of this section apply when employees are engaged in a steel erection activity. Simply because employees are working on a steel building or structure does not necessarily mean they are subject to the fall protection requirements of this section. They may not be engaged in a steel erection activity [see 1926.750(a), (b)(1) and (2)] and therefore must comply with the fall protection requirements of Subpart M.

2. Except for connectors and employees working in controlled decking zones, each employee engaged in a steel erection activity must be protected from falling when working at heights of 15 feet or more.

B. Connectors and decking activity.

1. Connectors must be protected from fall hazards of more than two stories or 30 feet, whichever is less. However, they must be provided with a fall arrest system, fall restraint system, or positioning device and wear the equipment necessary to be able to be tied off, if they chose to do so.

2. Employees may install metal decking at heights up to 30 feet without fall protection where a controlled decking zone (CDZ) has been established [see 1926.760(c)]. This applies only to those employees engaged in leading edge work and the initial attachment of the decking panels (safety deck attachments). Above 30 feet, they must be protected from falling. For other decking activities, such as final deck attachments, cutting and welding, one or more of the fall protection systems listed in 1926.760(a)(1) must be used at heights of 15 feet or more.

C. Perimeter safety cables.

1. Make sure the perimeter safety cables conform to the guardrail requirements of Subpart M.

2. If the safety cables or other fall protection equipment is to be left in place to be used by other trades, the general contractor must inspect the equipment and accept control and responsibility before workers other than steel erectors are allowed in the area. If this is not done, the fall protection equipment must be removed.

TRAINING

1926.761: Section 1926.761 supplements 1926.21(b)(2) training requirements. Failure to train on hazards not covered by this section should be cited under 1926.21(b)(2) (for example: training on falling objects, bolting, and impalement hazards from rebar).

A. Employees must be provided the training prior to exposure to the hazard.

1. Ask the employer whether they trained the employees or relied on a third party trainer. If a third party trainer was used, ask how the employer determined that the training met the standard.

2. Subpart R does not include a testing requirement. However, an effective training program involves some means of determining whether the instruction was understood. Ask the employer how they make this determination (this can be done in a variety of ways, such as formal oral or written tests, observation, or through discussion). Also, ask employees about their training.

B. Section 1926.761(a) requires that all training required by this section be provided by a qualified person.

C. A qualified person is defined in 1926.751 as one who by possession of a recognized degree, certificate, or professional standing, or by extensive knowledge, training, and experience has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project.

D. Section 1926.761(b) requires that all employees exposed to fall hazards receive fall hazard training. They need to be able to recognize fall hazards and be knowledgeable in the procedures and fall protection systems to be used before they are exposed to the hazard.

E. Section 1926.761(c) requires the employer to provide special training to employees engaged in multiple lift, connector and controlled decking zone procedures. **This special training is essential for connectors and employees working in controlled decking zones where they may work without fall protection at heights up to 30 feet.** The training must establish access, proper connecting and decking techniques and work practices that minimize the risk of falling.

ADDITIONAL TRAINING REQUIREMENTS 437-003-0761:

A. Paragraph 437-003-0761(1) requires the employer to prepare a written certification verifying the training required by this section has been conducted.

B. Paragraph 437-003-0761 (2) requires the employer to retrain any affected employee when there is reason to believe that employee does not have the understanding and skill required by this section.

History: Issued 10-1-1981 Revised 6-1-2001, 10-1-2013 and 1-30-15

QUESTIONS AND ANSWERS:

Question 1: Which provisions in the standard are considered "component requirements?"

Answer: A number of provisions in the final rule address the safety of certain structural components. These provisions contain design requirements for the components to help ensure that the structure can be erected safely.

1926.755(a) and 1926.758(b)	Requires all columns to be anchored by a minimum of 4 anchor bolts, which must meet specified strength requirements.
1926.756(c)(1) and 1926.758(e)	Sets requirements for double connections.
1926.756(d)	Requires column splices to be at a specified height and meet a strength requirement.
1926.756(e)	Requires perimeter columns to have holes or other devices for perimeter safety cables.
1926.757(a)(1)(i)	Requires a vertical stabilizer plate to stabilize steel joists.
1926.757(a)(3)	Requires certain joists to be strong enough to allow one employee to release the hoisting cable without the need for erection bridging.
1926.757(a)(8)(i)	Requires certain joists to be fabricated to allow for field bolting during erection.

SECTION 1926.750 – SCOPE:

Question 2(a): The structural steel and decking has been completed on floor 4. Structural steel is being erected for floor 6. Is the installation of an item listed only in 1926.750(b)(2) on floor 4 considered steel erection?

Answer: No. The activities listed in 1926.750(b)(1) are covered by the standard. The activities listed in 1926.750(b)(2) are covered by the standard only if they are installed "during and are a part of" steel erection activities listed in (b)(l).

In this scenario no (b)(1) activities are taking place on the 4th floor, the ongoing steel erection activities have progressed to the 6th floor, and the installation of the (b)(2) item is not part of the work on floor 6. The work on floor 4 is not covered by Subpart R.

Question 2(b): Some structural steel work (listed in (b)(1)) is taking place in the northeast corner of floor 5. In the southwest corner of floor 5, some work listed in (b)(2) is taking place. Is the installation of the (b)(2) item covered by Subpart R?

Answer: No. As long as the 1926.750(b)(1) activities can proceed irrespective of the progress on the 1926.750(b)(2) activities, the (b)(2) activities are excluded from coverage under Subpart R.

Question 3: When a tank is to be supported by a structure that falls under the scope of Subpart R, does construction of the tank also fall within the scope of Subpart R?

Answer: No. 1926.750(a) excludes tank construction from the scope of Subpart R. It is excluded because it is considered to be a specialized industry based upon its unique use of cylindrical construction techniques. The construction of the tank itself would not be steel erection even though the structure supporting the tank is covered by Subpart R.

Question 4: When installing an integrated metal roof decking system, which includes the metal banding, insulation, and screw down clips, is the entire process considered steel erection?

Answer: Yes. These operations take place in a repeating sequence of steps. Once the banding is in place, a row of insulation is put down, metal decking is laid over it and then secured with clips. The metal decking forms both the structural and weatherproofing roof surface. Working from that completed row, the next row of insulation and decking is then installed and the process repeated across the building.

The installation of the metal roof decking is covered by Subpart R under 1926.750(b)(1). Because the metal banding, insulation and screw-down clips are installed "during and [as] a part of" the installation of the metal decking, these activities are covered by Subpart R under 1926.750(b)(2).

Question 5(a): Is the construction of a house framed with metal studs within Subpart R?

Answer: No. Metal studs are not mentioned in 1926.750, and while the installation of "structural steel" is covered, the definition of structural steel in 1926.751 includes metal studs only where those studs are "integrated with the structural steel framing of a building." Since such a house has no such structural steel framing, but simply the cold-formed metal studs, a house framed with metal studs is not covered by Subpart R.

Question 5(b): Is the limited use of structural steel such as a load supporting I-beam within a house built using traditional wood frame construction and methods within Subpart R?

Answer: No. The definition of structural steel in 1926.751 includes beams only where those beams are "integrated with the structural steel framing of a building." The limited use of structural steel, whether load supporting or not, in a predominantly wood-framed house such as a steel I-beam supported by or supporting wood framing is not covered by Subpart R.

Where a traditionally wood framed house incorporates a sub-system of interconnected structural steel components, such as steel I-beams connected to load-carrying vertical steel columns creating a steel skeletal frame, then that subsystem and the interconnected structural steel components are covered by Subpart R.

Question 6: Subpart R does not apply to transmission towers. Some power lines are supported with steel poles. Is the installation of these steel poles covered by Subpart R?

Answer: No. Although such poles are not "towers," 1926 Subpart V (Power Transmission and Distribution) is a more specifically applicable standard. Under 1926.950(a), Subpart V applies to "the construction of electric transmission and distribution lines and equipment." "Equipment" is defined in 1926.960(s) as including "fittings, devices, appliances, fixtures, apparatus, and the like, used as part of, or in connection with, an electrical power transmission and distribution system, or communication systems." Steel poles used to support power lines meet this definition. Therefore, the installation of these poles is covered by 1926 Subpart V, not Subpart R.

SECTION 1927.752 – SITE LAYOUT, SITE-SPECIFIC ERECTION PLAN AND CONSTRUCTION SEQUENCE:

Question 7: Before any steel erection begins, who is responsible for performing the test to determine whetherif the concrete has cured to 75% of the intended minimum compressive design strength or cured enough so that it can support the loads imposed during steel erection?

Answer: The controlling contractor must ensure that written notification is given to the steel erector that the concrete has cured to the level required by the standard. The standard does not require any specific entity to perform the test. The choice of who will do the test is left to the controlling contractor. Since it is the controlling contractor's responsibility to ensure that the notification is given to the steel erector, the controlling contractor must select an entity that has the expertise to perform the test. The controlling contractor may do the test itself if it has the expertise to do so. In the preamble of the final rule (page 5206), Oregon OSHA stated:

> *"In the proposed rule, the controlling contractor would have had to provide the ASTM test results to the steel erector. The final rule has been changed to reflect that the controlling contractor must ensure that the test results are provided to the steel erector. This rephrasing will allow the controlling contractor to have a contractor familiar with the ASTM test methods perform the test and provide the results to the steel erector."*

Question 8: Can the controlling contractor contract with subcontractors to perform the work required by 1926.752(a)? If so, is the controlling contractor still responsible for these duties after subcontracting them out?

Answer: Under 1926.752(a), the controlling contractor "shall ensure that the steel erector is provided" with written notification that the concrete has cured to the specified degree. While the controlling contractor may contract with subcontractors to do the requisite tests and provide the written notification, the controlling contractor remains responsible for ensuring that the subcontractor does that work. If the subcontractor fails to do the test and provide the notification, the controlling contractor may be cited for a violation under 1926.752(a).

Question 9: Section 1926.752 (a) (1) requires the controlling contractor to ensure that the steel erector is provided with written notifications that the concrete and masonry meet certain specified strength requirements. To what extent is the controlling contractor responsible for the accuracy of the strength assessments in the written notifications?

Answer: As explained in Q&A #7, the controlling contractor can choose to either: (1) conduct the tests themselves, if it has the expertise to do so; or (2) select an entity that has the expertise to

do the test. If the controlling contractor does the tests, they are responsible for the accuracy of the tests.

If the controlling contractor selects someone else to do the tests, they are responsible for exercising reasonable care in the selection of the testing entity. As long as they have a reasonable basis for believing that the testing entity is competent and capable of doing the work, and the controlling contractor has no actual knowledge that the tests results are wrong, erroneous test results are not a violation of 1926.752(a).

Question 10: Section 1926.752(a)(1) and (b) require that an appropriate ASTM standard test method be used to determine that field-cured concrete/mortar testing samples have attained 75% of the intended minimum compressive strength or sufficient strength to support loads imposed during steel erection before that erection begins. Can I rely on cure time instead of doing such a test?

Answer: No. The standard does not provide that cure time may be used instead of the ASTM test. Because of the many factors that influence cure rates (temperature, humidity, ingredient ratios, etc.), cure time is an unreliable means of assessing how much the concrete has cured.

Question 11(a): Does the written notification from the controlling contractor to the steel erector about concrete footings, etc., in 1926.752(a) and (b) have to be maintained on site?

Answer: Yes, 437-003-1752 requires the controlling contractor to maintain a copy of the written notification at the site until completion of the project.

Question 11(b): Does the anchor bolt repair, replacement or field-modification approval from the Structural Engineer of Record (SER) required by 1926.755(b)(1) have to be maintained on site?

Answer: No. There is no requirement that a record of the SER's approval be maintained at the site. However, 437-003-1752 requires the controlling contractor to maintain a copy of the written notification to the steel erection contractor of any repairs, replacements and modifications to the anchor bolts for review until completion of the project.

SECTION 1926.753 – HOISTING AND RIGGING:

Question 12: Section 1926.753(e)(4) requires the members be rigged at least 7 feet apart on a multiple lift rigging assembly (Christmas tree rig). If they are rigged 7 feet apart and the connector needs to slacken the line to unhook the lower beam, the beam above now has less than 7 feet of clearance. Does a 7-foot clearance need to be maintained at all times?

Answer: No. The 7 feet specifically refers to the distance rigged.

Question 13: Does the standard permit a qualified rigger to design and assemble a "multiple lift rigging" assembly on the jobsite by mixing components from one rigging supplier or by mixing components from several rigging suppliers?

Answer: Yes. In 1926.751, "Multiple lift rigging" is defined as "a rigging assembly manufactured by wire rope rigging suppliers. . . ." The use of the term "suppliers" means an

assembly may be made from components from more than one manufacturer. This is also reflected in the fact that 1926.753(e)(2) allows a qualified rigger to certify the capacity of an assembly instead of a manufacturer: "Components of the multiple lift rigging assembly shall be specifically designed and assembled with a maximum capacity for total assembly and for each attachment point. This capacity, certified by the manufacturer or a qualified rigger, shall be based on the manufacturer's specifications with a 5 to 1 safety factor for all components." [Emphasis added] The preamble to the final rule also shows that an assembly may be either put together from separately produced manufactured components, or obtained as a single, manufactured unit: "[t]he rigging must be certified by the qualified rigger who assembles it or the manufacturer who provides the entire assembly to ensure that the assembly can support the whole load. . . ." (Volume 66 of the Federal Register at page 5211) The provision, then, permits a qualified rigger to assemble the multiple lift rigging from manufactured components. These may be from either single or multiple suppliers.

Question 14: How often must the multiple lift rigging assembly be inspected?

Answer: In 1926.753(c)(2), the standard requires a qualified rigger to inspect the rigging before every shift in accordance with 1926.251, *Rigging equipment for material handling.* Additional inspections of the rigging assembly where service conditions warrant are required under 1926.251(a)(6).

Question 15: Section 1926.753(c)(1)(i) requires a pre-shift visual inspection of cranes by a competent person. Section 1926.753(c)(1)(iv) states that "the [crane] operator shall be responsible for those operations under the operator's direct control. Whenever there is any doubt as to safety, the operator shall have the authority to stop and refuse to handle loads until safety has been assured."

Scenario: The crane is rented, and the operator is supplied by the crane rental company. The steel erector designates the operator as the competent person for purposes of the pre-shift inspection requirements. Is the steel erector still responsible for compliance with the pre-shift inspection requirements? Is the steel erector responsible for crane operations under the direct control of the operator?

Answer: Under 1926.750(a), "the requirements of [Subpart R] apply to employers engaged in steel erection unless otherwise specified." Section 1926.753(c)(1)(iv) specifies the operator as responsible for operations that are "under the operator's direct control." However, those are only operations involving the actual operation of the crane.
While an operator may be designated as a competent person for purposes of the pre-shift inspection, 1926.753(c)(1)(i) does not specify who is responsible for compliance with the pre-shift inspection requirements. Therefore, a designation by the steel erector of the crane owner's operator as the competent person would not absolve the steel erector of responsibility for making sure that the pre-shift inspection was done (note, though, that the steel erector is not expected to have the same level of expertise regarding those inspections as either the crane owner or the competent person).

Question 16: Does 1926.753(e) permit beams of different sizes to be lifted in a multiple lift?

Answer: Yes.

Question 17: Section 1926.753(e)(2) requires that the capacity of each multiple lift rigging component and the total assembly be certified by the manufacturer or qualified rigger. Does that certification have to be in writing?

Answer: Yes, a certification is a written document.

SECTION 1926.754 – STRUCTURAL STEEL ASSEMBLY:

Question 18: Section 1926.754(b)(3) requires a "fully planked or decked floor or nets" within two stories or 30 feet, whichever is less. Can an employer's requirement that workers be protected by fall arrest equipment at all times above 10 feet (or less) take the place of nets and temporary floors?

Answer: No, 1926.754(b)(3) requires that a fully planked or decked floor or nets be maintained within 2 stories or 30 feet, whichever is less, directly under any erection work being performed. This provision serves many purposes: limits falls to 30 feet in the event that the required fall protection is not used or otherwise fails, provides falling object protection, and can be used as a staging area for emergency rescue. Fall arrest equipment alone is the subject of a separate set of requirements and cannot fully meet the intent of 1926.754(b)(3). In instances where the building structural design does not allow for fully planked or decked floors or safety nets, Oregon OSHA will consider these feasibility exceptions on a case-by-case basis.

Question 19: I have beams with shop-installed shear connectors at 20 feet. If the employer requires the use of fall protection for all workers, including connectors and deckers, would the presence of the shop-installed shear connectors on these beams still be a violation under 1926.754(c)(1)?

Answer: Yes. Oregon OSHA does recognize that there may be special circumstances where shop installed shear connectors are specified due to design, quality control or other issues. In those instances where the bridge or building structural designs may require shop installed shear connectors, based on feasibility, Oregon OSHA will consider these exceptions on a case-by-case basis.

Question 20: Are bundle packaging and strapping that have been designed for hoisting purposes marked accordingly? If not, who is responsible under 1926.754(e)(1)(i) for determining whether they are designed for hoisting? How is this determination made?

Answer: Under 1926.754(e)(1)(i), employers engaged in steel erection are responsible for ensuring that bundle packaging and strapping, if used for hoisting, are specifically designed for hoisting purposes. Some manufacturers design metal decking bundle packaging and strapping, applied at the factory to keep bundles together, to be used as a lifting device. However, Subpart R does not require marking. We are not aware that the manufacturers mark these bundles uniformly or consistently.

When bundle packaging and strapping is used for hoisting, it is considered rigging. Under 1926. 753(c)(2), a qualified rigger must inspect the rigging prior to each shift in accordance with 1926.251. Therefore, the employer would use a qualified rigger in making this determination.

SECTION 1926.755 – COLUMN ANCHORAGE:

Question 21: To make a field repair to an anchor rod (anchor bolt), must there be a written order from the project's engineer of record?

Answer: No. Section 1926.755(b)(1) prohibits such repairs "without the approval of the project structural engineer of record." While the standard requires approval, it does not require the approval to be in writing.

Question 22: The requirements in 1926.755(b) apply to the "repair, replacement or field modification of anchor rods (anchor bolts)." Is hitting an anchor bolt with a hammer to line it up with the base plate holes considered a modification?

Answer: Generally, hitting an anchor bolt with a hammer to line it up with the base plate holes would not be considered a modification, since those minor adjustments do not normally affect the structural integrity of the rod or the concrete. However, straightening a bolt is considered a modification since that will weaken it.

SECTION 1926.757 – 0PEN WEB STEEL JOISTS:

Question 23: Is it acceptable to use a forklift to raise and set in place roof joists?

Answer: Yes. It is acceptable to use a forklift to raise and set joists in steel erection provided all the necessary safety requirements for landing and placing loads contained in 1926.757(e) are followed. In addition, the employer must comply with the requirements of 1926.602, Material Handling Equipment, for the use and operation of the forklift equipment itself.

Question 24: 1926.757(a)(3) requires: "where steel joists at or near columns span 60 feet or less, the joist shall be designed with sufficient strength to allow one employee to release the hoisting cable without the need for erection bridging." Joist manufacturers stated that for some lengths there are not existing joist designs that provide the necessary stability (even with the stabilizer plate). These are primarily joist in the 55 – 60 foot length range. The manufacturers conducted tests to determine if joists that are now available meet the requirements of 1926.757(a)(3). Their tests showed that some of the joists now available meet the requirement, but only if erectors followed a number of erection criteria that are not in the steel erection standard. Also, for some spans and dimensions, there still are no joists that meet the requirement (even if those additional criteria were followed). How will Oregon OSHA enforce this provision?

Answer: The enforcement policy that was scheduled to expire on July 18, 2004 will remain in effect indefinitely. That policy is as follows: for all joists at or near columns that span 60 feet or less, employers will be considered to be in compliance with 1926.757(a)(3) if they erect these joists by: (1) installing bridging or otherwise stabilizing the joist prior to releasing the hoisting cable, or (2) releasing the cable without having a worker on the joists.

Question 25: Section 1926.757(c)(2) requires that joists over 60 feet be attached in accordance with 1926.757(b). Section 1926.757(b) allows either bolting or welding of the joist ends. However, 1926.757(a)(8) requires that all joists over 40 feet be bolted (with an exception for contractibility). Do these provisions conflict?

Answer: No. Section 1926.757(b)(2) refers to the final connection of the member; 1926.757 (a)(8) refers to the initial connection of the member. They work together as follows:

> Under 1926.757(c)(2), there are several requirements that must be met before the hoisting cables can be released from these joists. One of these requirements is that the joist be attached as specified in 1926.757(b)(2). Under that provision, the final connection can be either a bolted or welded connection.
>
> In contrast, 1926.757(a)(8) refers to the initia1connection of certain members. Under this provision, these members must be initially bolted (unless constructability does not allow). However, the final connection can be either bolted or welded. The initial bolting is typically done with an erection bolt, which would either be replaced with a high-strength bolt for the final connection or the final connection would be welded.
>
> So, 1926.757(c)(2)'s requirement that joists over 60 feet be attached in accordance with 1926.757(b) means that there must be a final connection - whether bolted or welded - that meets the 1926.757(b) requirements before the hoisting cable is released. While these joists had to be initially bolted, the final connection could be either bolted or welded.

Question 26(a): Section 1926.757(c)(3) and (d) contain requirements that refer to Table A (Erection Bridging for Short Span Joists) and Table B (Erection Bridging for Long Span Joists). How do I read these tables?

Answer: Joists are manufactured in a variety of types and lengths. Some types need no erection bridging at any length. Other types need bridging if they are a certain length or greater.

Each table has two columns. The left-hand column, titled "Joist," identifies specific types of joists. The right-hand column, titled "Span," indicates at what length erection bridging is required. Many of the joists have "NM" (for "not mandatory") marked in the Span column. That means that the type of joist designated does not require erection bridging, irrespective of its length.

Other joists have numbers marked in the Span column. For example, in Table A, Joist 12Kl has "23-0" marked in the Span column. That means that 12Kl joists that are 23 feet 0 inches in length or longer require erection bridging. Shorter lengths of this type of joist do not require erection bridging.

In Table B, joist 32LH06 has "47-0 through 60-0" in the Span column. That means that 32LH06 joists 47 feet long, up through 60 feet long, require erection bridging.

Also in Table B, joist 32LH09 has "NM through 60-0" in the Span column. That means that erection bridging is not required for lengths through 60 feet. However, lengths over 60 feet 0 inches do require erection bridging.

Once it is determined that erection bridging is required, the erection bridging must be installed in accordance with 1926.757(d).

Questions 26(b): Section 1926.757(c)(3) states that, "on steel joists that do not require erection bridging under Tables A and B, only one employee shall be allowed on the joist until all bridging is installed and anchored." If a joist does not require erection bridging under the Tables, what bridging is required under this provision before allowing additional employees on the joist?

Answer: Under this provision, if a steel joist does not require erection bridging (bolted diagonal bridging) under 1926.757(c)(3), bridging that is called for in the erection drawings must be installed prior to additional employees going out on the joist. This includes any horizontal bridging or bolted diagonal bridging that is specified in the drawings.

Question 27: Section 1926.757(a)(6) requires that, "when steel joists are landed on a structure, they shall be secured to prevent unintentional displacement prior to installation." Do all joists remaining in a bundle have to be re-secured each time a joist is removed to be installed?

Answer: No. In the preamble to the final rule, Oregon OSHA stated that this provision:

> *"Addresses the hazard that arises when a single steel joist or a bundle of joists are placed on the structure and then left unattended and unattached. . . The bundles must remain intact prior to installation until the time comes for them to be set. This paragraph also prevents those ironworkers who are shaking out the filler joists from getting too far ahead of those workers welding the joists, a practice that leaves many joists placed but unattached. Paragraph (b)(3) of this section. . . requires that at least one end of each steel joist be attached immediately upon placement in its final erection position and before additional joists are placed. Another example of a situation addressed by this paragraph is if the exact dimensions of a piece of mechanical equipment to be installed in the decking are not known. A common practice, when this occurs, is to leave a joist unattached until the dimension is known. This paragraph requires such a joist to be secured, pending its final attachment." (Volume 66 of the Federal Register on page 5231.)*

The joists remaining in the bundle do not have to be re-secured while workers are in the process of removing them from the bundle and installing them. However, if, for example, an erector lands all of the joist bundles for a section of a building and will not install the joists until the following day, the joists must be secured to prevent unintentional displacement.

SECTION 1926.759 – FALLING OBJECT PROTECTION:

Question 28: An 80-foot long beam has been initially connected, if ironworkers are now bolting-up the beam, is the controlling contractor required to protect (or bar) operations under the beam in areas where the ironworkers are not working in accordance with 1926.759(b)?

For example, if an ironworker is working at one end of a beam bolting-up, and another is bolting-up the other end (80 feet away), do operations below the middle of the beam have to be protected or barred?

Answer: No. As stated in the preamble to the final rule (page 5243), the intent of this provision is to protect employees from falling objects. If there are no tools or materials located at the middle of the beam that could be displaced, then employees working below the middle of the beam would not be subjected to the hazard of falling objects. In that case, protection or barring operations would not be required below the middle area of the beam.

SECTION 1926.760 - FALL PROTECTION:

Question 29: A connector initially connects one end of a beam. Do Oregon OSHA standards allow the connector to then walk across the beam to connect the other end while the beam remains suspended from the crane?

Answer: Section 437-003-0752, Site Specific Erection Plan, states that "Employee(s) are allowed on suspended loads only when a competent person has determined that it is the safest way to accomplish a specific task or there is no other way to do the work." Oregon OSHA recognizes that there may be those limited situations when walking across a suspended beam or other structural member, after initially connecting one end, may be an acceptable means of accessing the other connection point. This is only allowed when the employer can demonstrate that it is infeasible or creates a greater hazard to position a connector at each connection point or use other means such as ladders, scaffolds, or aerial lifts to access the remaining connection point. A description of the procedures and work practices that will be used to protect employees from falls and other hazards while on suspended loads is required in the site specific erection plan.

Question 30: At what height are steel erectors required to be protected from falls?

Answer: Section 1926.760(a)(1) requires each employee engaged in a steel erection activity, except connectors and those working in controlled decking zones, to be protected from falls of 15 feet or more. When a steel erector (ironworker) is not engaged in a steel erection activity as set forth in the scope of this section (1926.750), they must be protected from falls according to the requirements of Subpart M, 1926.501.

Question 31: At what height are connectors required to be protected from falls? Is there a conflict between 1926.760(b)(1) and 1926.760(b)(3)?

Answer: There is not a conflict between 1926.760(b)(1) and 1926.760(b)(3). Section 1926.760(b)(3) requires that at all times between 15 and 30 feet, a connector must be provided with fall protection equipment and wear the necessary tie off equipment. This provision addresses circumstances when an employer must provide fall protection, whereas, 1926.760(b)(1) addresses when an employee must use the fall protection equipment. For clarification, under the requirements of 1926.760(b)(1), connectors working on a single story structure are not required to tie off until they are above 30 feet since the two-story criteria would not apply. Furthermore, connectors working on a multi-story structure are not required to tie off until they are above two stories or 30 feet, whichever is less.

Question 32: Does a connector have to be tied off above 15 feet while moving to an initial beam connection location and while moving to or from subsequent beam connection locations if the crane is busy getting the next piece?

Answer: No. The process of connecting includes moving on the steel to and from initial and subsequent points at which these connections are made.

Question 33: Can controlling contractors require tie off at less than 15 feet?

Answer: Yes. The standard does not prohibit controlling contractors from imposing stricter requirements than those in the standard.

Question 34: When do perimeter cables have to be installed?

Answer: Section 1926.760(a)(2) requires perimeter safety cables to be installed in multi-story structures. Under this provision, they must be installed "as soon as the metal decking has been installed, or before there is employee exposure." Employers may choose to install them earlier.

Question 35: At what height are roof and floor holes and openings required to be guarded and perimeter cables installed?

Answer: 437-003-1754 requires that where roof and floor holes and openings cannot be decked over, they must be provided with a cover or guardrail system as soon as they are created. This is similar to the requirement for installing the perimeter cables [1926.760(a)(2)], which states, "as soon as the metal decking has been installed." Neither rule designates a trigger height at which fall protection is required. The 15-foot trigger height requirement of 1926.760(a)(1) was arrived at on the premise that most steel erection work is done at or above 15 feet, and that 15 feet is the minimum fall arrest distance needed for a personal fall arrest system to function properly. Connectors and other workers on the skeletal steel frame are, for the most part, limited to the use of a personal fall arrest system. This is not the case for workers on the metal deck who are not involved in leading edge activity. Perimeter safety cables at the final interior and exterior perimeters, and covers or guardrails at roof and floor holes and openings can easily be installed and are therefore required where employees are exposed to a fall hazard of 6 feet or more.

Question 36: Section 1926.760(c) says that employees in a CDZ can work unprotected up to 30 feet. However, in 1926.760(c)(1) it requires employees at the leading edge to be protected from fall hazards of "more than two stories or 30 feet, whichever is less." At which height, 30 feet or two stories, is conventional fall protection required to be used to protect deckers?

Answer: The answer depends on whether the building is single or multi-story, and, if multi-story, whether two stories is less than 30 feet. Under paragraph 1926.760(c), a CDZ "may" be established up to 30 feet and used as a substitute for fall protection required in 1926.760(a), depending on certain prerequisites being met. Under 1926.760(c)(1), one of the prerequisites for using a CDZ instead of fall protection as high as 30 feet is that, if the building is multi-story, two stories must be 30 feet. Otherwise, where two stories are less than 30 feet, the CDZ may be used as a substitute for fall protection only up to two stories. In a single story structure, the prerequisite is automatically met and the CDZ can be used as a fall protection substitute up to 30 feet.

Question 37: Does some decking need to be in place for a CDZ to begin?

Answer: A CDZ can be implemented in an area where metal decking is being installed and forms the leading edge of the work surface. One or more panels will normally need to be installed before the control line is erected. These panels can be installed while workers are positioned on ladders, elevated platforms, protected by conventional fall protection, or otherwise protected from falling.

Question 38: A CDZ is defined as an area where certain work may take place "without the use of guardrail systems, personal fall arrest systems, fall restraint systems, or safety net systems . . ." Are employees required to use a positioning device when working in a CDZ?

Answer: No. Positioning device systems, as defined in the standard, are systems used on vertical surfaces, such as walls or columns. In a CDZ, workers are installing the horizontal surface on which they will be standing and working. No mention was made of positioning device systems in the CDZ definition since (as defined) they are not to be used while on a horizontal surface.

Question 39: Under 1926.760 (c)(2), only those employees involved in "leading edge work" are allowed to have access to the CDZ. The rule defines the term "leading edge" but not "leading edge work." What constitutes leading edge work in a CDZ?

Answer: In a CDZ, leading edge work consists of the placement and initial installation (by safety deck attachments, which typically are tack welds) of decking to create a deck. The leading edge of the deck changes location as this work progresses.

Question 40: Section 1926.760(c)(2) states that "access to a CDZ shall be limited to only those employees engaged in leading edge work." Installation of perimeter fall protection does not meet the standard's definition of leading edge work. Are workers prohibited from installing perimeter fall protection in a CDZ?

Answer: Installation of perimeter cables inside a CDZ will be considered a *de minimis* violation of 1926.760(c)(2) where all of the following conditions are met: (1) the workers installing the perimeter cables are protected by conventional fall protection; (2) their work does not interfere with the deckers, and (3) they have been trained on the hazards associated with decking. In a situation where all three conditions are met, the violation will be considered *de minimis* and a citation for that provision will not be issued.

Question 41: Section 1926.760(c)(2) requires that access to a CDZ be limited to those engaged in leading edge work. Typically one crew lays down the metal decking and another crew comes behind and tack welds the sheets in place. Can the tack weld work be done in a CDZ?

Answer: Yes. Tack welding, if done for safety deck attachments, can be done in a CDZ. Section 1926.760(c)(6) gives criteria for performing safety deck attachments in the CDZ and states that they shall be performed from the leading edge back. However, 1926.760(c)(7) does not allow final deck attachments to be performed in a CDZ.

Question 42: Section 1926.760(c)(3) and Appendix D: The suggested example in the appendix states that: "any other means that restricts access" may be used instead of control lines. What are some examples of other means?

Answer: Section 1926.760(c)(3) requires that the boundaries of the CDZ be marked "by the use of control lines or the equivalent." In a CDZ, the control line restricts access by visually warning employees of an unprotected area (66 FR 5247). Control lines can be made of rope, wire, tape, or other equivalent materials, but they must clearly designate the CDZ. Examples of other acceptable methods would be a perimeter wall, guardrail system, or even a restraint system rigged so that non-leading edge workers could not access the area. In contrast, a line painted on the floor would not be considered to be equivalent to control lines since it would be less visible than a control line.

Question 43: Section 1926.760(d)(2) states that "fall arrest system components shall be used in fall restraint systems and shall conform to the criteria in 1926.502 . . . either body belts or body harnesses shall be used in fall restraint systems." Section 1926.502 prohibits the use of body belts. Is this section internally inconsistent?

Answer: No. Section 1926.502(d) prohibits the use of body belts "as part of a personal fall arrest system." A fall restraint system, as defined in 1926.751, is a system that "prevents the user from falling any distance;" rather than arresting a fall towards a lower level, it prevents it. Therefore, body belts are permitted to be used in restraint systems.

Question 44: Section 1926.760(e) requires that fall protection provided by the steel erector remain in place after steel erection in that area has been completed to be used by other trades only if the controlling contractor directs the steel erector to leave it and inspects and accepts responsibility for it. What, if any, documentation does OSHA require when the steel erector leaves and the fall protection is left in place under this provision?

Answer: No written documentation is required by the standard.

SECTION 1926.761 – TRAINING:

Question 45: Can third-party training be used to comply with 1926.761? Can an employer be cited for deficiencies in the third-party training of employees?

Answer: Third-party training can be used to comply with the requirements of 1926.761. The preamble to this section states:

> "*The employer can choose the provider, method, and frequency of training that* is *appropriate for the employees being trained. The provider may be an outside, professional training organization or other qualified entity, or the employer may develop and conduct the training in-house."* [Volume 66 Federal Register at page 5152.]

The preamble also states that "*the program must meet the requirements of this section, and each employee must be provided the training prior to exposure to the hazard."* [Same Federal Register page as above.] It is the responsibility of the employer to take reasonable steps to assess the third-party trainer's ability to adequately train the employees according to this section. For

example, discussing the curriculum and instructors' qualifications with the third-party trainer to determine if they were sufficient, coupled with evaluating the employee's knowledge after completing the training, would be considered reasonable steps. If a third-party training program is deficient, and an employer failed to take reasonable steps to assess it, or used it knowing that it was deficient, the employer may be cited.

Question 46: Does a steel erector need to provide refresher training to employees? When would an employee have to be given additional training?

Answer: There is no specific requirement for scheduled retraining. However, where technologies or techniques of steel erection have changed, resulting in new hazards, the employee would have to be trained regarding the new technologies, techniques, and associated hazards. Training in the recognition and avoidance of any new hazards, including unique, site-specific hazards, would be required under 1926.21(b)(2). Page 5251 of the preamble to the final steel erection standard states:

> "*While retraining/refresher training is not specifically addressed, the employer is responsible for making sure that it has programs necessary to comply with the training requirements in 1926.21(b)(2): 'The employer shall instruct each employee in the recognition of unsafe conditions and the regulations applicable to his work environment to control or eliminate any hazards or other exposure to illness or injury.' Steel erection involves progressive sequences of erection, so that the work environment on any one-day may involve entirely different or unique new hazards than the day before and that new employees may enter into the erection process when it is already underway. In order to apply 1926.21 during steel erection activities, an employer would have to assess the type of training needed on a continuing basis as the environment and changes in personnel occur. It is the employer's responsibility to determine if an employee needs retraining in order to strengthen skills required to safely perform the assigned job duties and whenever the work environment changes to include newly recognized or encountered hazards. This is a key element in the employer's accident prevention program."* [Volume 66 Federal Register at page 5152]

Question 47: Is receiving training through union apprenticeship programs the only way to meet the requirements of this standard?

Answer: No. Appendix E of the final rule states that "the training requirements of 1926.761 will be deemed to have been met if employees have completed a training course on steel erection . . . that has been approved by the U.S. Department of Labor, Bureau of Apprenticeship." Union apprenticeship programs are mentioned in the preamble as an example of an option an employer might choose for training its employees. However, union apprenticeship programs are not the only way to provide employee training.

An employer may elect to identify a qualified person (in or out of the employer's organization) or a third-party organization whose training program meets the requirements of 1926.761 to train those employees. The steel erection standard defines a qualified person in 1926.751 (definitions) as:

> "*one who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project."*

As discussed in the answer to Question 36, the employer is responsible for assessing the third-party organization's or qualified person's qualifications and experience as they relate to the training program requirements and subject areas described in section 1926.761. The proficiency of the employees in their work activities as determined by the employer is important evidence of an effective training program. [See page 5152 of January 18, 2001 FR]

Question 48: Does any required training under 1926.761 have to be documented? Does the employer have to keep a record of employee training?

Answer: Yes. Under 437-003-0761(1)(a) the employer must prepare a written certification record, verifying that the training required by this section has been conducted. Paragraph (1)(b) requires the employer to maintain the latest training certificate.