OSHA Subpart R: Steel Erection
Scope

1926.750(a) This subpart sets forth requirements to protect employees from the hazards associated with steel erection activities involved in the construction, alteration, and/or repair of single and multi-story buildings, bridges, and other structures where steel erection occurs. The requirements of this subpart apply to employers engaged in steel erection unless otherwise specified. This subpart does not cover electrical transmission towers, communication and broadcast towers, or tanks.
Before Authorizing The Start Of Steel Erection …

1926.752(a) Approval to begin steel erection. Before authorizing the commencement of steel erection, the controlling contractor shall ensure that the steel erector is provided with the following written notifications:

1926.752(a)(1) The concrete in the footings, piers and walls and the mortar in the masonry piers and walls has attained, on the basis of an appropriate ASTM standard test method of field-cured samples, either 75 percent of the intended minimum compressive design strength or sufficient strength to support the loads imposed during steel erection.

1926.752(b) Commencement of steel erection. A steel erection contractor shall not erect steel unless it has received written notification that the concrete in the footings … (from the controlling contractor)
Pre-shift Visual Crane Inspection

1926.753(c) General. (1) Pre-shift visual inspection of cranes. (i) Cranes being used in steel erection activities shall be visually inspected prior to each shift by a competent person; the inspection shall include observation for deficiencies during operation. At a minimum this inspection shall include the following:

1926.753(c)(1)(i)(A) All control mechanisms for maladjustments;

1926.753(c)(1)(i)(B) Control and drive mechanism for excessive wear of components and contamination by lubricants, water or other foreign matter;
1926.753(c)(1)(i)(C) Safety devices, including but not limited to boom angle indicators, boom stops, boom kick out devices, anti-two block devices, and load moment indicators where required;

1926.753(c)(1)(i)(D) Air, hydraulic, and other pressurized lines for deterioration or leakage, particularly those which flex in normal operation;

1926.753(c)(1)(i)(E) Hooks and latches for deformation, chemical damage, cracks, or wear;

1926.753(c)(1)(i)(F) Wire rope reeving for compliance with hoisting equipment manufacturer's specifications;
1926.753(c)(1)(i)(G) Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, or moisture accumulation;

1926.753(c)(1)(i)(H) Hydraulic system for proper fluid level;

1926.753(c)(1)(i)(I) Tires for proper inflation and condition;

1926.753(c)(1)(i)(J) Ground conditions around the hoisting equipment for proper support, including ground settling under and around outriggers, ground water accumulation, or similar conditions;
1926.753(c)(1)(i)(K) The hoisting equipment for level position; and

1926.753(c)(1)(i)(L) The hoisting equipment for level position after each move and setup.
1926.753(c)(3) The headache ball, hook or load shall not be used to transport personnel except as provided in paragraph (c)(4) of this section.

1926.753(c)(4) Cranes or derricks may be used to hoist employees on a personnel platform when work under this subpart is being conducted, provided that all provisions of § 1926.550 (except for § 1926.550(g)(2)) are met.
1926.753(d)(1) Routes for suspended loads shall be pre-planned to ensure that no employee is required to work directly below a suspended load except for:

1926.753(d)(1)(i) Employees engaged in the initial connection of the steel; or

1926.753(d)(1)(ii) Employees necessary for the hooking or unhooking of the load

Except when starting connections, when hooking up, and unhooking
Multiple lift rigging

1926.753(e)(1)(ii) A maximum of five members are hoisted per lift;

1926.753(e)(1)(iii) Only beams and similar structural members are lifted;

1926.753(e)(4)(i) Attached at their center of gravity and maintained reasonably level;

1926.753(e)(4)(ii) Rigged from top down; and

1926.753(e)(4)(iii) Rigged at least 7 feet (2.1 m) apart.

The members on the multiple lift rigging assembly shall be set from the bottom up.
1926.754(b)(1) The permanent floors shall be installed as the erection of structural members progresses, and there shall be not more than eight stories between the erection floor and the upper-most permanent floor, except where the structural integrity is maintained as a result of the design.
1926.754(b)(2) At no time shall there be more than four floors or 48 feet (14.6 m), whichever is less, of unfinished bolting or welding above the foundation or uppermost permanently secured floor, except where the structural integrity is maintained as a result of the design.
1926.754(b)(3) A fully planked or decked floor or nets shall be maintained within two stories or 30 feet (9.1 m), whichever is less, directly under any erection work being performed.
1926.754(c)(1) Tripping hazards. Shear connectors (such as headed steel studs, steel bars or steel lugs), reinforcing bars, deformed anchors or threaded studs shall not be attached to the top flanges of beams, joists or beam attachments so that they project vertically from or horizontally across the top flange of the member until after the metal decking, or other walking/working surface, has been installed.
1926.754(c)(2) Installation of shear connectors on composite floors, roofs and bridge decks. When shear connectors are used in construction of composite floors, roofs and bridge decks, employees shall lay out and install the shear connectors after the metal decking has been installed, using the metal decking as a working platform. Shear connector shall not be installed from within a controlled decking zone (CDZ), as specified in § 1926.760(c)(8).
Covers for Roof and Floor Openings

1926.754(e)(3)(i) Covers for roof and floor openings shall be capable of supporting, without failure, twice the weight of the employees, equipment and materials that may be imposed on the cover at any one time.

1926.754(e)(3)(ii) All covers shall be secured when installed to prevent accidental displacement by the wind, equipment or employees.

1926.754(e)(3)(iii) All covers shall be painted with high-visibility paint or shall be marked with the word "HOLE" or "COVER" to provide warning of the hazard.
1926.755(a)(1) All columns shall be anchored by a minimum of 4 anchor rods (anchor bolts).

1926.755(a)(2) Each column anchor rod (anchor bolt) assembly, including the column-to-base plate weld and the column foundation, shall be designed to resist a minimum eccentric gravity load of 300 pounds (136.2 kg) located 18 inches (.46m) from the extreme outer face of the column in each direction at the top of the column shaft.
1926.756(a)(1) During the final placing of solid web structural members, the load shall not be released from the hoisting line until the members are secured with at least two bolts per connection, of the same size and strength as shown in the erection drawings, drawn up wrench-tight or the equivalent as specified by the project structural engineer of record, except as specified in paragraph (b) of this section.
1926.756(e)(1) The perimeter columns extend a minimum of 48 inches (1.2 m) above the finished floor to permit installation of perimeter safety cables prior to erection of the next tier, except where constructibility does not allow (see Appendix F to this subpart);

1926.756(e)(2) The perimeter columns have holes or other devices in or attached to perimeter columns at 42-45 inches (107-114 cm) above the finished floor and the midpoint between the finished floor and the top cable to permit installation of perimeter safety cables required by § 1926.760(a)(2), except where constructibility does not allow. (See Appendix F to this subpart).
1926.760(a)(1) Except as provided by paragraph (a)(3) of this section, each employee engaged in a steel erection activity who is on a walking/working surface with an unprotected side or edge more than 15 feet (4.6 m) above a lower level shall be protected from fall hazards by guardrail systems, safety net systems, personal fall arrest systems, positioning device systems or fall restraint systems.
1926.760(c) Controlled Decking Zone (CDZ). A controlled decking zone may be established in that area of the structure over 15 and up to 30 feet above a lower level where metal decking is initially being installed and forms the leading edge of a work area. In each CDZ, the following shall apply:

1926.760(c)(1) Each employee working at the leading edge in a CDZ shall be protected from fall hazards of more than two stories or 30 feet (9.1 m), whichever is less.

1926.760(c)(2) Access to a CDZ shall be limited to only those employees engaged in leading edge work.

1926.760(c)(3) The boundaries of a CDZ shall be designated and clearly marked. The CDZ shall not be more than 90 feet (27.4 m) wide and 90 (27.4 m) feet deep from any leading edge. The CDZ shall be marked by the use of control lines or the equivalent. Examples of acceptable procedures for demarcating CDZ's can be found in Appendix D to this subpart.

1926.760(c)(4) Each employee working in a CDZ shall have completed CDZ training in accordance with § 1926.761.
1926.760(c)(5) Unsecured decking in a CDZ shall not exceed 3,000 square feet (914.4 m²).
HORIZONTAL BRIDGING TERMINUS AT WALL

LAG W/SHEILD OR EMBEDDED ANCHOR

HORIZ. BRDG.

TYP.
HORIZONTAL BRIDGING TERMINUS AT PANEL WALL

HORIZONTAL BRIDGING TERMINUS AT STRUCTURAL SHAPE
HORIZONTAL BRIDGING TERMINUS AT STRUCTURAL SHAPE WITH OPTIONAL "X-BRIDGING"

BOLTED DIAGONAL BRIDGING TERMINUS AT WALL
BOLTED DIAGONAL BRIDGING TERMINUS AT WALL

BOLTED DIAGONAL BRIDGING TERMINUS AT WALL
JOISTS PAIR BRIDGING TERMINUS POINT

JOISTS PAIR BRIDGING TERMINUS POINT W/HORIZ. TRUSS
HORIZONTAL BRIDGING TERMINUS POINT SECURED BY TEMP. GUY CABLES

DIAGONAL BRIDGING TERMINUS POINT SECURED BY TEMP. GUY CABLES
Clipped end connections are connection material on the end of a structural member which has a notch at the bottom and/or top to allow the bolt(s) of the first member placed on the opposite side of the central member to remain in place. The notch(es) fits around the nut or bolt head of the opposing member to allow the second member to be bolted up without removing the bolt(s) holding the first member.
Staggered connections are connection material on a structural member in which all of the bolt holes in the common member web are not shared by the two incoming members in the final connection. The extra hole in the column web allows the erector to maintain at least a one bolt connection at all times while making the double connection.