

# Erecting Open Web Steel Joists

## One of the Deadly Dozen Hazardous Activities

In January of 2012 the Safety and Health Department launched several new initiatives designed to “**target the deadly dozen hazardous activities that lead to fatalities and disabling injuries.**” The focus of this article is to highlight some of the serious hazards pertaining to the erection of “**open web steel joist.**” Fatality reports obtained from the Occupational Safety and Health Administration (OSHA) and The International Association revealed that 11% of fatalities occurred during the erection of open web steel joists. Following are illustrations and information that depict some of the primary hazards and regulatory requirements pertaining to the erection of open web steel joists.



**Requirements for Securing Joist Ends to Prevent Displacement Hazards** – One of the primary causation factors in many serious incidents and fatalities has been attributed to the failure to adequately secure the joist ends to the structure.

**OSHA 1926 757(b)(3)**- “except when panels that have been pre-assembled from steel joists with bridging, each steel joist shall be attached to the support structure, at least at one end on both sides of the seat, immediately upon placement in the final erection position and before additional joists are placed.”

When joist ends are not secured (bolted or welded) to the supporting beam or joist girder upon final placement, hazards pertaining to accidental displacement exists. Ironworkers traveling from point to point or dragging welding lead over the unsecured joists can easily cause the joist ends to slide, lose bearing and collapse to the ground or next lower level below.

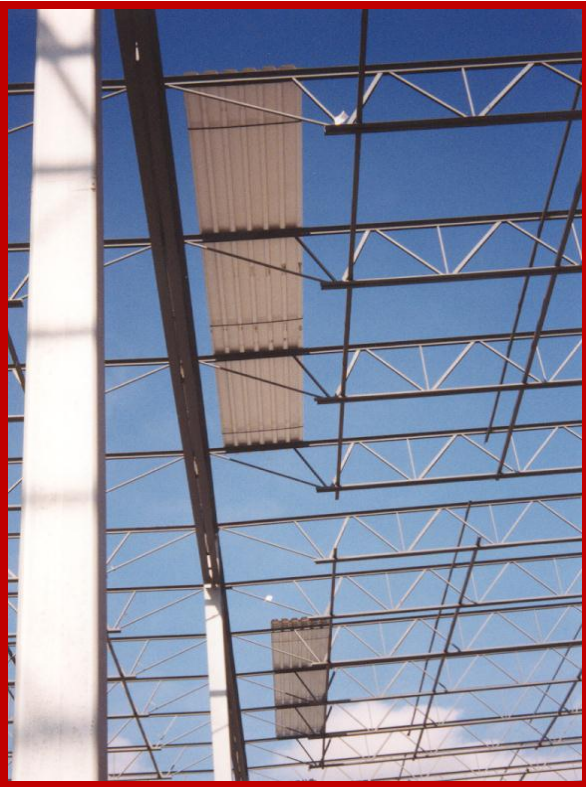


### **Requirements for Field-Bolted Joist Ends**

Long joists that are erected in bays of 40 feet or more have a greater tendency to twist or rotate, and create displacement and collapse hazards for the Ironworkers installing them. Requiring these joists to be field bolted at the time of final placement will allow the Ironworkers to safely erect, plumb joists, and install diagonal bolted bridging or horizontal bridging. The following OSHA standard protects Ironworkers from the hazard of the joist ends losing bearing on the structural support.

**The OSHA 1926 757(a)(8)** requires “(i) except for steel joists that have been pre-assembled into panels, connections of individual steel joists to steel structures in bays of 40 feet or more shall be fabricated to allow for field bolting during erection. (ii) These connections shall be field-bolted unless constructability does not allow.”

This OSHA standard requires both the steel joist shoe and the beam to be fabricated with holes to allow for field bolting.



## **Requirements for Landing Deck Bundles to Prevent Structural Collapse Hazards**

Landing bundles of metal decking or bundles of horizontal bridging on steel joists that have not been adequately secured has caused many fatalities and structural collapse incidents. Bundles of joist bridging must be limited to 1000 pounds and placed within one foot of the secured end. These hazards are addressed by the following OSHA standards.

1926.757(e)(2) – “Except for special conditions contained in 1926.757(e)(4), no construction loads are allowed on the steel joists until all bridging is installed and anchored and all joist-bearing ends are attached. 1926.757(e)(5) – The edge of the construction load shall be placed within 1 foot of the bearing surface of the joist end.”

However, OSHA permits a special exception for landing deck bundles on open web steel joists provided that the steel erection contractor adhere to specific conditions.

When certain job site conditions are met, bundles of decking may be landed or placed on joists that are not fully bridged provided that the following six special conditions are met:

1. The employer has first determined from a qualified person and documented in a site-specific erection plan that the structure or portion of the structure is capable of supporting the load;
2. The bundle of decking is placed on a minimum of 3 steel joists;
3. The joist supporting the decking are attached at both ends;
4. At least one row of bridging is installed and anchored;
5. The total weight of the bundle of decking does not exceed 4,000 pounds; and
6. Placement of the bundle of decking shall be in accordance with paragraph (e)(5) of 1926.757.



## **Examples of Hazards and Unsafe Joist Erection**

The photograph on the left illustrates several serious hazards and OSHA violations. The steel joists were loaded with bundles of metal roof decking and horizontal bridging prior to the joist ends being secured and bridging installed. Additionally, the decking bundles were not placed within 1 foot of the bearing surface of the joist end. This can cause the unsecured joist to either shift or sprawl under loading. This jobsite was a fast-track project where many Ironworkers were accessing unsecured joists and shaking-out horizontal bridging. Serious accidents involving structural collapse can occur if the open web steel joists are not adequately secured prior to landing deck bundles, bridging bundles, or other construction materials. Ironworkers must never access joists unless all the above conditions are met.





**Example of Joist Collapse** - In the illustration on the left, 4 of the steel joists collapsed when bundles of roof decking were landed. The joist ends were not secured and the horizontal bridging was not installed as required by the OSHA standard below.

1926.757(e)(2) - "Except for special conditions contained in 1926.757(e)(4), no construction loads are allowed on the steel joists until all bridging is installed and anchored and all joist-bearing ends are attached.

On this project, several bundles of roof decking were being off-loaded from the truck and hoisted along the column line of the structure. This progression of hoisting and landing loads preceded the necessary work to secure the joists. Never let the erection sequence get ahead of securing the joists ends and installing the required bridging.

**The Importance of Training** - The Ironworkers National Training Fund has developed a special training module for apprentices and journeymen upgrading on the erection of open web steel joists. This training course is offered at our training facilities throughout the United States and Canada.

The "2012 Zero Fatality" campaign will challenge all members to "***intervene and prevent unsafe conditions and unsafe acts***" during the erection of open web steel joists. The erection of open web steel joists is one of the "***deadly dozen hazardous activities***" that has led to fatalities and disabling injuries. This campaign will include hard-hat stickers, gang-box stickers, and posters for training facilities and local unions. I will continue to work closely with District Councils, local unions, and IMPACT Regional Advisory Boards throughout the United States and Canada to promote the International Association's "***2012 Zero Fatality***" campaign by "***targeting the deadly dozen hazardous activities that lead to fatalities and disabling injuries.***"

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**April Feature Issue:**  
**"Preventing Column Collapse and Anchor Bolt Failure"**  
**Targeting One of the Deadly Dozen Hazardous Activities**