

# GLOSSARY

## NOTES:

Terms in **Bold** and their definitions come from the AISC AND AISI STANDARD Standard Definitions for Use in the Design of Steel Structures, 2004 Edition, First Printing April 2005.

- \* These terms are usually qualified by the type of *load effect*, e.g., nominal tensile strength, available compressive strength, design flexural strength.
- \*\* Term usually qualified by the type of component, e.g. local web buckling, local flange buckling, etc.
- † The definitions provided for these terms come from the OSHA Steel Erection Standard Part §1926.757 – Open Web Steel Joists.

**Accessories.** Structural components related to the design, fabrication and erection of *joists* and *Joist Girders* including, but not limited to sloped *end bearings*, *extended ends*, *ceiling extensions*, *bridging* and bridging anchors, *headers* and bottom chord lateral bracing for *Joist Girders*.

**Anchored Bridging†.** The means that the steel joist bridging is connected to a bridging terminus point.

**Applicable Building Code.** Building code under which the structure is designed.

**Bay.** The distance between the main structural frames or walls of a building.

**Bearing.** The distance that the bearing shoe or seat of a *joist* or *Joist Girder* extends over its masonry, concrete or steel support.

**Bearing depth.** Depth of the joist at the bearing point or bearing seat.

**Bearing Plate.** The steel plate used for a *joist* or *Joist Girder* to bear on when it is supported by masonry or concrete supports. The plate is designed by the *Specifying Professional* to carry the *joist* reaction to the supporting structure.

**Bottom Chord Extension (BCX).** The two angle extended part of a *joist* bottom chord from the first bottom chord panel point towards the end of the *joist*.

**Bridging.** In general, a member connected to a *joist* to brace it from lateral movement. See also Diagonal Bridging and Horizontal Bridging.

**Bridging Clip†.** A device that is attached to a steel *joist* to allow the bolting of the *bridging* to the steel *joist*.

**Bridging Terminus Point†.** A wall, beam, tandem *joists* (with all *bridging* installed and a horizontal truss in the plane of the top chord) or other element at an end or intermediate point(s) of a line of *bridging* that provides an anchor point for the steel *joist bridging*.

**Buckling.** *Limit state* of sudden change in the geometry of a structure or any of its elements under a critical loading condition.

**Buckling Strength.** *Nominal strength* for *buckling* or instability *limit states*.

**Bundle.** The banding together of *joist* products, bridging, and decking into certain sizes, weights, pieces, lengths, etc. to expedite shipping, unloading and storage, and erection at a job site.

**Buyer.** The entity that has agreed to purchase *material* from the manufacturer and has also agreed to the terms of sale.

**Camber.** An upward curvature of the *chords* of a *joist* or *Joist Girder* induced during shop fabrication. Note, this is in addition to the pitch of the top chord.

**Cantilever.** The portion of a *joist* product that extends beyond its structural support. A lateral brace may need to be provided at the end of the cantilever to ensure it is stable during erection and under load.

**Ceiling Extension.** A *bottom chord extension* except that only one angle of the *joist* bottom chord is extended from the first bottom chord panel point towards the end of the *joist*.

**Centering.** The material placed over the *joists* used for cast-in-place slabs and may be ribbed metal lath, corrugated steel sheets, paper-backed welded wire fabric, removable centering or any other suitable material capable of supporting the slab at the designated *joist* spacing. Centering shall not cause lateral displacement to the top chord of *joists* during installation or damage to the *joists* during removal or placing of the concrete.

**Choker†.** A wire rope or synthetic fiber rigging assembly that is used to attach a *load* to *hoisting equipment* or device.

**Chords.** The top and bottom members of a *joist* or *Joist Girder*. When a chord is comprised of two angles there is usually a gap between the members.

**Clear Span.** The actual clear distance or opening between supports for a *joist*, which is the distance between walls or the distance between the edges of flanges of beams.

**Cold-Formed Steel Structural Member.** Shape manufactured by press-braking blanks sheared from sheets, cut lengths of coils or plates, or by roll forming cold- or hot-rolled coils or sheets; both forming operations being performed at ambient room temperature, that is, without manifest addition of heat such as would be required for hot forming.

**Collateral Load.** All additional dead loads other than the weight of the building, such as sprinklers, pipes, ceilings, and mechanical or electrical components.

**Competent Person†.** One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

**Composite.** Condition in which steel and concrete elements and members work as a unit in the distribution of internal forces.



**Composite Steel Joist.** Open web, parallel chord, load-carrying member suitable for direct support of one-way floor or roof systems. Members may consist of hot-rolled or cold-formed steel, including cold-formed steel whose yield strength has been attained by cold working. Shear connection between the joist top chord and overlying concrete slab allows the steel joist and slab to act together as an integral unit after the concrete has adequately cured.

**Concrete Compressive Strength.** Compressive strength of concrete typically measured after 28 days of curing time.

**Concrete Unit Weight.** Weight of a volume of concrete, typically 145 lbs/ft.<sup>3</sup> (2300 kg/m<sup>3</sup>) for normal weight or 120 lbs/ft.<sup>3</sup> (1900 kg/m<sup>3</sup>) for light weight aggregate.

**Connection.** Combination of structural elements and *joints* used to transmit forces between two or more members. See also *Splice*.

**Connector†.** An employee who, working with *hoisting equipment*, is placing and connecting structural members and/or components.

**Constructability†.** The ability to erect structural steel members in accordance with Subpart R without having to alter the over-all structural design.

**Construction Joint.** Gap or saw cut in slab to allow for expansion and contraction of concrete.

**Construction Load†.** (for joist erection only) Any *load* other than the weight of the employee(s), *joists* and the *bridging bundle* (see OSHA Regulations 1926.757(d)(1), (d)(2) and (d)(3)).

**Deck.** A floor or roof covering made out of gage metal attached by welding or mechanical means to *joists*, beams, *purlins*, or other structural members and can be galvanized, painted, or unpainted.

**Design Length.** The length of a joist used in the structural analysis.

**Design Load.** Applied *load determined* in accordance with *LRFD load combinations*.

**Design Strength\*.** *Resistance factor* multiplied by the *nominal strength*,  $\phi R_n$ .

**Diagonal Bridging.** Two angles or other structural shapes connected from the top chord of one *joist* to the bottom chord of the next joist to form an 'X' shape. These members are almost always connected at their point of intersection.

**Diaphragm.** Roof, floor or other membrane or bracing system that transfers in-plane forces to the lateral force resisting system.

**Effective Length.** Length of an otherwise identical column with the same strength when analyzed with pin-ended boundary conditions.

**End Anchorage.** The proper attachment of the ends of a *joist* product to masonry, structural concrete or structural steel.

**End Diagonal or Web.** The first web member on either end

of a *joist* or *Joist Girder* which begins at the top chord at the seat and ends at the first bottom chord panel point.

**End Support.** The masonry, structural concrete or structural steel that supports the ends of *joist* products and is capable of carrying the loads transmitted to it by the *joist* products.

**Erection Bridging†.** The bolted *diagonal bridging* that is required to be installed prior to releasing the hoisting cables from the steel *joists*.

**Erector.** The entity that is responsible for the safe and proper erection of the *materials* in accordance with all applicable codes and regulations.

**Extended End.** The extended part of a *joist* top chord with the seat angles also being extended from the end of the joist extension back into the joist and maintaining the standard end *bearing* depth over the entire length of the extension.

**Factored Load.** Product of a *load factor* and the *nominal load*.

**Fall Restraint System†.** A fall protection system that prevents the user from falling any distance. The system is comprised of either a body belt or body harness, along with an anchorage, connectors and other necessary equipment. The other components typically include a lanyard, and may also include a lifeline and other devices.

**Ferrule.** Ceramic ring placed at base of the shear stud which shields the arc between welding equipment and steel deck.

**Filler.** A rod, plate or angle welded between a two angle web member or between a top or bottom chord panel to tie them together, usually located at the middle of the member.

**Flexural Buckling.** Buckling mode in which a compression member deflects laterally without twist or change in cross-sectional shape.

**Flexural-Torsional Buckling.** Buckling mode in which a compression member bends and twists simultaneously without change in cross-sectional shape.

**Gravity Load.** *Load*, such as that produced by dead and live loads, acting in the downward direction.

**Header.** A structural member located between two *joists* or between a joist and a wall which carries another joist or joists. It is usually made up of an angle, channel, or beam with saddle angle connections on each end for bearing.

**Hoisting Cable.** A chain, strap or cable that is attached at each end which is used to facilitate the moving and lifting of *joist* products, bridging, decking, etc.

**Hoisting Equipment†.** Commercially manufactured lifting equipment designed to lift and position a load of known weight to a location at some known elevation and horizontal distance from the equipment's center of rotation. 'Hoisting equipment' includes but is not limited to cranes, derricks, tower cranes, gin poles and gantry hoist systems. A "come-a-long" (a mechanical device, usually consisting of a chain or cable attached at each end, that is used to facilitate move-



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ment of materials through leverage) is not considered 'hoisting equipment.'

**Horizontal Bridging.** A continuous angle or other structural shape connected to the top and bottom chord of a joist.

**Inspector.** An independent person hired to verify that the erection of a structure is in accordance with the *Site-Specific Erection Plans* including the *Joist Placement Plans* and the deck placement drawings.

**Instability.** *Limit state* reached in the loading of a *structural component*, frame or structure in which a slight disturbance in the *loads* or geometry produces large displacements.

**Joint.** Area where two or more ends, surfaces or edges are attached. Categorized by type of fastener or weld used and the method of force transfer.

**Joist.** A structural load-carrying member with an open web system which supports floors and roofs utilizing hot-rolled or cold-formed steel and is designed as a simple span member. Currently, the SJI has the following joist designations: K-Series including KCS, LH-Series, DLH-Series, and CJ-Series.

**Joist Girder.** A primary structural load-carrying member with an open web system designed as a simple span supporting equally spaced concentrated loads of a floor or roof system acting at the panel points of the member and utilizing hot-rolled or cold-formed steel.

**Joist Placement Plans.** Drawings that are prepared depicting the interpretation of the Contract Documents requirements for the *material* to be supplied by the *Seller*. These floor and/or roof plans are approved by the *Specifying Professional, Buyer* or *Owner* for conformance with the design requirements. The *Seller* uses the information contained on these drawings for final material design. A unique piece mark number is typically shown for the individual placement of *joists, Joist Girders* and *accessories* along with sections that describe the end bearing conditions and minimum attachment required so that *material* is placed in the proper location in the field.

**Joist Substitute.** A structural member who's intended use is for very short spans (10 feet or less) where open web steel joists are impractical. They are usually used for short spans in skewed bays, over corridors or for outriggers. It can be made up of two or four angles to form channel sections or box sections.

**Lateral Buckling.** Buckling mode of a flexural member involving deflection normal to the plane of bending.

**Lateral-Torsional Buckling.** Buckling mode of a flexural member involving deflection normal to the plane of bending occurring simultaneously with twist about the shear center of the cross section.

**Limit State.** Condition in which a structure or component becomes unfit for service and is judged either to be no longer useful for its intended function (*serviceability limit state*) or to have reached its ultimate load-carrying capacity

(*strength limit state*).

**Load.** Force or other action that results from the weight of building materials, occupants and their possessions, environmental effects, differential movement, or restrained dimensional changes.

**Load Effect.** Forces, stresses, and deformations produced in a *structural component* by the applied loads.

**Load Factor.** Factor that accounts for deviations of the *nominal load* from the actual *load*, for uncertainties in the analysis that transforms the *load* into a *load effect*, and for the probability that more than one extreme *load* will occur simultaneously.

**Local Buckling\*\*.** *Limit state of buckling* of a compression element within a cross section.

**LRFD (Load and Resistance Factor Design).** Method of proportioning *structural components* such that the *design strength* equals or exceeds the *required strength* of the component under the action of the *LRFD load combinations*.

**LRFD Load Combination.** *Load combination* in the *applicable building code* intended for strength design (*Load and Resistance Factor Design*).

**Material.** *Joists, Joist Girders* and *accessories* as provided by the *Seller*.

**Nesting.** The positioning of *joist* products so that when they are bundled together the *chords* of one member fit tightly against or overlap the *chords* of the adjacent member in the *bundle*. Once the strapping that is used to *bundle* the *joists* together is cut the *joists* become de-nested.

**Nominal Load.** Magnitude of the *load* specified by the *applicable building code*.

**Nominal Strength\*.** Strength of a structure or component (without the *resistance factor* or *safety factor* applied) to resist the *load effects*, as determined in accordance with these *Standard Specifications*.

**Non-composite.** Condition in which steel and concrete elements and members do not work as a unit in the distribution of internal forces. The bare steel joist carries all applied loads including the wet weight of the concrete.

**OSHA.** The Occupational Safety and Health Administration is the federal government agency whose purpose is to save lives, prevent injuries, and protect the health of the workers of America.

**Owner.** The entity that is identified as such in the Contract Documents.

**Permanent Load.** *Load* in which variations over time are rare or of small magnitude. All other *loads* are *variable loads*.

**Personal Fall Arrest System†.** A system used to arrest an employee in a fall from a working level. A personal fall arrest system consists of an anchorage, connectors, a body harness and may include a lanyard, deceleration device, lifeline,



or suitable combination of these. The use of a body belt for fall arrest is prohibited.

Placement Plans. See “*Joist Placement Plans.*”

**Ponding.** Retention of water due solely to the deflection of flat roof framing.

Qualified Person†. 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.

Quality Assurance. System of shop and field activities and controls implemented by the *owner* or his/her designated representative to provide confidence to the *owner* and the building authority that quality requirements are implemented.

Quality Control. System of shop and field controls implemented by the *seller* and *erector* to ensure that contract and company fabrication and erection requirements are met.

**Required Strength\*.** Forces, stress, and deformations produced in a *structural component*, determined by either *structural analysis*, for the *LRFD* or *ASD load combinations*, as appropriate, or as specified by these *Standard Specifications*.

**Resistance Factor,  $\phi$ .** Factor that accounts for unavoidable deviations of the *nominal strength* from the actual strength and for the manner and consequences of failure.

Seller. A company certified by the Joist Institute engaged in the manufacture and distribution of *joists*, *Joist Girders* and *accessories*.

**Service Load.** Load under which serviceability limit states are evaluated.

Serviceability Limit State. Limiting condition affecting the ability of a structure to preserve its appearance, maintainability, durability, or the comfort of its occupants or function of machinery, under normal usage.

Shear Stud. Headed shear connector specifically designed for use on a steel joist or beam, which permits composite action between concrete slab and joist or beam.

Shear Stud Welder. Machine used to weld headed shear studs through the steel deck to the steel joist.

Site-Specific Erection Plan. OSHA has defined a site-specific erection plan in §1926.752(e) as one that shall be developed by a *qualified person* and be available at the work site. This site-specific erection plan is one where employers elect, due to conditions specific to the site, to develop alternate means and methods that provide employee protection in accordance with OSHA §1926.753(c)(5), §1926.757(a)(4) or §1926.757(e)(4).

Slab. Concrete placed to form a deck to a specified thickness. A portion of the slab serves as part of the composite joist system as well as sub-floor or finished floor.

Slenderness Ratio. The ratio of the effective length of a col-

umn to the radius of gyration of the column about the same axis of bending.

Span. The centerline-to-centerline distance between structural steel supports such as a beam, column or *Joist Girder* or the clear span distance plus four inches onto a masonry or concrete wall.

**Specified Minimum Yield Stress.** Lower limit of *yield stress* specified for a material as defined by ASTM.

Specifying Professional. The licensed professional who is responsible for sealing the building Contract Documents, which indicates that he or she has performed or supervised the analysis, design and document preparation for the structure and has knowledge of the load-carrying structural system.

Splice. *Connection* between two structural members joined at their ends by either bolting or welding to form a single, longer member.

Spreader Bar. A specially designed structural steel member attached to *hoisting equipment* that may be used to lift *joist*, *bridging*, or *decking bundles* at two points.

Square End. Bottom chord bearing condition of a parallel chord joist.

Stability. Condition reached in the loading of a *structural component*, frame or structure in which a slight disturbance in the *loads* or geometry does not produce large displacements.

Stabilizer Plate. A steel plate at a column or wall inserted between the end of a bottom chord of a *joist* or *Joist Girder*.

**Standard Specifications.** Documents developed and maintained by the Steel Joist Institute for the design and manufacture of open web steel joists and Joist Girders. The term “SJI Standard Specifications” encompass by reference the following:

ANSI/SJI-K1.1 Standard Specification for Open Web Steel Joists, K-Series; ANSI/SJI-LH/DLH-1.1 Standard Specifications for Longspan Steel Joists, LH-Series and Deep Longspan Steel Joists, DLH-Series; ANSI/SJI-JG-1.1 Standard Specifications for Joist Girders; and ANSI/SJI-CJ-1.0 Standard Specifications for Composite Steel Joists.

Strength Limit State. Limiting condition affecting the safety of the structure, in which the ultimate load-carrying capacity is reached.

Structural Drawings. The graphic or pictorial portions of the Contract Documents showing the design, location and dimensions of the work. These documents generally include plans, elevations, sections, details, connections, all loads, schedules, diagrams and notes.

Stud Installation Layout Drawing. Plan provided by *Seller* to *Buyer* showing size, quantity and location of all shear connectors to be installed on the composite steel joists.

Tagged End. The end of a *joist* or *Joist Girder* where an identification or piece mark is shown by a metal tag. The



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member must be erected with this tagged end in the same position as the tagged end noted on the *placement plan*.

**Tensile Strength (of material).** Maximum tensile stress that a material is capable of sustaining as defined by ASTM.

**Tie Joist.** A *joist* that is bolted at a column.

**Top Chord Extension (TCX).** The extended part of a *joist* top chord. This type of extension only has the two top chord angles extended past the joist seat.

**Torsional Buckling.** *Buckling* mode in which a compression member twists about its shear center axis.

**Unbraced Length.** Distance between braced points of a member, measured between the centers of gravity of the bracing members.

**Variable Load.** *Load* not classified as *permanent load*.

**Webs.** The vertical or diagonal members joined at the top and bottom *chords* of a *joist* or *Joist Girder* to form triangular patterns.

**Yield Point.** First stress in a material at which an increase in strain occurs without an increase in stress as defined by ASTM.

**Yield Strength.** Stress at which a material exhibits a specified limiting deviation from the proportionality of stress to strain as defined by ASTM.

**Yield Stress.** Generic term to denote either *yield point* or *yield strength*, as appropriate for the material.

