VULCRAFT

Steel Joists & Joist Girders

VULCRAFT
2007

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STEEL JOISTS
JOIST GIRDERS

STEEL JOIST INSTITUTE SJI

NUCOR
VULCRAFT GROUP

It's Our Nature.®

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FRONT COVER PICTURE:
The Prairie School - Racine, Wisconsin

This 68,000 sq. ft facility included a new locker room, fitness and weight training areas, a field house, and a track. The primary framing system consisted of a braced, compound-curved steel frame supporting long span barrel vaulted steel joists at the roof with precast plank supported on a steel frame and load bearing masonry walls at the floor. The structure was supported on conventional spread footings. The building featured large areas of clerestory glazing and curvilinear form.

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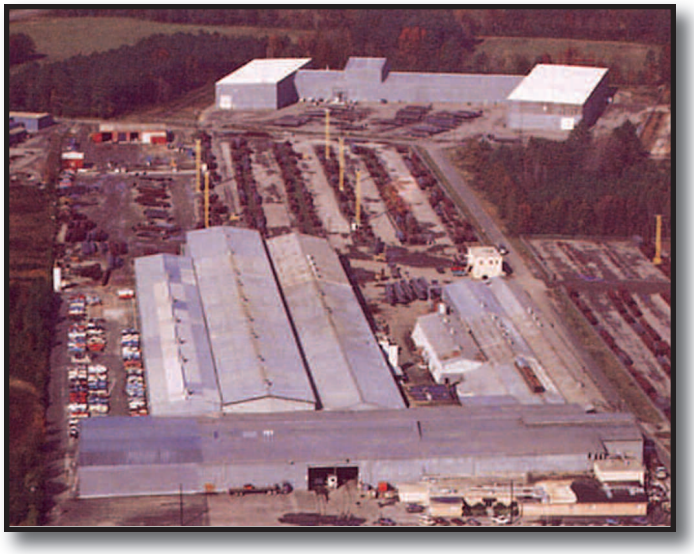

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Joists

A WORD ABOUT QUALITY

In manufacturing steel joists, there can be no compromise on quality. Your business depends on it. Our reputation and success depends on it. As the largest manufacturer of steel joists in the United States, a lot of buildings and a lot of people depend on Vulcraft for consistently high standards of quality that are demonstrated in reliable performance.

In the manufacturing of steel joists and joist girders, Vulcraft uses high quality steel. Welding to exact specifications is the key to making structurally sound joists — and the most critical step in the entire process. This being the case, all Vulcraft welders are qualified to American Welding Society standards. All welds are in accordance with the Steel Joist Institute's welding criteria and all Vulcraft joists are manufactured to meet the required design loads of the specifying professional.

To further insure the precision and quality of every weld, every Vulcraft quality assurance inspector is also certified to these same high standards. Furthermore Vulcraft's quality assurance supervisors report directly to the engineering manager. Vulcraft also employs an ongoing program of mechanical testing that includes full scale load tests at every facility.

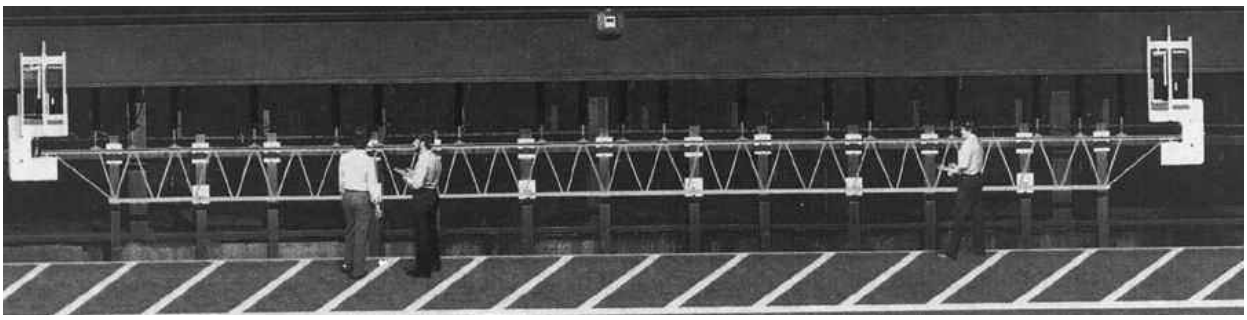
As the leading manufacturer of steel joists and joist girders in the United States, Vulcraft's reputation depends on successfully managed quality control programs. That's why quality is important at Vulcraft. You have our word on it.

NOTICE

Vulcraft, a Division of Nucor Corporation, has provided this catalog for use by engineers and architects in designing and using Vulcraft open web joists and open web girders. It includes all products available at the time of printing. Vulcraft reserves the right to change, revise or withdraw any Products or procedures without notice.

The information presented in this catalog has been prepared in accordance with recognized engineering principles and is for general information only. While it is believed to be accurate, this information should not be used or relied upon for any specific application without competent professional examination and verification of its accuracy, suitability and applicability by an engineer, architect or other licensed professional.

Vulcraft is a manufacturer of open web steel joists, joist girders, floor deck and roof deck. Vulcraft employs a staff of engineers for the design, manufacture and marketing of its products. Vulcraft does not accept the responsibility as the design professional of record for any structure. Vulcraft accepts the delegation of the engineering responsibility only for the products it manufactures, provided the application and applicable loading for these products are specified by the design professional of record. Vulcraft provides engineering for the design of its products and does not displace the need on any project for a design professional of record.



FLOOR VIBRATION

Floor vibration occurs, in varying degrees, in all types of building construction. Unlike steady state vibration, which can be isolated, vibration due to human impact is inconsistent in amplitude and frequency and therefore, more difficult to control.

The Steel Joist Institute and Nucor Research and Development have studied this phenomenon for many years. Laboratory research has been performed and numerous buildings, exhibiting both good and bad characteristics, were tested using seismic recording instruments. SJI Technical Digest #5 (1988) and AISC / CISC Steel Design Guide 11 (1997) discuss in detail methods for calculating vibrational properties for joist supported floors.

The vast majority of structures, including those utilizing steel joists, do not exhibit floor vibrations severe enough to be considered objectionable. However, human sensitivity to vibratory motion varies, and a satisfactory framing solution is dependent upon the sound judgment of qualified structural engineers.

DEFINITIONS

Floor vibration is measured in terms of acceleration amplitude, displacement amplitude, and frequency. These factors are not objectionable to all people at the same level since human sensitivity varies.

Acceleration amplitude is the maximum acceleration caused by a force excitation.

Displacement amplitude is defined as the magnitude or total distance traveled by each oscillation of the vibration.

Frequency is the term used to describe the speed of the oscillations and is expressed in cycles per second or Hz.

Acceleration is the only vibration factor which humans can sense.

Damping is defined as the rate of decay of amplitude.

The following observations, which were determined from research data to be beneficial in reducing vibration levels, are recommended only as a guide.

OPEN FLOOR AREAS are most subject to vibrational problems. Modern “electronic offices” tend to have lower live loading and damping, and hence can potentially be more prone to floor vibration. Partitions, file cabinets, book stacks, heavy furnishings and even crowds of people provide additional damping and minimize complaints.

THICKER FLOOR SLABS are an economical solution to floor vibration. Additional thickness increases floor system stiffness transverse to the joists, thus reducing the vibration. The additional mass of the system will reduce the objectionable vibration.

WIDER JOIST SPACINGS improve vibrational characteristics only when combined with thicker floor slabs. The resulting increase in joist size does not contribute significantly to the composite section. When used with a thicker slab, greater resistance to vibration can be achieved, and, since fewer pieces must be installed, may be more economical.

PARTITIONS introduce damping and usually eliminate vibration problems. They will be effective either above or below a floor as long as they are connected to the floor. Partitions below a joist supported floor ideally should be in direct contact with the steel deck. If partitions below a joist supported floor are in direct contact with the joists, the joist bottom chord and webs must be designed for such intermediate support conditions.

SUPPORT FRAMING BEAMS sometimes contribute to floor vibration. The natural frequency and amplitude for both the joist and supporting joist girders or hot-rolled girders need to be calculated. In this manner the resulting system acceleration or displacement and frequency can be determined from which the performance of the system can be predicted.

INCREASING JOIST STIFFNESS above that which is required by live load deflection may be beneficial. A higher frequency floor is generally a better floor for most applications. Increasing the stiffness of the steel joists themselves results in increasing the frequency and slightly decreasing the acceleration or displacement of the floor vibration.

BRIDGING of all standard types provide equal floor vibrational characteristics.

LONGER FLOOR SPANS have many advantages over shorter spans, both in construction cost and in vibrational response. Floor spans over 40 feet with a 2-1/2" thick concrete slab give a vibrational frequency in the 3 - 5 cycles per second range. There are many long spanning joist supported floors that perform satisfactorily.

PC-based software to evaluate vibration of joist supported floor systems is available from the

STEEL JOIST INSTITUTE
3127 Mr. Joe White Avenue
Myrtle Beach, SC 29577
phone (843) 626-1995

and

STRUCTURAL ENGINEERS, INC.
537 Wisteria Drive
Radford, VA 24141
phone (540) 731-3330

CONCLUSIONS:

Partitions eliminate vibration problems. When a floor area cannot have partitions, increasing the slab thickness and/or increasing the joist stiffness are the most economical and effective ways to reduce objectionable vibrations.

For more information refer to Steel Joist Institute Technical Digest No. 5 "Vibration of Steel Joist-Concrete Slab Floors", and the AISC / CISC Steel Design Guide 11 “Floor Vibrations Due to Human Activity”.

DEFLECTION OF STEEL JOISTS

The deflection of a steel joist when loaded with a uniformly-distributed load depends upon the following factors:

w= uniformly-distributed load carried by the joist (plf)
L= (span of the joist -.33)(ft.)
E= modulus of elasticity of steel (29,000,000 psi)
I= 26.767 W_{LL} (L3) (10^{-6}) where W_{LL}=red figure in load table

Tests have shown that deflection at mid-span may be determined with reasonable accuracy using the following formula:

Deflection (inches)=

$$\frac{1.15x5wL^4\ (12^3)}{384EI} =$$

$$\frac{25.88wL^4}{EI}$$

Example: Determine the approximate total load deflection of a 24K8 for the following conditions:

W=280 plf L=40.0 ft
W_{LL}= 161 plf E=29,000,000 psi
I=26.767(161) $(40-.33)^3$ (10^{-6})= 269.0 $in.^4$

Deflection=

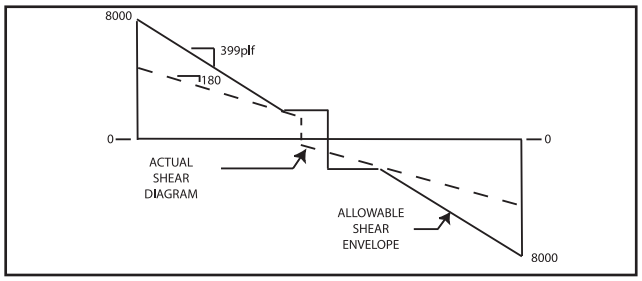
$$\frac{25.88(280)(40-.33)^4}{29{,}000{,}000(269)} = 2.30 \text{ in.}$$

HOW TO SPECIFY JOISTS FOR CONCENTRATED LOADS ON STEEL JOISTS

When specifying joists for concentrated loads, the specifying professional should first attempt to specify a larger standard joist or a KCS series joist. The joist specified must have adequate moment and shear resistance throughout the length of the joist.

The shear resistance of K or LH series joists varies throughout the length of the joist. The shear capacity of the joist must be checked at every location by use of a shear diagram showing the allowable shear envelope created by the uniform design load of the joist (given in the table), versus the actual shear diagram. This diagram can be easily drawn with free software (Vulcraft Assistant Program) available at our web site www.vulcraft.com. The following diagram is an example of a 40' joist with a 180 plf uniform load plus a concentrated load of 1900 lbs. at 17' from the left end.

In this case, using the developed 399 plf load, either a 30K10 with an 11% stress reversal, or a standard 26KCS3 could be specified.



Web members have a 5% stress reversal reserve capacity. If a stress reversal is larger than 5%, clearly specify the stress reversal with the joists. An "SP" is not required as long as the stress reversal requirement is clearly specified.

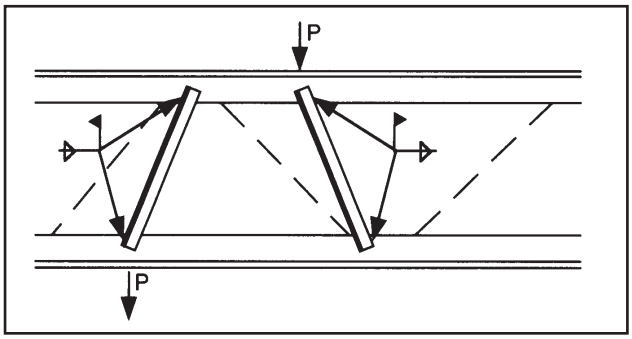
When a suitable K or LH series joist cannot be specified, use the required moment and shear to select a KCS series joist or use double joists to attain the required capacity. Note that LH series have deeper standard bearing depths than K or KCS series joists.

In some cases, a standard joist cannot be reasonably specified. In this case, all uniform, non-uniform (such as drift loads or varying uniform loads) and concentrated loads must be given on the drawing or load diagram with all dimensions given. The drawback of this method is that the exact dimensions and locations must be given. Often this information is not available at the time of joist fabrication.

Regardless of whether K-series, KCS-series or LH-series joists are specified, it is important to note that even though sufficient shear and moment capacity are provided within the special joist, the localized bending of the chord members due to concentrated loading between panel points is not considered. The joist design generally presumes that all concentrated loads are to be applied at panel points. When this is not the case, the specifying professional must specify on the structural drawings of the contract documents that a field installed member be located at all concentrated loads not occurring at panel points (see detail C1).

If the magnitude and locations of all loads are provided on the structural drawings, Vulcraft can design for the localized chord bending due to the load at the locations given.

The second alternative is the most economical.



DETAIL C1

VARYING UNIFORM LOADS ON STEEL JOISTS

The selection process of a joist for varying uniform loads such as drift loads or stepped uniform loads is essentially the same as that for concentrated loads. For K-series joists where the uniform load exceeds 550 pounds per lineal foot, the only options are: double joists or the use of special (SP) joists. Again a load diagram should be shown on the structural drawings.

2006 RECYCLED CONTENT OF NUCOR STEEL PRODUCTS FOR THE L.E.E.D.® PROGRAM

Nucor Corporation is the nation's largest recycler, using almost 21 million tons of scrap steel in 2006 to create new products. Nucor uses Electric Arc Furnace (EAF) technology at all of its steel producing facilities. EAFs use post-consumer scrap steel material for the major feedstock, unlike blast furnace operations which use mined iron ore as the major feedstock. Nucor has prepared the following information to help calculate the recycled content for products being used with "Green Building" applications or for projects in the L.E.E.D. program. Percentages are approximate and based on the total weight of the products. Calculations are based on 2006 scrap steel delivered and finished materials produced. Values do not consider home scrap or scrap generated onsite. Specific product information may be available from facility representatives.

RECYCLED CONTENT - LEED Version 2.2 Credit 4.1 and 4.2

2006 Recycled Steel Content of Nucor Products(*) (% by Total Weight)	
Product Group	**Average Recycled Content**
Nucor Bar Products	>99%
Nucor Sheet Products	70%
Total Nucor Steel Combined	**82.3%**
Vulcraft Structural Products	>99%
Vulcraft Decking	70%

REGIONAL MATERIALS - LEED Version 2.2 Credit 5.1 and 5.2

Nucor tracks the origin of all scrap shipments to our mills. Nucor can approximate the amount of scrap extracted from any project site region. Nucor owns steel and steel products manufacturing facilities throughout the US that are within 500 miles of almost any project site. Please contact your local sales representative if you have questions about regional materials.

BAR MILL GROUP - **Darlington SC, Norfolk NE, Jewett TX, Plymouth UT, Auburn NY, Birmingham AL, Kankakee IL, Jackson MS, Seattle WA, Marion OH**

2006 Approximate Recycled Steel Content Of All Nucor Bar Mill Group Products(*)				
Facility	Total Scrap Steel Use	Total Alloys and Other Iron Units	Total Post Consumer Recycled Content	Total Pre-consumer Recycled Content
All	**>99%**	**<1%**	**83%**	**17%**

The Nucor Bar Mill Group produces rebar, angles, flats, rounds and other miscellaneous shapes. The bar mill group uses recycled scrap steel for over 99% of the feedstock.

(*) *Studies from 2005 have shown that the recycled steel used for Nucor products consists of approximately 87% post-consumer scrap. The remaining 13% typically consists of pre-consumer scrap generated by manufacturing processes for products made with steel.*

Sheet Mill Group - **Crawfordsville IN, Hickman AR, Berkeley SC, Decatur AL**

2006 Approximate Recycled Steel Content Of Nucor Sheet Mill Group Products(*)				
Facility	Total Scrap Steel Used	Total Alloys and Other Iron Units	Total Post Consumer Recycled Content	Total Pre-consumer Recycled Content
Crawfordsville, IN	**82%**	**18%**	**68%**	**14%**
Hickman, AR	**70%**	**30%**	**58%**	**12%**
Berkley, SC	**56%**	**44%**	**46%**	**10%**
Decatur, AL	**71%**	**29%**	**59%**	**12%**

The Nucor Sheet Mill Group produces hot band, cold rolled, pickled and galvanized products. Nucor Sheet mills use varying amounts of recycled materials depending on metallurgical product demands and market conditions. The combined sheet mill total recycled content is approximately 70%.

VULCRAFT GROUP - **Florence SC, Norfolk NE, Brigham City UT, Grapeland TX, St. Joe IN, Fort Payne AL, Chemung NY**

JOISTS - The bar steel for most Vulcraft joists is obtained from one of the nine Nucor bar mills that use over 99% scrap steel as their feedstock. A breakdown of the recycled content of Nucor bar mill products is detailed above. Vulcraft facilities may receive steel from sources outside of Nucor that may contain lower amounts of recycled steel. Specific product information is available from facility representatives.

DECK – Steel for decking produced by Vulcraft facilities are typically obtained from one of the four Nucor sheet mills. A breakdown of the recycled content of Nucor sheet mill products is detailed above. Vulcraft deck products contain approximately 70% recycled steel.

Additional information is available online through the Steel Recycling Institute at *http://www.recycle-steel.org*.

(*) Studies from 2005 have shown that the recycled steel used for Nucor products consists of approximately 87% post-consumer scrap. The remaining 13% typically consists of pre-consumer scrap generated by manufacturing processes for products made with steel.

All figures shown are based on 2006 figures and may vary from year to year. Please contact your local sales representative for current average recycled content for Vulcraft products.

ECONOMICAL

HIGH STRENGTH

DESIGN - Vulcraft K Series open web steel joists are designed in accordance with specifications of the Steel Joist Institute.

ACCESSORIES see page 40.

FOR TOP CHORD EXTENSIONS AND EXTENDED ENDS see page 37.

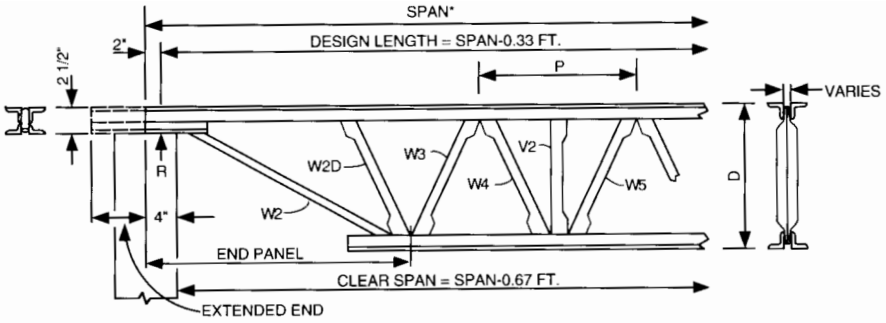
SJI SPANS TO 60'-0"

PAINT - Vulcraft joists receive a shop-coat of rust inhibitive primer whose performance characteristics conform to those of the Steel Joist Institute specifications 3.3.

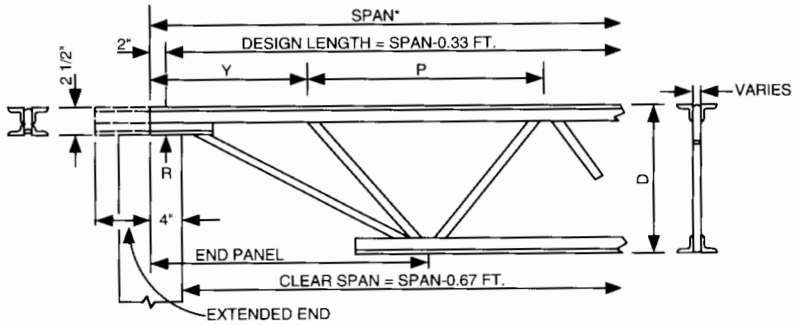
SPECIFICATIONS see page 10.

KCS SERIES JOIST see page 29.

ANGLE WEB



ROD WEB



* For Definition of Span, see page 20.
NOTE: Actual layout may vary from that shown.

MAXIMUM JOIST SPACING FOR HORIZONTAL BRIDGING							
	BRIDGING MATERIAL SIZE						
	Round Rod	Equal Leg Angles					
SECTION NUMBER**	1/2"DIA (13mm) r = .13"	1 x 7/64 (25mm x 3mm) r = .25"	1-1/4 x 7/64 (32mm x 3mm) r = .25"	1-1/2 x7/64 (38mm x 3mm) r = .30"	1-3/4 x 7/64 (45mm x 3mm) r = .35"	2x 1/8 (51mm x 3mm) r = .40"	2-1/2 x 5/32 (64mm x 4mm) r = .50"
1 thru 9	3'-3" (991mm)	5'-0" (1524mm)	6'-3" (1905mm)	7'-6" (2286mm)	8'-7" (2616mm)	10'-0" (3048mm)	12'-6" (3810mm)
10	3'-0" (914mm)	4'-8" (1422mm)	6'-3" (1905mm)	7'-6" (2286mm)	8'-7" (2616mm)	10'-0" (3048mm)	12'-6" (3810mm)
11 and 12	2'-7" (787mm)	4'-0" (1219mm)	5'-8" (1727mm)	7'-6" (2286mm)	8'-7" (2616mm)	10'-0" (3048mm)	12'-6" (3810mm)

*SECTION NUMBER REFERS TO THE LAST DIGITS OF JOIST DESIGNATION, CONNECTION TO JOIST MUST RESIST 700 POUNDS (3114 N)

MAXIMUM JOIST SPACING FOR DIAGONAL BRIDGING				
	BRIDGING ANGLE SIZE-EQUAL LEG ANGLES			
JOIST DEPTH	1 x 7/64 (25mm x 3mm) r = .20"	1 1/4 X7/64 (32mm x 3mm) r = .25"	1 1/2 X 7/64 (38mm x 3mm) r = .30"	1 3/4 x 7/64 (45mm x 3mm) r = .35"
12	6'-6" (1981mm)	8'-3" (2514mm)	9'-11" (3022mm)	11'-7" (3530mm)
14	6'-6" (1981mm)	8'-3" (2514mm)	9'-11" (3022mm)	11'-7" (3530mm)
16	6'-6" (1981mm)	8'-2" (2489mm)	9'-10" (2997mm)	11'-6" (3505mm)
18	6'-6" (1981mm)	8'-2" (2489mm)	9'-10" (2997mm)	11'-6" (3505mm)
20	6'-5" (1955mm)	8'-2" (2489mm)	9'-10" (2997mm)	11'-6" (3505mm)
22	6'-4" (1930mm)	8'-1" (2463mm)	9'-10" (2997mm)	11'-6" (3505mm)
24	6'-4" (1930mm)	8'-1" (2463mm)	9'-9" (2971mm)	11'-5" (3479mm)
26	6'-3" (1905mm)	8'-0" (2438mm)	9'-9" (2971mm)	11'-5" (3479mm)
28	6'-2" (1879mm)	8'-0" (2438mm)	9'-8" (2946mm)	11'-5" (3479mm)
30	6'-2" (1879mm)	7'-11" (2413mm)	9'-8" (2946mm)	11'-4" (3454mm)

K-series--all sections numbers use A307 bolt 3/8" (9mm) diameter.
See page 16 for number of rows of bridging required.

BRIDGING FOR STANDING SEAM ROOF SYSTEMS:

Generally, standing seam roof systems will not adequately brace the top chords of the joists with standard SJI bridging. We therefore, recommend that when a standing seam roof system is specified, the design professional specifically state that the joist manufacturer is to check the bridging requirements and provide bridging as required to adequately brace the top chord against lateral movement under full loading conditions.

UPLIFT BRIDGING:

Where uplift forces due to wind are a design requirement, these forces must be indicated on the structural drawings in terms of **net** uplift in pounds per square foot or pounds per linear foot. When these loads are specified, they must be considered in the design of joists and bridging. As a minimum, a single line of bottom chord bridging must be provided near the first bottom chord panel point, at each end of the joist, whenever uplift is a design consideration.*

*See Section 5.11 of the specifications.

STANDARD SPECIFICATIONS
FOR OPEN WEB STEEL JOISTS, K-SERIES

Adopted by the Steel Joist Institute November 4, 1985
Revised to November 10, 2003 - Effective March 01, 2005

SECTION 1.
SCOPE

This specification covers the design, manufacture and use of Open Web Steel Joists, **K-**Series. Load and Resistance Factor Design (LRFD) and Allowable Strength Design (ASD) are included in this specification.

SECTION 2.
DEFINITION

The term "Open Web Steel Joists **K-**Series," as used herein, refers to open web, parallel chord, load-carrying members suitable for the direct support of floors and roof decks in buildings, utilizing hot-rolled or cold-formed steel, including cold-formed steel whose yield strength* has been attained by cold working. **K-**Series Joists shall be designed in accordance with this specification to support the uniformly distributed loads given in the Standard Load Tables for Open Web Steel Joists, **K-**Series, attached hereto.

The KCS Joist is a **K-**Series Joist which is provided to address the problem faced by specifying professionals when trying to select joists to support uniform plus concentrated loads or other non-uniform loads.

The design of chord sections for **K-**Series Joists shall be based on a yield strength of 50 ksi (345 MPa). The design of web sections for **K-**Series Joists shall be based on a yield strength of either 36 ksi (250 MPa) or 50 ksi (345 MPa). Steel used for **K-**Series Joists chord or web sections shall have a minimum yield strength determined in accordance with one of the procedures specified in Section 3.2, which is equal to the yield strength assumed in the design.

* The term "Yield Strength" as used herein shall designate the yield level of a material as determined by the applicable method outlined in paragraph 13.1 "Yield Point", and in paragraph 13.2 "Yield Strength", of ASTM A370, *Standard Test Methods and Definitions for Mechanical Testing of Steel Products*, or as specified in paragraph 3.2 of this specification.

SECTION 3.
MATERIALS

3.1 STEEL

The steel used in the manufacture of chord and web sections shall conform to one of the following ASTM Specifications:

- Carbon Structural Steel, ASTM A36/A36M.
- High-Strength, Low-Alloy Structural Steel, ASTM A242/A242M.
- High-Strength Carbon-Manganese Steel of Structural Quality, ASTM A529/A529M, Grade 50.
- High-Strength Low-Alloy Columbium-Vanadium Structural Steel, ASTM A572/A572M, Grade 42 and 50.
- High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 inches (100 mm) Thick, ASTM A588/A588M.
- Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Corrosion Resistance, ASTM A606.
- Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, ASTM A1008/A1008M
- Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, ASTM A1011/A1011M

or shall be of suitable quality ordered or produced to other than the listed specifications, provided that such material in the state used for final assembly and manufacture is weldable and is proved by tests performed by the producer or manufacturer to have the properties specified in Section 3.2.

3.2 MECHANICAL PROPERTIES

The yield strength used as a basis for the design stresses prescribed in Section 4 shall be either 36 ksi (250 MPa) or 50 ksi (345 MPa). Evidence that the steel furnished meets or exceeds the design yield strength shall, if requested, be provided in the form of an affidavit or by witnessed or certified test reports.

For material used without consideration of increase in yield strength resulting from cold forming, the specimens shall be taken from as-rolled material. In the case of material, the mechanical properties of which conform to the requirements of one of the listed specifications, the test specimens and procedures shall conform to those of such specifications and to ASTM A370.

In the case of material, the mechanical properties of which do not conform to the requirements of one of the listed specifications, the test specimens and procedures shall conform to the applicable requirements of ASTM A370, and the specimens shall exhibit a yield strength equal to or exceeding the design yield strength and an elongation of not less than (a) 20 percent in 2 inches (51 millimeters) for sheet and strip, or (b) 18 percent in 8 inches (203 millimeters) for plates, shapes and bars with adjustments for thickness for plates, shapes and bars as prescribed in ASTM A36/A36M, A242/A242M, A529/A529M, A572/A572M, A588/A588M, whichever specification is applicable on the basis of design yield strength.

The number of tests shall be as prescribed in ASTM A6/A6M for plates, shapes, and bars; and ASTM A606, A1008/A1008M and A1011/A1011M for sheet and strip.

If as-formed strength is utilized, the test reports shall show the results of tests performed on full section specimens in accordance with the provisions of the AISI North American Specifications for the Design of Cold-Formed Steel Structural Members. They shall also indicate compliance with these provisions and with the following additional requirements:

a) The yield strength calculated from the test data shall equal or exceed the design yield strength.

b) Where tension tests are made for acceptance and control purposes, the tensile strength shall be at least 6 percent greater than the yield strength of the section.

c) Where compression tests are used for acceptance and control purposes, the specimen shall withstand a gross shortening of 2 percent of its original length without cracking. The length of the specimen shall be not greater than 20 times the least radius of gyration.

d) If any test specimen fails to pass the requirements of the subparagraphs (a), (b), or (c) above, as applicable, two retests shall be made of specimens from the same lot. Failure of one of the retest specimens to meet such requirements shall be the cause for rejection of the lot represented by the specimens.

3.3 PAINT

The standard shop paint is intended to protect the steel for only a short period of exposure in ordinary atmospheric conditions and shall be considered an impermanent and provisional coating.

When specified, the standard shop paint shall conform to one of the following:

a) Steel Structures Painting Council Specification, SSPC No. 15.

b) Or, shall be a shop paint which meets the minimum performance requirements of the above listed specification.

SECTION 4.
DESIGN AND MANUFACTURE

4.1 METHOD

Joists shall be designed in accordance with these specifications as simply supported, uniformly loaded trusses supporting a floor or roof deck so constructed as to brace the top chord of the joists against lateral buckling. Where any applicable design feature is not specifically covered herein, the design shall be in accordance with the following specifications:

a) Where the steel used consists of hot-rolled shapes, bars or plates, use the American Institute of Steel Construction, *Specification for Structural Steel Buildings*.

b) For members that are cold-formed from sheet or strip steel, use the American Iron and Steel Institute, *North American Specification for the Design of Cold-Formed Steel Structural Members*.

Design Basis:

Designs shall be made according to the provisions in this Specification for either Load and Resistance Factor Design (LRFD) or for Allowable Strength Design (ASD).

Load Combinations:

LRFD:

When load combinations are not specified to the joist manufacturer, the required stress shall be computed for the factored loads based on the factors and load combinations as follows:

1.4D

1.2D + 1.6 (L, or L_r, or S, or R)

ASD:

When load combinations are not specified to the joist manufacturer, the required stress shall be computed based on the load combinations as follows:

D

D + (L, or L_r, or S, or R)

Where:

D = dead load due to the weight of the structural elements and the permanent features of the structure

L = live load due to occupancy and movable equipment

L_r = roof live load

S = snow load

R = load due to initial rainwater or ice exclusive of the ponding contribution

When special loads are specified and the specifying professional does not provide the load combinations, the provisions of ASCE 7, *"Minimum Design Loads for Buildings and Other Structures"* shall be used for LRFD and ASD load combinations.

4.2 DESIGN AND ALLOWABLE STRESSES

Design Using Load and Resistance Factor Design (LRFD)

Joists shall have their components so proportioned that the required stresses, f_u, shall not exceed ϕF_n where,

f_u	=	required stress	ksi (MPa)
F_n	=	nominal stress	ksi (MPa)
ϕ	=	resistance factor	
ϕF_n	=	design stress	

Design Using Allowable Strength Design (ASD)

Joists shall have their components so proportioned that the required stresses, f, shall not exceed F_n / Ω where,

f	=	required stress	ksi (MPa)
F_n	=	nominal stress	ksi (MPa)
Ω	=	safety factor	
F_n/Ω	=	allowable stress	

Stresses:

(a) Tension: $\phi_t = 0.90$ (LRFD) $\Omega = 1.67$ (ASD)

For Chords: $F_y = 50$ ksi (345 MPa)

For Webs: $F_y = 50$ ksi (345 MPa), or $F_y = 36$ ksi (250 MPa)

Design Stress = $0.9F_y$ (LRFD) (4.2-1)

Allowable Stress = $0.6F_y$ (ASD) (4.2-2)

(b) Compression: $\phi_c = 0.90$ (LRFD) $\Omega_c = 1.67$ (ASD)

For members with $\frac{\ell}{r} \le 4.71\sqrt{\frac{E}{QF_y}}$

$$F_{cr} = Q\left[0.658^{\left(\frac{QF_y}{F_e}\right)}\right]F_y \qquad (4.2\text{-}3)$$

For members with $\frac{\ell}{r} > 4.71\sqrt{\frac{E}{QF_y}}$

$$F_{cr} = 0.877F_e \qquad (4.2\text{-}4)$$

Where F_e = Elastic buckling stress determined in accordance with Equation 4.2-5.

$$F_e = \frac{\pi^2 E}{\left(\frac{\ell}{r}\right)^2} \qquad (4.2\text{-}5)$$

For hot-rolled sections, "Q" is the full reduction factor for slender compression elements.

Design Stress = $0.9F_{cr}$ (LRFD) (4.2-6)

Allowable Stress = $0.6F_{cr}$ (ASD) (4.2-7)

In the above equations, ℓ is taken as the distance in inches (millimeters) between panel points for the chord members and the appropriate length for web members, and r is the corresponding least radius of gyration of the member or any component thereof. E is equal to 29,000 ksi (200,000 MPa).

Use 1.2 ℓ/r_x for a crimped, first primary compression web member when a moment-resistant weld group is not used for this member; where r_x = member radius of gyration in the plane of the joist.

For cold-formed sections the method of calculating the nominal column strength is given in the AISI, *North American Specification for the Design of Cold-Formed Steel Structural Members.*

(c) Bending: $\phi_b = 0.90$ (LRFD) $\Omega_b = 1.67$ (ASD)

Bending calculations are to be based on using the elastic section modulus.

For chords and web members other than solid rounds:
$F_y = 50$ ksi (345 MPa)

Design Stress = $0.9F_y$ (LRFD) (4.2-8)

Allowable Stress = $0.6F_y$ (ASD) (4.2-9)

For web members of solid round cross section:
$F_y = 50$ ksi (345 MPa), or $F_y = 36$ ksi (250 MPa)

Design Stress = $1.45F_y$ (LRFD) (4.2-10)

Allowable Stress = $0.95F_y$ (ASD) (4.2-11)

For bearing plates:
$F_y = 50$ ksi (345 MPa), or $F_y = 36$ ksi (250 MPa)

Design Stress = $1.35F_y$ (LRFD) (4.2-12)

Allowable Stress = $0.90F_y$ (ASD) (4.2-13)

4.3 MAXIMUM SLENDERNESS RATIOS

The slenderness ratio, ℓ/r, where ℓ is as used in Section 4.2 (b) and r is the corresponding least radius of gyration, shall not exceed the following:

Top chord interior panels	90
Top chord end panels	120
Compression members other than top chord	200
Tension members	240

4.4 MEMBERS

(a) Chords

The bottom chord shall be designed as an axially loaded tension member.

The radius of gyration of the top chord about its vertical axis shall not be less than ℓ/145 where ℓ is the spacing in inches (millimeters) between lines of bridging as specified in Section 5.4(c).

The top chord shall be considered as stayed laterally by the floor slab or roof deck when attachments are in accordance with the requirements of Section 5.8(e) of these specifications.

The top chord shall be designed for only axial compressive stress when the panel length, ℓ, does not exceed 24 inches (609 mm). When the panel length exceeds 24 inches (609 mm), the top chord shall be designed as a continuous member subject to combined axial and bending stresses and shall be so proportioned that:

For LRFD:

at the panel point:

$$f_{au} + f_{bu} \le 0.9F_y \qquad (4.4\text{-}1)$$

at the mid panel: for $\frac{f_{au}}{\phi_c F_{cr}} \ge 0.2$,

$$\frac{f_{au}}{\phi_c F_{cr}} + \frac{8}{9}\left[\frac{C_m f_{bu}}{\left[1-\left(\frac{f_{au}}{\phi_c F_e}\right)\right] Q\phi_b F_y}\right] \le 1.0 \qquad (4.4\text{-}2)$$

for $\frac{f_{au}}{\phi_c F_{cr}} < 0.2$,

$$\left(\frac{f_{au}}{2\phi_c F_{cr}}\right) + \left[\frac{C_m f_{bu}}{\left[1-\left(\frac{f_{au}}{\phi_c F_e}\right)\right] Q\phi_b F_y}\right] \le 1.0 \qquad (4.4\text{-}3)$$

$f_{au} = P_u/A$ = Required compressive stress, ksi (MPa)

P_u = Required axial strength using LRFD load combinations, kips (N)

$f_{bu} = M_u/S$ = Required bending stress at the location under consideration, ksi (MPa)

M_u = Required flexural strength using LRFD load combinations, kip-in. (N-mm)

S = Elastic Section Modulus, in.^{3} (mm^3)

F_{cr} = Nominal axial compressive stress in ksi (MPa) based on ℓ/ r as defined in Section 4.2(b),

$C_m = 1 - 0.3\, f_{au}/\phi F_e$ for end panels

$C_m = 1 - 0.4\, f_{au}/\phi F_e$ for interior panels

F_y = Specified minimum yield strength, ksi (MPa)

$F_e = \dfrac{\pi^2 E}{\left(\ell / r_x\right)^2}$, ksi (MPa)

Where ℓ is the panel length, in inches (millimeters), as defined in Section 4.2(b) and r_x is the radius of gyration about the axis of bending.

Q = Form factor defined in Section 4.2(b)

A = Area of the top chord, in.^{2} (mm^2)

For ASD:

at the panel point:

$$f_a + f_b \le 0.6F_y \qquad (4.4\text{-}4)$$

at the mid panel: for $\frac{f_a}{F_a} \ge 0.2$,

$$\frac{f_a}{F_a} + \frac{8}{9}\left[\frac{C_m f_b}{\left[1-\left(\frac{1.67 f_a}{F_e}\right)\right] QF_b}\right] \le 1.0 \qquad (4.4\text{-}5)$$

for $\frac{f_a}{F_a} < 0.2$,

$$\left(\frac{f_a}{2F_a}\right) + \left[\frac{C_m f_b}{\left[1-\left(\frac{1.67 f_a}{F_e}\right)\right] QF_b}\right] \le 1.0 \qquad (4.4\text{-}6)$$

$f_a = P/A$ = Required compressive stress, ksi (MPa)

P = Required axial strength using ASD load combinations, kips (N)

$f_b = M/S$ = Required bending stress at the location under consideration, ksi (MPa)

M = Required flexural strength using ASD load combinations, kip-in. (N-mm)

S = Elastic Section Modulus, in.^{3} (mm^3)

F_a = Allowable axial compressive stress based on ℓ/r as defined in Section 4.2(b), ksi (MPa)

F_b = Allowable bending stress; $0.6F_y$, ksi (MPa)

$C_m = 1 - 0.50\, f_a/F_e$ for end panels

$C_m = 1 - 0.67\, f_a/F_e$ for interior panels

(b) Web

The vertical shears to be used in the design of the web members shall be determined from full uniform loading, but such vertical shears shall be not less than 25 percent of the end reaction. Due consideration shall be given to the effect of eccentricity. The effect of combined axial compression and bending may be investigated using the provisions of Section 4.4(a), letting $C_m = 0.4$ when bending due to eccentricity produces reversed curvature.

Interior vertical web members used in modified Warren type web systems shall be designed to resist the gravity loads supported by the member plus an additional axial load of 1/2 of 1.0 percent of the top chord axial force.

(c) Extended Ends

The magnitude and location of the loads to be supported, deflection requirements, and proper bracing of extended

top chords or full depth cantilever ends shall be clearly indicated on the structural drawings.

4.5 CONNECTIONS

(a) Methods

Joist connections and splices shall be made by attaching the members to one another by arc or resistance welding or other accredited methods.

(1) Welded Connections

a) Selected welds shall be inspected visually by the manufacturer. Prior to this inspection, weld slag shall be removed.

b) Cracks are not acceptable and shall be repaired.

c) Thorough fusion shall exist between weld and base metal for the required design length of the weld; such fusion shall be verified by visual inspection.

d) Unfilled weld craters shall not be included in the design length of the weld.

e) Undercut shall not exceed 1/16 inch (2 millimeters) for welds oriented parallel to the principal stress.

f) The sum of surface (piping) porosity diameters shall not exceed 1/16 inch (2 millimeters) in any 1 inch (25 millimeters) of design weld length.

g) Weld spatter that does not interfere with paint coverage is acceptable.

(2) Welding Program

Manufacturers shall have a program for establishing weld procedures and operator qualification, and for weld sampling and testing. (See Technical Digest #8 - Welding of Open Web Steel Joists.)

(3) Weld Inspection by Outside Agencies (See Section 5.12 of these specifications)

The agency shall arrange for visual inspection to determine that welds meet the acceptance standards of Section 4.5(a)(1) above. Ultrasonic, X-Ray, and magnetic particle testing are inappropriate for joists due to the configurations of the components and welds.

(b) Strength

(1) Joint Connections - Joint connections shall be capable of withstanding forces due to an ultimate load equal to at least 1.35 times the LRFD, or 2.0 times the ASD load shown in the applicable Standard Load Table.

(2) Shop Splices – Splices may occur at any point in chord or web members. Members containing a butt weld splice shall develop an ultimate tensile force of at least 57 ksi (393 MPa) times the full design area of the chord or web. The term “member” shall be defined as all component parts comprising the chord or web, at the point of the splice.

(c) Eccentricity

Members connected at a joint shall have their centroidal axes meet at a point if practical. Otherwise, due consideration shall be given to the effect of eccentricity. In no case shall eccentricity of any web member at a joint exceed 3/4 of the over-all dimension, measured in the plane of the web, of the largest member connected. The eccentricity of any web member shall be the perpendicular distance from the centroidal axis of that web member to the point on the centroidal axis of the chord which is vertically above or below the intersection of the centroidal axes of the web members forming the joint. Ends of joists shall be proportioned to resist bending produced by eccentricity at the support.

4.6 CAMBER

Joists shall have approximate camber in accordance with the following:

TABLE 4.6-1

Top Chord Length		Approximate Camber	
20'-0"	(6096 mm)	1/4"	(6 mm)
30'-0"	(9144 mm)	3/8"	(10 mm)
40'-0"	(12192 mm)	5/8"	(16 mm)
50'-0"	(15240 mm)	1"	(25 mm)
60'-0"	(18288 mm)	1 1/2"	(38 mm)

The specifying professional shall give consideration to coordinating joist camber with adjacent framing.

4.7 VERIFICATION OF DESIGN AND MANUFACTURE

(a) Design Calculations

Companies manufacturing **K-**Series Joists shall submit design data to the Steel Joist Institute (or an independent agency approved by the Steel Joist Institute) for verification of compliance with the SJI Specifications. Design data shall be submitted in detail and in the format specified by the Institute.

(b) Tests of Chord and Web Members

Each manufacturer shall, at the time of design review by the Steel Joist Institute or other independent agency, verify by tests that the design, in accordance with Sections 4.1 through 4.5 of this specification, will provide the theoretical strength of critical members. Such tests shall be evaluated considering the actual yield strength of the members of the test joists.

Material tests for determining mechanical properties of component members shall be conducted.

(c) Tests of Joints and Connections

Each manufacturer shall verify by shear tests on representative joints of typical joists that connections will meet the provision of Section 4.5(b). Chord and web members may be reinforced for such tests.

(d) In-Plant Inspections

Each manufacturer shall verify their ability to manufacture **K-**Series Joists through periodic In-Plant Inspections. Inspections shall be performed by an independent agency approved by the Steel Joist Institute. The frequency, manner of inspection, and manner of reporting shall be determined by the Steel Joist Institute. The plant inspections are not a guarantee of the quality of any specific joists; this responsibility lies fully and solely with the individual manufacturer.

SECTION 5. APPLICATION

5.1 USAGE

These specifications shall apply to any type of structure where floors and roofs are to be supported directly by steel joists installed as hereinafter specified. Where joists are used other than on simple spans under uniformly distributed loading as prescribed in Section 4.1, they shall be investigated and modified if necessary to limit the required stresses to those listed in Section 4.2.

CAUTION: If a rigid connection of the bottom chord is to be made to the column or other support, it shall be made only after the application of the dead loads. The joist is then no longer simply supported, and the system must be investigated for continuous frame action by the specifying professional.

The designed detail of a rigid type connection and moment plates shall be shown on the structural drawings by the specifying professional. The moment plates shall be furnished by other than the joist manufacturer.

5.2 SPAN

The span of a joist shall not exceed 24 times its depth.

5.3 END SUPPORTS

(a) Masonry and Concrete

K-Series Joists supported by masonry or concrete are to bear on steel bearing plates and shall be designed as steel bearing. Due consideration of the end reactions and all other vertical or lateral forces shall be taken by the specifying professional in the design of the steel bearing plate and the masonry or concrete. The ends of **K-**Series Joists shall extend a distance of not less than 4 inches (102 millimeters) over the masonry or concrete support and be anchored to the steel bearing plate. The plate shall be located not more than 1/2 inch (13 millimeters) from the face of the wall and shall be not less than 6 inches (152 millimeters) wide perpendicular to the length of the joist. The plate is to be designed by the specifying professional and shall be furnished by other than the joist manufacturer.

Where it is deemed necessary to bear less than 4 inches (102 millimeters) over the masonry or concrete support, special consideration is to be given to the design of the steel bearing plate and the masonry or concrete by the specifying professional. The joists must bear a minimum of 2 1/2 inches (64 millimeters) on the steel bearing plate.

(b) Steel

Due consideration of the end reactions and all other vertical and lateral forces shall be taken by the specifying professional in the design of the steel support. The ends of **K-**Series Joists shall extend a distance of not less than 2 1/2 inches (64 millimeters) over the steel supports.

5.4 BRIDGING

Top and bottom chord bridging is required and shall consist of one or both of the following types.

(a) Horizontal

Horizontal bridging shall consist of continuous horizontal steel members. Attachments to the joist chords shall be made by welding or mechanical means and shall be capable of resisting a nominal (unfactored) horizontal force of not less than 700 pounds (3114 Newtons).

The ratio of unbraced length to least radius of gyration, ℓ/r, of the bridging member shall not exceed 300, where ℓ is the distance in inches (millimeters) between attachments and r is the least radius of gyration of the bridging member.

(b) Diagonal

Diagonal bridging shall consist of cross-bracing with a ℓ/r ratio of not more than 200, where ℓ is the distance in inches (millimeters) between connections and r is the least radius of gyration of the bracing member. Where cross-bracing members are connected at their point of intersection, the ℓ distance shall be taken as the distance in inches (millimeters) between connections at the point of intersection of the bracing members and the connections to the chord of the joists. Connections to the chords of steel joists shall be made by positive mechanical means or by welding.

(c) Quantity and Spacing

The number of rows of top chord bridging shall not be less than as shown in Bridging Tables 5.4-1 and the spacing shall meet the requirements of Section 4.4(a). The number of rows of bottom chord bridging, including bridging required per Section 5.11, shall not be less than the number of top chord rows. Rows of bottom chord bridging are permitted to be spaced independently of rows of top chord bridging. The spacing of rows of bottom chord bridging shall meet the slenderness requirement of Section 4.3 and any specified strength requirements.

(d) Bottom Chord Bearing Joists

Where bottom chord bearing joists are utilized, a row of diagonal bridging shall be provided near the support(s). This bridging shall be installed and anchored before the hoisting cable(s) is released.

TABLE 5.4-1

NUMBER OF ROWS OF TOP CHORD BRIDGING**

Refer to the **K-**Series Load Table and Specification Section 6 for required bolted diagonal bridging.
Distances are Joist Span lengths in feet - See "Definition of Span" preceding Load Table.

*Section Number	One Row	Two Rows	Three Rows	Four Rows	Five Rows
#1	Up thru 16	Over 16 thru 24	Over 24 thru 28		
#2	Up thru 17	Over 17 thru 25	Over 25 thru 32		
#3	Up thru 18	Over 18 thru 28	Over 28 thru 38	Over 38 thru 40	
#4	Up thru 19	Over 19 thru 28	Over 28 thru 38	Over 38 thru 48	
#5	Up thru 19	Over 19 thru 29	Over 29 thru 39	Over 39 thru 50	Over 50 thru 52
#6	Up thru 19	Over 19 thru 29	Over 29 thru 39	Over 39 thru 51	Over 51 thru 56
#7	Up thru 20	Over 20 thru 33	Over 33 thru 45	Over 45 thru 58	Over 58 thru 60
#8	Up thru 20	Over 20 thru 33	Over 33 thru 45	Over 45 thru 58	Over 58 thru 60
#9	Up thru 20	Over 20 thru 33	Over 33 thru 46	Over 46 thru 59	Over 59 thru 60
#10	Up thru 20	Over 20 thru 37	Over 37 thru 51	Over 51 thru 60	
#11	Up thru 20	Over 20 thru 38	Over 38 thru 53	Over 53 thru 60	
#12	Up thru 20	Over 20 thru 39	Over 39 thru 53	Over 53 thru 60	

* Last digit(s) of joist designation shown in Load Table
** See Section 5.11 for additional bridging required for uplift design.

5.5 INSTALLATION OF BRIDGING

Bridging shall support the top and bottom chords against lateral movement during the construction period and shall hold the steel joists in the approximate position as shown on the joist placement plans.

The ends of all bridging lines terminating at walls or beams shall be anchored thereto.

5.6 END ANCHORAGE

(a) Masonry and Concrete

Ends of **K-**Series Joists resting on steel bearing plates on masonry or structural concrete shall be attached thereto with a minimum of two 1/8 inch (3 millimeters) fillet welds 1 inch (25 millimeters) long, or with two 1/2 inch (13 millimeters) ASTM A307 bolts, or the equivalent.

(b) Steel

Ends of **K-**Series Joists resting on steel supports shall be attached thereto with a minimum of two 1/8 inch (3 millimeters) fillet welds 1 inch (25 millimeters) long, or with two 1/2 inch (13 millimeters) ASTM A307 bolts, or the equivalent. When **K-**Series Joists are used to provide lateral stability to the supporting member, the final connection shall be made by welding or as designated by the specifying professional.

(c) Uplift

Where uplift forces are a design consideration, roof joists shall be anchored to resist such forces (Refer to Section 5.11 Uplift).

5.7 JOIST SPACING

Joists shall be spaced so that the loading on each joist does not exceed the design load (LRFD or ASD) for the particular joist designation and span as shown in the applicable load tables.

5.8 FLOOR AND ROOF DECKS

(a) Material

Floor and roof decks may consist of cast-in-place or precast concrete or gypsum, formed steel, wood, or other suitable material capable of supporting the required load at the specified joist spacing.

(b) Thickness

Cast-in-place slabs shall be not less than 2 inches (51 millimeters) thick.

(c) Centering

Centering for cast-in-place slabs 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 or damage to the top chord of joists during installation or removal of the centering or placing of the concrete.

(d) Bearing

Slabs or decks shall bear uniformly along the top chords of the joists.

(e) Attachments

The spacing for slab or deck attachments along the joist top chord shall not exceed 36 inches (914 millimeters), and shall be capable of resisting a nominal (unfactored) lateral force of not less than 300 pounds (1335 Newtons), i.e., 100 plf (1.46 kN/m).

(f) Wood Nailers

Where wood nailers are used, such nailers in conjunction with deck or slab shall be attached to the top chords of the joists in conformance with Section 5.8(e).

(g) Joist With Standing Seam Roofing

The stiffness and strength of standing-seam roof clips varies from one manufacturer to another. Therefore, some roof systems cannot be counted on to provide lateral stability to the joists which support the roof. Sufficient stability must be provided to brace the joists laterally under the full design load. The compression chord must resist the chord axial design force in the plane of the joist (i.e., x-x axis buckling) and out of the plane of the joist (i.e., y-y axis buckling). Out-of-plane strength may be achieved by adjusting the bridging spacing and/or increasing the compression chord area, the joist depth, and the y-axis radius of gyration. The effective slenderness ratio in the y-direction equals 0.94 L/r_y; where L is the bridging spacing in inches (millimeters). The maximum bridging spacing may not exceed that specified in Section 5.4(c).

Horizontal bridging members attached to the compression chords and their anchorage's must be designed for a compressive axial force of 0.0025nP, where n is the number of joists between end anchors and P is the chord design force in kips (Newtons). The attachment force between the horizontal bridging member and the compression chord is 0.005P. Horizontal bridging attached to the tension chords shall be proportioned so that the slenderness ratio between attachments does not exceed 300. Diagonal bridging shall be proportioned so that the slenderness ratio between attachments does not exceed 200.

5.9 DEFLECTION

The deflection due to the design nominal live load shall not exceed the following:

Floors: 1/360 of span.

Roofs: 1/360 of span where a plaster ceiling is attached or suspended.
1/240 of span for all other cases.

The specifying professional shall give consideration to the effects of deflection and vibration* in the selection of joists.

* For further reference, refer to Steel Joist Institute Technical Digest #5, "Vibration of Steel Joist-Concrete Slab Floors" and the Institute's Computer Vibration Program.

5.10 PONDING*

The ponding investigation shall be performed by the specifying professional.

* For further reference, refer to Steel Joist Institute Technical Digest #3, "Structural Design of Steel Joist Roofs to Resist Ponding Loads" and AISC Specifications.

5.11 UPLIFT

Where uplift forces due to wind are a design requirement, these forces must be indicated on the contract drawings in terms of NET uplift in pounds per square foot (Pascals). The contract documents shall indicate if the net uplift is based upon LRFD or ASD. When these forces are specified, they must be considered in the design of joists and/or bridging. A single line of **bottom chord** bridging must be provided near the first bottom chord panel points whenever uplift due to wind forces is a design consideration.*

* For further reference, refer to Steel Joist Institute Technical Digest #6, "Structural Design of Steel Joist Roofs to Resist Uplift Loads".

5.12 INSPECTION

Joists shall be inspected by the manufacturer before shipment to verify compliance of materials and workmanship with the requirements of these specifications. If the purchaser wishes an inspection of the steel joists by someone other than the manufacturer's own inspectors, they may reserve the right to do so in their "Invitation to Bid" or the accompanying "Job Specifications".

Arrangements shall be made with the manufacturer for such inspection of the joists at the manufacturing shop by the purchaser's inspectors at purchaser's expense.

5.13 PARALLEL CHORD SLOPED JOISTS

The span of a parallel chord sloped joist shall be defined by the length along the slope. Minimum depth, load-carrying capacity, and bridging requirements shall be determined by the sloped definition of span. The Standard Load Table capacity shall be the component normal to the joist.

SECTION 6.*
ERECTION STABILITY AND HANDLING

When it is necessary for the erector to climb on the joists, extreme caution must be exercised since unbridged joists may exhibit some degree of instability under the erector's weight.

(a) Stability Requirements

1) Before an employee is allowed on the steel joist: BOTH ends of joists at columns (or joists designated as column joists) shall be attached to its supports. For all other joists a minimum of one end shall be attached before the employee is allowed on the joist. The attachment shall be in accordance with Section 5.6 – End Anchorage.

   When a bolted seat connection is used for erection purposes, as a minimum, the bolts must be snug tightened. The snug tight condition is defined as the tightness that exists when all plies of a joint are in firm contact. This may be attained by a few impacts of an impact wrench or the full effort of an employee using an ordinary spud wrench.

2) On steel joists that do not require erection bridging as shown by the unshaded area of the Load Tables, only one employee shall be allowed on the steel joist unless all bridging is installed and anchored.

   * For a thorough coverage of this topic, refer to SJI Technical Digest #9, "Handling and Erection of Steel Joists and Joist Girders".

3) Where the span of the steel joist is within the Red shaded area of the Load Table, the following shall apply:

   a) The row of bridging nearest the mid span of the steel joists shall be bolted diagonal erection bridging; and

   b) Hoisting cables shall not be released until this bolted diagonal erection bridging is installed and anchored, unless an alternate method of stabilizing the joist has been provided; and

   c) No more than one employee shall be allowed on these spans until all other bridging is installed and anchored.

4) When permanent bridging terminus points cannot be used during erection, additional temporary bridging terminus points are required to provide stability.

5) In the case of bottom chord bearing joists, the ends of the joist must be restrained laterally per Section 5.4(d).

6) After the joist is straightened and plumbed, and all bridging is completely installed and anchored, the ends of the joists shall be fully connected to the supports in accordance with Section 5.6 End Anchorage.

(b) Landing and Placing Loads

1) Except as stated in paragraphs 6(b)(3) and 6(b)(4) of this section, no "construction loads"[1] are allowed on the steel joists until all bridging is installed and anchored, and all joist bearing ends are attached.

2) During the construction period, loads placed on the steel joists shall be distributed so as not to exceed the capacity of the steel joists.

3) The weight of a bundle of joist bridging shall not exceed a total of 1000 pounds (454 kilograms). The bundle of joist bridging shall be placed on a minimum of 3 steel joists that are secured at one end. The edge of the bridging bundle shall be positioned within 1 foot (0.30 m) of the secured end.

[1] See page 150 for definition of "construction load". A copy of the OSHA Steel Erection Standard §1926.757, Open Web Steel Joists, is included in Appendix E for reference purposes.

4) No bundle of deck may be placed on steel joists until all bridging has been installed and anchored and all joist bearing ends attached, unless the following conditions are met:

a) The contractor has first determined from a *"qualified person"* [2] and documented in a site-specific erection plan that the structure or portion of the structure is capable of supporting the load;

b) The bundle of decking is placed on a minimum of 3 steel joists;

c) The joists supporting the bundle of decking are attached at both ends;

d) At least one row of bridging is installed and anchored;

e) The total weight of the decking does not exceed 4000 pounds (1816 kilograms); and

f) The edge of the decking shall be placed within 1 foot (0.30 meters) of the bearing surface of the joist end.

g) The edge of the construction load shall be placed within 1 foot (0.30 meters) of the bearing surface of the joist end.

(c) Field Welding

1) All field welding shall be performed in accordance with the contract documents. Field welding shall not damage the joists.

2) On cold-formed members whose yield strength has been attained by cold working, and whose as-formed strength is used in the design, the total length of weld at any one point shall not exceed 50 percent of the overall developed width of the cold-formed section.

(d) Handling

Care shall be exercised at all times to avoid damage to the joists and accessories.

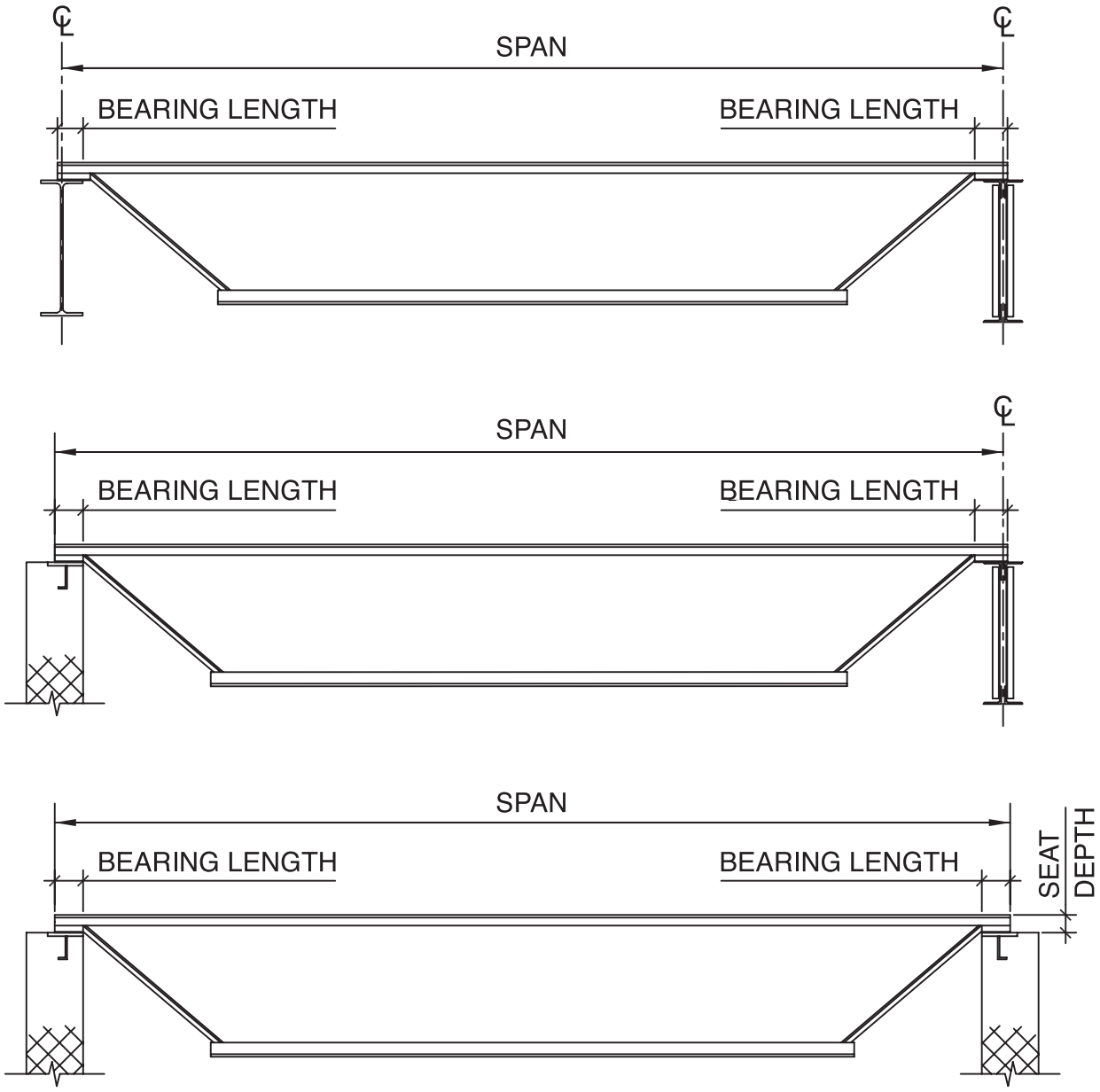
(e) Fall Arrest Systems

Steel joists shall not be used as anchorage points for a fall arrest system unless written direction to do so is obtained from a *"qualified person"* [2].

[2] See page 150 for OSHA definition of "qualified person".

DEFINITION OF SPAN

(U. S. Customary Units)



NOTES: 1) DESIGN LENGTH = SPAN - 0.33 FT.

2) BEARING LENGTH FOR STEEL SUPPORTS SHALL NOT BE LESS THAN 2 1/2 INCHES; FOR MASONRY AND CONCRETE NOT LESS THAN 4 INCHES.

3) PARALLEL CHORD JOISTS INSTALLED TO A SLOPE GREATER THAN 1/2 INCH PER FOOT SHALL USE SPAN DEFINED BY THE LENGTH ALONG THE SLOPE.

STANDARD LRFD LOAD TABLE

OPEN WEB STEEL JOISTS, K-SERIES

Based on a 50 ksi Maximum Yield Strength
Adopted by the Steel Joist Institute May 1, 2000
Revised to November 10, 2003 – Effective March 01, 2005

The black figures in the following table give the TOTAL safe factored uniformly distributed load-carrying capacities, in pounds per linear foot, of **LRFD K-Series** Steel Joists. The weight of factored DEAD loads, including the joists, must be deducted to determine the factored LIVE load-carrying capacities of the joists. Sloped parallel-chord joists shall use span as defined by the length along the slope.

The figures shown in **RED** in this load table are the unfactored nominal LIVE loads per linear foot of joist which will produce an approximate deflection of 1/360 of the span. LIVE loads which will produce a deflection of 1/240 of the span may be obtained by multiplying the figures in **RED** by 1.5. In no case shall the TOTAL load capacity of the joists be exceeded.

The approximate joist weights per linear foot shown in these tables do not include accessories.

The approximate moment of inertia of the joist, in inches^4 is;

$I_j = 26.767(W_{LL})(L^3)(10^{-6})$, where W_{LL}= **RED** figure in the Load Table and L = (Span - 0.33) in feet.

For the proper handling of concentrated and/or varying loads, see Section 6.1 in the Code of Standard Practice for Steel Joists and Joist Girders.

Where the joist span exceeds the unshaded area of the Load Table, the row of bridging nearest the mid span shall be diagonal bridging with bolted connections at the chords and intersections.

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STANDARD LOAD TABLE FOR OPEN WEB STEEL JOISTS, K-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	8K1	10K1	12K1	12K3	12K5	14K1	14K3	14K4	14K6	16K2	16K3	16K4	16K5	16K6	16K7	16K9
Depth (in.)	8	10	12	12	12	14	14	14	14	16	16	16	16	16	16	16
Approx. Wt (lbs./ft.)	5.1	5.0	5.0	5.7	7.1	5.2	6.0	6.7	7.7	5.5	6.3	7.0	7.5	8.1	8.6	10.0
Span (ft.) ↓																
8	825 550															
9	825 550															
10	825 480	825 550														
11	798 377	825 542														
12	666 288	825 455	825 550	825 550	825 550											
13	565 225	718 363	825 510	825 510	825 510											
14	486 179	618 289	750 425	825 463	825 463	825 550	825 550	825 550	825 550							
15	421 145	537 234	651 344	814 428	825 434	766 475	825 507	825 507	825 507							
16	369 119	469 192	570 282	714 351	825 396	672 390	825 467	825 467	825 467	825 550	825 550	825 550	825 550	825 550	825 550	825 550
17		415 159	504 234	630 291	825 366	592 324	742 404	825 443	825 443	768 488	825 526	825 526	825 526	825 526	825 526	825 526
18		369 134	448 197	561 245	760 317	528 272	661 339	795 397	825 408	684 409	762 456	825 490	825 490	825 490	825 490	825 490
19		331 113	402 167	502 207	681 269	472 230	592 287	712 336	825 383	612 347	682 386	820 452	825 455	825 455	825 455	825 455
20		298 97	361 142	453 177	613 230	426 197	534 246	642 287	787 347	552 297	615 330	739 386	825 426	825 426	825 426	825 426
21			327 123	409 153	555 198	385 170	483 212	582 248	712 299	499 255	556 285	670 333	754 373	822 405	825 406	825 406
22			298 106	373 132	505 172	351 147	439 184	529 215	648 259	454 222	505 247	609 289	687 323	747 351	825 385	825 385
23			271 93	340 116	462 150	321 128	402 160	483 188	592 226	415 194	462 216	556 252	627 282	682 307	760 339	825 363
24			249 81	312 101	423 132	294 113	367 141	442 165	543 199	381 170	424 189	510 221	576 248	627 269	697 298	825 346
25						270 100	339 124	408 145	501 175	351 150	390 167	469 195	529 219	576 238	642 263	771 311
26						249 88	313 110	376 129	462 156	324 133	360 148	433 173	489 194	532 211	592 233	711 276
27						231 79	289 98	349 115	427 139	300 119	334 132	402 155	453 173	493 188	549 208	658 246
28						214 70	270 88	324 103	397 124	279 106	310 118	373 138	421 155	459 168	510 186	612 220
29										259 95	289 106	348 124	391 139	427 151	475 167	570 198
30										241 86	270 96	324 112	366 126	399 137	444 151	532 178
31										226 78	252 87	304 101	342 114	373 124	415 137	498 161
32										213 71	237 79	285 92	321 103	349 112	388 124	466 147

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STANDARD LOAD TABLE FOR OPEN WEB STEEL JOISTS, K-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	18K3	18K4	18K5	18K6	18K7	18K9	18K10	20K3	20K4	20K5	20K6	20K7	20K9	20K10	22K4	22K5	22K6	22K7	22K9	22K10	22K11
Depth (In.)	18	18	18	18	18	18	18	20	20	20	20	20	20	20	22	22	22	22	22	22	22
Approx. Wt. (lbs./ft.)	6.6	7.2	7.7	8.5	9	10.2	11.7	6.7	7.6	8.2	8.9	9.3	10.8	12.2	8	8.8	9.2	9.7	11.3	12.6	13.8
Span (ft.) ↓																					
18	825 550	825 550	825 550	825 550	825 550	825 550	825 550														
19	771 494	825 523	825 523	825 523	825 523	825 523	825 523														
20	694 423	825 490	825 490	825 490	825 490	825 490	825 490	775 517	825 550	825 550	825 550	825 550	825 550	825 550							
21	630 364	759 426	825 460	825 460	825 460	825 460	825 460	702 453	825 520	825 520	825 520	825 520	825 520	825 520							
22	573 316	690 370	777 414	825 438	825 438	825 438	825 438	639 393	771 461	825 490	825 490	825 490	825 490	825 490	825 548	825 548	825 548	825 548	825 548	825 548	825 548
23	523 276	630 323	709 362	774 393	825 418	825 418	825 418	583 344	703 402	793 451	825 468	825 468	825 468	825 468	777 491	825 518	825 518	825 518	825 518	825 518	825 518
24	480 242	577 284	651 318	709 345	789 382	825 396	825 396	535 302	645 353	727 396	792 430	825 448	825 448	825 448	712 431	804 483	825 495	825 495	825 495	825 495	825 495
25	441 214	532 250	600 281	652 305	727 337	825 377	825 377	493 266	594 312	669 350	729 380	811 421	825 426	825 426	657 381	739 427	805 464	825 474	825 474	825 474	825 474
26	408 190	492 222	553 249	603 271	672 299	807 354	825 361	456 236	549 277	618 310	673 337	750 373	825 405	825 405	606 338	682 379	744 411	825 454	825 454	825 454	825 454
27	378 169	454 198	513 222	558 241	622 267	747 315	825 347	421 211	508 247	573 277	624 301	694 333	825 389	825 389	561 301	633 337	688 367	768 406	825 432	825 432	825 432
28	351 151	423 177	477 199	519 216	577 239	694 282	822 331	391 189	472 221	532 248	579 269	645 298	775 353	825 375	522 270	588 302	640 328	712 364	825 413	825 413	825 413
29	327 136	394 159	444 179	483 194	538 215	646 254	766 298	364 170	439 199	495 223	540 242	601 268	723 317	825 359	486 242	547 272	597 295	664 327	798 387	825 399	825 399
30	304 123	367 144	414 161	451 175	502 194	603 229	715 269	340 153	411 179	462 201	504 218	561 242	675 286	799 336	453 219	511 245	556 266	619 295	745 349	825 385	825 385
31	285 111	343 130	387 146	421 158	469 175	564 207	669 243	318 138	384 162	433 182	471 198	525 219	631 259	748 304	424 198	478 222	520 241	580 267	697 316	825 369	825 369
32	267 101	322 118	363 132	396 144	441 159	529 188	627 221	298 126	360 147	406 165	442 179	492 199	592 235	702 276	397 180	448 201	489 219	544 242	654 287	775 337	823 355
33	252 92	303 108	342 121	372 131	414 145	498 171	589 201	280 114	339 134	381 150	415 163	463 181	556 214	660 251	373 164	421 183	459 199	511 221	615 261	729 307	798 334
34	237 84	285 98	321 110	349 120	390 132	468 156	555 184	264 105	318 122	358 137	391 149	435 165	523 195	621 229	352 149	397 167	432 182	481 202	579 239	687 280	774 314
35	223 77	268 90	303 101	330 110	367 121	441 143	523 168	249 96	300 112	339 126	369 137	411 151	493 179	585 210	331 137	373 153	408 167	454 185	546 219	648 257	741 292
36	211 70	253 82	286 92	312 101	348 111	417 132	495 154	235 88	283 103	319 115	348 125	388 139	466 164	553 193	313 126	354 141	385 153	429 169	516 201	612 236	700 269
37								222 81	268 95	303 106	330 115	367 128	441 151	523 178	297 116	334 130	364 141	406 156	487 185	579 217	663 247
38								211 74	255 87	286 98	312 106	348 118	418 139	496 164	280 107	316 119	345 130	384 144	462 170	549 200	628 228
39								199 69	241 81	271 90	297 98	330 109	397 129	471 151	267 98	300 110	327 120	364 133	438 157	520 185	595 211
40								190 64	229 75	258 84	282 91	313 101	376 119	447 140	253 91	285 102	310 111	346 123	417 146	495 171	565 195
41															241 85	271 95	295 103	330 114	396 135	471 159	538 181
42															229 79	259 88	282 96	313 106	378 126	448 148	513 168
43															219 73	247 82	268 89	300 99	360 117	427 138	489 157
44															208 68	235 76	256 83	286 92	343 109	408 128	466 146

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STANDARD LOAD TABLE FOR OPEN WEB STEEL JOISTS, K-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	24K4	24K5	24K6	24K7	24K8	24K9	24K10	24K12	26K5	26K6	26K7	26K8	26K9	26K10	26K12
Depth (In.)	24	24	24	24	24	24	24	24	26	26	26	26	26	26	26
Approx. Wt. (lbs./ft.)	8.4	9.3	9.7	10.1	11.5	12.0	13.1	16.0	9.8	10.6	10.9	12.1	12.2	13.8	16.6
Span (ft.) ↓															
24	780 516	825 544	825 544	825 544	825 544	825 544	825 544	825 544							
25	718 456	810 511	825 520	825 520	825 520	825 520	825 520	825 520							
26	663 405	748 453	814 493	825 499	825 499	825 499	825 499	825 499	813 535	825 541	825 541	825 541	825 541	825 541	825 541
27	615 361	693 404	754 439	825 479	825 479	825 479	825 479	825 479	753 477	820 519	825 522	825 522	825 522	825 522	825 522
28	571 323	643 362	700 393	781 436	825 456	825 456	825 456	825 456	699 427	762 464	825 501	825 501	825 501	825 501	825 501
29	531 290	600 325	652 354	727 392	804 429	825 436	825 436	825 436	651 384	709 417	790 463	825 479	825 479	825 479	825 479
30	496 262	559 293	609 319	679 353	750 387	816 419	825 422	825 422	607 346	661 377	738 417	816 457	825 459	825 459	825 459
31	465 237	523 266	570 289	636 320	702 350	765 379	825 410	825 410	568 314	619 341	690 378	763 413	825 444	825 444	825 444
32	435 215	490 241	535 262	595 290	658 318	717 344	823 393	823 393	534 285	580 309	648 343	715 375	778 407	823 431	823 431
33	409 196	462 220	502 239	559 265	619 289	673 313	798 368	798 368	501 259	546 282	609 312	672 342	732 370	798 404	798 404
34	385 179	435 201	472 218	526 242	582 264	634 286	753 337	774 344	472 237	514 257	573 285	633 312	688 338	774 378	774 378
35	363 164	409 184	445 200	496 221	549 242	598 262	709 308	751 324	445 217	484 236	540 261	597 286	649 310	751 356	751 356
36	343 150	387 169	421 183	469 203	519 222	565 241	670 283	730 306	420 199	457 216	510 240	564 263	613 284	729 334	730 334
37	324 138	366 155	399 169	444 187	490 205	534 222	634 260	711 290	397 183	433 199	483 221	534 242	580 262	690 308	711 315
38	307 128	346 143	378 156	421 172	465 189	507 204	601 240	691 275	376 169	411 184	457 204	505 223	550 241	654 284	691 299
39	292 118	328 132	358 144	399 159	441 174	480 189	570 222	673 261	357 156	390 170	433 188	480 206	522 223	619 262	673 283
40	277 109	312 122	340 133	379 148	420 161	456 175	541 206	657 247	340 145	370 157	412 174	456 191	496 207	589 243	657 269
41	264 101	297 114	324 124	361 137	399 150	435 162	516 191	640 235	322 134	352 146	393 162	433 177	472 192	561 225	640 256
42	252 94	283 106	309 115	343 127	379 139	414 151	490 177	625 224	307 125	336 136	373 150	412 164	450 178	534 210	625 244
43	240 88	270 98	294 107	328 118	363 130	394 140	468 165	609 213	294 116	319 126	357 140	394 153	429 166	508 195	610 232
44	229 82	258 92	280 100	313 110	346 121	376 131	447 154	580 199	280 108	306 118	340 131	376 143	409 155	486 182	597 222
45	219 76	246 86	268 93	298 103	330 113	360 122	427 144	555 185	268 101	291 110	325 122	360 133	391 145	465 170	583 212
46	208 71	235 80	256 87	286 97	316 106	345 114	408 135	531 174	256 95	279 103	310 114	343 125	375 135	444 159	570 203
47	199 67	225 75	246 82	274 90	303 99	330 107	391 126	508 163	246 89	267 96	298 107	328 117	358 127	426 149	553 192
48	192 63	216 70	235 77	262 85	291 93	316 101	375 118	487 153	235 83	256 90	285 100	315 110	343 119	408 140	529 180
49									225 78	246 85	274 94	303 103	330 112	391 131	508 169
50									216 73	235 80	262 89	291 97	316 105	375 124	487 159
51									208 69	226 75	252 83	279 91	304 99	361 116	469 150
52									199 65	217 71	243 79	268 86	292 93	346 110	451 142

LRFD

STANDARD LOAD TABLE FOR OPEN WEB STEEL JOISTS, K-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	28K6	28K7	28K8	28K9	28K10	28K12	30K7	30K8	30K9	30K10	30K11	30K12
Depth (In.)	28	28	28	28	28	28	30	30	30	30	30	30
Approx. Wt. (lbs./ft.)	11.4	11.8	12.7	13.0	14.3	17.1	12.3	13.2	13.4	15.0	16.4	17.6
Span (ft.) ↓												
28	822 541	825 543	825 543	825 543	825 543	825 543						
29	766 486	825 522	825 522	825 522	825 522	825 522						
30	715 439	796 486	825 500	825 500	825 500	825 500	825 543	825 543	825 543	825 543	825 543	825 543
31	669 397	745 440	825 480	825 480	825 480	825 480	801 508	825 520	825 520	825 520	825 520	825 520
32	627 361	699 400	772 438	823 463	823 463	823 463	751 461	823 500	823 500	823 500	823 500	823 500
33	589 329	657 364	726 399	790 432	798 435	798 435	706 420	780 460	798 468	798 468	798 468	798 468
34	555 300	618 333	684 364	744 395	774 410	774 410	664 384	735 420	774 441	774 441	774 441	774 441
35	523 275	583 305	645 333	702 361	751 389	751 389	627 351	693 384	751 415	751 415	751 415	751 415
36	495 252	550 280	609 306	663 332	730 366	730 366	592 323	654 353	712 383	730 392	730 392	730 392
37	468 232	522 257	576 282	627 305	711 344	711 344	559 297	619 325	673 352	711 374	711 374	711 374
38	444 214	493 237	546 260	594 282	691 325	691 325	531 274	586 300	639 325	691 353	691 353	691 353
39	420 198	469 219	519 240	564 260	670 306	673 308	504 253	556 277	606 300	673 333	673 333	673 333
40	399 183	445 203	492 222	535 241	636 284	657 291	478 234	529 256	576 278	657 315	657 315	657 315
41	379 170	424 189	468 206	510 224	606 263	640 277	454 217	502 238	547 258	640 300	640 300	640 300
42	361 158	403 175	445 192	486 208	576 245	625 264	433 202	480 221	522 240	619 282	625 284	625 284
43	345 147	385 163	426 179	463 194	550 228	610 252	414 188	457 206	498 223	591 263	610 270	610 270
44	330 137	367 152	406 167	442 181	525 212	597 240	394 176	436 192	475 208	564 245	597 258	597 258
45	315 128	351 142	388 156	423 169	501 198	583 229	376 164	417 179	454 195	538 229	583 246	583 246
46	301 120	336 133	372 146	405 158	480 186	570 219	361 153	399 168	435 182	516 214	570 236	570 236
47	288 112	321 125	355 136	387 148	459 174	558 210	345 144	382 157	415 171	493 201	558 226	558 226
48	276 105	309 117	340 128	370 139	441 163	547 201	331 135	366 148	399 160	472 188	543 215	547 216
49	265 99	295 110	327 120	355 130	423 153	535 193	318 127	351 139	382 150	454 177	520 202	535 207
50	255 93	283 103	313 113	342 123	405 144	525 185	304 119	337 130	367 141	436 166	499 190	525 199
51	244 88	273 97	301 106	328 115	390 136	507 175	292 112	324 123	352 133	418 157	480 179	514 192
52	235 83	262 92	289 100	315 109	375 128	487 165	282 106	312 116	339 126	402 148	462 169	504 184
53	226 78	252 87	279 95	304 103	360 121	469 156	271 100	300 109	327 119	387 140	444 159	495 177
54	217 74	243 82	268 89	292 97	348 114	451 147	261 94	288 103	313 112	373 132	427 150	486 170
55	210 70	234 77	259 85	282 92	334 108	435 139	252 89	277 98	303 106	360 125	412 142	468 161
56	202 66	226 73	249 80	271 87	322 102	420 132	243 84	268 92	292 100	346 118	397 135	451 153
57							234 80	259 88	282 95	334 112	384 128	435 145
58							226 76	250 83	271 90	322 106	370 121	420 137
59							219 72	241 79	262 86	312 101	358 115	406 130
60							211 69	234 75	253 81	301 96	346 109	393 124

STANDARD ASD LOAD TABLE
OPEN WEB STEEL JOISTS, K-SERIES

Based on a 50 ksi Maximum Yield Strength
Adopted by the Steel Joist Institute November 4, 1985
Revised to November 10, 2003 - Effective March 01, 2005

The black figures in the following table give the TOTAL safe uniformly distributed load-carrying capacities, in pounds per linear foot, of **ASD K-Series** Steel Joists. The weight of DEAD loads, including the joists, must be deducted to determine the LIVE load-carrying capacities of the joists. Sloped parallel-chord joists shall use span as defined by the length along the slope.

The figures shown in **RED** in this load table are the nominal LIVE loads per linear foot of joist which will produce an approximate deflection of 1/360 of the span. LIVE loads which will produce a deflection of 1/240 of the span may be obtained by multiplying the figures in **RED** by 1.5. In no case shall the TOTAL load capacity of the joists be exceeded.

The approximate joist weights per linear foot shown in these tables do not include accessories.

The approximate moment of inertia of the joist, in inches^4 is;

$I_j = 26.767(W_{LL})(L^3)(10^{-6})$, where W_{LL}= **RED** figure in the Load Table and L = (Span - 0.33) in feet.

For the proper handling of concentrated and/or varying loads, see Section 6.1 in the Code of Standard Practice for Steel Joists and Joist Girders.

Where the joist span exceeds the unshaded area of the Load Table, the row of bridging nearest the mid span shall be diagonal bridging with bolted connections at the chords and intersections.

ASD

STANDARD LOAD TABLE FOR OPEN WEB STEEL JOISTS, K-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	8K1	10K1	12K1	12K3	12K5	14K1	14K3	14K4	14K6	16K2	16K3	16K4	16K5	16K6	16K7	16K9
Depth (in.)	8	10	12	12	12	14	14	14	14	16	16	16	16	16	16	16
Approx. Wt (lbs./ft.)	5.1	5.0	5.0	5.7	7.1	5.2	6.0	6.7	7.7	5.5	6.3	7.0	7.5	8.1	8.6	10.0
Span (ft.) ↓																
8	550 550															
9	550 550															
10	550 480	550 550														
11	532 377	550 542														
12	444 288	550 455	550 550	550 550	550 550											
13	377 225	479 363	550 510	550 510	550 510											
14	324 179	412 289	500 425	550 463	550 463	550 550	550 550	550 550	550 550							
15	281 145	358 234	434 344	543 428	550 434	511 475	550 507	550 507	550 507							
16	246 119	313 192	380 282	476 351	550 396	448 390	550 467	550 467	550 467	550 550	550 550	550 550	550 550	550 550	550 550	550 550
17		277 159	336 234	420 291	550 366	395 324	495 404	550 443	550 443	512 488	550 526	550 526	550 526	550 526	550 526	550 526
18		246 134	299 197	374 245	507 317	352 272	441 339	530 397	550 408	456 409	508 456	550 490	550 490	550 490	550 490	550 490
19		221 113	268 167	335 207	454 269	315 230	395 287	475 336	550 383	408 347	455 386	547 452	550 455	550 455	550 455	550 455
20		199 97	241 142	302 177	409 230	284 197	356 246	428 287	525 347	368 297	410 330	493 386	550 426	550 426	550 426	550 426
21			218 123	273 153	370 198	257 170	322 212	388 248	475 299	333 255	371 285	447 333	503 373	548 405	550 406	550 406
22			199 106	249 132	337 172	234 147	293 184	353 215	432 259	303 222	337 247	406 289	458 323	498 351	550 385	550 385
23			181 93	227 116	308 150	214 128	268 160	322 188	395 226	277 194	308 216	371 252	418 282	455 307	507 339	550 363
24			166 81	208 101	282 132	196 113	245 141	295 165	362 199	254 170	283 189	340 221	384 248	418 269	465 298	550 346
25						180 100	226 124	272 145	334 175	234 150	260 167	313 195	353 219	384 238	428 263	514 311
26						166 88	209 110	251 129	308 156	216 133	240 148	289 173	326 194	355 211	395 233	474 276
27						154 79	193 98	233 115	285 139	200 119	223 132	268 155	302 173	329 188	366 208	439 246
28						143 70	180 88	216 103	265 124	186 106	207 118	249 138	281 155	306 168	340 186	408 220
29										173 95	193 106	232 124	261 139	285 151	317 167	380 198
30										161 86	180 96	216 112	244 126	266 137	296 151	355 178
31										151 78	168 87	203 101	228 114	249 124	277 137	332 161
32										142 71	158 79	190 92	214 103	233 112	259 124	311 147

ASD

STANDARD LOAD TABLE FOR OPEN WEB STEEL JOISTS, K-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	18K3	18K4	18K5	18K6	18K7	18K9	18K10	20K3	20K4	20K5	20K6	20K7	20K9	20K10	22K4	22K5	22K6	22K7	22K9	22K10	22K11
Depth (In.)	18	18	18	18	18	18	18	20	20	20	20	20	20	20	22	22	22	22	22	22	22
Approx. Wt. (lbs./ft.)	6.6	7.2	7.7	8.5	9	10.2	11.7	6.7	7.6	8.2	8.9	9.3	10.8	12.2	8	8.8	9.2	9.7	11.3	12.6	13.8
Span (ft.) ↓																					
18	550 550	550 550	550 550	550 550	550 550	550 550	550 550														
19	514 494	550 523	550 523	550 523	550 523	550 523	550 523														
20	463 423	550 490	550 490	550 490	550 490	550 490	550 490	517 517	550 550	550 550	550 550	550 550	550 550	550 550							
21	420 364	506 426	550 460	550 460	550 460	550 460	550 460	468 453	550 520	550 520	550 520	550 520	550 520	550 520							
22	382 316	460 370	518 414	550 438	550 438	550 438	550 438	426 393	514 461	550 490	550 490	550 490	550 490	550 490	550 548	550 548	550 548	550 548	550 548	550 548	550 548
23	349 276	420 323	473 362	516 393	550 418	550 418	550 418	389 344	469 402	529 451	550 468	550 468	550 468	550 468	518 491	550 518	550 518	550 518	550 518	550 518	550 518
24	320 242	385 284	434 318	473 345	526 382	550 396	550 396	357 302	430 353	485 396	528 430	550 448	550 448	550 448	475 431	536 483	550 495	550 495	550 495	550 495	550 495
25	294 214	355 250	400 281	435 305	485 337	550 377	550 377	329 266	396 312	446 350	486 380	541 421	550 426	550 426	438 381	493 427	537 464	550 474	550 474	550 474	550 474
26	272 190	328 222	369 249	402 271	448 299	538 354	550 361	304 236	366 277	412 310	449 337	500 373	550 405	550 405	404 338	455 379	496 411	550 454	550 454	550 454	550 454
27	252 169	303 198	342 222	372 241	415 267	498 315	550 347	281 211	339 247	382 277	416 301	463 333	550 389	550 389	374 301	422 337	459 367	512 406	550 432	550 432	550 432
28	234 151	282 177	318 199	346 216	385 239	463 282	548 331	261 189	315 221	355 248	386 269	430 298	517 353	550 375	348 270	392 302	427 328	475 364	550 413	550 413	550 413
29	218 136	263 159	296 179	322 194	359 215	431 254	511 298	243 170	293 199	330 223	360 242	401 268	482 317	550 359	324 242	365 272	398 295	443 327	532 387	550 399	550 399
30	203 123	245 144	276 161	301 175	335 194	402 229	477 269	227 153	274 179	308 201	336 218	374 242	450 286	533 336	302 219	341 245	371 266	413 295	497 349	550 385	550 385
31	190 111	229 130	258 146	281 158	313 175	376 207	446 243	212 138	256 162	289 182	314 198	350 219	421 259	499 304	283 198	319 222	347 241	387 267	465 316	550 369	550 369
32	178 101	215 118	242 132	264 144	294 159	353 188	418 221	199 126	240 147	271 165	295 179	328 199	395 235	468 276	265 180	299 201	326 219	363 242	436 287	517 337	549 355
33	168 92	202 108	228 121	248 131	276 145	332 171	393 201	187 114	226 134	254 150	277 163	309 181	371 214	440 251	249 164	281 183	306 199	341 221	410 261	486 307	532 334
34	158 84	190 98	214 110	233 120	260 132	312 156	370 184	176 105	212 122	239 137	261 149	290 165	349 195	414 229	235 149	265 167	288 182	321 202	386 239	458 280	516 314
35	149 77	179 90	202 101	220 110	245 121	294 143	349 168	166 96	200 112	226 126	246 137	274 151	329 179	390 210	221 137	249 153	272 167	303 185	364 219	432 257	494 292
36	141 70	169 82	191 92	208 101	232 111	278 132	330 154	157 88	189 103	213 115	232 125	259 139	311 164	369 193	209 126	236 141	257 153	286 169	344 201	408 236	467 269
37								148 81	179 95	202 106	220 115	245 128	294 151	349 178	198 116	223 130	243 141	271 156	325 185	386 217	442 247
38								141 74	170 87	191 98	208 106	232 118	279 139	331 164	187 107	211 119	230 130	256 144	308 170	366 200	419 228
39								133 69	161 81	181 90	198 98	220 109	265 129	314 151	178 98	200 110	218 120	243 133	292 157	347 185	397 211
40								127 64	153 75	172 84	188 91	209 101	251 119	298 140	169 91	190 102	207 111	231 123	278 146	330 171	377 195
41															161 85	181 95	197 103	220 114	264 135	314 159	359 181
42															153 79	173 88	188 96	209 106	252 126	299 148	342 168
43															146 73	165 82	179 89	200 99	240 117	285 138	326 157
44															139 68	157 76	171 83	191 92	229 109	272 128	311 146

ASD

STANDARD LOAD TABLE FOR OPEN WEB STEEL JOISTS, K-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	24K4	24K5	24K6	24K7	24K8	24K9	24K10	24K12	26K5	26K6	26K7	26K8	26K9	26K10	26K12
Depth (In.)	24	24	24	24	24	24	24	24	26	26	26	26	26	26	26
Approx. Wt. (lbs./ft.)	8.4	9.3	9.7	10.1	11.5	12.0	13.1	16.0	9.8	10.6	10.9	12.1	12.2	13.8	16.6
Span (ft.) ↓															
24	520 516	550 544	550 544	550 544	550 544	550 544	550 544	550 544							
25	479 456	540 511	550 520	550 520	550 520	550 520	550 520	550 520							
26	442 405	499 453	543 493	550 499	550 499	550 499	550 499	550 499	542 535	550 541	550 541	550 541	550 541	550 541	550 541
27	410 361	462 404	503 439	550 479	550 479	550 479	550 479	550 479	502 477	547 519	550 522	550 522	550 522	550 522	550 522
28	381 323	429 362	467 393	521 436	550 456	550 456	550 456	550 456	466 427	508 464	550 501	550 501	550 501	550 501	550 501
29	354 290	400 325	435 354	485 392	536 429	550 436	550 436	550 436	434 384	473 417	527 463	550 479	550 479	550 479	550 479
30	331 262	373 293	406 319	453 353	500 387	544 419	550 422	550 422	405 346	441 377	492 417	544 457	550 459	550 459	550 459
31	310 237	349 266	380 289	424 320	468 350	510 379	550 410	550 410	379 314	413 341	460 378	509 413	550 444	550 444	550 444
32	290 215	327 241	357 262	397 290	439 318	478 344	549 393	549 393	356 285	387 309	432 343	477 375	519 407	549 431	549 431
33	273 196	308 220	335 239	373 265	413 289	449 313	532 368	532 368	334 259	364 282	406 312	448 342	488 370	532 404	532 404
34	257 179	290 201	315 218	351 242	388 264	423 286	502 337	516 344	315 237	343 257	382 285	422 312	459 338	516 378	516 378
35	242 164	273 184	297 200	331 221	366 242	399 262	473 308	501 324	297 217	323 236	360 261	398 286	433 310	501 356	501 356
36	229 150	258 169	281 183	313 203	346 222	377 241	447 283	487 306	280 199	305 216	340 240	376 263	409 284	486 334	487 334
37	216 138	244 155	266 169	296 187	327 205	356 222	423 260	474 290	265 183	289 199	322 221	356 242	387 262	460 308	474 315
38	205 128	231 143	252 156	281 172	310 189	338 204	401 240	461 275	251 169	274 184	305 204	337 223	367 241	436 284	461 299
39	195 118	219 132	239 144	266 159	294 174	320 189	380 222	449 261	238 156	260 170	289 188	320 206	348 223	413 262	449 283
40	185 109	208 122	227 133	253 148	280 161	304 175	361 206	438 247	227 145	247 157	275 174	304 191	331 207	393 243	438 269
41	176 101	198 114	216 124	241 137	266 150	290 162	344 191	427 235	215 134	235 146	262 162	289 177	315 192	374 225	427 256
42	168 94	189 106	206 115	229 127	253 139	276 151	327 177	417 224	205 125	224 136	249 150	275 164	300 178	356 210	417 244
43	160 88	180 98	196 107	219 118	242 130	263 140	312 165	406 213	196 116	213 126	238 140	263 153	286 166	339 195	407 232
44	153 82	172 92	187 100	209 110	231 121	251 131	298 154	387 199	187 108	204 118	227 131	251 143	273 155	324 182	398 222
45	146 76	164 86	179 93	199 103	220 113	240 122	285 144	370 185	179 101	194 110	217 122	240 133	261 145	310 170	389 212
46	139 71	157 80	171 87	191 97	211 106	230 114	272 135	354 174	171 95	186 103	207 114	229 125	250 135	296 159	380 203
47	133 67	150 75	164 82	183 90	202 99	220 107	261 126	339 163	164 89	178 96	199 107	219 117	239 127	284 149	369 192
48	128 63	144 70	157 77	175 85	194 93	211 101	250 118	325 153	157 83	171 90	190 100	210 110	229 119	272 140	353 180
49									150 78	164 85	183 94	202 103	220 112	261 131	339 169
50									144 73	157 80	175 89	194 97	211 105	250 124	325 159
51									139 69	151 75	168 83	186 91	203 99	241 116	313 150
52									133 65	145 71	162 79	179 86	195 93	231 110	301 142

ASD

STANDARD LOAD TABLE FOR OPEN WEB STEEL JOISTS, K-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	28K6	28K7	28K8	28K9	28K10	28K12	30K7	30K8	30K9	30K10	30K11	30K12
Depth (In.)	28	28	28	28	28	28	30	30	30	30	30	30
Approx. Wt. (lbs./ft.)	11.4	11.8	12.7	13.0	14.3	17.1	12.3	13.2	13.4	15.0	16.4	17.6
Span (ft.) ↓												
28	548 541	550 543	550 543	550 543	550 543	550 543						
29	511 486	550 522	550 522	550 522	550 522	550 522						
30	477 439	531 486	550 500	550 500	550 500	550 500	550 543	550 543	550 543	550 543	550 543	550 543
31	446 397	497 440	550 480	550 480	550 480	550 480	534 508	550 520	550 520	550 520	550 520	550 520
32	418 361	466 400	515 438	549 463	549 463	549 463	501 461	549 500	549 500	549 500	549 500	549 500
33	393 329	438 364	484 399	527 432	532 435	532 435	471 420	520 460	532 468	532 468	532 468	532 468
34	370 300	412 333	456 364	496 395	516 410	516 410	443 384	490 420	516 441	516 441	516 441	516 441
35	349 275	389 305	430 333	468 361	501 389	501 389	418 351	462 384	501 415	501 415	501 415	501 415
36	330 252	367 280	406 306	442 332	487 366	487 366	395 323	436 353	475 383	487 392	487 392	487 392
37	312 232	348 257	384 282	418 305	474 344	474 344	373 297	413 325	449 352	474 374	474 374	474 374
38	296 214	329 237	364 260	396 282	461 325	461 325	354 274	391 300	426 325	461 353	461 353	461 353
39	280 198	313 219	346 240	376 260	447 306	449 308	336 253	371 277	404 300	449 333	449 333	449 333
40	266 183	297 203	328 222	357 241	424 284	438 291	319 234	353 256	384 278	438 315	438 315	438 315
41	253 170	283 189	312 206	340 224	404 263	427 277	303 217	335 238	365 258	427 300	427 300	427 300
42	241 158	269 175	297 192	324 208	384 245	417 264	289 202	320 221	348 240	413 282	417 284	417 284
43	230 147	257 163	284 179	309 194	367 228	407 252	276 188	305 206	332 223	394 263	407 270	407 270
44	220 137	245 152	271 167	295 181	350 212	398 240	263 176	291 192	317 208	376 245	398 258	398 258
45	210 128	234 142	259 156	282 169	334 198	389 229	251 164	278 179	303 195	359 229	389 246	389 246
46	201 120	224 133	248 146	270 158	320 186	380 219	241 153	266 168	290 182	344 214	380 236	380 236
47	192 112	214 125	237 136	258 148	306 174	372 210	230 144	255 157	277 171	329 201	372 226	372 226
48	184 105	206 117	227 128	247 139	294 163	365 201	221 135	244 148	266 160	315 188	362 215	365 216
49	177 99	197 110	218 120	237 130	282 153	357 193	212 127	234 139	255 150	303 177	347 202	357 207
50	170 93	189 103	209 113	228 123	270 144	350 185	203 119	225 130	245 141	291 166	333 190	350 199
51	163 88	182 97	201 106	219 115	260 136	338 175	195 112	216 123	235 133	279 157	320 179	343 192
52	157 83	175 92	193 100	210 109	250 128	325 165	188 106	208 116	226 126	268 148	308 169	336 184
53	151 78	168 87	186 95	203 103	240 121	313 156	181 100	200 109	218 119	258 140	296 159	330 177
54	145 74	162 82	179 89	195 97	232 114	301 147	174 94	192 103	209 112	249 132	285 150	324 170
55	140 70	156 77	173 85	188 92	223 108	290 139	168 89	185 98	202 106	240 125	275 142	312 161
56	135 66	151 73	166 80	181 87	215 102	280 132	162 84	179 92	195 100	231 118	265 135	301 153
57							156 80	173 88	188 95	223 112	256 128	290 145
58							151 76	167 83	181 90	215 106	247 121	280 137
59							146 72	161 79	175 86	208 101	239 115	271 130
60							141 69	156 75	169 81	201 96	231 109	262 124

KCS JOISTS

The KCS Joists:

1. Provide a versatile **K-**Series Joist that can be easily specified to support uniform loads plus concentrated and non-uniform loads.
2. Eliminate many repetitive load diagrams required on contract documents and allow some flexibility of load locations.

KCS joists are designed in accordance with the Standard Specification for **K-**Series Joists.

Standard **K-**Series Joists are designed for simple span uniform loading which results in a parabolic moment diagram for chord forces and a linearly sloped shear diagram for web forces. When non-uniform and/or concentrated loads are encountered the shear and moment diagrams required may be shaped quite differently and may not be covered by the shear and moment design envelopes of a standard **K-**Series Joist.

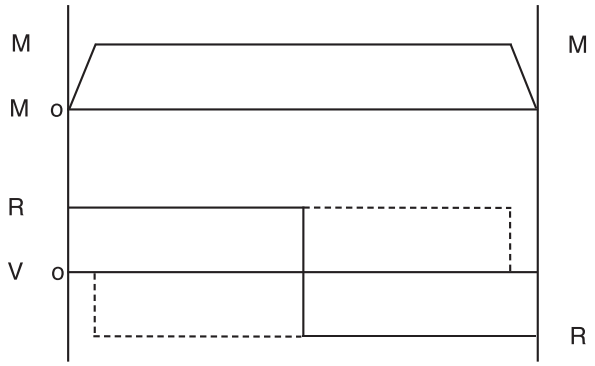
KCS Joist chords are designed for a flat positive moment envelope. The moment capacity is constant at all interior panels. The top chord end panel is designed for axial load based on the force in the first tension web, which is based on the specified shear. A uniform load of 825 plf (12030 N/m) LRFD or 550 plf (8020 N/m) ASD is used to check end panel bending.

The web forces are determined based on a flat shear envelope. All webs are designed for a vertical shear equal to the specified shear capacity. Furthermore, all webs (except the first tension web which remains in tension under all simple span gravity loads) will be designed for 100% stress reversal.

Both LRFD and ASD KCS Joist load tables list the shear and moment capacity of each joist. The selection of a KCS Joist requires the specifying professional to calculate the maximum moment and shear imposed and select the appropriate KCS Joist. If a KCS Joist cannot be selected from the load table or if any uniform load exceeds 825 plf (12030 N/m) LRFD or 550 plf (8020 N/m) ASD or if the maximum concentrated load exceeds the shear capacity of the joist, use double KCS Joists or select an **LH-**Series Joist. For the **LH-**Series Joist, supply a load diagram. When net uplift loads, end moments or other external horizontal loads are a design consideration; these loads shall be provided to the joist manufacturer by the specifying professional.

As is the case with standard **K-**, **LH-** and **DLH-**Series Joists, chord bending due to concentrated loads must be addressed. In the case of concentrated loads, the specifying professional shall handle them in one of two ways: 1) specify on the structural drawings that an extra web must be field applied at all concentrated loads not occurring at joist panel points, or 2) provide exact locations of all concentrated loads for which the joist manufacturer shall provide necessary reinforcement. Please reference SJI Technical Digest #9 “Handling and Erection of Steel Joists and Joist Girders” for further information.

NOTE: In the following examples joist selection is based on minimum depth and minimum weight (plf, kg/m). Other selections may be more suitable for specific job conditions.

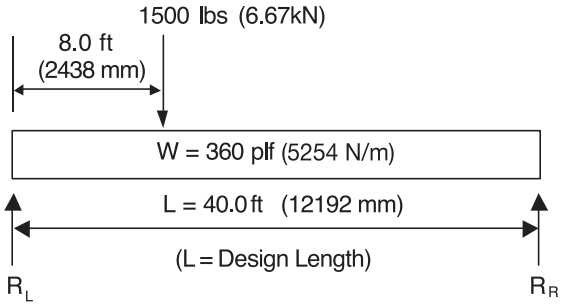


KCS JOIST
SHEAR AND MOMENT ENVELOPES

LRFD EXAMPLES

EXAMPLE 1

LRFD FACTORED LOADS



M = 938 in.-kip (105.9 kN-m)

R_L = 8400 lbs (37.37 kN), R_R = 7500 lbs (33.36 kN)

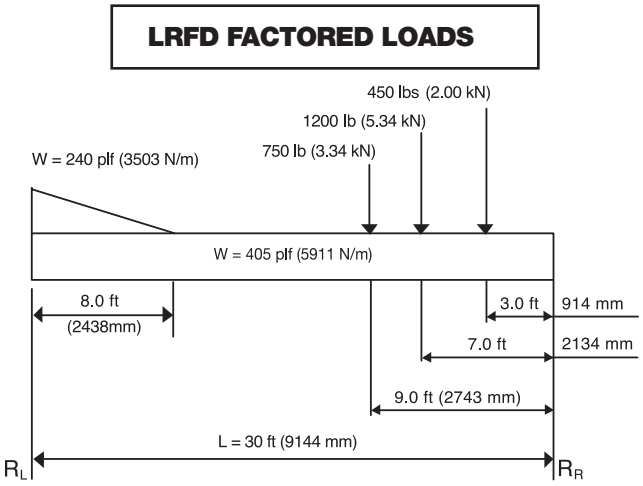
Select a 22KCS3, M = 987 in.-kip (111.5 kN-m)

R = 9900 lbs (44.0 kN)

Bridging section no. 9 for L = 40 ft. (12192 mm)
Use 22K9 to determine bridging and stability requirements.

Since a standard KCS Joist can be selected from the load table a load diagram is not required.

EXAMPLE 2



M = 664 in.-kip (75.03 kN-m)

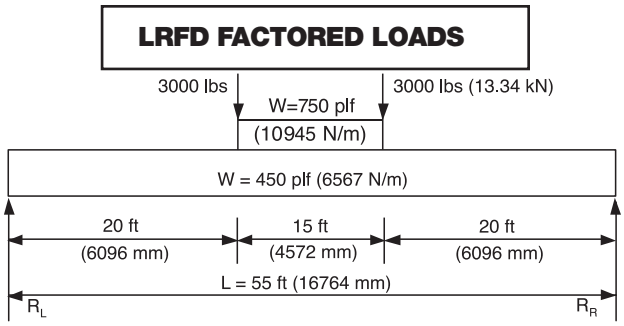
R_L = 7500 lbs (33.36 kN), R_R = 8010 lbs (35.63 kN)

Select a 22KCS2, M = 732 in.-kip (82.64 kN-m)
R = 8850 lbs (39.3 kN)

Bridging section no. 6 for L = 30 ft. (9144 mm)

Use 22K6 to determine bridging and stability requirements. Since the maximum *factored* uniform load of 645 plf (9413 N/m) (405 plf (5911 N/m) + 240 plf (3503 N/m) does not exceed the maximum KCS Joist uniform load of 825 plf (12030 N/m) and a standard KCS Joist can be selected from the load table, a load diagram is not required.

EXAMPLE 3



M = 4365 in.-kip (493.2 kN-m)

$R_L = R_R$ = 21000 lbs (93.41 kN)

EXCEEDS CAPACITY OF 30KCS5 (MAXIMUM KCS JOIST AND EXCEEDS MAXIMUM *FACTORED* UNIFORM LOAD OF 825 plf (12040 N/m).

OPTION A: Use double joists each having a minimum moment capacity M = 2183 in.-kip (246.65 kN-m) and shear capacity R = 10500 lbs (46.71 kN) and a uniform load of 600 plf (8756 N/m).

Select two 28KCS5, M = 2556 in.-kip (288.7 kN-m), R = 13800 lbs (61.3 kN).

Bridging section no. 12 for L = 55 ft. (16764 mm) Use 28K12 to determine bridging and stability requirements.

OPTION B: Select an **LH-**Series Joist. Calculate an equivalent uniform load based on the maximum moment or shear:

$$W_M = \frac{8M}{L^2} = 962 \text{ plf (14.04 kN/m)}$$

$$W_V = \frac{2R}{L} = 764 \text{ plf (11.14 kN/m)}$$

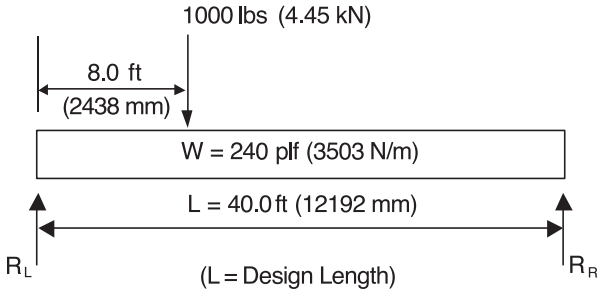
Use 962 plf (14.04 kN/m)

From the **LH-**Series LRFD Load Table select a 32LH13, W = 1035 plf (15.10 kN/m) for a 55 ft. (16764 mm) clear span. Specify a 32LH13SP and present a load diagram on the structural drawings with the following note:

JOIST MANUFACTURER SHALL DESIGN FOR THE LOADING SHOWN IN THE LOAD DIAGRAM.

ASD EXAMPLES

EXAMPLE 1



M = 625 in.-kip (70.6 kN-m)

R_L=5600 lbs (24.9 kN), R_R=5000 lbs (22.2 kN)

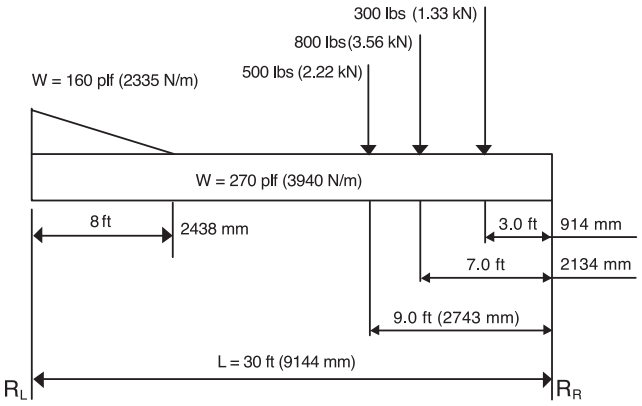
Select a 22KCS3, M = 658 in.-kip (74.3 kN-m)
R = 6600 lbs (29.3 kN)

Bridging section no. 9 for L = 40 ft. (12192 mm)

Use 22K9 to determine bridging and stability requirements.

Since a standard KCS Joist can be selected from the load table a load diagram is not required.

EXAMPLE 2



M = 443 in.-kip (50.1 kN-m)

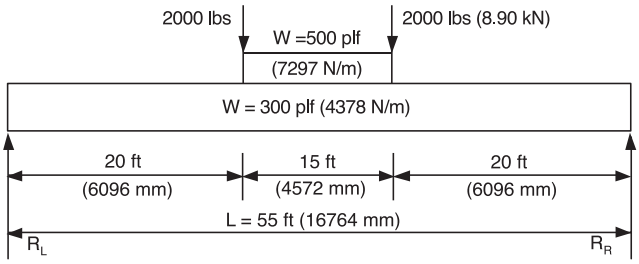
R_L = 5000 lbs (22.24 kN), R_R = 5340 lbs (23.75 kN)

Select a 22KCS2, M = 488 in.-kip (55.1 kN-m)
R = 5900 lbs (26.2 kN)

Bridging section no. 6 for L = 30 ft. (9144 mm)

Use 22K6 to determine bridging and stability requirements. Since the maximum uniform load of 430 plf [6275 N/m) (270 plf (3940 N/m) + 160 plf (2335 N/m)] does not exceed the maximum KCS Joist uniform load of 550 plf (8020 N/m) and a standard KCS Joist can be selected from the load table, a load diagram is not required.

EXAMPLE 3



M = 2910 in.-kip (328.8 kN-m)

$R_L = R_R$ = 14000 lbs (62.28 kN)

EXCEEDS CAPACITY OF 30KCS5 (MAXIMUM KCS JOIST) AND EXCEEDS MAXIMUM UNIFORM LOAD OF 550 plf (8027 N/m).

OPTION A: Use double joists each having a minimum moment capacity M = 1455 in.-kip (164.4 kN-m) and shear capacity R = 7000 lbs (31.14 kN) and a uniform load of 400 plf (5838 N/m).

Select two 28KCS5, M = 1704 in.-kip (192.5 kN-m), R = 9200 lbs (40.9 kN)

Bridging section no. 12 for L = 55 ft. (16764 mm) Use 28K12 to determine bridging and stability requirements.

OPTION B: Select an **LH-**Series Joist. Calculate an equivalent uniform load based on the maximum moment or shear:

$$W_M = \frac{8M}{L^2} = 641 \text{ plf (9.35 kN/m)}$$

$$W_V = \frac{2R}{L} = 509 \text{ plf (7.43 kN/m)}$$

Use 641 plf (9.35 kN/m)

From the **LH-**Series ASD Load Table select a 32LH13, W = 690 plf (10.06 kN/m) for a 55 ft. (16764 mm) clear span. Specify a **32LH13SP** and present a load diagram on the structural drawings with the following note:

JOIST MANUFACTURER SHALL DESIGN FOR THE LOADING SHOWN IN THE LOAD DIAGRAM.

LRFD

STANDARD LOAD TABLE FOR KCS OPEN WEB STEEL JOISTS
Based on a 50 ksi Maximum Yield Strength

JOIST DESIGNATION	DEPTH (inches)	MOMENT CAPACITY (inch-kips)	SHEAR CAPACITY* (lbs)	APPROX. WEIGHT** (lbs/ft)	GROSS MOMENT OF INERTIA (in.^{4})	BRIDGING TABLE SECTION NUMBER
10KCS1	10	258	3000	6.0	29	1
10KCS2	10	337	3750	7.5	37	1
10KCS3	10	444	4500	10.0	47	1
12KCS1	12	313	3600	6.0	43	3
12KCS2	12	411	4500	8.0	55	5
12KCS3	12	543	5250	10.0	71	5
14KCS1	14	370	4350	6.5	59	4
14KCS2	14	486	5100	8.0	77	6
14KCS3	14	642	5850	10.0	99	6
16KCS2	16	523	6000	8.5	99	6
16KCS3	16	705	7200	10.5	128	9
16KCS4	16	1080	7950	14.5	192	9
16KCS5	16	1401	8700	18.0	245	9
18KCS2	18	592	7050	9.0	127	6
18KCS3	18	798	7800	11.0	164	9
18KCS4	18	1225	8550	15.0	247	10
18KCS5	18	1593	9300	18.5	316	10
20KCS2	20	663	7800	9.5	159	6
20KCS3	20	892	9000	11.5	205	9
20KCS4	20	1371	11850	16.5	308	10
20KCS5	20	1786	12600	20.0	396	10
22KCS2	22	732	8850	10.0	194	6
22KCS3	22	987	9900	12.5	251	9
22KCS4	22	1518	11850	16.5	377	11
22KCS5	22	1978	12900	20.5	485	11
24KCS2	24	801	9450	10.0	232	6
24KCS3	24	1080	10800	12.5	301	9
24KCS4	24	1662	12600	16.5	453	12
24KCS5	24	2172	13350	20.5	584	12
26KCS2	26	870	9900	10.0	274	6
26KCS3	26	1174	11700	12.5	355	9
26KCS4	26	1809	12750	16.5	536	12
26KCS5	26	2364	13800	20.5	691	12
28KCS2	28	939	10350	10.5	320	6
28KCS3	28	1269	12000	12.5	414	9
28KCS4	28	1954	12750	16.5	626	12
28KCS5	28	2556	13800	20.5	808	12
30KCS3	30	1362	12000	13.0	478	9
30KCS4	30	2100	12750	16.5	722	12
30KCS5	30	2749	13800	21.0	934	12

*MAXIMUM UNIFORMLY DISTRIBUTED LOAD CAPACITY IS 825 PLF AND SINGLE CONCENTRATED LOAD CANNOT EXCEED SHEAR CAPACITY

**DOES NOT INCLUDE ACCESSORIES

ASD

STANDARD LOAD TABLE FOR KCS OPEN WEB STEEL JOISTS
Based on a 50 ksi Maximum Yield Strength

JOIST DESIGNATION	DEPTH (inches)	MOMENT CAPACITY* (inch-kips)	SHEAR CAPACITY* (lbs)	APPROX. WEIGHT** (lbs/ft)	GROSS MOMENT OF INERTIA (in.^{4})	BRIDGING TABLE SECTION NUMBER
10KCS1	10	172	2000	6.0	29	1
10KCS2	10	225	2500	7.5	37	1
10KCS3	10	296	3000	10.0	47	1
12KCS1	12	209	2400	6.0	43	3
12KCS2	12	274	3000	8.0	55	5
12KCS3	12	362	3500	10.0	71	5
14KCS1	14	247	2900	6.5	59	4
14KCS2	14	324	3400	8.0	77	6
14KCS3	14	428	3900	10.0	99	6
16KCS2	16	349	4000	8.5	99	6
16KCS3	16	470	4800	10.5	128	9
16KCS4	16	720	5300	14.5	192	9
16KCS5	16	934	5800	18.0	245	9
18KCS2	18	395	4700	9.0	127	6
18KCS3	18	532	5200	11.0	164	9
18KCS4	18	817	5700	15.0	247	10
18KCS5	18	1062	6200	18.5	316	10
20KCS2	20	442	5200	9.5	159	6
20KCS3	20	595	6000	11.5	205	9
20KCS4	20	914	7900	16.5	308	10
20KCS5	20	1191	8400	20.0	396	10
22KCS2	22	488	5900	10.0	194	6
22KCS3	22	658	6600	12.5	251	9
22KCS4	22	1012	7900	16.5	377	11
22KCS5	22	1319	8600	20.5	485	11
24KCS2	24	534	6300	10.0	232	6
24KCS3	24	720	7200	12.5	301	9
24KCS4	24	1108	8400	16.5	453	12
24KCS5	24	1448	8900	20.5	584	12
26KCS2	26	580	6600	10.0	274	6
26KCS3	26	783	7800	12.5	355	9
26KCS4	26	1206	8500	16.5	536	12
26KCS5	26	1576	9200	20.5	691	12
28KCS2	28	626	6900	10.5	320	6
28KCS3	28	846	8000	12.5	414	9
28KCS4	28	1303	8500	16.5	626	12
28KCS5	28	1704	9200	20.5	808	12
30KCS3	30	908	8000	13.0	478	9
30KCS4	30	1400	8500	16.5	722	12
30KCS5	30	1833	9200	21.0	934	12

*MAXIMUM UNIFORMLY DISTRIBUTED LOAD CAPACITY IS 550 PLF AND SINGLE CONCENTRATED LOAD CANNOT EXCEED SHEAR CAPACITY

**DOES NOT INCLUDE ACCESSORIES

NOTES

JOIST SUBSTITUTES K SERIES

Joist substitutes are 2.5 inch (64 mm) deep sections intended for use in very short spans (less than 8 feet (2.4 m) where Open Web Steel Joists are impractical. They are commonly specified to span over hallways and short spans in skewed bays.

Joist substitutes are fabricated from material conforming to Steel Joist Institute Specifications. Full lateral support to the compressive flange is provided by attachments to the deck. Caution must be exercised during erection since joist substitutes exhibit some degree of instability. After erection and before loads of any description are placed on the joist substitutes, the ends must be attached to the supports per SJI **K-Series** specifications and the deck installed and attached to the top flange.

Tables below list uniform loads based on **LRFD** and **ASD** methods of design and listed in U.S. Customary units:

LRFD

2.5 Inch K-Series Joist Substitutes			
Based on a Maximum Yield Strength of 50 ksi			
Designation	2.5K1	2.5K2	2.5K3
Span (ft-in)	Pounds per Linear Foot		
4'-0"	825	825	825
5'-0"	825 338	825 465	825
6'-0"	561 189	779 260	825 354
7'-0"	405 116	563 160	810 218
8'-0"	306 76	426 105	612 143
9'-0"	— —	333 73	480 99
10'-0"	— —	267 52	386 71

ASD

2.5 Inch K-Series Joist Substitutes			
Based on a Maximum Yield Strength of 50 ksi			
Designation	2.5K1	2.5K2	2.5K3
Span (ft-in)	Pounds per Linear Foot		
4'-0"	550	550	550
5'-0"	550 338	550 465	550
6'-0"	374 189	519 260	550 354
7'-0"	270 116	375 160	540 218
8'-0"	204 76	284 105	408 143
9'-0"	— —	222 73	320 99
10'-0"	— —	178 52	257 71

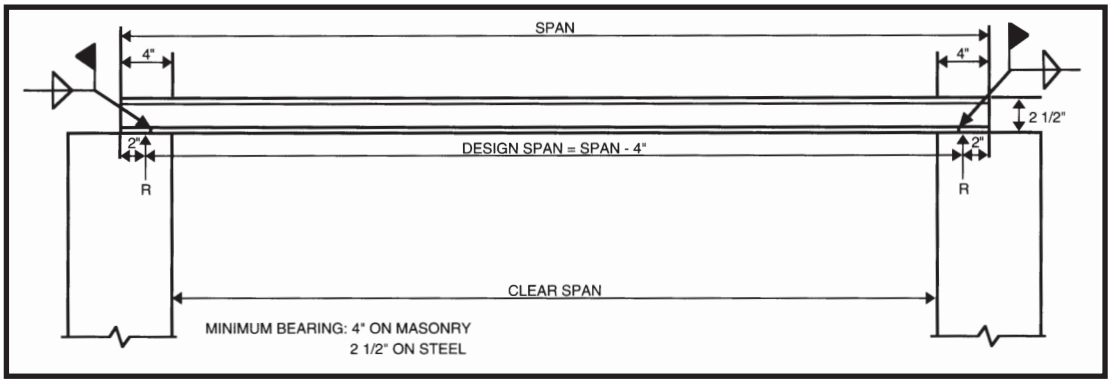
The figures shown in red are the uniform live loads which produce an approximate deflection of 1/360 of the span. Live loads which will produce a deflection of 1/240 of the span may be obtained by multiplying the figures in **red** by 1.5. In no case shall the total load capacity of the joist substitute be exceeded.

FABRICATION

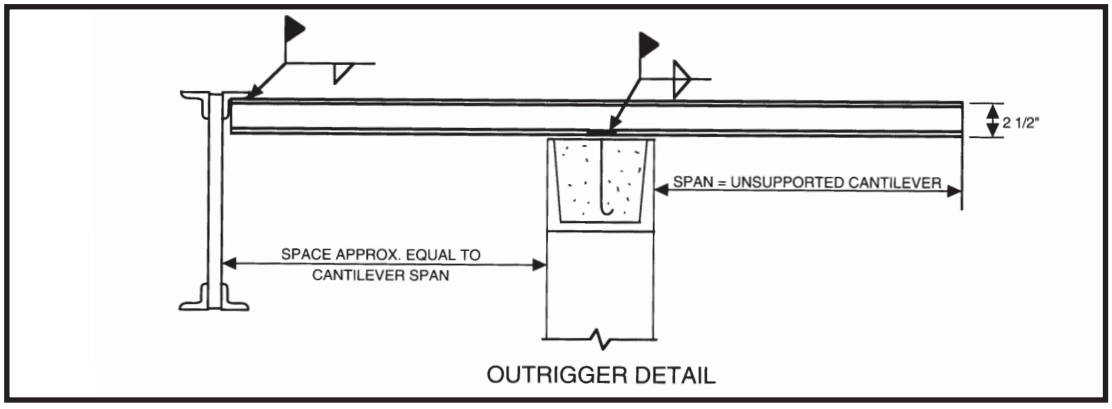
- Depth 2.5 in
- Maximum Length 10 ft
- Minimum Length 3 ft
- Contact your local Vulcraft plant for sloped or pitched seat information.

2.5K SERIES SIMPLE SPAN INFORMATION

2.5K TYPE	2.5K1	2.5K2	2.5K3
S in^3	0.62	0.84	1.2
I in^4	0.78	1.1	1.5
WT lbs/ft	3.0	4.2	6.4



NOTE: 2.5K SERIES NOT U.L. APPROVED.



NOTE: 2.5K SERIES NOT U.L. APPROVED.

LRFD

LOAD TABLE FOR LOOSE OUTRIGGERS

OUTRIGGER TYPE	TOTAL ALLOWABLE LOAD FOR UNSUPPORTED CANTILEVER PLF* SPAN ft-in									
	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"
2.5K1	825	749	519	381	293	231	188	155	—	—
2.5K2	825	825	698	512	392	311	251	207	174	—
2.5K3	825	825	825	740	566	447	362	299	252	215

ASD

LOAD TABLE FOR LOOSE OUTRIGGERS

OUTRIGGER TYPE	TOTAL ALLOWABLE LOAD FOR UNSUPPORTED CANTILEVER PLF* SPAN ft-in									
	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"	6'-6"
2.5K1	550	499	346	254	195	154	125	103	—	—
2.5K2	550	550	465	341	261	207	167	138	116	—
2.5K3	550	550	550	493	377	298	241	199	168	143

*Serviceability requirements must be checked by the specifying professional.

TOP CHORD EXTENSIONSAND EXTENDED ENDS, K-SERIES

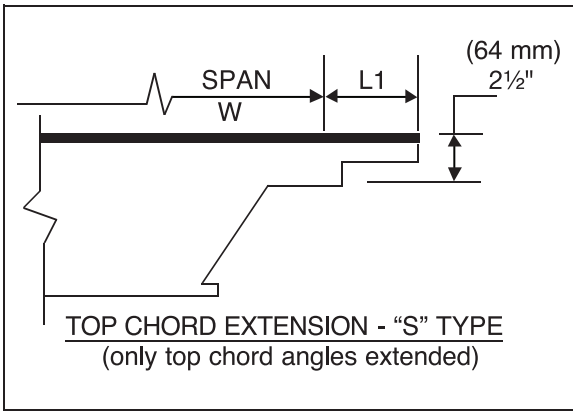
Joist extensions are commonly furnished to support a variety of overhang conditions. The two types are pictured below. The first is the TOP CHORD EXTENSION or "S" TYPE, which has only the top chord angles extended. The second is the EXTENDED END or "R" TYPE in which the standard 2 1/2 in., (64 mm) end bearing depth is maintained over the entire length of the extension. The "S" TYPE extension is so designated because of its Simple nature whereas the "R" TYPE involves Reinforcing the top chord angles. The **specifying professional** should be aware that an "S" TYPE is more economical and should be specified whenever possible.

The following load tables for **K-**Series TOP CHORD EXTENSIONS and EXTENDED ENDS for **LRFD** and **ASD** methods of design and listed in U.S. Customary and Metric units, have been developed as an aid to the **specifying professional**. The black number in the tables is the maximum allowable uniform load in pounds per linear foot (kilo-Newton/Meter). The red number is the uniform load which will produce an approximate deflection of L1/240, where L1 is the length of the extension. The load tables are applicable for uniform loads only. If there are concentrated loads and/or non-uniform loads, a loading diagram must be provided by the **specifying professional** on the structural drawings. In cases where it is not possible to meet specific job requirements with a 2 1/2 in. (64 mm) deep "R" type extension (refer to "S" and "I" values in the Extended End Load Table), the depth of the extension must be increased to provide greater load-carrying capacity. If the loading diagram for any condition is not shown, the joist manufacturer will design the extension to support the uniform load indicated in the **K-**Series Joist Load Table for the span of the joist.

When TOP CHORD EXTENSIONS or EXTENDED ENDS are specified, the allowable deflection and the bracing requirements must be considered by the **specifying professional**.

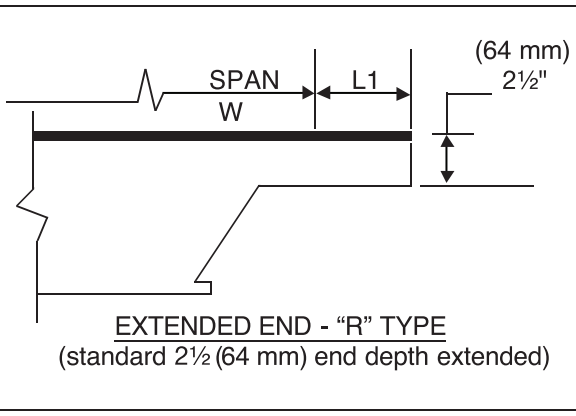
It should be noted that an "R" TYPE extension must be specified when building details dictate a 2 1/2 in., (64 mm) depth at the end of the extension. In the absence of specific instructions, the joist manufacturer may provide either type.

TOP CHORD EXTENSION



TOP CHORD EXTENSION - "S" TYPE
(only top chord angles extended)

EXTENDED END



EXTENDED END - "R" TYPE
(standard 2½ (64 mm) end depth extended)

W = Uniform Load
L1 = Length of Extension
SPAN = See K-Series Load Table for definition of Span

LRFD

TOP CHORD EXTENSION LOAD TABLE (S TYPE)
Based on a Maximum Yield Strength of 50 ksi
Pounds per Linear Foot

TYPE	"S" ($in.^3$)	"I" ($in.^4$)	LENGTH (L1) 0'-6"	1'-0"	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"
S1	0.099	0.088	825 550	544 363	267 127	157 58					
S2	0.127	0.138	825 550	700 422	343 200	202 91					
S3	0.144	0.156	825 550	793 550	388 226	229 104					
S4	0.160	0.172	825 550	825 550	432 249	255 113	168 60				
S5	0.176	0.188	825 550	825 550	474 272	280 124	184 66				
S6	0.192	0.204	825 550	825 550	517 295	306 134	202 72				
S7	0.241	0.306	825 550	825 550	649 443	384 201	253 108	180 64			
S8	0.266	0.332	825 550	825 550	717 481	424 219	280 117	198 70			
S9	0.288	0.358	825 550	825 550	777 519	459 236	303 126	214 75	160 48		
S10	0.380	0.544	825 550	825 550	825 550	606 359	400 192	283 115	211 74	163 50	
S11	0.438	0.622	825 550	825 550	825 550	699 410	460 220	327 131	243 84	189 57	150 41
S12	0.494	0.696	825 550	825 550	825 550	789 459	520 246	369 147	274 94	213 64	169 45

LRFD

TOP CHORD EXTENSION LOAD TABLE (R TYPE)
Based on a Maximum Yield Strength of 50 ksi
Pounds per Linear Foot

TYPE	"S" ($in.^3$)	"I" ($in.^4$)	LENGTH (L1) 0'-6"	1'-0"	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"
R1	0.895	1.119	825 550	825 550	825 550	825 550	825 396	669 236	498 152	385 103	307 73	250 54	208 41	175 32
R2	0.923	1.157	825 550	825 550	825 550	825 550	825 409	690 244	514 157	399 107	318 76	259 56	216 42	181 33
R3	1.039	1.299	825 550	825 550	825 550	825 550	825 459	777 274	579 176	448 120	358 85	292 63	243 47	205 37
R4	1.147	1.433	825 550	825 550	825 550	825 550	825 507	825 302	639 195	495 132	394 94	321 69	267 52	225 41
R5	1.249	1.561	825 550	825 550	825 550	825 550	825 550	825 329	696 212	538 144	429 103	349 75	291 57	246 44
R6	1.352	1.690	825 550	825 550	825 550	825 550	825 550	825 357	753 230	583 156	465 111	379 82	315 62	265 48
R7	1.422	1.802	825 550	825 550	825 550	825 550	825 550	825 380	792 245	613 167	489 119	399 87	331 66	279 51
R8	1.558	1.948	825 550	825 550	825 550	825 550	825 550	825 411	825 265	672 180	535 128	436 94	363 71	306 55
R9	1.673	2.091	825 550	825 550	825 550	825 550	825 550	825 442	825 284	721 194	576 138	469 101	390 77	328 59
R10	1.931	2.414	825 550	825 550	825 550	825 550	825 550	825 510	825 328	825 224	664 159	541 117	450 89	379 69
R11	2.183	2.729	825 550	825 550	825 550	825 550	825 550	825 550	825 371	825 253	751 180	612 132	508 100	430 78
R12	2.413	3.016	825 550	825 550	825 550	825 550	825 550	825 550	825 410	825 279	825 199	676 146	562 111	475 86

ASD

TOP CHORD EXTENSION LOAD TABLE (S TYPE)
Based on a Maximum Yield Strength of 50 ksi
Pounds per Linear Foot

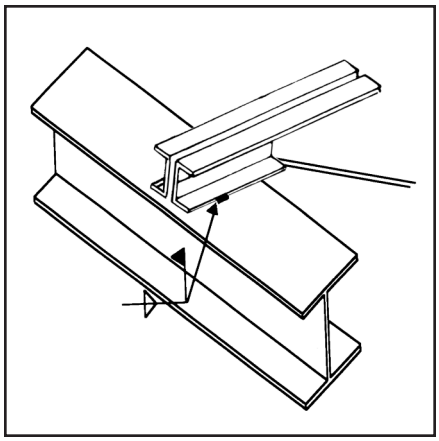
TYPE	"S" ($in.^3$)	"I" ($in.^4$)	LENGTH (L1) 0'-6"	1'-0"	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"
S1	0.099	0.088	550 550	363 363	178 127	105 58					
S2	0.127	0.138	550 550	467 422	229 200	135 91					
S3	0.144	0.156	550 550	529 510	259 226	153 104					
S4	0.160	0.172	550 550	550 550	288 249	170 113	112 60				
S5	0.176	0.188	550 550	550 550	316 272	187 124	123 66				
S6	0.192	0.204	550 550	550 550	345 295	204 134	135 72				
S7	0.241	0.306	550 550	550 550	433 433	256 201	169 108	120 64			
S8	0.266	0.332	550 550	550 550	478 481	283 219	187 117	132 70			
S9	0.288	0.358	550 550	550 550	518 518	306 236	202 126	143 75	107 48		
S10	0.380	0.544	550 550	550 550	550 550	404 359	267 192	189 115	141 74	109 50	
S11	0.438	0.622	550 550	550 550	550 550	466 410	307 220	218 131	162 84	126 57	100 41
S12	0.494	0.696	550 550	550 550	550 550	526 459	347 246	246 147	183 94	142 64	113 45

ASD

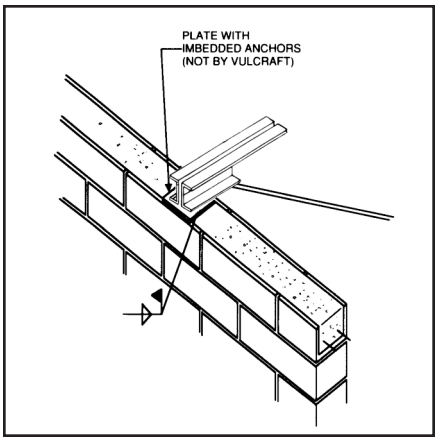
TOP CHORD EXTENSION LOAD TABLE (R TYPE)
Based on a Maximum Yield Strength of 50 ksi
Pounds per Linear Foot

TYPE	"S" ($in.^3$)	"I" ($in.^4$)	LENGTH (L1) 0'-6"	1'-0"	1'-6"	2'-0"	2'-6"	3'-0"	3'-6"	4'-0"	4'-6"	5'-0"	5'-6"	6'-0"
R1	0.895	1.119	550 550	550 550	550 550	550 550	550 396	446 236	332 152	257 103	205 73	167 54	139 41	117 32
R2	0.923	1.157	550 550	550 550	550 550	550 550	550 409	460 244	343 157	266 107	212 76	173 56	144 42	121 33
R3	1.039	1.299	550 550	550 550	550 550	550 550	550 459	518 274	386 176	299 120	239 85	195 63	162 47	137 37
R4	1.147	1.433	550 550	550 550	550 550	550 550	550 507	550 302	426 195	330 132	263 94	214 69	178 52	150 41
R5	1.249	1.561	550 550	550 550	550 550	550 550	550 550	550 329	464 212	359 144	286 103	233 75	194 57	164 44
R6	1.352	1.690	550 550	550 550	550 550	550 550	550 550	550 357	502 230	389 156	310 111	253 82	210 62	177 48
R7	1.422	1.802	550 550	550 550	550 550	550 550	550 550	550 380	528 245	409 167	326 119	266 87	221 66	186 51
R8	1.558	1.948	550 550	550 550	550 550	550 550	550 550	550 411	550 265	448 180	357 128	291 94	242 71	204 55
R9	1.673	2.091	550 550	550 550	550 550	550 550	550 550	550 442	550 284	481 194	384 138	313 101	260 77	219 59
R10	1.931	2.414	550 550	550 550	550 550	550 550	550 550	550 510	550 328	550 224	443 159	361 117	300 89	253 69
R11	2.183	2.729	550 550	550 550	550 550	550 550	550 550	550 550	550 371	550 253	501 180	408 132	339 100	287 78
R12	2.413	3.016	550 550	550 550	550 550	550 550	550 550	550 550	550 410	550 279	550 199	451 146	375 111	317 86

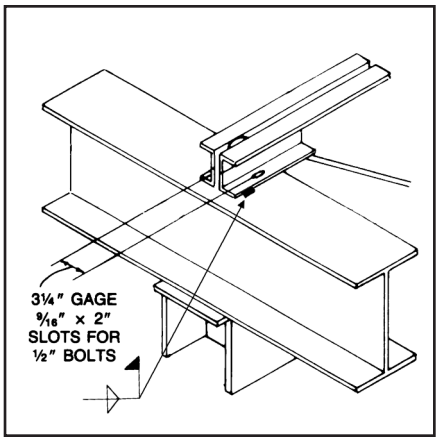
K SERIES OPEN WEB STEEL JOISTS



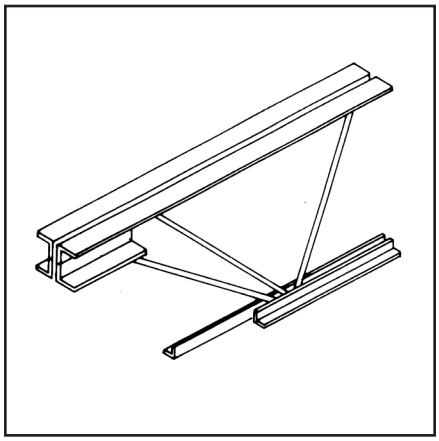
ANCHORAGE TO STEEL
SEE SJI SPECIFICATION 5.3 (b) AND 5.6



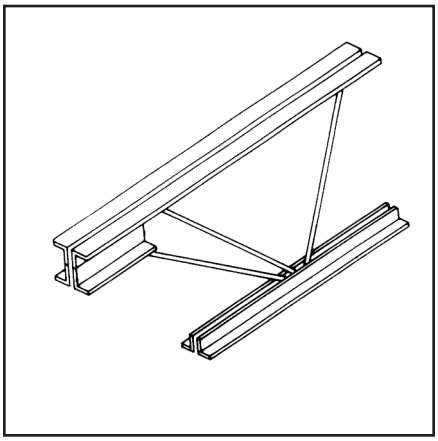
ANCHORAGE TO MASONARY
SEE SJI SPECIFICATION 5.3 (a) AND 5.6



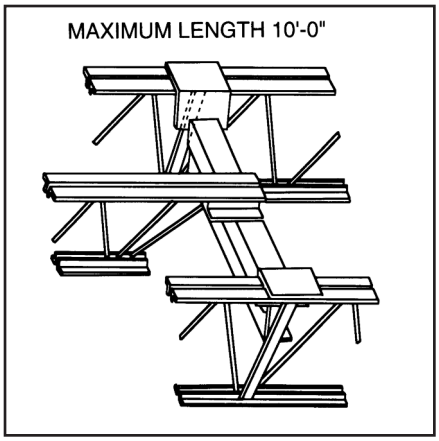
BOLTED CONNECTION*
TYPICALLY REQUIRED AT COLUMNS



CEILING EXTENSION



BOTTOM CHORD STRUT



HEADERS
Note: If header does not bear at a Joist Panel Point add extra web in field as shown.
EW or Panel Point by Vulcraft

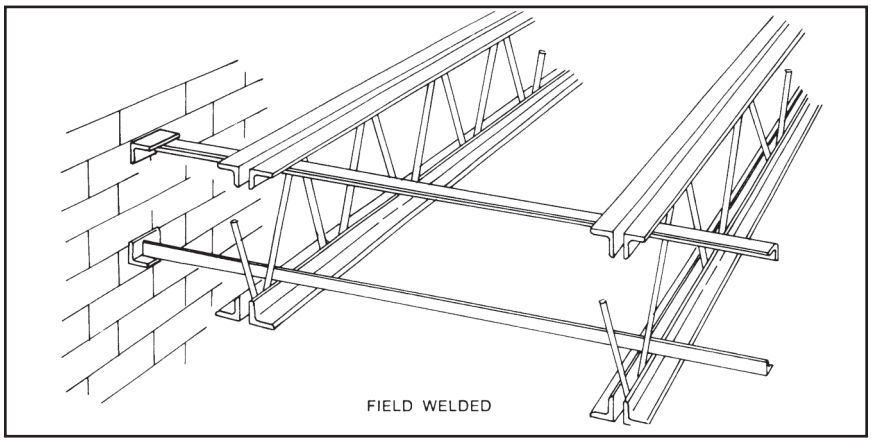
MAXIMUM DUCT OPENING SIZES (K SERIES)*

JOIST DEPTH	ROUND	SQUARE	RECTANGLE
8 inches	5 inches	4x4 inches	3x8 inches
10 inches	6 inches	5x5 inches	3x8 inches
12 inches	7 inches	6x6 inches	4x9 inches
14 inches	8 inches	6x6 inches	5x9 inches
16 inches	9 inches	7 1/2x 71/2 inches	6X10 inches
18 inches	11 inches	8x8 inches	7x11 inches
20 inches	11 inches	9x9 inches	7x12 inches
22 inches	12 inches	9 1/2 x9 1/2 inches	8x12 inches
24 inches	13 inches	10x10 inches	8x13 inches
26 inches	151/2 inches	12x12 inches	9x18 inches
28 inches	16 inches	13x13 inches	9x18 inches
30 inches	17 inches	14x14 inches	10x18 inches
***FOR LH SERIES CONSULT WITH VULCRAFT**			

SPECIFYING PROFESSIONAL MUST INDICATE ON STRUCTURAL DRAWINGS SIZE AND LOCATION OF ANY DUCT THAT IS TO PASS THRU JOIST.

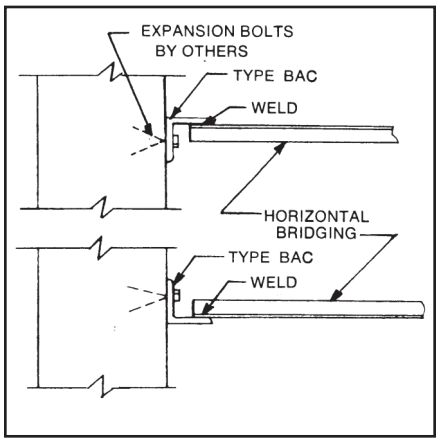
SEE SJI SPECIFICATION - SECTION 6. FOR HANDLING AND ERECTION OF K-SERIES OPEN WEB STEEL JOISTS AND SJI TECHNICAL DIGEST NO. 9.

K SERIES OPEN WEB STEEL JOISTS

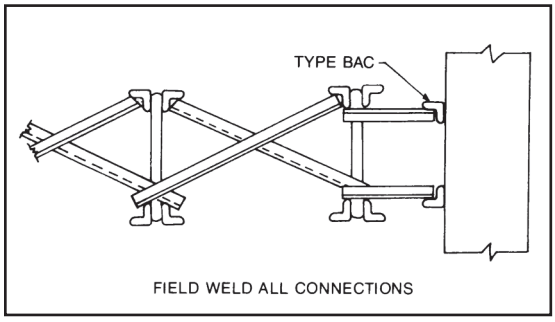


HORIZONTAL BRIDGING
SEE SJI SPECIFICATION 5.5 AND 6.

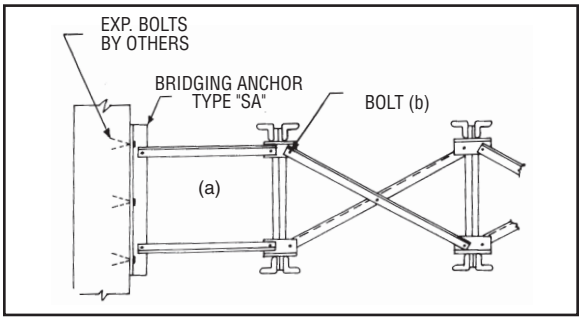
NOTE: DO NOT WELD BRIDGING TO JOIST WEB MEMBERS.
DO NOT HANG ANY MECHANICAL, ELECTRICAL, ETC. FROM BRIDGING.



BRIDGING ANCHORS
SEE SJI SPECIFICATION 5.5 AND 6.



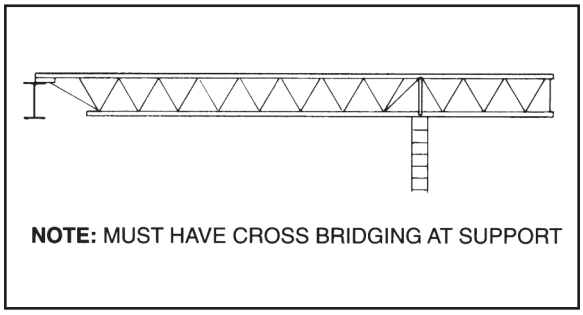
WELDED CROSS BRIDGING
SEE SJI SPECIFICATION 5.5 AND 6.
HORIZONTAL BRIDGING SHALL BE USED IN SPACE ADJACENT TO THE WALL TO ALLOW FOR PROPER DEFLECTION OF THE JOIST NEAREST THE WALL.



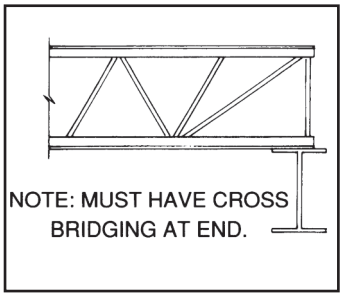
BOLTED CROSS BRIDGING
SEE SJI SPECIFICATION 5.5 AND 6.

(a) Horizontal Bridging units shall be used in the space adjacent to the wall to allow for proper deflection of the joist nearest the wall.

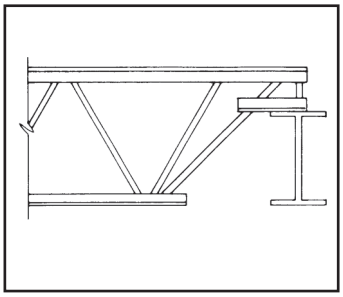
(b) For required bolt size refer to bridging table on page 136.
NOTE: Clip configuration may vary from that shown.



FULL DEPTH CANTILEVER END
SEE SJI SPECIFICATION 5.4 (d) AND 5.5 FOR BRIDGING REQUIREMENTS.



SQUARE END
SEE SJI SPECIFICATION 5.4 (d)
AND 5.5 FOR BRIDGING
REQUIREMENTS.

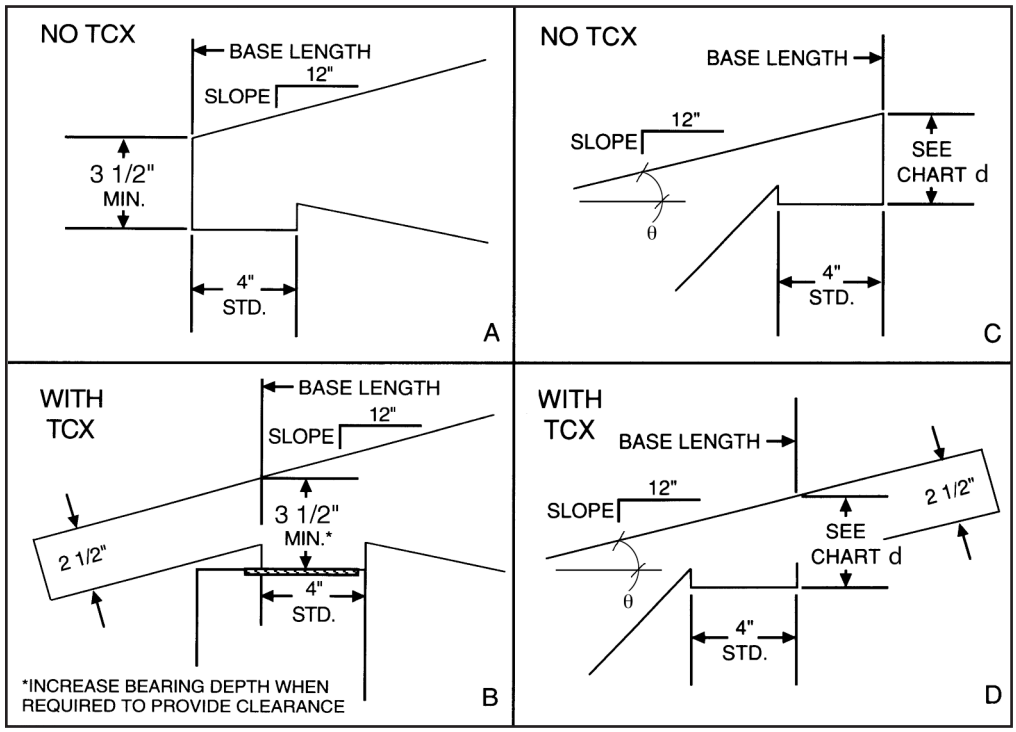


DEEP BEARINGS
CONFIGURATION MAY VARY

K SERIES OPEN WEB STEEL JOISTS

SLOPED SEAT REQUIREMENTS FOR SLOPES 3/8:12 AND GREATER

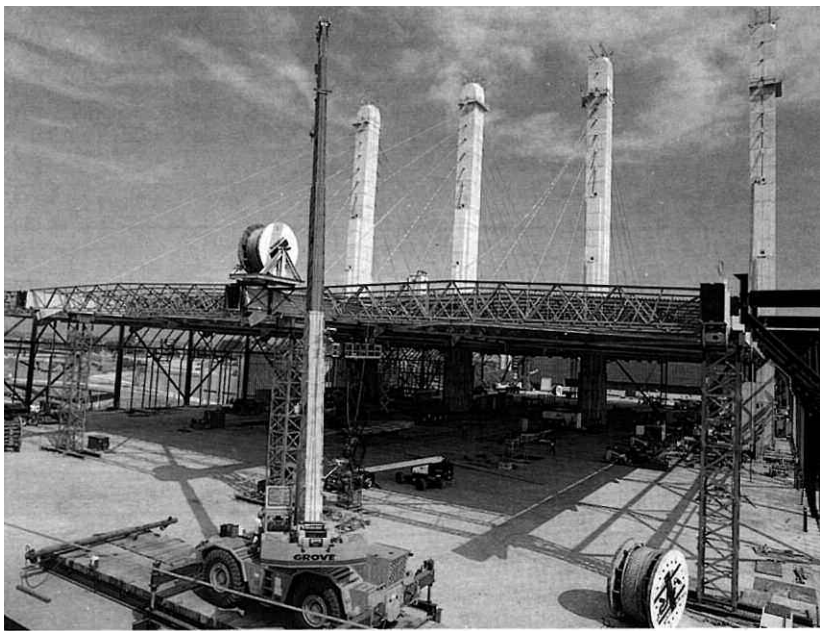
LOW END **HIGH END**



Slope Rate	High End Recommended Seat Depth d
3/8:12	3 1/2"
1/2:12	3 1/2"
1:12	4"
1 1/2:12	4"
2:12	4"
2 1/2:12	4 1/2"
3:12	4 1/2"
3 1/2:12	5"
4:12	5"
4 1/2:12	5"
5:12	5 1/2"
5 1/2:12	5 1/2"
6:12	5 1/2"

IF OVER 6:12 SEE BELOW

NOTES:
(1) Depths shown are the minimums required for fabrication of sloped bearing seats. Depths may vary depending on actual bearing conditions.
(2) $d = 5/8 + 2.5 / \cos\theta + 4 \tan\theta$
(3) Clearance must be checked at outer edge of support as shown in detail B. Increase bearing depth as required to permit passage of 2 1/2" deep extension.
(4) If extension depth greater than 2 1/2" is required (see details B and D) increase bearing depths accordingly.
(5) If slope is 1/4:12 or less sloped seats are not required.



BARTLE HALL CONVENTION CENTER

Kansas City, Missouri

Architect-Engineer: HNTB Corp.
General Contractor: Watson General Contractors, Inc.
Steel Fabricator: Havens Steel, Inc.
Steel Erector: Danny's Construction Co., Inc.

BRIDGING REQUIREMENTS FOR K-SERIES JOISTS

Number of Rows of Bridging***
Distances are Span Lengths
(see "Definition of Span" on page 20.)

Section Numbers*	ERECTION STABILITY SPANS (SJI Spec. Section 6) Depth	Span Less Than**	1 Row	2 Rows	3 Rows	4 Rows	5 Rows
1	8 10 12 14	17' 21' 23' 27'	Up thru 16'	Over 16' thru 24'	Over 24' thru 28'		
2	16	29'	Up thru 17'	Over 17' thru 25'	Over25'thru32'		
3	12 14 16 18 20	25' 29' 30' 31' 32'	Up thru 18'	Over 18' thru 28'	Over 28' thru 38'	Over 38' thru 40'	
4	14 16 18 20 22 24	29' 32' 32' 34' 34' 36'	Up thru 19'	Over 19' thru 28'	Over 28' thru 38'	Over 38' thru 48'	
5	12 16 18 20 22 24 26	25' 32' 33' 34' 35' 38' 38'	Up thru 19'	Over 19' thru 29'	Over 29' thru 39'	Over 39' thru 50'	Over 50' thru 52'
6	14 16 18 20 22 24 26 28	29' 33' 35' 36' 36' 39' 39' 40'	Up thru 19'	Over 19' thru 29'	Over 29' thru 39'	Over 39' thru 51'	Over 51' thru 56'
7	16 18 20 22 24 26 28 30	33' 37' 39' 40' 43' 43' 43' 44'	Up thru 20'	Over 20' thru 33'	Over 33' thru 45'	Over 45' thru 58'	Over 58' thru 60'
8	24 26 28 30	43' 44' 44' 45'	Up thru 20'	Over 20' thru 33'	Over 33' thru 45'	Over 45' thru 58'	Over 58' thru 60'
9	16 18 20 22 24 26 28 30	33' 37' 39' 40' 44' 44' 45' 45'	Up thru 20'	Over 20' thru 33'	Over 33' thru 46'	Over 46' thru 59'	Over 59' thru 60'
10	18 20 22 24 26 28 30	37' 41' 45' 49' 49' 49' 50'	Up thru 20'	Over 20' thru 37'	Over 37' thru 51'	Over 51' thru 60'	
11	22 30	45' 52'	Up thru 20'	Over 20' thru 38'	Over 38' thru 53'	Over 53' thru 60'	
12	24 26 28 30	49' 53' 53' 54'	Up thru 20'	Over 20' thru 39'	Over 39' thru 53'	Over 53' thru 60'	

* Last digit(s) of joist designation.
** For spans **EQUAL TO OR EXCEEDING t**hat shown above, one of the required rows, nearest mid-span, must be bolted diagonal type. Bolted diagonal bridging shall be installed and connected BEFORE releasing the hoisting lines. Refer to Specification Section 6 for handling and erection requirements.
*** See SJI Specifications 5.11 for uplift requirement, page 18.

K-Series Joist
Maximum Joist Spacing for Horizontal Bridging

*Bridging Material Size	Equal Leg Angles					
Section Numbers**	1x7/64 r =.20"	1-1/4x7/64 r =.25"	1-1/2x7/64 r =.30"	1-3/4x7/64 r =.35"	2x1/8 r =.40"	2-1/2x5/32 r =.50"
1 thru 9	5'-0"	6'-3"	7'-6"	8'-7"	10'-0"	12'-6"
10	4'-8"	6'-3"	7'-6"	8'-7"	10'-0"	12'-6"
11 & 12	4'-0"	5'-8"	7'-6"	8'-7"	10'-0"	12'-6"

* Connection to Joist must resist 700 pounds.
** Refer to last digit(s) of Joist Designation.

K, LH & DLH Series Joist
Maximum Joist Spacing for Diagonal Bridging

Bridging Angle Size					
Joist Depth	1x7/64 r =.20"	1-1/4x7/64 r =.25"	1-1/2x7/64 r =.30"	1-3/4x7/64 r =.35"	2x1/8 r =.40"
12	6'-6"	8'-3"	9'-11"	11'-7"	
14	6'-6"	8'-3"	9'-11"	11'-7"	
16	6'-6"	8'-2"	9'-10"	11'-6"	
18	6'-6"	8'-2"	9'-10"	11'-6"	
20	6'-5"	8'-2"	9'-10"	11'-6"	
22	6'-4"	8'-1"	9'-10"	11'-6"	
24	6'-4"	8'-1"	9'-9"	11'-5"	
26	6'-3"	8'-0"	9'-9"	11'-5"	
28	6'-2"	8'-0"	9'-8"	11'-5"	
30	6'-2"	7'-11"	9'-8"	11'-4"	
32	6'-1"	7'-10"	9'-7"	11'-4"	13'-0"
36		7'-9"	9'-6"	11'-3"	12'-11"
40		7'-7"	9'-5"	11'-2"	12'-10"
44		7'-5"	9'-3"	11'-0"	12'-9"
48		7'-3"	9'-2"	10'-11"	12'-8"
52			9'-0"	10'-9"	12'-7"
56			8'-10"	10'-8"	12'-5"
60			8'-7"	10'-6"	12'-4"
64			8'-5"	10'-4"	12'-2"
68			8'-2"	10'-2"	12'-0"
72			8'-0"	10'-0"	11'-10"

LH-Series Joist*
Maximum Joist Spacing for Horizontal Bridging

Bridging Angle Size						
Section Numbers**	1x7/64 r =.20"	1-1/4x7/64 r =.25"	1-1/2x7/64 r =.30"	1-3/4x7/64 r =.35"	2x1/8 r =.40"	2-1/2x5/32 r =.50"
02,03,04	4'-7"	6'-3"	7'-6"	8'-9"	10'-0"	12'-4"
05,06	4'-1"	5'-9"	7'-6"	8'-9"	10'-0"	12'-4"
07,08	3'-9"	5'-1"	6'-8"	8'-6"	10'-0"	12'-4"
09,10		4'-6"	6'-0"	7'-8"	10'-0"	12'-4"
11,12		4'-1"	5'-5"	6'-10"	8'-11"	12'-4"
13,14		3'-9"	4'-11"	6'-3"	8'-2"	12'-4"
15,16			4'-3"	5'-5"	7'-1"	11'-0"
17			4'-0"	5'-1"	6'-8"	10'-5"

* Connection to Joist must resist 700 pounds.
** Refer to last digit(s) of Joist Designation.

Bridging Requirements for LH-Series and DLH-Series Joists***

Erection Stability Spans (SJI Spec. Section 105)

Depth	Section Number	Spans less than **
18	02	33'
	03 thru 09	37'
20	02	33'
	03	38'
	04 thru 10	41'
24	03	35'
	04	39'
	05	40'
	06	45'
	07 thru 11	49'
28	05	42'
	06	46'
	07 thru 08	54'
	09 thru 13	57'
32	06 thru 07	47'
	08	55'
	09 thru 15	60'
36	07 thru 08	47'
	09	57'
	10 thru 15	60'
40	08 thru 09	47'
	10 thru 17	60'
44	09	52'
	10 thru 17	60'
48	10 thru 17	60'

* Last two digits of joist designation.

** NOTE: Erection Stability Span = Clear span + 8". (See SJI Specifications Section 104.2) For spans EQUAL TO OR EXCEEDING that shown, one of the rows nearest mid-span must be bolted diagonal type. For spans through 60 feet, the bolted diagonal bridging must be installed BEFORE releasing the hoisting lines. FOR SPANS OVER 60 FEET, ALL BRIDGING ROWS MUST BE BOLTED DIAGONAL TYPE. Spans over 60 feet through 100 feet require two rows of bolted diagonal bridging to be installed, at one-third points, BEFORE releasing the hoisting lines. Spans over 100 feet require ALL rows of bolted diagonal bridging to be installed BEFORE releasing the hoisting lines.

*** All DLH-Series JOISTS REQUIRE ALL BRIDGING ROWS TO BE BOLTED DIAGONAL TYPE.

Bridging Spacing

LH-DLH Sect. Number*	Minimum Bolt Diameter**	Max.Spacing of Bridging Lines
02,03,04	3/8"	11'-0"
05,06	3/8"	12'-0"
07,08	3/8"	13'-0"
09,10	3/8"	14'-0"
11,12	3/8"	16'-0"
13,14	1/2"	16'-0"
15,16,17	1/2"	21'-0"
18,19	5/8"	26'-0"

* Last two digits of joist designation.

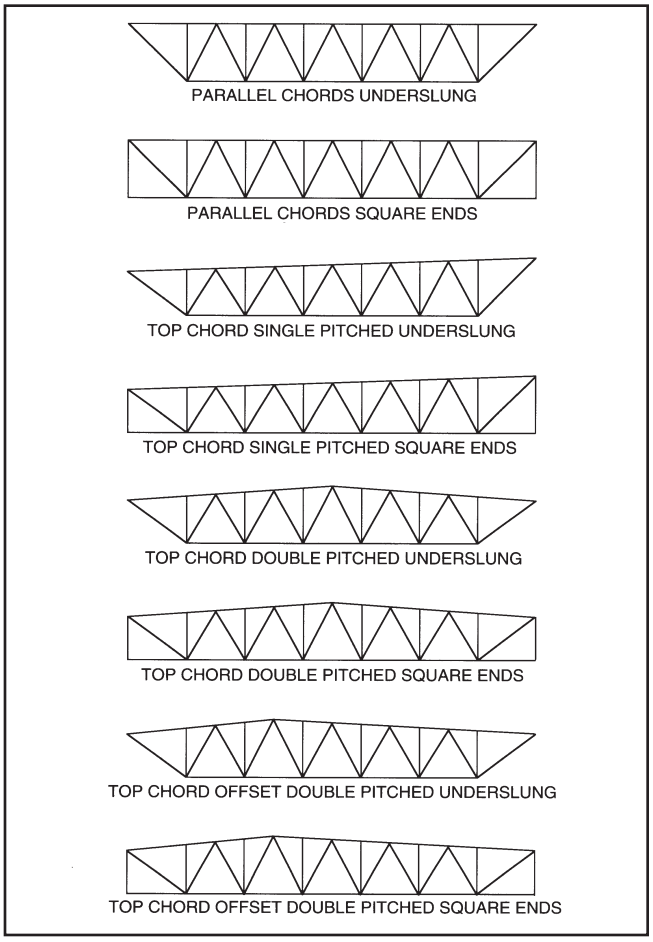
** Size required due to requirements as indicated for bolted diagonal bridging connections per SJI Specifications Section 104.5(e). Minimum A307 Bolt required for connection.

STANDARD TYPES

Longspan steel joists can be furnished with either underslung or square ends, with parallel chords or with single or double pitched top chords to provide sufficient slope for roof drainage.

The Longspan joist designation is determined by its nominal depth at the center of the span, except for offset double pitched joists, where the depth should be given at the ridge. A part of the designation should be either the section number or the total design load over the design live load (TL/LL given in plf).

All pitched joists will be cambered in addition to the pitch unless specified otherwise.



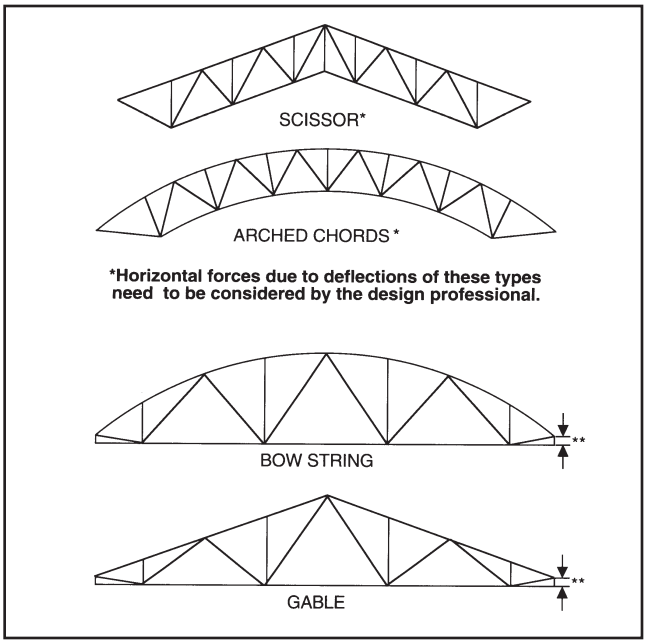
CAMBER

Non-Standard Types: The design professional shall provide on the structural drawings the amount of camber desired in inches. If camber is not specified, Vulcraft will use the camber values for LH and DLH joists based on top chord length.

Standard Types: The camber listed in the table will be fabricated into the joists unless the design professional specifically states otherwise on the structural drawings.

NON-STANDARD TYPES

The following joists can also be supplied by Vulcraft, however, **THE DISTRICT SALES OFFICE OR MANUFACTURING FACILITY NEAREST YOU SHOULD BE CONTACTED FOR ANY LIMITATIONS IN DEPTH OR LENGTH.**



**Contact Vulcraft for minimum depth at ends.

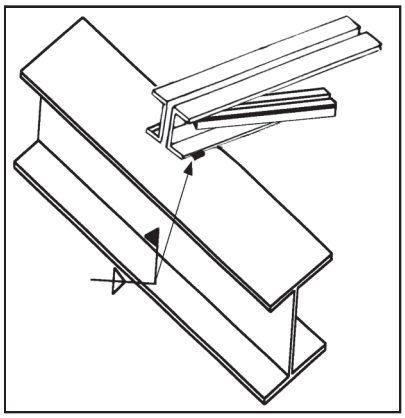
CAMBER FOR STANDARD TYPES

LH &DLH series joists shall have camber in accordance with the following table:***

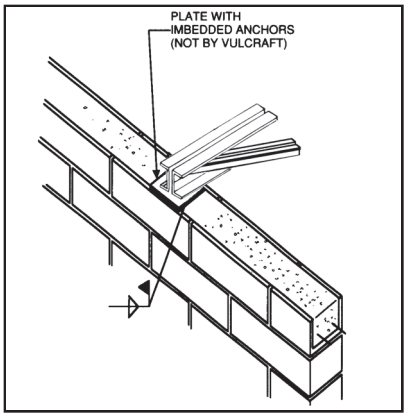
Top Chord Length		Approx. Camber	
20'-0"	(6096 mm)	1/4"	(6 mm)
30'-0"	(9144 mm)	3/8"	(10 mm)
40'-0"	(12192 mm)	5/8"	(16 mm)
50'-0"	(15240 mm)	1"	(25 mm)
60'-0"	(18288 mm)	1 1/2"	(38 mm)
70'-0"	(21336 mm)	2"	(51 mm)
80'-0"	(24384 mm)	2 3/4"	(70 mm)
90'-0"	(27432 mm)	3 1/2"	(89 mm)
100'-0"	(30480 mm)	4 1/4"	(108 mm)
110'-0"	(33528 mm)	5"	(127 mm)
120'-0"	(36576 mm)	6"	(152 mm)
130'-0"	(39621 mm)	7"	(178 mm)
140'-0"	(42672 mm)	8"	(203 mm)
144'-0"	(43890 mm)	8 1/2"	(216 mm)

*** NOTE: If full camber is not desired near walls or other structural members please note on the structural drawings.

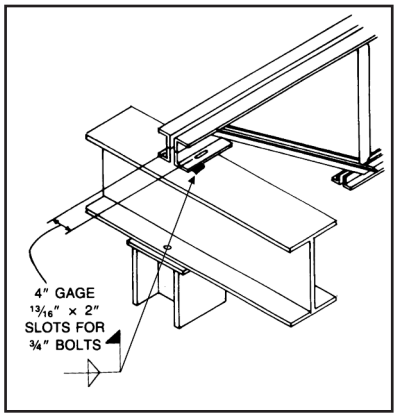
LH & DLH SERIES LONGSPAN STEEL JOISTS



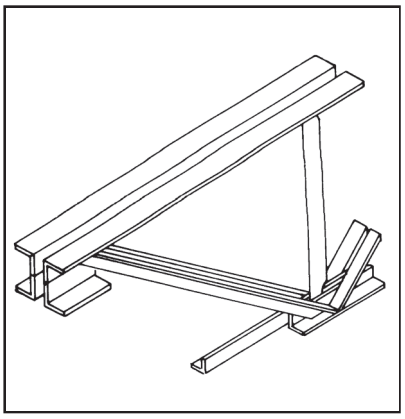
ANCHORAGE TO STEEL
SEE SJI SPECIFICATION
104.4 (b) AND 104.7 (b)



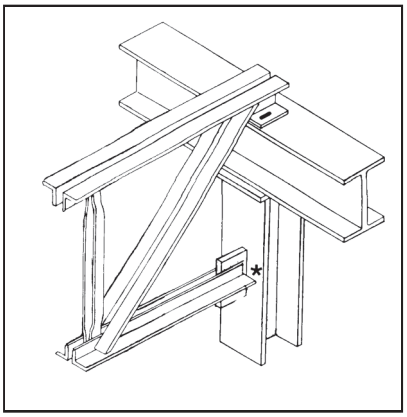
ANCHORAGE TO MASONRY
SEE SJI SPECIFICATION
104.4 (a) AND 104.7 (a)



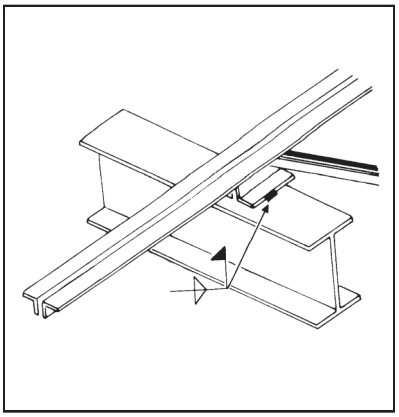
BOLTED CONNECTION
See Note (c)
Typically required at columns



CEILING EXTENSION



BOTTOM CHORD EXTENSION
*If bottom chord extension is to be bolted or welded the specifiying professional must provide axial loads on structural drawings.



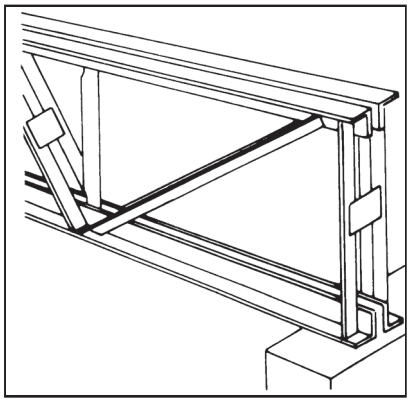
TOP CHORD EXTENSION
See Note (a)

(a) Extended top chords or full depth cantilever ends require the special attention of the specifying professional.
The magnitude and location of the design loads to be supported, the deflection requirements, and the proper bracing shall be clearly indicated on the structural drawings.

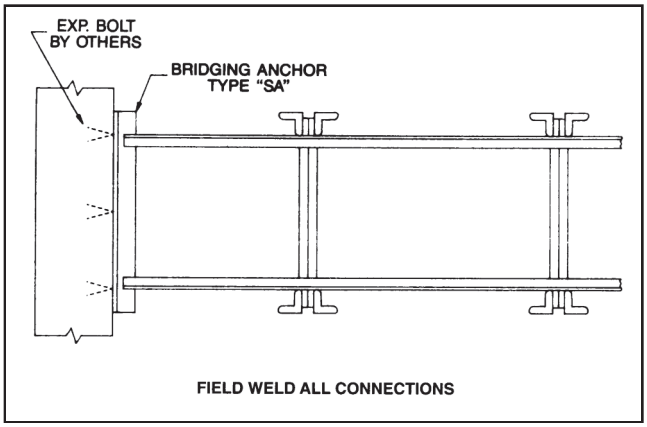
(b) See SJI Specification - Section 105 for Handling and Erection of LH and DLH joists.

(c) The Occupational Safety and Health Administration Standards (OSHA), Paragraph 1910.12 refers to Paragraph 1518.751 of "Construction Standards" which states:
"In steel framing, where bar joists are utilized, and columns are not framed in at least two directions with structural steel members, a bar joist shall be field-bolted at columns to provide lateral stability during construction."

NOTE: Configurations may vary from that shown.



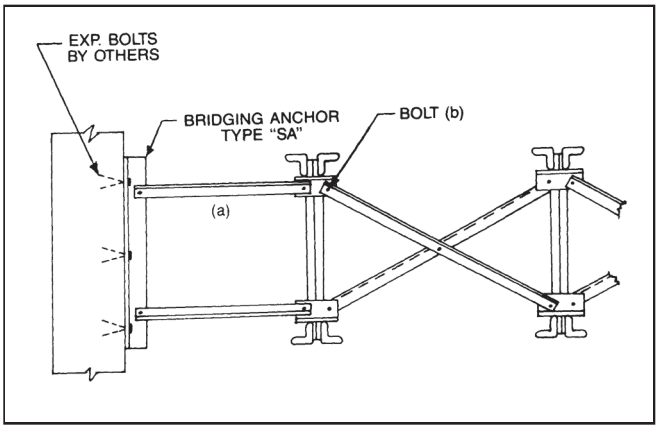
SQUARE END
See SJI Specification 104.5 (f).
Cross bridging required at end of bottom bearing joist.



HORIZONTAL BRIDGING

For the proper use of horizontal bridging refer to sections 104.5(a) and 105.

NOTE: Do not weld bridging to web members. Do not hang any mechanical, electrical, etc. from bridging.



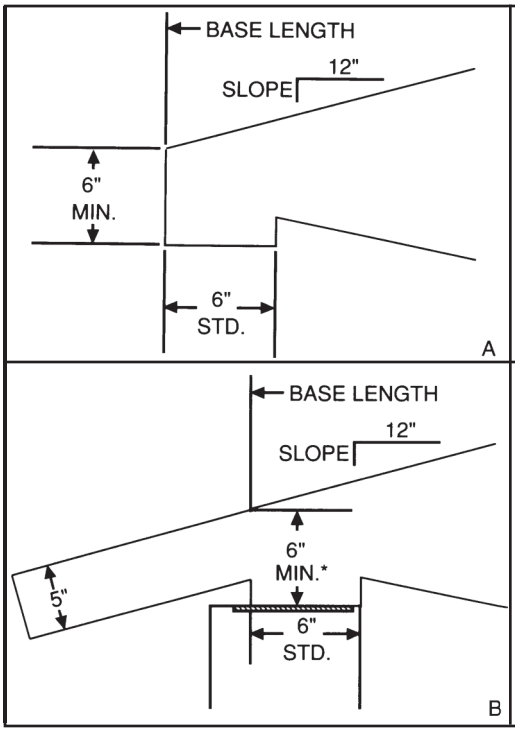
CROSS BRIDGING

(a) Horizontal Bridging units shall be used in the space adjacent to the wall to allow for proper deflection of the joist nearest the wall.

(b) For required bolt size refer to bridging table on page 136. NOTE: Clip configuration may vary from that shown.

LH & DLH SERIES OPEN WEB STEEL JOISTS SLOPED SEAT REQUIREMENTS

LOW END **HIGH END**



SLOPE RATE	HIGH END MINIMUM **SEAT DEPTH d
1/4:12	6 1/2"
3/8:12	6 1/2"
1/2:12	6 1/2"
1:12	6 1/2"
1 1/2:12	7"
2:12	7"
2 1/2:12	7 1/2"
3:12	7 1/2"
3 1/2:12	8"
4:12	8 1/2"
4 1/2:12	8 1/2"
5:12	9 1/2"
6:12 & OVER SEE BELOW	

* 7 1/2" at 18 and 19 chord section numbers. Consult Vulcraft for information when TCX's are present.
** Add 2 1/2" to seat depths at 18 and 19 chord section numbers.

NOTES:
(1) Depths shown are the minimums required for fabrication of sloped bearing seats.
(2) $d = 5/8 + 5 / \cos\theta + 6 \tan\theta$
(3) Clearance must be checked at outer edge of support as shown in detail B. Increase bearing depth as required to permit passage of 5" deep extension.
(4) If extension depth greater than 5" is required (see detail B and D) increase bearing depths accordingly.

NOTES

HIGH STRENGTH

ECONOMICAL

DESIGN – Vulcraft LH & DLH Series long span steel joists are designed in accordance with the specifications of the Steel Joist Institute.

ACCESSORIES see page 45.

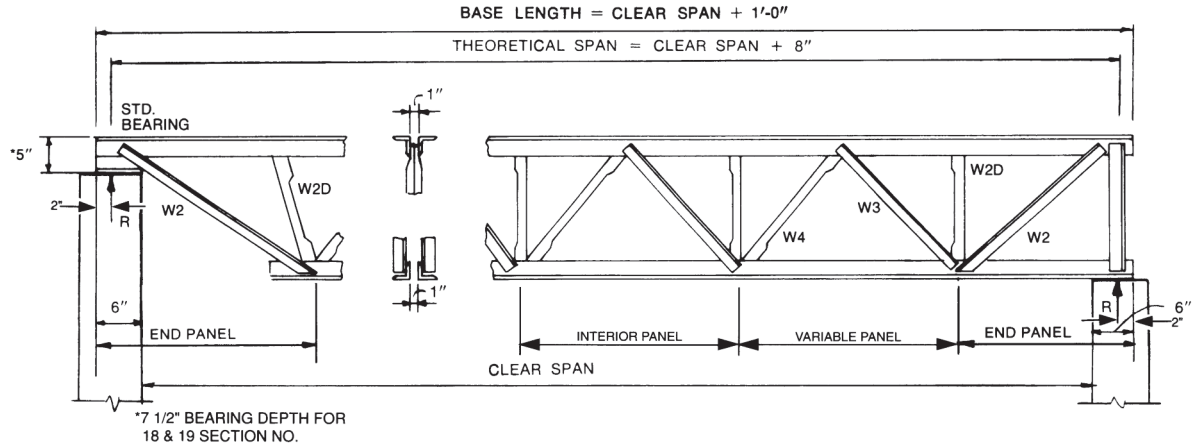
ROOF SPANS TO 144'-0

FLOOR SPANS TO 120'-0

PAINT – Vulcraft joists receive a shop-coat of rust inhibitive primer whose performance characteristics conform to those of the Steel Joist Institute specification 102.4.

SPECIFICATIONS see page 50.

LH & DLH SERIES DETAILS



MAXIMUM JOIST SPACING FOR DIAGONAL BRIDGING					
BRIDGING ANGLE SIZE-EQUAL LEG ANGLES					
JOIST DEPTH	1x7/64 (25mm x 3mm) r =.20"	1-1/4x7/64 (32mm x 3mm) r =.25"	1-1/2x7/64 (38mm x 3mm) r =.30"	1-3/4x7/64 (45mm x 3mm) r =.35"	2x1/8 (51mm x 3mm) r =.40"
32	6'-1"(1854mm)	7'-10"(2387mm)	9'-7"(2921mm)	11'-4"(3454mm)	13'-0"(3962mm)
36		7'-9"(2362mm)	9'-6"(2895 mm)	11'-3"(3429mm)	12'-11"(3973mm)
40		7'-7"(2311mm)	9'-5"(2870 mm)	11'-2"(3403mm)	12'-10"(3911mm)
44		7'-5"(2260mm)	9'-3"(2819 mm)	11'-0"(3352mm)	12'-9"(3886mm)
48		7'-3"(2209mm)	9'-2"(2794 mm)	10'-11"(3327mm)	12'-8"(3860mm)
52			9'-0"(2743 mm)	10'-9"(3276mm)	12'-7"(3835mm)
56			8'-10"(2692 mm)	10'-8"(3251mm)	12'-5"(3784mm)
60			8'-7"(2616 mm)	10'-6"(3200mm)	12'-4"(3759mm)
64			8'-5"(2565 mm)	10'-4"(3149mm)	12'-2"(3708mm)
68			8'-2"(2489 mm)	10'-2"(3098mm)	12'-0"(3657mm)
72			8'-0"(2438 mm)	10'-0"(3048mm)	11'-10"(3606mm)

MAXIMUM JOIST SPACING FOR HORIZONTAL BRIDGING SPANS OVER 60' REQUIRE BOLTED DIAGONAL BRIDGING						
BRIDGING ANGLE SIZE-EQUAL LEG ANGLES						
SECTION NUMBER*	1x7/64 (25mm x 3mm) r = .20"	1-1/4x7/64 (32mm x 3mm) r = .25"	1-1/2x7/64 (38mm x 3mm) r = .30"	1-3/4x7/64 (45mm x 3mm) r = .35"	2x1/8 (51mm x 3mm) r = .40"	2-1/2x5/32 (64mm x 4mm) r = .50"
02, 03, 04	4'-7"(1397mm)	6'-3"(1905mm)	7'-6"(2286mm)	8'-9"(2667mm)	10'-0"(3048mm)	12'-4"(3759mm)
05 - 06	4'-1"(1245mm)	5'-9"(1753mm)	7'-6"(2286mm)	8'-9"(2667mm)	10'-0"(3048mm)	12'-4"(3759mm)
07 - 08	3'-9"(1143mm)	5'-1"(1549mm)	6'-8"(2032mm)	8'-6"(2590mm)	10'-0"(3048mm)	12'-4"(3759mm)
09 - 10		4'-6"(1372mm)	6'-0"(1829mm)	7'-8"(2337mm)	10'-0"(3048mm)	12'-4"(3759mm)
11 - 12		4'-1"(1245mm)	5'-5"(1651mm)	6'-10"(2083mm)	8'-11"(2718mm)	12'-4"(3759mm)
13 - 14		3'-9"(1143mm)	4'-11"(1499mm)	6'-3"(1905mm)	8'-2"(2489mm)	12'-4"(3759mm)
15 - 16			4'-3"(1295mm)	5'-5"(1651mm)	7'-1"(2159mm)	11'-0"(3353mm)
17			4'-0"(1219mm)	5'-1"(1549mm)	6'-8"(2032mm)	10'-5"(3175mm)

*REFER TO THE LAST DIGITS OF JOIST DESIGNATION CONNECTION TO JOIST MUST RESIST FORCES LISTED IN TABLE 104.5.1.

LH & DLH TABLE MINIMUM BEARING LENGTHS			
Joist Type	On Masonry	On Concrete	On Steel
LH 02 thru 17 DLH 10 thru 19	6"	6"	4"
MINIMUM BEARING PLATE WIDTHS			
LH 02 thru LH 12 DLH 10 thru DLH 12	9"	9"	
LH 13 thru LH 17 DLH 13 thru DLH 19	12"	12"	

SECTION NUMBER*	MAX. SPACING OF LINES OF BRIDGING	HORIZONTAL BRACING FORCE**	
		lbs.	(N)
02, 03, 04	11'-0" (3352mm)	400	(1779)
05 - 06	12'-0" (3657mm)	500	(2224)
07 - 08	13'-0" (3962mm)	650	(2891)
09 - 10	14'-0" (4267mm)	800	(3558)
11 - 12	16'-0" (4876mm)	1000	(4448)
13 - 14	16'-0" (4876mm)	1200	(5337)
15 - 16	21'-0" (6400mm)	1600	(7117)
17	21'-0' (6400mm)	1800	(8006)
18 - 19	26'-0" (7924mm)	2000	(8896)

NUMBER OF LINES OF BRIDGING BASED ON CLEAR SPAN.
*LAST TWO DIGITS OF JOIST DESIGNATION.
**NOMINAL BRACING FORCE IS UNFACTORED.

MIN. A307 BOLT REQ'D FOR CONNECTION		
SERIES	SECTION NUMBER*	A307 BOLT DIAMETER
LH/DLH	2 - 12	3/8" (9mm)
LH/DLH	13 - 17	1/2" (12mm)
DLH	18 & 19	5/8" (15mm)

*LAST TWO DIGITS OF JOIST DESIGNATION.

NOTES:1. Special designed LH and DLH can be supplied in longer lengths. See SLH Series Page 73.

2. Additional bridging may be required when joists support standing seam roof decks. The specifying professional should require that the joist manufacturer check the system and provide bridging as required to adequately brace the joists against lateral movement. For bridging requirements due to uplift pressures refer to sect. 104.12.

STANDARD SPECIFICATIONS
FOR LONGSPAN STEEL JOISTS, LH-SERIES AND DEEP LONGSPAN STEEL JOISTS, DLH-SERIES

Adopted by the Steel Joist Institute February 15, 1978
Revised to November 10, 2003 - Effective March 01, 2005

SECTION 100.
SCOPE

This specification covers the design, manufacture and use of Longspan Steel Joists **LH-**Series, and Deep Longspan Steel Joists, **DLH-**Series. Load and Resistance Factor Design (LRFD) and Allowable Strength Design (ASD) are included in this specification.

SECTION 101.
DEFINITION

The term "Longspan Steel Joists **LH-**Series and Deep Longspan Steel Joists **DLH-**Series", as used herein, refers to open web, load-carrying members utilizing hot-rolled or cold-formed steel, including cold-formed steel whose yield strength* has been attained by cold working. **LH-**Series are suitable for the direct support of floors and roof decks in buildings, and **DLH-**Series are suitable for direct support of roof decks in buildings.

The design of **LH-** and **DLH-**Series joist chord and web sections shall be based on a yield strength of at least 36 ksi (250 MPa), but not greater than 50 ksi (345 MPa). Steel used for **LH-** and **DLH-**Series joist chord or web sections shall have a minimum yield strength determined in accordance with one of the procedures specified in Section 102.2, which is equal to the yield strength assumed in the design. **LH-** and **DLH-**Series Joists shall be designed in accordance with these specifications to support the loads given in the Standard Load Tables for Longspan and Deep Longspan Steel Joists, **LH-** and **DLH-**Series, attached hereto.

* The term "Yield Strength" as used herein shall designate the yield level of a material as determined by the applicable method outlined in paragraph 13.1, "Yield Point" and in paragraph 13.2, "Yield Strength", of ASTM Standard A370, "*Standard Test Methods and Definitions for Mechanical Testing of Steel Products",* or as specified in Section 102.2 of this Specification.

SECTION 102.
MATERIALS

102.1 STEEL

The steel used in the manufacture of chord and web sections shall conform to one of the following ASTM Specifications:

- Carbon Structural Steel, ASTM A36/A36M.
- High-Strength, Low-Alloy Structural Steel, ASTM A242/A242M.
- High-Strength Carbon-Manganese Steel of Structural Quality ASTM A529/A529M, Grade 50.
- High-Strength Low-Alloy Columbium-Vanadium Structural Steel, ASTM A572/A572M Grade 42 or 50.
- High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 inches (100 mm) Thick, ASTM A588/A588M.
- Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Corrosion Resistance, ASTM A606.
- Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, ASTM A1008/A1008M
- Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, ASTM A1011/A1011M

or shall be of suitable quality ordered or produced to other than the listed specifications, provided that such material in the state used for final assembly and manufacture is weldable and is proved by tests performed by the producer or manufacturer to have the properties specified in Section 102.2.

102.2 MECHANICAL PROPERTIES

The yield strength used as a basis for the design stresses prescribed in Section 103 shall be at least 36 ksi (250 MPa), but shall not be greater than 50 ksi (345 MPa). Evidence that the steel furnished meets or exceeds the design yield strength shall, if requested, be provided in the form of an affidavit or by witnessed or certified test reports.

For material used without consideration of increase in yield strength resulting from cold forming, the specimens shall be taken from as-rolled material. In the case of material, the mechanical properties of which conform to the requirements of one of the listed specifications, the test specimens and

procedures shall conform to those of such specifications and to ASTM A370.

In the case of material, the mechanical properties of which do not conform to the requirements of one of the listed specifications, the test specimens and procedures shall conform to the applicable requirements of ASTM A370, and the specimens shall exhibit a yield strength equal to or exceeding the design yield strength and an elongation of not less than (a) 20 percent in 2 inches (51 millimeters) for sheet and strip, or (b) 18 percent in 8 inches (203 millimeters) for plates, shapes and bars with adjustments for thickness for plates, shapes and bars as prescribed in ASTM A36/A36M, A242/A242M, A529/A529M, A572/A572M, A588/A588M, whichever specification is applicable on the basis of design yield strength.

The number of tests shall be as prescribed in ASTM A6/A6M for plates, shapes, and bars; and ASTM A606, A1008/A1008M and A1011/A1011M for sheet and strip.

If as-formed strength is utilized, the test reports shall show the results of tests performed on full section specimens in accordance with the provisions of the AISI North American Specification for the Design of Cold-Formed Steel Structural Members. They shall also indicate compliance with these provisions and with the following additional requirements:

a) The yield strength calculated from the test data shall equal or exceed the design yield strength.

b) Where tension tests are made for acceptance and control purposes, the tensile strength shall be at least 6 percent greater than the yield strength of the section.

c) Where compression tests are used for acceptance and control purposes, the specimen shall withstand a gross shortening of 2 percent of its original length without cracking. The length of the specimen shall be not greater than 20 times its least radius of gyration.

d) If any test specimen fails to pass the requirements of subparagraphs (a), (b), or (c) above, as applicable, two retests shall be made of specimens from the same lot. Failure of one of the retest specimens to meet such requirements shall be the cause for rejection of the lot represented by the specimens.

102.3 WELDING ELECTRODES

The following electrodes shall be used for arc welding:

a) For connected members both having a specified yield strength greater than 36 ksi (250 MPa).

AWS A5.1: E70XX
AWS A5.5: E70XX-X
AWS A5.17: F7XX-EXXX, F7XX-ECXXX flux electrode combination
AWS A5.18: ER70S-X, E70C-XC, E70C-XM
AWS A5.20: E7XT-X, E7XT-XM
AWS A5.23: F7XX-EXXX-XX, F7XX-ECXXX-XX
AWS A5.28: ER70S-XXX, E70C-XXX
AWS A5.29: E7XTX-X, E7XTX-XM

b) For connected members both having a specified minimum yield strength of 36 ksi (250 MPa) or one having a specified minimum yield strength of 36 ksi (250 MPa), and the other having a specified minimum yield strength greater than 36 ksi (250 MPa).

AWS A5.1: E60XX
AWS A5.17: F6XX-EXXX, F6XX-ECXXX flux electrode combination
AWS A5.20: E6XT-X, E6XT-XM
AWS A5.29: E6XTX-X, E6XT-XM
or any of those listed in Section 102.3(a).

Other welding methods, providing equivalent strength as demonstrated by tests, may be used.

102.4 PAINT

The standard shop paint is intended to protect the steel for only a short period of exposure in ordinary atmospheric conditions and shall be considered an impermanent and provisional coating.

When specified, the standard shop paint shall conform to one of the following:

a) Steel Structures Painting Council Specification, SSPC No. 15

b) Or, shall be a shop paint which meets the minimum performance requirements of the above listed specification.

SECTION 103.
DESIGN AND MANUFACTURE

103.1 METHOD

Joists shall be designed in accordance with these specifications as simply supported, uniformly loaded trusses supporting a floor or roof deck so constructed as to brace the top chord of the joists against lateral buckling. Where any applicable design feature is not specifically covered herein, the design shall be in accordance with the following specifications:

a) Where the steel used consists of hot-rolled shapes, bars or plates, use the American Institute of Steel Construction, *Specification for Structural Steel Buildings*.

b) For members that are cold-formed from sheet or strip steel, use the American Iron and Steel Institute, *North American Specification for the Design of Cold-Formed Steel Structural Members*.

Design Basis:

Designs shall be made according to the provisions in this Specification for either Load and Resistance Factor Design (LRFD) or for Allowable Strength Design (ASD).

Load Combinations:

LRFD:

When load combinations are not specified to the joist manufacturer, the required stress shall be computed for the

factored loads based on the factors and load combinations as follows:

1.4D

1.2D + 1.6 (L, or L_r, or S, or R)

ASD:

When load combinations are not specified to the joist manufacturer, the required stress shall be computed based on the load combinations as follows:

D

D + (L, or L_r, or S, or R)

Where:

D = dead load due to the weight of the structural elements and the permanent features of the structure

L = live load due to occupancy and movable equipment

L_r = roof live load

S = snow load

R = load due to initial rainwater or ice exclusive of the ponding contribution

When special loads are specified and the specifying professional does not provide the load combinations, the provisions of ASCE 7, *"Minimum Design Loads for Buildings and Other Structures"* shall be used for LRFD and ASD load combinations.

103.2 DESIGN AND ALLOWABLE STRESSES

Design Using Load and Resistance Factor Design (LRFD)

Joists shall have their components so proportioned that the required stresses, f_u, shall not exceed ϕF_n where,

f_u	=	required stress	ksi (MPa)
F_n	=	nominal stress	ksi (MPa)
ϕ	=	resistance factor	
ϕF_n	=	design stress	

Design Using Allowable Strength Design (ASD)

Joists shall have their components so proportioned that the required stresses, f, shall not exceed F_n / Ω where,

f	=	required stress	ksi (MPa)
F_n	=	nominal stress	ksi (MPa)
Ω	=	safety factor	
F_n/Ω	=	allowable stress	

Stresses:

(a) Tension: $\phi_t = 0.90$ (LRFD) $\Omega_t = 1.67$ (ASD)

For Chords: $F_y = 50$ ksi (345 MPa)

For Webs: $F_y = 50$ ksi (345 MPa), or $F_y = 36$ ksi (250 MPa)

Design Stress = $0.9F_y$ (LRFD) (103.2-1)

Allowable Stress = $0.6F_y$ (ASD) (103.2-2)

(b) Compression: $\phi_c = 0.90$ (LRFD) $\Omega_c = 1.67$ (ASD)

For members with $\frac{K\ell}{r} \le 4.71\sqrt{\frac{E}{QF_y}}$

$$F_{cr} = Q\left[0.658^{\left(\frac{QF_y}{F_e}\right)}\right]F_y \qquad (103.2\text{-}3)$$

For members with $\frac{K\ell}{r} > 4.71\sqrt{\frac{E}{QF_y}}$

$$F_{cr} = 0.877F_e \qquad (103.2\text{-}4)$$

Where, F_e = elastic buckling stress determined in accordance with Equation 103.2-5.

$$F_e = \frac{\pi^2 E}{\left(\frac{K\ell}{r}\right)^2} \qquad (103.2\text{-}5)$$

For hot-rolled sections, "Q" is the full reduction factor for slender compression elements.

Design Stress = $0.9F_{cr}$ (LRFD) (103.2-6)

Allowable Stress = $0.6F_{cr}$ (ASD) (103.2-7)

In the above equations, ℓ is taken as the distance in inches (millimeters) between panel points for the chord members and the appropriate length for web members, and r is the corresponding least radius of gyration of the member or any component thereof. E is equal to 29,000 ksi (200,000 MPa).

Use $1.2\ell/r_x$ for a crimped, first primary compression web member when a moment-resistant weld group is not used for this member; where = r_x member radius of gyration in the plane of the joist.

For cold-formed sections the method of calculating the nominal column strength is given in the AISI, *North American Specification for the Design of Cold-Formed Steel Structural Members*.

(c) Bending: $\phi_b = 0.90$ (LRFD) $\Omega_b = 1.67$ (ASD)

Bending calculations are to be based on using the elastic section modulus.

For chords and web members other than solid rounds: $F_y = 50$ ksi (345 MPa)

Design Stress = $0.9F_y$ (LRFD) (103.2-8)

Allowable Stress = $0.6F_y$ (ASD) (103.2-9)

For web members of solid round cross section: $F_y = 50$ ksi (345 MPa), or $F_y = 36$ ksi (250 MPa)

Design Stress = $1.45F_y$ (LRFD) (103.2-10)

Allowable Stress = $0.95F_y$ (ASD) (103.2-11)

For bearing plates: $F_y = 50$ ksi (345MPa), or $F_y = 36$ ksi (250MPa)

Design Stress = $1.35F_y$ (LRFD) (103.2-12)

Allowable Stress = $0.9F_y$ (ASD) (103.2-13)

(d) Weld Strength:

Shear at throat of fillet welds:

Nominal Shear Stress = $F_{nw} = 0.6F_{exx}$ (103.2-14)

LRFD: $\phi_w = 0.75$

Design Shear Strength = $\phi R_n = \phi_w F_{nw} A = 0.45F_{exx} A$ (103.2-15)

ASD: $\Omega_w = 2.0$

Allowable Shear Strength = $R_n/\Omega_w = F_{nw}A/\Omega_w = 0.3F_{exx} A$ (103.2-16)

A = effective throat area

Made with E70 series electrodes or F7XX-EXXX flux-electrode combinations.....F_{exx} = 70 ksi (483 MPa)

Made with E60 series electrodes or F6XX-EXXX flux-electrode combinations.....F_{exx} = 60 ksi (414 MPa)

Tension or compression on groove or butt welds shall be the same as those specified for the connected material.

103.3 MAXIMUM SLENDERNESS RATIOS

The slenderness ratios, $1.0\ell/r$ and $1.0\ell_s/r$ of members as a whole or any component part shall not exceed the values given in Table 103.3-1, Parts A.

The effective slenderness ratio, $K\ell/r^*$, to be used in calculating the nominal stresses F_{cr} and F'_e, is the largest value as determined from Table 103.3-1, Parts B and C.

In compression members when fillers or ties are used, they shall be spaced so that the ℓ_s/r_z ratio of each component does not exceed the governing ℓ/r ratio of the member as a whole.

The terms used in Table 103.3-1 are defined as follows:

ℓ = Length center-to-center of panel points, except $\ell = 36$ in. (914 mm) for calculating ℓ/r_y of top chord member.

ℓ_s = maximum length center-to-center between panel point and filler (tie), or between adjacent fillers (ties).

r_x = member radius of gyration in the plane of the joist.

r_y = member radius of gyration out of the plane of the joist.

r_z = least radius of gyration of a member component.

* See P.N. Chod and T. V. Galambos, Compression Chords Without Fillers in Longspan Steel Joists, Research Report No. 36, June 1975 Structural Division, Civil Engineering Department, Washington University, St. Louis, MO.

TABLE 103.3-1
MAXIMUM AND EFFECTIVE SLENDERNESS RATIOS

I TOP CHORD INTERIOR PANEL

A. The slenderness ratios, 1.0 ℓ/r and 1.0 ℓ_s/r, of members as a whole or any component part shall not exceed 90.

B. *The effective slenderness ratio to determine* "F_{cr}"

1. With fillers or ties	0.75 ℓ/r_x	1.0 ℓ/r_y		1.0 ℓ_s/r_z
2. Without fillers or ties			0.75 ℓ/r_z	
3. Single component members	0.75 ℓ/r_x	1.0 ℓ/r_y		

C. *The effective slenderness ratio to determine* "F'_e"

1. With fillers or ties	0.75 ℓ/r_x
2. Without fillers or ties	0.75 ℓ/r_x
3. Single component members	0.75 ℓ/r_x

II TOP CHORD END PANEL

A. The slenderness ratios, 1.0 ℓ/r and 1.0 ℓ_s/r, of members as a whole or any component part shall not exceed 120.

B. *The effective slenderness ratio to determine* "F_{cr}"

1. With fillers or ties	1.0 ℓ/r_x	1.0 ℓ/r_y		1.0 ℓ_s/r_z
2. Without fillers or ties			1.0 ℓ/r_z	
3. Single component members	1.0 ℓ/r_x	1.0 ℓ/r_y		

C. *The effective slenderness ratio to determine* "F'_e"

1. With fillers or ties	1.0 ℓ/r_x
2. Without fillers or ties	1.0 ℓ/r_x
3. Single component members	1.0 ℓ/r_x

III TENSION MEMBERS - CHORDS AND WEBS

A. The slenderness ratios, 1.0 ℓ/r and 1.0 ℓ_s/r, of members as a whole or any component part shall not exceed 240.

IV COMPRESSION WEB MEMBERS

A. The slenderness ratios, 1.0 ℓ/r and 1.0 ℓ_s/r, of members as a whole or any component part shall not exceed 200.

B. *The effective slenderness ratio to determine* "F_{cr}"

1. With fillers or ties	0.75 ℓ/r_x	1.0 ℓ/r_y		1.0 ℓ_s/r_z
2. Without fillers or ties			1.0 ℓ/r_z	
3. Single component members	0.75 ℓ/r_x*	1.0 ℓ/r_y		

* Use 1.2 ℓ/r_x for a crimped, first primary compression web member when a moment-resistant weld group is not used for this member.

103.4 MEMBERS

(a) Chords

The bottom chord shall be designed as an axially loaded tension member.

The radius of gyration of the top chord about its vertical axis shall not be less than $\ell/170$ where ℓ is the spacing in inches (millimeters) between lines of bridging as specified in Section 104.5(d)

The top chord shall be considered as stayed laterally by the floor slab or roof deck provided the requirements of Section 104.9(e) of this specification are met.

The top chord shall be designed as a continuous member subject to combined axial and bending stresses and shall be so proportioned that

For LRFD:

at the panel point:

$$f_{au} + f_{bu} \le 0.9F_y \qquad (103.4\text{-}1)$$

at the mid panel: for $\dfrac{f_{au}}{\phi_c F_{cr}} \ge 0.2$,

$$\frac{f_{au}}{\phi_c F_{cr}} + \frac{8}{9}\left[\frac{C_m f_{bu}}{\left[1-\left(\dfrac{f_{au}}{\phi_c F'_e}\right)\right] Q\phi_b F_y}\right] \le 1.0 \qquad (103.4\text{-}2)$$

for $\dfrac{f_{au}}{\phi_c F_{cr}} < 0.2$,

$$\left(\frac{f_{au}}{2\phi_c F_{cr}}\right) + \left[\frac{C_m f_{bu}}{\left[1-\left(\dfrac{f_{au}}{\phi_c F'_e}\right)\right] Q\phi_b F_y}\right] \le 1.0 \qquad (103.4\text{-}3)$$

$f_{au} = P_u/A$ = Required compressive stress, ksi (MPa)

P_u = Required axial strength using LRFD load combinations, kips (N)

$f_{bu} = M_u/S$ = Required bending stress at the location under consideration, ksi (MPa)

M_u = Required flexural strength using LRFD load combinations, kip-in. (N-mm)

S = Elastic Section Modulus, in.^{3} (mm^3)

F_{cr} = Nominal axial compressive stress in ksi (MPa) based on ℓ/r as defined in Section 103.2(b)

$C_m = 1 - 0.3\, f_{au}/\phi F'_e$ for end panels

$C_m = 1 - 0.4\, f_{au}/\phi F'_e$ for interior panels

F_y = Specified minimum yield strength, ksi (MPa)

$F'_e = \dfrac{\pi^2 E}{\left(K\ell/r_x\right)^2}$, ksi (MPa)

Where ℓ is the panel length,in inches (millimeters), as defined in Section 103.2(b) and r_x is the radius of gyration about the axis of bending.

Q = Form factor defined in Section 103.2(b)

A = Area of the top chord, in.^{2}, (mm^2)

For ASD:

at the panel point:

$$f_a + f_b \le 0.6F_y \qquad (103.4\text{-}4)$$

at the mid panel: for $\dfrac{f_a}{F_a} \ge 0.2$,

$$\frac{f_a}{F_a} + \frac{8}{9}\left[\frac{C_m f_b}{\left[1-\left(\dfrac{1.67f_a}{F'_e}\right)\right] QF_b}\right] \le 1.0 \qquad (103.4\text{-}5)$$

for $\dfrac{f_a}{F_a} < 0.2$,

$$\left(\frac{f_a}{2F_a}\right) + \left[\frac{C_m f_b}{\left[1-\left(\dfrac{1.67f_a}{F'_e}\right)\right] QF_b}\right] \le 1.0 \qquad (103.4\text{-}6)$$

$f_a = P/A$ = Required compressive stress, ksi (MPa)

P = Required axial strength using ASD load combinations, kips (N)

$f_b = M/S$ = Required bending stress at the location under consideration, ksi (MPa)

M = Required flexural strength using ASD load combinations, kip-in. (N-mm)

S = Elastic Section Modulus, in.^{3} (mm^3)

F_a = Allowable axial compressive stress, based on ℓ/r as defined in Section 103.2(b), ksi (MPa)

F_b = Allowable bending stress; $0.6F_y$, ksi (MPa)

$C_m = 1 - 0.50\, f_a/F'_e$ for end panels

$C_m = 1 - 0.67\, f_a/F'_e$ for interior panels

(b) Web

The vertical shears to be used in the design of the web members shall be determined from full uniform loading, but such vertical shears shall be not less than 25 percent of the end reaction.

Interior vertical web members used in modified Warren type web systems shall be designed to resist the gravity loads supported by the member plus an additional axial load of 1/2 of 1.0 percent of the top chord axial force.

(c) Depth

Joists may have either parallel chords or a top chord slope of 1/8 inch per foot (1:96). The depth, for the purpose of design, in all cases shall be the depth at mid-span.

(d) Eccentricity

Members connected at a joint shall have their center of gravity lines meet at a point, if practical. Eccentricity on either side of the neutral axis of chord members may be neglected when it does not exceed the distance between the neutral axis and the back of the chord. Otherwise, provision shall be made for the stresses due to eccentricity. Ends of joists shall be proportioned to resist bending produced by eccentricity at the support.

In those cases where a single angle compression member is attached to the outside of the stem of a tee or double angle chord, due consideration shall be given to eccentricity.

(e) Extended Ends

Extended top chords or full depth cantilever ends require the special attention of the specifying professional. The magnitude and location of the loads to be supported, deflection requirements, and proper bracing shall be clearly indicated on the structural drawings.

103.5 CONNECTIONS

(a) Methods

Joist connections and splices shall be made by attaching the members to one another by arc or resistance welding or other accredited methods.

(1) Welded Connections

a) Selected welds shall be inspected visually by the manufacturer. Prior to this inspection, weld slag shall be removed.

b) Cracks are not acceptable and shall be repaired.

c) Thorough fusion shall exist between layers of weld metal and between weld metal and base metal for the required design length of the weld; such fusion shall be verified by visual inspection.

d) Unfilled weld craters shall not be included in the design length of the weld.

e) Undercut shall not exceed 1/16 inch (2 millimeters) for welds oriented parallel to the principal stress.

f) The sum of surface (piping) porosity diameters shall not exceed 1/16 inch (2 millimeters) in any 1 inch (25 millimeters) of design weld length.

g) Weld spatter that does not interfere with paint coverage is acceptable.

(2) Welding Program

Manufacturers shall have a program for establishing weld procedures and operator qualification, and for weld sampling and testing.

(3) Weld Inspection by Outside Agencies (See Section 104.13 of this specification).

The agency shall arrange for visual inspection to determine that welds meet the acceptance standards of Section 103.5(a)(1). Ultrasonic, X-Ray, and magnetic particle testing are inappropriate for joists due to the configurations of the components and welds.

(b) Strength

(1) Joint Connections – Joint connections shall develop the maximum force due to any of the design loads, but not less than 50 percent of the strength of the member in tension or compression, whichever force is the controlling factor in the selection of the member.

(2) Shop Splices - Shop splices may occur at any point in chord or web members. Splices shall be designed for the member force but not less than 50 percent of the member strength. Members containing a butt weld splice shall develop an ultimate tensile force of at least 57 ksi (393 MPa) times the full design area of the chord or web. The term “member” shall be defined as all component parts comprising the chord or web, at the point of splice.

(c) Field Splices

Field Splices shall be designed by the manufacturer and may be either bolted or welded. Splices shall be designed for the member force, but not less than 50 percent of the member strength.

103.6 CAMBER

Joists shall have approximate cambers in accordance with the following:

TABLE 103.6-1

Top Chord Length		Approximate Camber	
20'-0"	(6096 mm)	1/4"	(6 mm)
30'-0"	(9144 mm)	3/8"	(10 mm)
40'-0"	(12192 mm)	5/8"	(16 mm)
50'-0"	(15240 mm)	1"	(25 mm)
60'-0"	(18288 mm)	1 1/2"	(38 mm)
70'-0"	(21336 mm)	2"	(51 mm)
80'-0"	(24384 mm)	2 3/4"	(70 mm)
90'-0"	(27432 mm)	3 1/2"	(89 mm)
100'-0"	(30480 mm)	4 1/4"	(108 mm)
110'-0"	(33528 mm)	5"	(127 mm)
120'-0"	(36576 mm)	6"	(152 mm)
130'-0"	(39621 mm)	7"	(178 mm)
140'-0"	(42672 mm)	8"	(203 mm)
144'-0"	(43890 mm)	8 1/2"	(216 mm)

The specifying professional shall give consideration to coordinating joist camber with adjacent framing.

103.7 VERIFICATION OF DESIGN AND MANUFACTURE

(a) Design Calculations

Companies manufacturing any **LH-** or **DLH-**Series Joists shall submit design data to the Steel Joist Institute (or an independent agency approved by the Steel Joist Institute) for verification of compliance with the SJI Specifications.

(b) In-Plant Inspections

Each manufacturer shall verify their ability to manufacture **LH-** and **DLH-**Series Joists through periodic In-Plant Inspections. Inspections shall be performed by an independent agency approved by the Steel Joist Institute. The frequency, manner of inspection, and manner of reporting shall be determined by the Steel Joist Institute. The plant inspections are not a guarantee of the quality of any specific joists; this responsibility lies fully and solely with the individual manufacturer.

SECTION 104.
APPLICATION

104.1 USAGE

This specification shall apply to any type of structure where floors and roofs are to be supported directly by steel joists installed as hereinafter specified. Where joists are used other than on simple spans under uniformly distributed loading as prescribed in Section 103.1, they shall be investigated and modified if necessary to limit the required stresses to those listed in Section 103.2.

CAUTION: If a rigid connection of the bottom chord is to be made to a column or other support, it shall be made only after the application of the dead loads. The joist is then no longer simply supported, and the system must be investigated for continuous frame action by the specifying professional.

The designed detail of a rigid type connection and moment plates shall be shown on the structural drawings by the specifying professional. The moment plates shall be furnished by other than the joist manufacturer.

104.2 SPAN

The clear span of a joist shall not exceed 24 times its depth. The term “Span” as used herein is defined as the clear span plus 8 inches (203 millimeters).

104.3 DEPTH

The nominal depth of sloping chord joists shall be the depth at mid-span. The standard slope of the top chord shall be 1/8 inch per foot (1:96).

104.4 END SUPPORTS

(a) Masonry and Concrete

LH- and **DLH-**Series Joists supported by masonry or concrete are to bear on steel bearing plates and shall be designed as steel bearing. Due consideration of the end reactions and all other vertical and lateral forces shall be taken by the specifying professional in the design of the steel bearing plate and the masonry or concrete. The ends of **LH-** and **DLH-**Series Joists shall extend a distance of not less than 6 inches (152 millimeters) over the masonry or concrete support and be anchored to the steel bearing plate. The plate shall be located not more than 1/2 inch (13 millimeters) from the face of the wall and shall be not less than 9 inches (229 millimeters) wide perpendicular to the length of the joist. The plate is to be designed by the specifying professional and shall be furnished by other than the joist manufacturer.

Where it is deemed necessary to bear less than 6 inches (152 millimeters) over the masonry or concrete support, special consideration is to be given to the design of the steel bearing plate and the masonry or concrete by the specifying professional. The joists must bear a minimum 4 inches (102 millimeters) on the steel bearing plate.

(b) Steel

Due consideration of the end reactions and all other vertical and lateral forces shall be taken by the specifying professional in the design of the steel support.

The ends of **LH-** or **DLH-**Series Joists shall extend a distance of not less than 4 inches (102 millimeters) over the steel supports. Where it is deemed necessary to butt opposite joists over a narrow steel support with bearing less than that noted above, special ends must be specified, and such ends shall have positive attachment to the support, either by bolting or welding.

104.5 BRIDGING

Top and bottom chord bridging is required and shall consist of one or both of the following types.

(a) Horizontal

Horizontal bridging lines shall consist of continuous horizontal steel members. The ℓ/r of the bridging member shall not exceed 300, where ℓ is the distance in inches (millimeters) between attachments and r is the least radius of gyration of the bridging member.

(b) Diagonal

Diagonal bridging shall consist of cross-bracing with a ℓ/r ratio of not more than 200, where ℓ is the distance in inches (millimeters) between connections, and r is the least radius of gyration of the bridging member. Where cross-bracing members are connected at their point of intersection, the ℓ distance shall be taken as the distance in inches (millimeters) between connections at the point of intersection of the bridging members and the connections to the chord of the joists.

(c) Bridging Lines

For spans up through 60 feet (18288 mm), welded horizontal bridging may be used except where the row of bridging near-

est the center is required to be bolted diagonal bridging as indicated by the **Red** shaded area in the Load Table. For spans over 60 feet (18288 mm) bolted diagonal bridging shall be used as indicated by the **Blue** and **Gray** shaded areas of the Load Table.

(d) Quantity and Spacing

The maximum spacing of lines of top chord bridging shall not exceed the values in Table 104.5-1. The number of rows of bottom chord bridging, including bridging required per Section 104.12, shall not be less than the number of top chord rows. Rows of bottom chord bridging are permitted to be spaced independently of rows of top chord bridging. The spacing of rows of bottom chord bridging shall meet the slenderness requirement of Section 103.4(a) and any specified strength requirements.

Table 104.5-1

LH-DLH SECTION* NUMBER	MAX. SPACING OF LINES OF TOP CHORD BRIDGING	NOMINAL** HORIZONTAL BRACING FORCE	
		lbs	(N)
02,03,04	11'-0" (3352 mm)	400	(1779)
05,06	12'-0" (3657 mm)	500	(2224)
07,08	13'-0" (3962 mm)	650	(2891)
09,10	14'-0" (4267 mm)	800	(3558)
11,12	16'-0" (4876 mm)	1000	(4448)
13,14	16'-0" (4876 mm)	1200	(5337)
15,16	21'-0" (6400 mm)	1600	(7117)
17	21'-0" (6400 mm)	1800	(8006)
18,19	26'-0" (7924 mm)	2000	(8896)

Number of lines of bridging is based on joist clear span dimensions.
* Last two digits of joist designation shown in load table.
** Nominal bracing force is unfactored.

(e) Connections

Connections to the chords of the steel joists shall be made by positive mechanical means or by welding, and capable of resisting a horizontal force not less than that specified in Table 104.5-1.

(f) Bottom Chord Bearing Joists

Where bottom chord bearing joists are utilized, a row of diagonal bridging shall be provided near the support(s). This bridging shall be installed and anchored before the hoisting cable(s) is released.

104.6 INSTALLATION OF BRIDGING

Bridging shall support the top and bottom chords against lateral movement during the construction period and shall hold the steel joists in the approximate position as shown on the joist placement plans.

The ends of all bridging lines terminating at walls or beams shall be anchored to resist the nominal force shown in Table 104.5-1.

104.7 END ANCHORAGE

(a) Masonry and Concrete

Ends of **LH-** and **DLH-**Series Joists resting on steel bearing plates on masonry or structural concrete shall be attached thereto with a minimum of two 1/4 inch (6 millimeters) fillet welds 2 inches (51 millimeters) long, or with two 3/4 inch (19 millimeters) ASTM A307 bolts (minimum), or the equivalent.

(b) Steel

Ends of **LH-** and **DLH-**Series Joists resting on steel supports shall be attached thereto with a minimum of two 1/4 inch (6 millimeters) fillet welds 2 inches (51 millimeters) long, or with two 3/4 inch (19 millimeters) ASTM A307 bolts, or the equivalent. When LH/DLH series joists are used to provide lateral stability to the supporting member, the final connection shall be made by welding or as designated by the specifying professional.

(c) Uplift

Where uplift forces are a design consideration, roof joists shall be anchored to resist such forces (Refer to Section 104.12).

104.8 JOIST SPACING

Joists shall be spaced so that the loading on each joist does not exceed the design load (LRFD or ASD) for the particular joist designation and span as shown in the applicable load tables.

104.9 FLOOR AND ROOF DECKS

(a) Material

Floor and roof decks may consist of cast-in-place or precast concrete or gypsum, formed steel, wood, or other suitable material capable of supporting the required load at the specified joist spacing.

(b) Thickness

Cast-in-place slabs shall be not less than 2 inches (51 millimeters) thick.

(c) Centering

Centering for structural slabs 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 or damage to the top chord of joists during installation or removal of the centering or placing of the concrete.

(d) Bearing

Slabs or decks shall bear uniformly along the top chords of the joists.

(e) Attachments

The spacing of attachments along the top chord shall not exceed 36 inches (914 millimeters). Such attachments of the slab or deck to the top chords of joists shall be capable of resisting the following forces:

Table 104.9-1

SECTION* NUMBER	NOMINAL** FORCE REQUIRED
02 to 04 incl.	120 lbs/ft (1.75 kN/m)
05 to 09 incl.	150 lbs/ft (2.19 kN/m)
10 to 17 incl.	200 lbs/ft (2.92 kN/m)
18 and 19	250 lbs/ft (3.65 kN/m)

* Last two digits of joist designation shown in the load table.
** Nominal force is unfactored.

(f) Wood Nailers

Where wood nailers are used, such nailers in conjunction with deck or slab shall be firmly attached to the top chords of the joists in conformance with Section 104.9(e).

(g) Joist with Standing Seam Roofing

The stiffness and strength of standing-seam roof clips varies from one manufacturer to another. Therefore, some roof systems cannot be counted on to provide lateral stability to the joists which support the roof. Sufficient stability must be provided to brace the joists laterally under the full design load. The compression chord must resist the chord axial design force in the plane of the joist (i.e., x-x axis buckling) and out of the plane of the joist (i.e., y-y axis buckling). Out of plane strength may be achieved by adjusting the bridging spacing and/or increasing the compression chord area, the joist depth, and the y-axis radius of gyration. The effective slenderness ratio in the y-direction equals 0.94 L/r_y; where L is the bridging spacing in inches (millimeters). The maximum bridging spacing may not exceed that specified in Section 104.5(d).

Horizontal bridging members attached to the compression chords and their anchorages must be designed for a compressive axial force of 0.0025nP, where n is the number of joists between end anchors and P is the chord design force in kips (Newtons). The attachment force between the horizontal bridging member and the compression chord is 0.005P. Horizontal bridging attached to the tension chords shall be proportioned so that the slenderness ratio between attachments does not exceed 300. Diagonal bridging shall be proportioned so that the slenderness ratio between attachments does not exceed 200.

104.10 DEFLECTION

The deflection due to the design live load shall not exceed the following:

Floors: 1/360 of span.

Roofs: 1/360 of span where a plaster ceiling is attached or suspended.

1/240 of span for all other cases.

The specifying professional shall give consideration to the effects of deflection and vibration* in the selection of joists.

* For further reference, refer to Steel Joist Institute Technical Digest #5, “Vibration of Steel Joist-Concrete Slab Floors” and the Institute’s Computer Vibration Program.

104.11 PONDING*

The ponding investigation shall be performed by the specifying professional.

* For further reference, refer to Steel Joist Institute Technical Digest #3, “Structural Design of Steel Joist Roofs to Resist Ponding Loads” and AISC Specifications.

104.12 UPLIFT

Where uplift forces due to wind are a design requirement, these forces must be indicated on the contract drawings in terms of NET uplift in pounds per square foot (Pascals). The contract documents shall indicate if the net uplift is based on ASD or LRFD. When these forces are specified, they must be considered in the design of joists and/or bridging. A single line of **bottom chord** bridging must be provided near the first bottom chord panel points whenever uplift due to wind forces is a design consideration.*

* For further reference, refer to Steel Joist Institute Technical Digest #6, “Structural Design of Steel Joist Roofs to Resist Uplift Loads”.

104.13 INSPECTION

Joists shall be inspected by the manufacturer before shipment to verify compliance of materials and workmanship with the requirements of these specifications. If the purchaser wishes an inspection of the steel joists by someone other than the manufacturer’s own inspectors, they may reserve the right to do so in their “Invitation to Bid” or the accompanying “Job Specifications”.

Arrangements shall be made with the manufacturer for such shop inspection of the joists at the manufacturing shop by the purchaser’s inspectors at purchaser’s expense.

104.14 PARALLEL CHORD SLOPED JOISTS

The span of a parallel chord sloped joist shall be defined by the length along the slope. Minimum depth, load-carrying capacity, and bridging requirements shall be determined by the sloped definition of span. The Load Table capacity shall be the component normal to the joist.

SECTION 105.*

ERECTION STABILITY AND HANDLING

When it is necessary for the erector to climb on the joists, extreme caution must be exercised since unbridged joists may exhibit some degree of instability under the erector's weight.

(a) Stability Requirements

1) Before an employee is allowed on the steel joist: BOTH ends of joists at columns (or joists designated as column joists) shall be attached to its supports. For all other joists a minimum of one end shall be attached before the employee is allowed on the joist. The attachment shall be in accordance with Section 104.7 – End Anchorage.

   When a bolted seat connection is used for erection purposes, as a minimum, the bolts must be snug tightened. The snug tight condition is defined as the tightness that exists when all plies of a joint are in firm contact. This may be attained by a few impacts of an impact wrench or the full effort of an employee using an ordinary spud wrench.

2) On steel joists that do not require erection bridging as shown by the unshaded area of the Load Table, only one employee shall be allowed on the joist unless all bridging is installed and anchored.

   * For a thorough coverage of this topic, refer to SJI Technical Digest #9, "Handling and Erection of Steel Joists and Joist Girders".

3) Where the span of the steel joist is within the Red shaded area of the Load Table, the following shall apply:

   a) The row of bridging nearest the mid span of the steel joist shall be bolted diagonal erection bridging; and

   b) Hoisting cables shall not be released until this bolted diagonal erection bridging is installed and anchored, unless an alternate method of stabilizing the joist has been provided; and

   c) No more than one employee shall be allowed on these spans until all other bridging is installed and anchored.

4) Where the span of the steel joist is within the Blue shaded area of the Load Table, the following shall apply:

   a) All rows of bridging shall be bolted diagonal bridging; and

   b) Hoisting cables shall not be released until the two rows of bolted diagonal erection bridging nearest the third points of the steel joist are installed and anchored; and

   c) No more than two employees shall be allowed on these spans until all other bridging is installed and anchored.

5) Where the span of the steel joist is in the Gray shaded area of the Load Table, the following shall apply:

   a) All rows of bridging shall be bolted diagonal bridging; and

   b) Hoisting cables shall not be released until all bridging is installed and anchored; and

   c) No more than two employees shall be allowed on these spans until all other bridging is installed and anchored.

6) When permanent bridging terminus points cannot be used during erection, additional temporary bridging terminus points are required to provide lateral stability.

7) In the case of bottom chord bearing joists, the ends of the joist must be restrained laterally per Section 104.5(f) before releasing the hoisting cables.

8) After the joist is straightened and plumbed, and all bridging is completely installed and anchored, the ends of the joists shall be fully connected to the supports in accordance with Section 104.7- End Anchorage.

(b) Landing and Placing Loads

1) Except as stated in paragraph 105(b)(3) of this section, no "construction loads"[1] are allowed on the steel joists until all bridging is installed and anchored, and all joist bearing ends are attached.

2) During the construction period, loads placed on the joists shall be distributed so as not to exceed the capacity of the joists.

3) No bundle of deck may be placed on steel joists until all bridging has been installed and anchored and all joist bearing ends attached, unless the following conditions are met:

   a) The contractor has first determined from a *"qualified person"* [2] and documented in a site specific erection plan that the structure or portion of structure is capable of supporting the load;

   b) The bundle of decking is placed on a minimum of 3 steel joists;

   c) The joists supporting the bundle of decking are attached at both ends;

   d) At least one row of bridging is installed and anchored;

   e) The total weight of the decking does not exceed 4000 pounds (1816 kilograms); and

   f) The edge of the bundle of decking shall be placed within 1 foot (0.30 meters) of the bearing surface of the joist end.

g) The edge of the construction load shall be placed within 1 foot (0.30 meters) of the bearing surface of the joist end.

(c) Field Welding

1) All field welding shall be performed in accordance with contract documents. Field welding shall not damage the joists.

2) On cold-formed members whose yield strength has been attained by cold working, and whose as-formed strength is used in the design, the total length of weld at any one point shall not exceed 50 percent of the overall developed width of the cold-formed section.

[(1)] See page 150 for definition of "construction load". A copy of the OSHA Steel Erection Standard §1926.757, Open Web Steel Joists, is included in Appendix E for reference purposes.

(d) Handling

Particular attention should be paid to the erection of Longspan and Deep Longspan Steel Joists. Care shall be exercised at all times to avoid damage to the joists and accessories.

Each joist shall be adequately braced laterally before any loads are applied. If lateral support is provided by bridging, the bridging lines as defined in Section 105(a), paragraphs 2, 3, 4 and 5, must be anchored to prevent lateral movement.

(e) Fall Arrest Systems

Steel joists shall not be used as anchorage points for a fall arrest system unless written approval to do so is obtained from a "qualified person" [(2)].

[(2)] See page 150 for OSHA definition of "qualified person".

STANDARD LRFD LOAD TABLE
LONGSPAN STEEL JOISTS, LH-SERIES

Based on a 50 ksi Maximum Yield Strength
Adopted by the Steel Joist Institute May 1, 2000
Revised to November 10, 2003 - Effective March 01, 2005

The black figures in the following table give the TOTAL safe factored uniformly distributed load-carrying capacities, in pounds per linear foot, of **LRFD** **LH-Series** Steel Joists. The weight of factored DEAD loads, including the joists, must in all cases be deducted to determine the factored LIVE load-carrying capacities of the joists. The approximate DEAD load of the joists may be determined from the weights per linear foot shown in the tables.

The **RED** figures in this load table are the unfactored, nominal LIVE loads per linear foot of joist which will produce an approximate deflection of 1/360 of the span. LIVE loads which will produce a deflection of 1/240 of the span may be obtained by multiplying the **RED** figures by 1.5. In no case shall the TOTAL load capacity of the joists be exceeded.

This load table applies to joists with either parallel chords or standard pitched top chords. When top chords are pitched, the carrying capacities are determined by the nominal depth of the joists at the center of the span. Standard top chord pitch is 1/8 inch per foot. If pitch exceeds this standard, the load table does not apply. Sloped parallel-chord joists shall use span as defined by the length along the slope.

Where the joist span is in the **RED SHADED** area of the load table, the row of bridging nearest the midspan shall be diagonal bridging with bolted connections at chords and intersection. Hoisting cables shall not be released until this row of bolted diagonal bridging is completely installed.

Where the joist span is in the **BLUE SHADED** area of the load table, all rows of bridging shall be diagonal bridging with bolted connections at chords and intersection. Hoisting cables shall not be released until the two rows of bridging nearest the third points are completely installed.

The approximate moment of inertia of the joist, in inches^4 is; $I_j = 26.767(W_{LL})(L^3)(10^{-6})$, where W_{LL}= **RED** figure in the Load Table, and L = (clear span + 0.67) in feet.

When holes are required in top or bottom chords, the carrying capacities must be reduced in proportion to the reduction of chord areas.

The top chords are considered as being stayed laterally by floor slab or roof deck.

The approximate joist weights per linear foot shown in these tables do not include accessories.

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STANDARD LOAD TABLE FOR LONGSPAN STEEL JOISTS, LH-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	Approx. Wt in Lbs. Per Linear Ft (Joists only)	Depth in inches	SAFE LOAD* in Lbs. Between	CLEAR SPAN IN FEET																	
			21-24	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**						
18LH02	10	18	18000	702	663	627	586	550	517	486	459	433	409	388	367						
				313	284	259	234	212	193	175	160	147	135	124	114						
18LH03	11	18	19950	781	739	700	657	613	573	538	505	475	448	424	400						
				348	317	289	262	236	213	194	177	161	148	136	124						
18LH04	12	18	23250	906	856	802	750	703	660	619	582	547	516	487	462						
				403	367	329	296	266	242	219	200	182	167	153	141						
18LH05	15	18	26250	1026	972	921	871	814	762	714	672	631	595	562	532						
				454	414	378	345	311	282	256	233	212	195	179	164						
18LH06	15	18	31050	1213	1123	1044	972	907	849	796	748	705	664	627	594						
				526	469	419	377	340	307	280	254	232	212	195	180						
18LH07	17	18	32250	1260	1213	1170	1089	1017	952	892	838	789	744	703	666						
				553	513	476	428	386	349	317	288	264	241	222	204						
18LH08	19	18	33600	1314	1264	1218	1176	1137	1075	1020	961	906	856	810	768						
				577	534	496	462	427	387	351	320	292	267	246	226						
18LH09	21	18	36000	1404	1351	1302	1257	1215	1174	1138	1069	1006	949	897	849						
				616	571	527	491	458	418	380	346	316	289	266	245						
			22-24	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**		
20LH02	10	20	16950	663	655	646	615	582	547	516	487	460	436	412	393	373	355	337	322		
				306	303	298	274	250	228	208	190	174	160	147	136	126	117	108	101		
20LH03	11	20	18000	703	694	687	678	651	621	592	558	528	499	474	448	424	403	382	364		
				337	333	317	302	280	258	238	218	200	184	169	156	143	133	123	114		
20LH04	12	20	22050	861	849	837	792	744	700	660	624	589	558	529	502	477	454	433	412		
				428	406	386	352	320	291	265	243	223	205	189	174	161	149	139	129		
20LH05	14	20	23700	924	913	903	892	856	816	769	726	687	651	616	585	556	529	504	481		
				459	437	416	395	366	337	308	281	258	238	219	202	187	173	161	150		
20LH06	15	20	31650	1233	1186	1144	1084	1018	952	894	840	790	745	703	666	631	598	568	541		
				606	561	521	477	427	386	351	320	292	267	246	226	209	192	178	165		
20LH07	17	20	33750	1317	1267	1221	1179	1140	1066	1000	940	885	834	789	745	706	670	637	606		
				647	599	556	518	484	438	398	362	331	303	278	256	236	218	202	187		
20LH08	19	20	34800	1362	1309	1263	1219	1177	1140	1083	1030	981	931	882	837	795	754	718	685		
				669	619	575	536	500	468	428	395	365	336	309	285	262	242	225	209		
20LH09	21	20	38100	1485	1429	1377	1329	1284	1242	1203	1167	1132	1068	1009	954	904	858	816	775		
				729	675	626	581	542	507	475	437	399	366	336	309	285	264	244	227		
20LH10	23	20	41100	1602	1542	1486	1434	1386	1341	1297	1258	1221	1186	1122	1060	1005	954	906	862		
				786	724	673	626	585	545	510	479	448	411	377	346	320	296	274	254		

LRFD

STANDARD LOAD TABLE FOR LONGSPAN STEEL JOISTS, LH-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	Approx. Wt in Lbs. Per Linear Ft. (Joists only)	Depth in inches	SAFELOAD* in Lbs. Between		CLEAR SPAN IN FEET															
			28-32		**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**
24LH03	11	24	17250		513	508	504	484	460	439	418	400	382	366	351	336	322	310	298	286
					235	226	218	204	188	175	162	152	141	132	124	116	109	102	96	90
24LH04	12	24	21150		628	597	568	540	514	490	468	447	427	409	393	376	361	346	333	321
					288	265	246	227	210	195	182	169	158	148	138	130	122	114	107	101
24LH05	13	24	22650		673	669	660	628	598	570	544	520	496	475	456	436	420	403	387	372
					308	297	285	264	244	226	210	196	182	171	160	150	141	132	124	117
24LH06	16	24	30450		906	868	832	795	756	720	685	655	625	598	571	546	522	501	480	460
					411	382	356	331	306	284	263	245	228	211	197	184	172	161	152	142
24LH07	17	24	33450		997	957	919	882	847	811	774	736	702	669	639	610	583	559	535	514
					452	421	393	367	343	320	297	276	257	239	223	208	195	182	171	161
24LH08	18	24	35700		1060	1015	973	933	895	858	817	780	745	712	682	652	625	600	576	553
					480	447	416	388	362	338	314	292	272	254	238	222	208	196	184	173
24LH09	21	24	42000		1248	1212	1177	1146	1096	1044	994	948	903	861	822	786	751	720	690	661
					562	530	501	460	424	393	363	337	313	292	272	254	238	223	209	196
24LH10	23	24	44400		1323	1284	1248	1213	1182	1152	1105	1053	1002	955	912	873	834	799	766	735
					596	559	528	500	474	439	406	378	351	326	304	285	266	249	234	220
24LH11	25	24	46800		1390	1350	1312	1276	1243	1210	1180	1152	1101	1051	1006	963	924	885	850	816
					624	588	555	525	498	472	449	418	388	361	337	315	294	276	259	243
			33-40		**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**
28LH05	13	28	21000		505	484	465	445	429	412	397	382	367	355	342	330	319	309	298	289
					219	205	192	180	169	159	150	142	133	126	119	113	107	102	97	92
28LH06	16	28	27900		672	643	618	592	568	546	525	505	486	469	451	436	421	406	393	379
					289	270	253	238	223	209	197	186	175	166	156	148	140	133	126	120
28LH07	17	28	31500		757	726	696	667	640	615	591	568	547	528	508	490	474	457	442	427
					326	305	285	267	251	236	222	209	197	186	176	166	158	150	142	135
28LH08	18	28	33750		810	775	744	712	684	657	630	604	580	556	535	516	496	478	462	445
					348	325	305	285	268	252	236	222	209	196	185	175	165	156	148	140
28LH09	21	28	41550		1000	958	918	879	844	810	778	748	721	694	669	645	622	601	580	561
					428	400	375	351	329	309	291	274	258	243	228	216	204	193	183	173
28LH10	23	28	45450		1093	1056	1018	976	937	900	864	831	799	769	742	715	690	666	643	622
					466	439	414	388	364	342	322	303	285	269	255	241	228	215	204	193
28LH11	25	28	48750		1170	1143	1104	1066	1023	982	943	907	873	841	810	781	753	727	702	679
					498	475	448	423	397	373	351	331	312	294	278	263	249	236	223	212
28LH12	27	28	53550		1285	1255	1227	1200	1173	1149	1105	1063	1023	984	948	913	880	849	819	790
					545	520	496	476	454	435	408	383	361	340	321	303	285	270	256	243
28LH13	30	28	55800		1342	1311	1281	1252	1224	1198	1173	1149	1126	1083	1041	1002	964	930	897	865
					569	543	518	495	472	452	433	415	396	373	352	332	314	297	281	266
			38-46	**47-48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**
32LH06	14	32	25050	25050	507	489	472	456	441	426	412	399	385	373	363	351	340	330	321	312
					211	199	189	179	169	161	153	145	138	131	125	119	114	108	104	99
32LH07	16	32	28200	28200	568	549	529	511	493	477	462	447	432	418	406	393	381	370	360	349
					235	223	211	200	189	179	170	162	154	146	140	133	127	121	116	111
32LH08	17	32	30600	30600	616	595	574	553	535	517	499	483	468	453	439	426	412	400	388	378
					255	242	229	216	205	194	184	175	167	159	151	144	137	131	125	120
32LH09	21	32	38400	38400	774	747	720	694	670	648	627	606	586	568	550	534	517	502	487	472
					319	302	285	270	256	243	230	219	208	198	189	180	172	164	157	149
32LH10	21	32	42450	42450	856	825	796	768	742	717	693	667	645	624	603	583	564	546	529	513
					352	332	315	297	282	267	254	240	228	217	206	196	186	178	169	162
32LH11	24	32	46500	46500	937	903	870	840	811	783	757	732	709	687	664	643	624	604	585	567
					385	363	343	325	308	292	277	263	251	239	227	216	206	196	187	179
32LH12	27	32	54600	54600	1101	1068	1032	996	961	928	897	867	838	811	786	762	738	715	694	673
					450	428	406	384	364	345	327	311	295	281	267	255	243	232	221	211
32LH13	30	32	60900	60900	1225	1201	1177	1156	1113	1072	1035	999	964	931	900	871	843	816	790	766
					500	480	461	444	420	397	376	354	336	319	304	288	275	262	249	238
32LH14	33	32	62700	62700	1264	1239	1215	1192	1170	1149	1107	1069	1032	997	964	933	903	874	846	820
					515	495	476	458	440	417	395	374	355	337	321	304	290	276	264	251
32LH15	35	32	64800	64800	1305	1279	1255	1231	1207	1186	1164	1144	1125	1087	1051	1017	984	952	924	895
					532	511	492	473	454	438	422	407	393	374	355	338	322	306	292	279
			42-46	**47-56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**
36LH07	16	36	25200	25200	438	424	411	399	387	376	366	355	345	336	327	318	310	301	294	286
					177	168	160	153	146	140	134	128	122	117	112	107	103	99	95	91
36LH08	18	36	27750	27750	481	466	453	439	426	414	402	390	379	369	358	349	340	331	322	313
					194	185	176	168	160	153	146	140	134	128	123	118	113	109	104	100
36LH09	21	36	35550	35550	616	597	579	561	544	528	513	499	484	471	459	445	433	423	412	400
					247	235	224	214	204	195	186	179	171	163	157	150	144	138	133	127
36LH10	21	36	39150	39150	681	660	639	619	601	583	567	550	535	520	507	492	480	466	454	442
					273	260	248	236	225	215	206	197	188	180	173	165	159	152	146	140
36LH11	23	36	42750	42750	742	720	697	676	657	637	618	601	583	567	552	537	522	508	495	483
					297	283	269	257	246	234	224	214	205	196	188	180	173	166	159	153
36LH12	25	36	51150	51150	889	862	835	810	784	762	739	717	696	675	655	636	618	600	583	567
					354	338	322	307	292	279	267	255	243	232	222	213	204	195	187	179
36LH13	30	36	60150	60150	1045	1012	981	951	922	894	868	843	819	796	774	753	732	712	694	676
					415	395	376	359	342	327	312	298	285	273	262	251	240	231	222	213
36LH14	36	36	66300	66300	1152	1132	1093	1059	1024	991	961	931	903	876	850	826	802	780	757	738
					456	434	412	392	373	356	339	323	309	295	283	270	259	247	237	228
36LH15	36	36	69900	69900	1213	1192	1171	1153	1116	1081	1047	1015	984	955	927	900	874	850	826	804
					480	464	448	434	413	394	375	358	342	327	312	299	286	274	263	252

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STANDARD LOAD TABLE FOR LONGSPAN STEEL JOISTS, LH-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	Approx. Wt in Lbs. Per Linear Ft. (Joists Only)	Depth in inches	SAFELOAD* in Lbs. Between		CLEAR SPAN IN FEET															
			47-59	60-64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80
40LH08	16	40	24900	24900	381 150	370 144	361 138	351 132	342 127	333 122	325 117	316 112	309 108	301 104	294 100	288 97	280 93	274 90	267 86	261 83
40LH09	21	40	32700	32700	498 196	484 188	472 180	459 173	447 166	436 160	424 153	414 147	403 141	394 136	384 131	375 126	366 122	358 118	349 113	342 109
40LH10	21	40	36000	36000	550 216	535 207	520 198	507 190	493 183	481 176	469 169	457 162	445 156	435 150	424 144	414 139	403 134	393 129	382 124	373 119
40LH11	22	40	39300	39300	598 234	582 224	567 215	552 207	537 198	523 190	510 183	498 176	484 169	472 163	462 157	450 151	439 145	429 140	418 135	409 130
40LH12	25	40	47850	47850	729 285	708 273	688 261	670 251	652 241	636 231	619 222	603 213	588 205	573 197	559 189	546 182	532 176	519 169	507 163	495 157
40LH13	30	40	56400	56400	859 334	835 320	813 307	792 295	771 283	750 271	730 260	712 250	694 241	676 231	660 223	643 214	628 207	613 199	598 192	585 185
40LH14	35	40	64500	64500	984 383	957 367	930 351	904 336	880 323	856 309	834 297	813 285	792 273	772 263	753 252	735 243	717 233	699 225	682 216	666 209
40LH15	36	40	72150	72150	1101 427	1068 408	1036 390	1006 373	978 357	949 342	924 328	898 315	874 302	850 290	828 279	807 268	786 258	766 248	747 239	729 230
40LH16	42	40	79500	79500	1212 469	1194 455	1176 441	1158 428	1141 416	1126 404	1095 387	1065 371	1036 356	1009 342	982 329	957 316	933 304	909 292	886 282	864 271
			52-59	**60-72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**
44LH09	19	44	30000	30000	408 158	397 152	388 146	379 141	370 136	363 131	354 127	346 122	339 118	331 114	324 110	316 106	310 103	303 99	297 96	291 93
44LH10	21	44	33150	33150	450 174	439 168	429 162	418 155	408 150	399 144	390 139	381 134	373 130	364 125	357 121	349 117	342 113	334 110	327 106	321 103
44LH11	22	44	35850	35850	487 188	475 181	465 175	453 168	442 162	433 157	423 151	414 146	403 140	396 136	387 131	378 127	370 123	363 119	354 115	348 111
44LH12	25	44	44400	44400	603 232	589 224	574 215	561 207	547 200	534 192	520 185	508 179	496 172	484 166	472 160	462 155	450 149	439 144	430 139	420 134
44LH13	30	44	52650	52650	715 275	699 265	681 254	666 246	649 236	634 228	619 220	606 212	592 205	579 198	565 191	553 185	541 179	529 173	519 167	507 161
44LH14	31	44	60600	60600	823 315	801 302	780 291	759 279	739 268	721 259	703 249	685 240	669 231	654 223	637 215	622 207	609 200	594 193	580 187	568 181
44LH15	36	44	70500	70500	958 366	934 352	912 339	889 326	868 314	847 303	826 292	805 281	786 271	768 261	750 252	732 243	714 234	699 227	682 219	667 211
44LH16	42	44	81300	81300	1105 421	1078 405	1051 390	1026 375	1002 362	978 348	955 336	933 324	912 313	891 302	870 291	852 282	832 272	814 263	796 255	780 246
44LH17	47	44	87300	87300	1185 450	1170 438	1153 426	1138 415	1125 405	1098 390	1072 376	1048 363	1024 351	1000 338	978 327	957 316	936 305	915 295	895 285	876 276
			56-59	**60-80**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**
48LH10	21	48	30000	30000	369 141	361 136	354 132	346 127	339 123	331 119	325 116	318 112	312 108	306 105	300 102	294 99	288 96	282 93	277 90	271 87
48LH11	22	48	32550	32550	399 152	390 147	382 142	373 137	366 133	358 129	351 125	343 120	337 117	330 113	324 110	318 106	312 103	306 100	300 97	294 94
48LH12	25	48	41100	41100	504 191	493 185	483 179	472 173	462 167	451 161	442 156	433 151	424 147	415 142	408 138	399 133	391 129	384 126	376 122	369 118
48LH13	29	48	49200	49200	603 228	589 221	576 213	564 206	552 199	540 193	529 187	517 180	507 175	498 170	487 164	477 159	468 154	459 150	450 145	441 141
48LH14	32	48	58050	58050	712 269	696 260	681 251	666 243	651 234	637 227	624 220	610 212	598 206	585 199	574 193	562 187	550 181	540 176	529 171	519 165
48LH15	36	48	66750	66750	817 308	799 298	781 287	765 278	748 269	732 260	717 252	702 244	687 236	672 228	658 221	645 214	633 208	619 201	607 195	595 189
48LH16	42	48	76950	76950	943 355	922 343	901 331	882 320	864 310	844 299	826 289	810 280	792 271	777 263	760 255	745 247	730 239	715 232	702 225	688 218
48LH17	47	48	86400	86400	1059 397	1035 383	1012 371	990 358	969 346	948 335	928 324	909 314	889 304	871 294	853 285	837 276	820 268	804 260	787 252	772 245

* The safe factored uniform load for the clear spans shown in the Safe Load Column is equal to (Safe Load) / (Clear span + 0.67). (The added 0.67 feet (8 inches) is required to obtain the proper length on which the Load Tables were developed).

In no case shall the safe factored uniform load, for clear spans less than the minimum clear span shown in the Safe Load Column, exceed the uniform load calculated for the minimum clear span listed in the Safe Load Column.

To solve for *live* loads for clear spans shown in the Safe Load Column (or lesser clear spans), multiply the live load of the shortest clear span shown in the Load Table by the (the shortest clear span shown in the Load Table + 0.67 feet)^2 and divide by (the actual clear span + 0.67 feet)^2. The live load shall *not* exceed the safe uniform load.

STANDARD ASD LOAD TABLE
LONGSPAN STEEL JOISTS, LH-SERIES

Based on a 50 ksi Maximum Yield Strength
Adopted by the Steel Joist Institute May 25, 1983
Revised to November 10, 2003 - Effective March 01, 2005

The black figures in the following table give the TOTAL safe uniformly distributed load-carrying capacities, in pounds per linear foot, of **ASD** **LH-Series** Steel Joists. The weight of DEAD loads, including the joists, must in all cases be deducted to determine the LIVE load-carrying capacities of the joists. The approximate DEAD load of the joists may be determined from the weights per linear foot shown in the tables.

The **RED** figures in this load table are the nominal LIVE loads per linear foot of joist which will produce an approximate deflection of 1/360 of the span. LIVE loads which will produce a deflection of 1/240 of the span may be obtained by multiplying the **RED** figures by 1.5. In no case shall the TOTAL load capacity of the joists be exceeded.

This load table applies to joists with either parallel chords or standard pitched top chords. When top chords are pitched, the carrying capacities are determined by the nominal depth of the joists at the center of the span. Standard top chord pitch is 1/8 inch per foot. If pitch exceeds this standard, the load table does not apply. Sloped parallel-chord joists shall use span as defined by the length along the slope.

Where the joist span is in the **RED SHADED** area of the load table, the row of bridging nearest the midspan shall be diagonal bridging with bolted connections at chords and intersection. Hoisting cables shall not be released until this row of bolted diagonal bridging is completely installed.

Where the joist span is in the **BLUE SHADED** area of the load table, all rows of bridging shall be diagonal bridging with bolted connections at chords and intersection. Hoisting cables shall not be released until the two rows of bridging nearest the third points are completely installed.

The approximate moment of inertia of the joist, in inches^4 is; $I_j = 26.767(W_{LL})(L^3)(10^{-6})$, where W_{LL} = **RED** figure in the Load Table, and L = (clear span + 0.67) in feet.

When holes are required in top or bottom chords, the carrying capacities must be reduced in proportion to the reduction of chord areas.

The top chords are considered as being stayed laterally by floor slab or roof deck.

The approximate joist weights per linear foot shown in these tables do not include accessories.

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STANDARD LOAD TABLE FOR LONGSPAN STEEL JOISTS, LH-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	Approx. Wt in Lbs. Per Linear Ft (Joists only)	Depth in inches	SAFE LOAD* in Lbs. Between	CLEAR SPAN IN FEET															
			21-24	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**				
18LH02	10	18	12000	468	442	418	391	367	345	324	306	289	273	259	245				
				313	284	259	234	212	193	175	160	147	135	124	114				
18LH03	11	18	13300	521	493	467	438	409	382	359	337	317	299	283	267				
				348	317	289	262	236	213	194	177	161	148	136	124				
18LH04	12	18	15500	604	571	535	500	469	440	413	388	365	344	325	308				
				403	367	329	296	266	242	219	200	182	167	153	141				
18LH05	15	18	17500	684	648	614	581	543	508	476	448	421	397	375	355				
				454	414	378	345	311	282	256	233	212	195	179	164				
18LH06	15	18	20700	809	749	696	648	605	566	531	499	470	443	418	396				
				526	469	419	377	340	307	280	254	232	212	195	180				
18LH07	17	18	21500	840	809	780	726	678	635	595	559	526	496	469	444				
				553	513	476	428	386	349	317	288	264	241	222	204				
18LH08	19	18	22400	876	843	812	784	758	717	680	641	604	571	540	512				
				577	534	496	462	427	387	351	320	292	267	246	226				
18LH09	21	18	24000	936	901	868	838	810	783	759	713	671	633	598	566				
				616	571	527	491	458	418	380	346	316	289	266	245				
			22-24	**25**	**26**	**27**	**28**	**29**	**30**	**31**	**32**	**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**
20LH02	10	20	11300	442	437	431	410	388	365	344	325	307	291	275	262	249	237	225	215
				306	303	298	274	250	228	208	190	174	160	147	136	126	117	108	101
20LH03	11	20	12000	469	463	458	452	434	414	395	372	352	333	316	299	283	269	255	243
				337	333	317	302	280	258	238	218	200	184	169	156	143	133	123	114
20LH04	12	20	14700	574	566	558	528	496	467	440	416	393	372	353	335	318	303	289	275
				428	406	386	352	320	291	265	243	223	205	189	174	161	149	139	129
20LH05	14	20	15800	616	609	602	595	571	544	513	484	458	434	411	390	371	353	336	321
				459	437	416	395	366	337	308	281	258	238	219	202	187	173	161	150
20LH06	15	20	21100	822	791	763	723	679	635	596	560	527	497	469	444	421	399	379	361
				606	561	521	477	427	386	351	320	292	267	246	226	209	192	178	165
20LH07	17	20	22500	878	845	814	786	760	711	667	627	590	556	526	497	471	447	425	404
				647	599	556	518	484	438	398	362	331	303	278	256	236	218	202	187
20LH08	19	20	23200	908	873	842	813	785	760	722	687	654	621	588	558	530	503	479	457
				669	619	575	536	500	468	428	395	365	336	309	285	262	242	225	209
20LH09	21	20	25400	990	953	918	886	856	828	802	778	755	712	673	636	603	572	544	517
				729	675	626	581	542	507	475	437	399	366	336	309	285	264	244	227
20LH10	23	20	27400	1068	1028	991	956	924	894	865	839	814	791	748	707	670	636	604	575
				786	724	673	626	585	545	510	479	448	411	377	346	320	296	274	254

ASD

STANDARD LOAD TABLE FOR LONGSPAN STEEL JOISTS, LH-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	Approx. Wt in Lbs. Per Linear Ft. (Joists only)	Depth in inches	SAFELOAD* in Lbs. Between		CLEAR SPAN IN FEET															
			28-32		**33**	**34**	**35**	**36**	**37**	**38**	**39**	**40**	**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**
24LH03	11	24	11500		342	339	336	323	307	293	279	267	255	244	234	224	215	207	199	191
					235	226	218	204	188	175	162	152	141	132	124	116	109	102	96	90
24LH04	12	24	14100		419	398	379	360	343	327	312	298	285	273	262	251	241	231	222	214
					288	265	246	227	210	195	182	169	158	148	138	130	122	114	107	101
24LH05	13	24	15100		449	446	440	419	399	380	363	347	331	317	304	291	280	269	258	248
					308	297	285	264	244	226	210	196	182	171	160	150	141	132	124	117
24LH06	16	24	20300		604	579	555	530	504	480	457	437	417	399	381	364	348	334	320	307
					411	382	356	331	306	284	263	245	228	211	197	184	172	161	152	142
24LH07	17	24	22300		665	638	613	588	565	541	516	491	468	446	426	407	389	373	357	343
					452	421	393	367	343	320	297	276	257	239	223	208	195	182	171	161
24LH08	18	24	23800		707	677	649	622	597	572	545	520	497	475	455	435	417	400	384	369
					480	447	416	388	362	338	314	292	272	254	238	222	208	196	184	173
24LH09	21	24	28000		832	808	785	764	731	696	663	632	602	574	548	524	501	480	460	441
					562	530	501	460	424	393	363	337	313	292	272	254	238	223	209	196
24LH10	23	24	29600		882	856	832	809	788	768	737	702	668	637	608	582	556	533	511	490
					596	559	528	500	474	439	406	378	351	326	304	285	266	249	234	220
24LH11	25	24	31200		927	900	875	851	829	807	787	768	734	701	671	642	616	590	567	544
					624	588	555	525	498	472	449	418	388	361	337	315	294	276	259	243
			33-40		**41**	**42**	**43**	**44**	**45**	**46**	**47**	**48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**
28LH05	13	28	14000		337	323	310	297	286	275	265	255	245	237	228	220	213	206	199	193
					219	205	192	180	169	159	150	142	133	126	119	113	107	102	97	92
28LH06	16	28	18600		448	429	412	395	379	364	350	337	324	313	301	291	281	271	262	253
					289	270	253	238	223	209	197	186	175	166	156	148	140	133	126	120
28LH07	17	28	21000		505	484	464	445	427	410	394	379	365	352	339	327	316	305	295	285
					326	305	285	267	251	236	222	209	197	186	176	166	158	150	142	135
28LH08	18	28	22500		540	517	496	475	456	438	420	403	387	371	357	344	331	319	308	297
					348	325	305	285	268	252	236	222	209	196	185	175	165	156	148	140
28LH09	21	28	27700		667	639	612	586	563	540	519	499	481	463	446	430	415	401	387	374
					428	400	375	351	329	309	291	274	258	243	228	216	204	193	183	173
28LH10	23	28	30300		729	704	679	651	625	600	576	554	533	513	495	477	460	444	429	415
					466	439	414	388	364	342	322	303	285	269	255	241	228	215	204	193
28LH11	25	28	32500		780	762	736	711	682	655	629	605	582	561	540	521	502	485	468	453
					498	475	448	423	397	373	351	331	312	294	278	263	249	236	223	212
28LH12	27	28	35700		857	837	818	800	782	766	737	709	682	656	632	609	587	566	546	527
					545	520	496	476	454	435	408	383	361	340	321	303	285	270	256	243
28LH13	30	28	37200		895	874	854	835	816	799	782	766	751	722	694	668	643	620	598	577
					569	543	518	495	472	452	433	415	396	373	352	332	314	297	281	266
			38-46	**47-48**	**49**	**50**	**51**	**52**	**53**	**54**	**55**	**56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**
32LH06	14	32	16700	16700	338	326	315	304	294	284	275	266	257	249	242	234	227	220	214	208
					211	199	189	179	169	161	153	145	138	131	125	119	114	108	104	99
32LH07	16	32	18800	18800	379	366	353	341	329	318	308	298	288	279	271	262	254	247	240	233
					235	223	211	200	189	179	170	162	154	146	140	133	127	121	116	111
32LH08	17	32	20400	20400	411	397	383	369	357	345	333	322	312	302	293	284	275	267	259	252
					255	242	229	216	205	194	184	175	167	159	151	144	137	131	125	120
32LH09	21	32	25600	25600	516	498	480	463	447	432	418	404	391	379	367	356	345	335	325	315
					319	302	285	270	256	243	230	219	208	198	189	180	172	164	157	149
32LH10	21	32	28300	28300	571	550	531	512	495	478	462	445	430	416	402	389	376	364	353	342
					352	332	315	297	282	267	254	240	228	217	206	196	186	178	169	162
32LH11	24	32	31000	31000	625	602	580	560	541	522	505	488	473	458	443	429	416	403	390	378
					385	363	343	325	308	292	277	263	251	239	227	216	206	196	187	179
32LH12	27	32	36400	36400	734	712	688	664	641	619	598	578	559	541	524	508	492	477	463	449
					450	428	406	384	364	345	327	311	295	281	267	255	243	232	221	211
32LH13	30	32	40600	40600	817	801	785	771	742	715	690	666	643	621	600	581	562	544	527	511
					500	480	461	444	420	397	376	354	336	319	304	288	275	262	249	238
32LH14	33	32	41800	41800	843	826	810	795	780	766	738	713	688	665	643	622	602	583	564	547
					515	495	476	458	440	417	395	374	355	337	321	304	290	276	264	251
32LH15	35	32	43200	43200	870	853	837	821	805	791	776	763	750	725	701	678	656	635	616	597
					532	511	492	473	454	438	422	407	393	374	355	338	322	306	292	279
			42-46	**47-56**	**57**	**58**	**59**	**60**	**61**	**62**	**63**	**64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**
36LH07	16	36	16800	16800	292	283	274	266	258	251	244	237	230	224	218	212	207	201	196	191
					177	168	160	153	146	140	134	128	122	117	112	107	103	99	95	91
36LH08	18	36	18500	18500	321	311	302	293	284	276	268	260	253	246	239	233	227	221	215	209
					194	185	176	168	160	153	146	140	134	128	123	118	113	109	104	100
36LH09	21	36	23700	23700	411	398	386	374	363	352	342	333	323	314	306	297	289	282	275	267
					247	235	224	214	204	195	186	179	171	163	157	150	144	138	133	127
36LH10	21	36	26100	26100	454	440	426	413	401	389	378	367	357	347	338	328	320	311	303	295
					273	260	248	236	225	215	206	197	188	180	173	165	159	152	146	140
36LH11	23	36	28500	28500	495	480	465	451	438	425	412	401	389	378	368	358	348	339	330	322
					297	283	269	257	246	234	224	214	205	196	188	180	173	166	159	153
36LH12	25	36	34100	34100	593	575	557	540	523	508	493	478	464	450	437	424	412	400	389	378
					354	338	322	307	292	279	267	255	243	232	222	213	204	195	187	179
36LH13	30	36	40100	40100	697	675	654	634	615	596	579	562	546	531	516	502	488	475	463	451
					415	395	376	359	342	327	312	298	285	273	262	251	240	231	222	213
36LH14	36	36	44200	44200	768	755	729	706	683	661	641	621	602	584	567	551	535	520	505	492
					456	434	412	392	373	356	339	323	309	295	283	270	259	247	237	228
36LH15	36	36	46600	46600	809	795	781	769	744	721	698	677	656	637	618	600	583	567	551	536
					480	464	448	434	413	394	375	358	342	327	312	299	286	274	263	252

ASD

STANDARD LOAD TABLE FOR LONGSPAN STEEL JOISTS, LH-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	Approx. Wt in Lbs. Per Linear Ft. (Joists Only)	Depth in inches	SAFELOAD* in Lbs. Between		CLEAR SPAN IN FEET															
			47-59	**60-64**	**65**	**66**	**67**	**68**	**69**	**70**	**71**	**72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**
40LH08	16	40	16600	16600	254	247	241	234	228	222	217	211	206	201	196	192	187	183	178	174
					150	144	138	132	127	122	117	112	108	104	100	97	93	90	86	83
40LH09	21	40	21800	21800	332	323	315	306	298	291	283	276	269	263	256	250	244	239	233	228
					196	188	180	173	166	160	153	147	141	136	131	126	122	118	113	109
40LH10	21	40	24000	24000	367	357	347	338	329	321	313	305	297	290	283	276	269	262	255	249
					216	207	198	190	183	176	169	162	156	150	144	139	134	129	124	119
40LH11	22	40	26200	26200	399	388	378	368	358	349	340	332	323	315	308	300	293	286	279	273
					234	224	215	207	198	190	183	176	169	163	157	151	145	140	135	130
40LH12	25	40	31900	31900	486	472	459	447	435	424	413	402	392	382	373	364	355	346	338	330
					285	273	261	251	241	231	222	213	205	197	189	182	176	169	163	157
40LH13	30	40	37600	37600	573	557	542	528	514	500	487	475	463	451	440	429	419	409	399	390
					334	320	307	295	283	271	260	250	241	231	223	214	207	199	192	185
40LH14	35	40	43000	43000	656	638	620	603	587	571	556	542	528	515	502	490	478	466	455	444
					383	367	351	336	323	309	297	285	273	263	252	243	233	225	216	209
40LH15	36	40	48100	48100	734	712	691	671	652	633	616	599	583	567	552	538	524	511	498	486
					427	408	390	373	357	342	328	315	302	290	279	268	258	248	239	230
40LH16	42	40	53000	53000	808	796	784	772	761	751	730	710	691	673	655	638	622	606	591	576
					469	455	441	428	416	404	387	371	356	342	329	316	304	292	282	271
			52-59	**60-72**	**73**	**74**	**75**	**76**	**77**	**78**	**79**	**80**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**
44LH09	19	44	20000	20000	272	265	259	253	247	242	236	231	226	221	216	211	207	202	198	194
					158	152	146	141	136	131	127	122	118	114	110	106	103	99	96	93
44LH10	21	44	22100	22100	300	293	286	279	272	266	260	254	249	243	238	233	228	223	218	214
					174	168	162	155	150	144	139	134	130	125	121	117	113	110	106	103
44LH11	22	44	23900	23900	325	317	310	302	295	289	282	276	269	264	258	252	247	242	236	232
					188	181	175	168	162	157	151	146	140	136	131	127	123	119	115	111
44LH12	25	44	29600	29600	402	393	383	374	365	356	347	339	331	323	315	308	300	293	287	280
					232	224	215	207	200	192	185	179	172	166	160	155	149	144	139	134
44LH13	30	44	35100	35100	477	466	454	444	433	423	413	404	395	386	377	369	361	353	346	338
					275	265	254	246	236	228	220	212	205	198	191	185	179	173	167	161
44LH14	31	44	40400	40400	549	534	520	506	493	481	469	457	446	436	425	415	406	396	387	379
					315	302	291	279	268	259	249	240	231	223	215	207	200	193	187	181
44LH15	36	44	47000	47000	639	623	608	593	579	565	551	537	524	512	500	488	476	466	455	445
					366	352	339	326	314	303	292	281	271	261	252	243	234	227	219	211
44LH16	42	44	54200	54200	737	719	701	684	668	652	637	622	608	594	580	568	555	543	531	520
					421	405	390	375	362	348	336	324	313	302	291	282	272	263	255	246
44LH17	47	44	58200	58200	790	780	769	759	750	732	715	699	683	667	652	638	624	610	597	584
					450	438	426	415	405	390	376	363	351	338	327	316	305	295	285	276
			56-59	**60-80**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**
48LH10	21	48	20000	20000	246	241	236	231	226	221	217	212	208	204	200	196	192	188	185	181
					141	136	132	127	123	119	116	112	108	105	102	99	96	93	90	87
48LH11	22	48	21700	21700	266	260	255	249	244	239	234	229	225	220	216	212	208	204	200	196
					152	147	142	137	133	129	125	120	117	113	110	106	103	100	97	94
48LH12	25	48	27400	27400	336	329	322	315	308	301	295	289	283	277	272	266	261	256	251	246
					191	185	179	173	167	161	156	151	147	142	138	133	129	126	122	118
48LH13	29	48	32800	32800	402	393	384	376	368	360	353	345	338	332	325	318	312	306	300	294
					228	221	213	206	199	193	187	180	175	170	164	159	154	150	145	141
48LH14	32	48	38700	38700	475	464	454	444	434	425	416	407	399	390	383	375	367	360	353	346
					269	260	251	243	234	227	220	212	206	199	193	187	181	176	171	165
48LH15	36	48	44500	44500	545	533	521	510	499	488	478	468	458	448	439	430	422	413	405	397
					308	298	287	278	269	260	252	244	236	228	221	214	208	201	195	189
48LH16	42	48	51300	51300	629	615	601	588	576	563	551	540	528	518	507	497	487	477	468	459
					355	343	331	320	310	299	289	280	271	263	255	247	239	232	225	218
48LH17	47	48	57600	57600	706	690	675	660	646	632	619	606	593	581	569	558	547	536	525	515
					397	383	371	358	346	335	324	314	304	294	285	276	268	260	252	245

* The safe uniform load for the clear spans shown in the Safe Load Column is equal to (Safe Load) / (Clear span + 0.67). (The added 0.67 feet (8 inches) is required to obtain the proper length on which the Load Tables were developed).

In no case shall the safe uniform load, for clear spans less than the minimum clear span shown in the Safe Load Column, exceed the uniform load calculated for the minimum clear span listed in the Safe Load Column.

To solve for *live* loads for clear spans shown in the Safe Load Column (or lesser clear spans), multiply the live load of the shortest clear span shown in the Load Table by the (the shortest clear span shown in the Load Table + 0.67 feet)^2 and divide by (the actual clear span + 0.67 feet)^2. The live load shall *not* exceed the safe uniform load.

STANDARD LRFD LOAD TABLE
DEEP LONGSPAN STEEL JOISTS, DLH-SERIES

Based on a 50 ksi Maximum Yield Strength
Adopted by the Steel Joist Institute May 1, 2000
Revised to November 10, 2003 - Effective March 01, 2005

The black figures in the following table give the TOTAL safe factored uniformly distributed load-carrying capacities, in pounds per linear foot, of an **LRFD DLH-Series** Steel Joists. The weight of factored DEAD loads, including the joists, must in all cases be deducted to determine the factored LIVE load-carrying capacities of the joists. The approximate DEAD load of the joists may be determined from the weights per linear foot shown in the tables. All loads shown are for roof construction only.

The **RED** figures in this load table are the unfactored, nominal LIVE loads per linear foot of joist which will produce an approximate deflection of 1/360 of the span. LIVE loads which will produce a deflection of 1/240 of the span may be obtained by multiplying the **RED** figures by 1.5. In no case shall the TOTAL load capacity of the joists be exceeded.

This load table applies to joists with either parallel chords or standard pitched top chords. When top chords are pitched, the carrying capacities are determined by the nominal depth of the joists at the center of the span. Standard top chord pitch is 1/8 inch per foot. If pitch exceeds this standard, the load table does not apply. Sloped parallel-chord joists shall use span as defined by the length along the slope.

All rows of bridging shall be diagonal bridging with bolted connections at the chords and intersections.

Where the joist span is in the **BLUE SHADED** area of the load table hoisting cables shall not be released until the two rows of bridging nearest the third points are completely installed.

Where the joist span is in the **GRAY SHADED** area of the load table hoisting cables shall not be released until all rows of bridging are completely installed.

The approximate moment of inertia of the joist, in inches^4 is; $I_j = 26.767(W_{LL})(L^3)(10^{-6})$, where W_{LL}= **RED** figure in the Load Table, and L = (clear span + 0.67) in feet.

When holes are required in top or bottom chords, the carrying capacities must be reduced in proportion to the reduction of chord areas.

The top chords are considered as being stayed laterally by floor slab or roof deck.

The approximate joist weights per linear foot shown in these tables do not include accessories.

LRFD

STANDARD LOAD TABLE FOR DEEP LONGSPAN STEEL JOISTS, DLH-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	Approx. Wt in Lbs. Per Linear Ft (Joists only)	Depth in inches	SAFELOAD* in Lbs. Between	CLEAR SPAN IN LINEAR FEET															
			61-88	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**	**101**	**102**	**103**	**104**
52DLH10	25	52	40050	447 171	436 165	427 159	418 154	409 150	400 145	391 140	384 136	376 132	369 128	361 124	354 120	346 116	340 114	334 110	327 107
52DLH11	26	52	43950	490 187	480 181	469 174	459 169	448 164	439 158	430 153	421 149	412 144	405 140	396 135	388 132	381 128	373 124	366 120	360 117
52DLH12	29	52	49050	547 204	535 197	523 191	513 185	501 179	490 173	480 168	471 163	460 158	451 153	442 149	433 144	426 140	417 135	409 132	402 128
52DLH13	34	52	59550	664 247	649 239	636 231	621 224	609 216	595 209	583 203	571 197	559 191	549 185	537 180	526 174	516 170	507 164	496 159	487 155
52DLH14	39	52	68100	760 276	745 266	729 258	714 249	699 242	685 234	670 227	657 220	645 213	631 207	619 201	607 194	595 189	585 184	573 178	562 173
52DLH15	42	52	76500	853 311	835 301	817 291	799 282	783 272	766 264	750 256	735 247	720 240	705 233	691 226	676 219	664 213	651 207	639 201	627 195
52DLH16	45	52	82500	921 346	901 335	882 324	862 314	844 304	826 294	810 285	792 276	777 267	760 260	745 252	730 245	717 237	702 230	688 224	676 217
52DLH17	52	52	94950	1059 395	1036 381	1014 369	991 357	970 346	951 335	930 324	912 315	892 304	874 296	858 286	840 279	823 270	808 263	792 255	777 247
			66-96	**97**	**98**	**99**	**100**	**101**	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**	**111**	**112**
56DLH11	26	56	42150	432 169	424 163	415 158	408 153	400 149	393 145	385 140	379 136	372 133	366 129	358 125	352 122	346 118	340 115	334 113	328 110
56DLH12	30	56	48450	496 184	486 178	477 173	468 168	459 163	450 158	442 153	433 150	426 145	417 141	409 137	402 133	394 130	388 126	381 123	373 119
56DLH13	34	56	58650	601 223	591 216	579 209	568 204	558 197	547 191	537 186	526 181	516 175	507 171	496 166	487 161	478 157	471 152	462 149	454 145
56DLH14	39	56	66300	679 249	666 242	652 234	640 228	628 221	616 214	604 209	594 202	582 196	571 190	562 186	552 181	541 175	532 171	523 167	514 162
56DLH15	42	56	75750	777 281	762 272	747 264	732 256	717 248	703 242	690 234	676 228	664 221	651 215	639 209	628 204	616 198	604 192	594 188	583 182
56DLH16	46	56	81750	838 313	822 304	805 294	789 285	774 277	759 269	744 262	730 254	717 247	703 240	690 233	678 227	666 221	654 214	642 209	630 204
56DLH17	51	56	94200	964 356	945 345	927 335	907 325	891 316	873 306	856 298	840 289	823 281	808 273	793 266	780 258	765 251	751 245	738 238	724 231

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STANDARD LOAD TABLE LONGSPAN STEEL JOISTS, LRFD DLH-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	Approx. Wt in Lbs. Per Linear Ft (Joists only)	Depth in inches	SAFE LOAD* in Lbs. Between		CLEAR SPAN IN LINEAR FEET															
			70-99	**100-104**	**105**	**106**	**107**	**108**	**109**	**110**	**111**	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**
60DLH12	29	60	46650	46650	442	433	426	418	411	405	397	391	384	378	372	366	360	354	348	342
					168	163	158	154	150	146	142	138	134	131	128	124	121	118	115	113
60DLH13	35	60	56700	56700	537	526	517	508	499	490	483	474	466	459	451	444	436	429	423	415
					203	197	191	187	181	176	171	167	163	158	154	151	147	143	139	135
60DLH14	40	60	63000	63000	597	586	574	564	555	544	534	525	516	507	498	490	481	474	465	457
					216	210	205	199	193	189	183	178	173	170	165	161	156	152	149	145
60DLH15	43	60	73950	73950	700	687	675	663	651	640	628	618	607	597	588	577	568	559	550	541
					255	248	242	235	228	223	216	210	205	200	194	190	185	180	175	171
60DLH16	46	60	81300	81300	769	756	741	727	714	702	690	676	666	654	642	631	621	610	600	589
					285	277	269	262	255	247	241	235	228	223	217	211	206	201	196	190
60DLH17	52	60	93450	93450	885	868	853	837	822	807	793	778	765	751	739	726	714	702	690	679
					324	315	306	298	290	283	275	267	261	254	247	241	235	228	223	217
60DLH18	59	60	107850	107850	1021	1002	984	966	948	931	915	898	883	867	852	838	823	810	796	783
					366	357	346	337	327	319	310	303	294	286	279	272	266	259	252	246
			75-99	**100-112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**	**121**	**122**	**123**	**124**	**125**	**126**	**127**	**128**
64DLH12	31	64	45000	45000	396	388	382	376	370	364	358	352	346	342	336	331	327	321	316	312
					153	150	146	142	138	135	132	129	125	122	119	116	114	111	109	106
64DLH13	34	64	54600	54600	481	472	465	457	450	442	436	429	421	415	409	403	396	390	385	379
					186	181	176	171	168	163	159	155	152	148	144	141	137	134	131	128
64DLH14	40	64	62550	62550	550	540	531	523	514	505	498	489	481	474	466	459	451	444	438	430
					199	193	189	184	179	174	171	166	162	158	154	151	147	143	140	136
64DLH15	43	64	71700	71700	631	621	610	600	591	580	571	562	553	544	537	528	520	511	504	496
					234	228	223	217	211	206	201	196	191	187	182	177	173	170	165	161
64DLH16	46	64	80700	80700	711	699	687	675	664	652	642	631	621	610	601	591	582	573	564	555
					262	254	248	242	235	229	224	218	213	208	203	198	193	189	184	180
64DLH17	52	64	93000	93000	819	804	790	777	763	751	738	726	714	702	691	681	669	658	648	639
					298	290	283	275	268	262	255	248	243	237	231	226	220	215	210	205
64DLH18	59	64	107400	107400	945	928	912	897	880	867	852	838	823	810	798	784	772	760	748	736
					337	328	320	311	304	296	288	282	274	267	261	255	249	243	237	232
			80-99	**100-120**	**121**	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**	**131**	**132**	**133**	**134**	**135**	**136**
68DLH13	37	68	52500	52500	432	426	418	412	406	400	394	388	382	378	372	366	361	355	351	346
					171	168	164	159	155	152	149	145	142	138	135	133	130	127	124	121
68DLH14	40	68	60450	60450	498	490	483	475	468	462	454	448	441	435	429	421	415	409	403	399
					184	179	175	171	167	163	159	155	152	148	145	141	138	135	133	130
68DLH15	44	68	67800	67800	558	547	540	531	522	514	505	498	490	483	475	468	462	454	448	441
					206	201	196	191	187	182	178	174	170	166	162	158	155	152	148	145
68DLH16	49	68	80400	80400	661	649	640	630	619	610	600	591	582	573	564	556	547	540	531	523
					242	236	230	225	219	214	209	204	199	195	190	186	182	178	174	171
68DLH17	55	68	90600	90600	745	733	721	711	700	690	679	669	658	649	640	630	621	612	604	595
					275	268	262	256	249	244	238	232	228	222	217	212	208	203	198	194
68DLH18	61	68	104850	104850	862	849	835	823	810	798	786	774	762	751	739	729	718	708	697	688
					311	304	297	289	283	276	269	263	257	251	246	240	234	230	225	219
68DLH19	67	68	120750	120750	993	976	961	946	931	916	901	888	874	861	847	835	822	810	798	787
					353	344	336	328	320	313	305	298	291	285	278	272	266	260	254	248
			84-99	**100-128**	**129**	**130**	**131**	**132**	**133**	**134**	**135**	**136**	**137**	**138**	**139**	**140**	**141**	**142**	**143**	**144**
72DLH14	41	72	58800	58800	454	447	441	435	427	421	415	411	405	399	393	388	382	378	372	367
					171	167	163	159	155	152	149	146	143	139	136	133	131	128	125	123
72DLH15	44	72	67350	67350	520	513	504	496	489	483	475	468	462	454	448	442	436	429	423	418
					191	187	183	178	174	171	167	163	160	156	152	150	147	143	140	137
72DLH16	50	72	77850	77850	601	592	585	576	567	559	552	544	537	529	522	514	507	501	493	487
					225	219	214	209	205	200	196	191	188	183	179	175	171	169	165	161
72DLH17	56	72	87600	87600	676	667	657	648	639	630	621	612	603	595	586	579	571	564	556	549
					256	250	245	239	233	228	224	218	213	209	205	200	196	191	188	184
72DLH18	59	72	102600	102600	792	780	768	757	745	735	724	718	705	694	685	675	666	657	648	639
					289	283	276	270	265	258	252	247	242	236	231	227	222	217	212	209
72DLH19	70	72	120300	120300	928	913	900	886	873	859	847	835	823	811	799	789	777	766	756	745
					328	321	313	306	300	293	286	280	274	268	263	257	251	247	241	236

* The safe factored uniform load for the clear spans shown in the Safe Load Column is equal to (Safe Load) / (Clear span + 0.67). (The added 0.67 feet (8 inches) is required to obtain the proper length on which the Load Tables were developed).

In no case shall the safe uniform load, for clear spans less than the minimum clear span shown in the Safe Load Column, exceed the uniform load calculated for the minimum clear span listed in the Safe Load Column.

To solve for *live* loads for clear spans shown in the Safe Load Column (or lesser clear spans), multiply the live load of the shortest clear span shown in the Load Table by (the shortest clear span shown in the Load Table + 0.67 feet)^2 and divide by (the actual clear span + 0.67 feet)^2. The live load shall *not* exceed the safe uniform load.

STANDARD ASD LOAD TABLE
DEEP LONGSPAN STEEL JOISTS, DLH-SERIES

Based on a 50 ksi Maximum Yield Strength
Adopted by the Steel Joist Institute May 25, 1983
Revised to November 10, 2003 - Effective March 01, 2005

The black figures in the following table give the TOTAL safe uniformly distributed load-carrying capacities, in pounds per linear foot, of an **ASD** **DLH-Series** Steel Joists. The weight of DEAD loads, including the joists, must in all cases be deducted to determine the LIVE load-carrying capacities of the joists. The approximate DEAD load of the joists may be determined from the weights per linear foot shown in the tables. All loads shown are for roof construction only.

The **RED** figures in this load table are the nominal LIVE loads per linear foot of joist which will produce an approximate deflection of 1/360 of the span. LIVE loads which will produce a deflection of 1/240 of the span may be obtained by multiplying the **RED** figures by 1.5. In no case shall the TOTAL load capacity of the joists be exceeded.

This load table applies to joists with either parallel chords or standard pitched top chords. When top chords are pitched, the carrying capacities are determined by the nominal depth of the joists at the center of the span. Standard top chord pitch is 1/8 inch per foot. If pitch exceeds this standard, the load table does not apply. Sloped parallel-chord joists shall use span as defined by the length along the slope.

All rows of bridging shall be diagonal bridging with bolted connections at the chords and intersections.

Where the joist span is in the **BLUE SHADED** area of the load table hoisting cables shall not be released until the two rows of bridging nearest the third points are completely installed.

Where the joist span is in the **GRAY SHADED** area of the load table hoisting cables shall not be released until all rows of bridging are completely installed.

The approximate moment of inertia of the joist, in inches^4 is; $I_j = 26.767(W_{LL})(L^3)(10^{-6})$, where W_{LL}= **RED** figure in the Load Table, and L = (clear span + 0.67) in feet.

When holes are required in top or bottom chords, the carrying capacities must be reduced in proportion to the reduction of chord areas.

The top chords are considered as being stayed laterally by floor slab or roof deck.

The approximate joist weights per linear foot shown in these tables do not include accessories.

ASD

STANDARD LOAD TABLE LONGSPAN STEEL JOISTS, DLH-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	Approx. Wt in Lbs. Per Linear Ft (Joists only)	Depth in inches	SAFELOAD* in Lbs. Between	CLEAR SPAN IN FEET															
			61-88	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**	**97**	**98**	**99**	**100**	**101**	**102**	**103**	**104**
52DLH10	25	52	26700	298 171	291 165	285 159	279 154	273 150	267 145	261 140	256 136	251 132	246 128	241 124	236 120	231 116	227 114	223 110	218 107
52DLH11	26	52	29300	327 187	320 181	313 174	306 169	299 164	293 158	287 153	281 149	275 144	270 140	264 135	259 132	254 128	249 124	244 120	240 117
52DLH12	29	52	32700	365 204	357 197	349 191	342 185	334 179	327 173	320 168	314 163	307 158	301 153	295 149	289 144	284 140	278 135	273 132	268 128
52DLH13	34	52	39700	443 247	433 239	424 231	414 224	406 216	397 209	389 203	381 197	373 191	366 185	358 180	351 174	344 170	338 164	331 159	325 155
52DLH14	39	52	45400	507 276	497 266	486 258	476 249	466 242	457 234	447 227	438 220	430 213	421 207	413 201	405 194	397 189	390 184	382 178	375 173
52DLH15	42	52	51000	569 311	557 301	545 291	533 282	522 272	511 264	500 256	490 247	480 240	470 233	461 226	451 219	443 213	434 207	426 201	418 195
52DLH16	45	52	55000	614 346	601 335	588 324	575 314	563 304	551 294	540 285	528 276	518 267	507 260	497 252	487 245	478 237	468 230	459 224	451 217
52DLH17	52	52	63300	706 395	691 381	676 369	661 357	647 346	634 335	620 324	608 315	595 304	583 296	572 286	560 279	549 270	539 263	528 255	518 247
			66-96	**97**	**98**	**99**	**100**	**101**	**102**	**103**	**104**	**105**	**106**	**107**	**108**	**109**	**110**	**111**	**112**
56DLH11	26	56	28100	288 169	283 163	277 158	272 153	267 149	262 145	257 140	253 136	248 133	244 129	239 125	235 122	231 118	227 115	223 113	219 110
56DLH12	30	56	32300	331 184	324 178	318 173	312 168	306 163	300 158	295 153	289 150	284 145	278 141	273 137	268 133	263 130	259 126	254 123	249 119
56DLH13	34	56	39100	401 223	394 216	386 209	379 204	372 197	365 191	358 186	351 181	344 175	338 171	331 166	325 161	319 157	314 152	308 149	303 145
56DLH14	39	56	44200	453 249	444 242	435 234	427 228	419 221	411 214	403 209	396 202	388 196	381 190	375 186	368 181	361 175	355 171	349 167	343 162
56DLH15	42	56	50500	518 281	508 272	498 264	488 256	478 248	469 242	460 234	451 228	443 221	434 215	426 209	419 204	411 198	403 192	396 188	389 182
56DLH16	46	56	54500	559 313	548 304	537 294	526 285	516 277	506 269	496 262	487 254	478 247	469 240	460 233	452 227	444 221	436 214	428 209	420 204
56DLH17	51	56	62800	643 356	630 345	618 335	605 325	594 316	582 306	571 298	560 289	549 281	539 273	529 266	520 258	510 251	501 245	492 238	483 231

ASD

STANDARD LOAD TABLE LONGSPAN STEEL JOISTS, DLH-SERIES
Based on a 50 ksi Maximum Yield Strength - Loads Shown in Pounds per Linear Foot (plf)

Joist Designation	Approx. Wt in Lbs. Per Linear Ft (Joists only)	Depth in inches	SAFE LOAD* in Lbs. Between		CLEAR SPAN IN FEET															
			70-99	**100-104**	**105**	**106**	**107**	**108**	**109**	**110**	**111**	**112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**
60DLH12	29	60	31100	31100	295 168	289 163	284 158	279 154	274 150	270 146	265 142	261 138	256 134	252 131	248 128	244 124	240 121	236 118	232 115	228 113
60DLH13	35	60	37800	37800	358 203	351 197	345 191	339 187	333 181	327 176	322 171	316 167	311 163	306 158	301 154	296 151	291 147	286 143	282 139	277 135
60DLH14	40	60	42000	42000	398 216	391 210	383 205	376 199	370 193	363 189	356 183	350 178	344 173	338 170	332 165	327 161	321 156	316 152	310 149	305 145
60DLH15	43	60	49300	49300	467 255	458 248	450 242	442 235	434 228	427 223	419 216	412 210	405 205	398 200	392 194	385 190	379 185	373 180	367 175	361 171
60DLH16	46	60	54200	54200	513 285	504 277	494 269	485 262	476 255	468 247	460 241	451 235	444 228	436 223	428 217	421 211	414 206	407 201	400 196	393 190
60DLH17	52	60	62300	62300	590 324	579 315	569 306	558 298	548 290	538 283	529 275	519 267	510 261	501 254	493 247	484 241	476 235	468 228	460 223	453 217
60DLH18	59	60	71900	71900	681 366	668 357	656 346	644 337	632 327	621 319	610 310	599 303	589 294	578 286	568 279	559 272	549 266	540 259	531 252	522 246
			75-99	**100-112**	**113**	**114**	**115**	**116**	**117**	**118**	**119**	**120**	**121**	**122**	**123**	**124**	**125**	**126**	**127**	**128**
64DLH12	31	64	30000	30000	264 153	259 150	255 146	251 142	247 138	243 135	239 132	235 129	231 125	228 122	224 119	221 116	218 114	214 111	211 109	208 106
64DLH13	34	64	36400	36400	321 186	315 181	310 176	305 171	300 168	295 163	291 159	286 155	281 152	277 148	273 144	269 141	264 137	260 134	257 131	253 128
64DLH14	40	64	41700	41700	367 199	360 193	354 189	349 184	343 179	337 174	332 171	326 166	321 162	316 158	311 154	306 151	301 147	296 143	292 140	287 136
64DLH15	43	64	47800	47800	421 234	414 228	407 223	400 217	394 211	387 206	381 201	375 196	369 191	363 187	358 182	352 177	347 173	341 170	336 165	331 161
64DLH16	46	64	53800	53800	474 262	466 254	458 248	450 242	443 235	435 229	428 224	421 218	414 213	407 208	401 203	394 198	388 193	382 189	376 184	370 180
64DLH17	52	64	62000	62000	546 298	536 290	527 283	518 275	509 268	501 262	492 255	484 248	476 243	468 237	461 231	454 226	446 220	439 215	432 210	426 205
64DLH18	59	64	71600	71600	630 337	619 328	608 320	598 311	587 304	578 296	568 288	559 282	549 274	540 267	532 261	523 255	515 249	507 243	499 237	491 232
			80-99	**100-120**	**121**	**122**	**123**	**124**	**125**	**126**	**127**	**128**	**129**	**130**	**131**	**132**	**133**	**134**	**135**	**136**
68DLH13	37	68	35000	35000	288 171	284 168	279 164	275 159	271 155	267 152	263 149	259 145	255 142	252 138	248 135	244 133	241 130	237 127	234 124	231 121
68DLH14	40	68	40300	40300	332 184	327 179	322 175	317 171	312 167	308 163	303 159	299 155	294 152	290 148	286 145	281 141	277 138	273 135	269 133	266 130
68DLH15	44	68	45200	45200	372 206	365 201	360 196	354 191	348 187	343 182	337 178	332 174	327 170	322 166	317 162	312 158	308 155	303 152	299 148	294 145
68DLH16	49	68	53600	53600	441 242	433 236	427 230	420 225	413 219	407 214	400 209	394 204	388 199	382 195	376 190	371 186	365 182	360 178	354 174	349 171
68DLH17	55	68	60400	60400	497 275	489 268	481 262	474 256	467 249	460 244	453 238	446 232	439 228	433 222	427 217	420 212	414 208	408 203	403 198	397 194
68DLH18	61	68	69900	69900	575 311	566 304	557 297	549 289	540 283	532 276	524 269	516 263	508 257	501 251	493 246	486 240	479 234	472 230	465 225	459 219
68DLH19	67	68	80500	80500	662 353	651 344	641 336	631 328	621 320	611 313	601 305	592 298	583 291	574 285	565 278	557 272	548 266	540 260	532 254	525 248
			84-99	**100-128**	**129**	**130**	**131**	**132**	**133**	**134**	**135**	**136**	**137**	**138**	**139**	**140**	**141**	**142**	**143**	**144**
72DLH14	41	72	39200	39200	303 171	298 167	294 163	290 159	285 155	281 152	277 149	274 146	270 143	266 139	262 136	259 133	255 131	252 128	248 125	245 123
72DLH15	44	72	44900	44900	347 191	342 187	336 183	331 178	326 174	322 171	317 167	312 163	308 160	303 156	299 152	295 150	291 147	286 143	282 140	279 137
72DLH16	50	72	51900	51900	401 225	395 219	390 214	384 209	378 205	373 200	368 196	363 191	358 188	353 183	348 179	343 175	338 171	334 169	329 165	325 161
72DLH17	56	72	58400	58400	451 256	445 250	438 245	432 239	426 233	420 228	414 224	408 218	402 213	397 209	391 205	386 200	381 196	376 191	371 188	366 184
72DLH18	59	72	68400	68400	528 289	520 283	512 276	505 270	497 265	490 258	483 252	479 247	470 242	463 236	457 231	450 227	444 222	438 217	432 212	426 209
72DLH19	70	72	80200	80200	619 328	609 321	600 313	591 306	582 300	573 293	565 286	557 280	549 274	541 268	533 263	526 257	518 251	511 247	504 241	497 236

* The safe uniform load for the clear spans shown in the Safe Load Column is equal to (Safe Load) / (Clear Span + 0.67). (The added 0.67 feet (8 inches) is required to obtain the proper length on which the Load Tables were developed).

In no case shall the safe uniform load, for clear spans less than the minimum clear span shown in the Safe Load Column, exceed the uniform load calculated for the minimum clear span listed in the Safe Load Column.

To solve for *live* loads for clear spans shown in the Safe Load Column (or lesser clear spans), multiply the live load of the shortest clear span shown in the Load Table by (the shortest clear span shown in the Load Table + 0.67 feet)^2 and divide by (the actual clear span + 0.67 feet)^2. The live load shall *not* exceed the safe uniform load.

NOTES

HIGH STRENGTH

ECONOMICAL

DESIGN - Vulcraft SLH Series long span steel joists are designed in accordance with the specifications included in this section.

ACCESSORIES see page 74.

PAINT - Vulcraft SLH Series joists receive a shop-coat of rust inhibitive primer that conforms to specification 202.4.

SPECIFICATIONS - see page 80.

TABLE 1

SLH- SERIES BRIDGING SPACING

JOIST SECTION NUMBER*	MINIMUM BOLT DIAMETER	MAXIMUM SPACING OF BRIDGING LINES
SLH 15-18	5/8" dia A325	21'-0"
SLH 19-20	5/8" dia A325	26'-0"
SLH 21-22	5/8" dia A325	30'-0"
SLH 23-25	3/4" dia A325	30'-0"

*LAST TWO DIGITS OF JOIST DESIGNATION SHOWN IN LOAD TABLE.

TABLE 2

SLH-SERIES BEARING DATA

JOIST SECTION NUMBER*	BEARING DEPTH	MINIMUM BEARING LENGTH	BEARING SEAT FILLET WELD (1)	BEARING SEAT BOLTS FOR ERECTION (1)
SLH 15-18	7-1/2"	4"	2-1/4" x 2"	2-3/4" dia A325
SLH 19-25	7-1/2"	6"	2-1/4" x 4"	2-3/4" dia A325

(1) BEARING SEATS MUST BE WELDED IN ADDITION TO BEING BOLTED.

TABLE 3

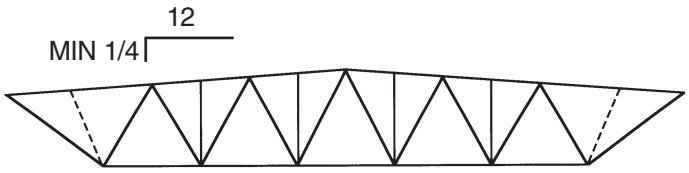
JOIST DEPTH	HORIZONTAL PLUS DIAGONAL BRIDGING*		DIAGONAL ONLY BRIDGING				
	.66 X DEPTH*	HORIZONTAL AND DIAGONAL ANGLE SIZE	MIN. JOIST SPACE FOR DIAGONAL ONLY BRIDGING	MAXIMUM JOIST SPACING FOR DIAGONAL BRIDGING SIZE			
				2" x 2" x 1/8"	2 1/2" x 2 1/2" x 3/16"	3" x 3" x 3/16"	3 1/2" x 3 1/2" x 1/4"
80"	4'-4"	1 3/4" x 1 3/4" x 1/8"	4'-5"	9'-11"	15'-1"	18'-8"	22'-1"
88"	4'-9"	1 3/4" x 1 3/4" x 1/8"	4'-10"	7'-3"	14'-9"	18'-5"	21'-11"
96"	5'-3"	2" x 2" x 1/8"	5'-4"		14'-5"	18'-2"	21'-8"
104"	5'-8"	2 1/2" x 2 1/2" x 3/16"	5'-9"		14'-0"	17'-10"	21'-5"
112"	6'-1"	2 1/2" x 2 1/2" x 3/16"	6'-2"		11'-11"	17'-6"	21'-1"
120"	6'-7"	2 1/2" x 2 1/2" x 3/16"	6'-8"			17'-0"	20'-10"

***NOTE: WHEN THE JOIST SPACING IS LESS THAN 0.66 x JOIST DEPTH, BOLTED HORIZONTAL BRIDGING SHALL BE USED IN ADDITION TO THE DIAGONAL BRIDGING.**

NOTES: 1. For lengths and depths greater than those shown in the load tables contact Vulcraft.

2. Additional bridging may be required when joists support a standing seam roof. The specifying professional should require the joist manufacturer to check the system and provide bridging as required to adequately brace the joists against lateral movement. For bridging requirements due to uplift loading refer to specification section 204.13.

ACCESSORIES AND DETAILS
SLH SERIES LONGSPAN STEEL JOISTS.



THE RECOMMENDED CONFIGURATION FOR SLH-SERIES JOISTS IS A DOUBLE PITCHED TOP CHORD WITH A MINIMUM PITCH OF 1/4 INCH PER FOOT. THE DEPTH OF THE JOIST SHALL BE THAT AT THE RIDGE OF THE JOIST. FOR OTHER CONFIGURATIONS CONTACT VULCRAFT. WEB LAYOUT MAY VARY FROM THAT SHOWN.

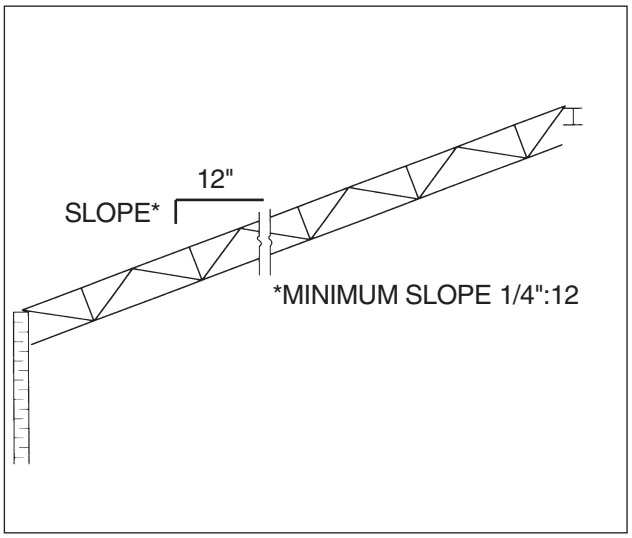
SLH-SERIES CAMBER*

TOP CHORD LENGTH	DOUBLE PITCH JOISTS**	PARALLEL CHORD JOISTS
111'-0"	3 1/4"	5 1/4"
120'-0"	3 1/2"	6"
130'-0"	3 7/8"	7"
140'-0"	4 1/8"	8"
150'-0"	4 3/8"	8 3/4"
160'-0"	4 3/4"	9 1/2"
180'-0"	5 1/4"	10 1/2"
200'-0"	5 7/8"	11 3/4"
220'-0"	6 1/2"	13"
240'-0"	7"	14"

**JOISTS WITH TOP CHORD PITCH OF 1/4" PER FOOT OR GREATER.

*For walls or other structural members near SLH-Series Joists provisions need to be made to match top chord elevation.

Specifying professional must provide camber requirements in inches if camber is different from that shown.

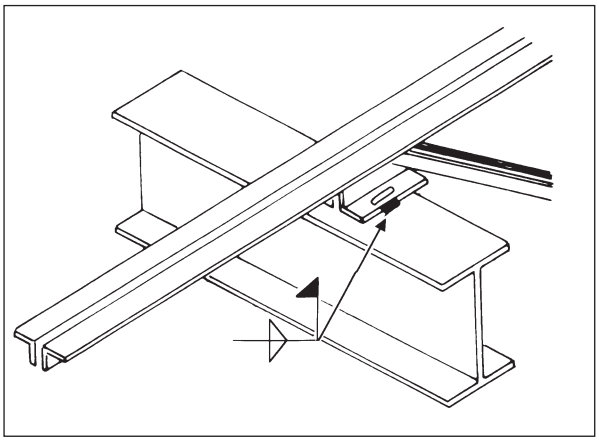


PARALLEL CHORD JOISTS
SEE SPECIFICATION 203.4 (c)

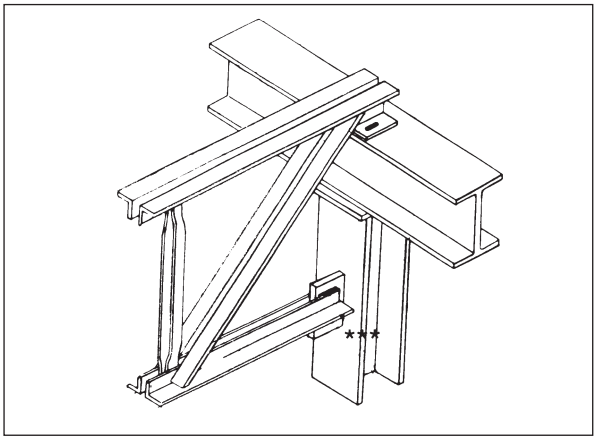
(a) Extend top chords require the special attention of the specifying engineer.

The magnitude and location of the design loads to be supported, the deflection requirements, and the proper bracing shall be clearly indicated on the structural drawings.

NOTE:
FOR ANY CONCENTRATED LOADS SUCH AS BASKETBALL GOALS, CURTAINS, SCORE BOARDS, HVAC UNITS, ETC. IT IS ESSENTIAL THAT THE SPECIFYING ENGINEER PROVIDE THE MAGNITUDE AND LOCATION OF ALL LOADS ON THE STRUCTURAL DRAWINGS.

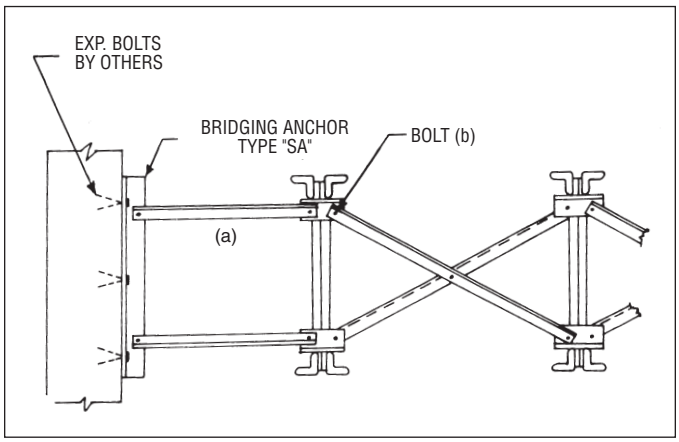


TOP CHORD EXTENSION (a)
SEE TABLE 204.8.1



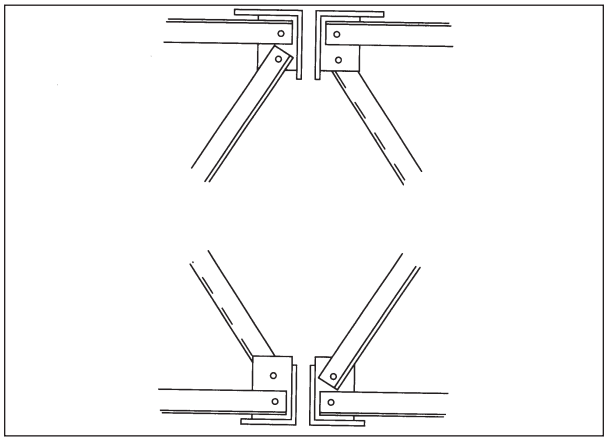
BOTTOM CHORD STRUT
(SEE SPECFICATION 204.1)

*** If bottom chord is to be bolted or welded the specifying professional must provide axial loads on structural drawings.



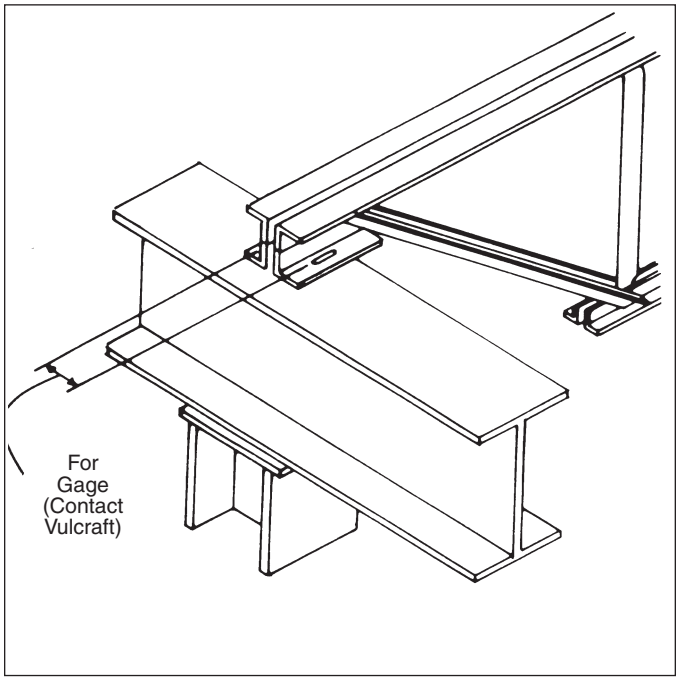
CROSS BRIDGING

A) HORIZONTAL BRIDGING IS TO BE USED IN THE SPACE ADJACENT TO THE WALL TO ALLOW FOR PROPER DEFLECTION OF THE JOIST NEAREST THE WALL. SEE TABLES 1 AND 3 PAGE 73.
B) FOR REQUIRED BOLT SIZE REFER TO BRIDGING TABLE ON PAGE 73. NOTE: CLIP CONFIGURATION MAY VARY FROM THAT SHOWN.



BOLTED, HORIZONTAL PLUS DIAGONAL, BRIDGING

SEE TABLE 3, PAGE 73 AND SPECIFICATION 204.6.
NOTE: CLIP CONFIGURATION MAY VARY FROM THAT SHOWN.
NOTE: DO NOT HANG ANY MECHANICAL, ELECTRICAL, ETC. FROM BRIDGING.

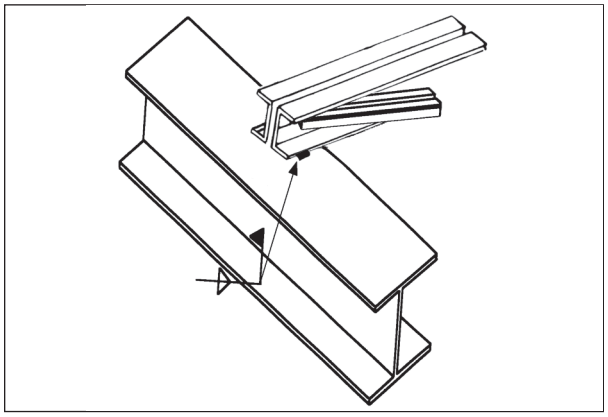


BOLTED CONNECTION (b)

SEE TABLE 2, PAGE 73.
TYPICALLY USED AT COLUMNS

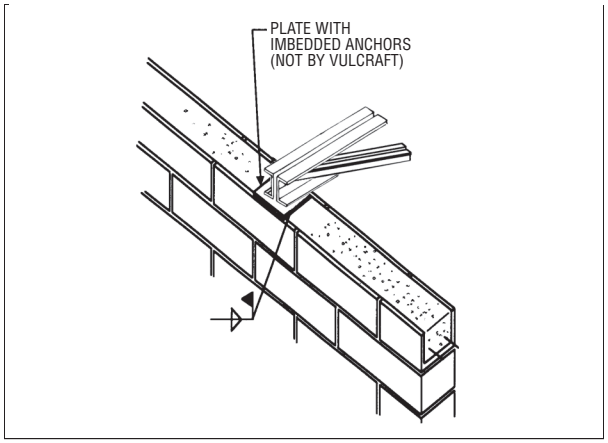
The Occupation Safety and Health Administration Standards (OSHA), Paragraph 1910.12 refers to Paragraph 1518.751 of "Construction Standards" which states:

"In steel framing, where bar joists are utilized, and columns are not framed in at least two directions with structural steel members, a bar joist shall be field-bolted at columns to provide lateral stability during construction."



ANCHORAGE TO STEEL

SEE TABLE 2, PAGE 73.



ANCHORAGE TO MASONRY

SEE SPECIFICATION 204.5 (a)
SEE TABLE 2, PAGE 73.

VULCRAFT LOAD TABLE
SUPER LONGSPAN STEEL JOISTS, LRFD SLH-SERIES

JANUARY 1, 2007

Based on a 50 ksi Maximum Yield Strength

The black figures in the following table give the TOTAL safe uniformly-distributed load-carrying capacities, in pounds per linear foot, of **LRFD SLH-Series** Joists. The weight of DEAD loads, including the joists, must in all cases be deducted to determine the LIVE load-carrying capacities of the joists. The approximate DEAD load of the joists may be determined from the weights per linear foot shown in the tables. All loads shown are for roof construction only.

The red figures in this table are the LIVE loads per linear foot of joist which will produce an approximate deflection of 1/360 of the span. LIVE loads which will produce a deflection of 1/240 of the span may be obtained by multiplying the red figures by 1.5. In no case shall the TOTAL load capacity of the joists be exceeded.

*The safe load for the clear spans shown in the shaded section is equal to (Safe Load) / (Clear Span + 0.67). [The added 0.67 feet (8 inches) is required to obtain the proper length on which the Load Tables were developed.]
In no case shall the safe uniform load, for clear spans less than the minimum clear span shown in the shaded area, exceed the uniform load calculated for the minimum clear span listed in the shaded area.

This load table applies to joists with either parallel chords or standard pitched top chords. When top chords are pitched, the design capacities are determined by the nominal depth of the joists at the center of the span. Standard top chord pitch is 1/4 inch per foot. If pitch exceeds this standard, the load table does not apply. This load table may be used for parallel chord joists installed to a maximum slope of 1/2 inch per foot.

When holes are required in top or bottom chords, the carrying capacities must be reduced in proportion to reduction of chord areas.

The top chords are considered as being stayed laterally by the roof deck.

The approximate joist weights per linear foot shown in these table do not include accessories.

When erecting SLH joists, hoisting cables shall not be released until all rows of bridging are completely installed.

To solve for **live** loads for clear spans shown in the shaded area (or lesser clear spans), multiply the live load of the shortest clear span shown in the Load tables by (the shortest clear span shown in the Load table + 0.67 feet)^2 and divide by (the actual clear span +.067 feet)^2. The live load shall **not** exceed the safe uniform load.

**For spans between those listed use a linear interpolation.

LRFD

Joist Designation	Approx. Wt. In Lbs. per Linear Ft. (Joists Only)	Depth In Inches	Safe Load* In Lbs. Between	CLEAR SPAN IN FEET**															
			80-110	**111**	**114**	**117**	**120**	**123**	**126**	**129**	**132**	**135**	**138**	**141**	**144**	**147**	**150**	**155**	
80SLH**15**	40	80	78,000	699	663	632	602	575	549	525	503	482	461	443	425	408	392	366	342
				321	296	275	255	236	220	205	192	179	167	157	147	139	130	118	107
80SLH**16**	46	80	93,750	840	802	763	727	691	658	628	600	574	549	525	504	483	463	433	406
				375	347	321	297	276	257	240	224	209	196	184	172	162	162	138	126
80SLH**17**	53	80	108,300	971	926	881	839	800	765	731	699	669	641	615	590	567	545	510	479
				451	416	386	358	332	309	288	269	252	235	221	207	195	183	166	151
80SLH**18**	60	80	122,400	1097	1044	993	947	903	863	825	789	756	723	695	666	641	615	576	542
				516	477	441	409	380	354	330	308	288	270	253	237	223	210	190	173
80SLH**19**	67	80	142,800	1280	1218	1160	1104	1052	1005	960	918	878	840	806	774	743	714	668	627
				578	533	493	458	425	396	369	344	322	301	283	266	250	235	213	193
80SLH**20**	75	80	160,500	1446	1382	1323	1268	1211	1157	1104	1056	1011	968	927	891	855	821	770	722
				646	596	552	512	475	443	412	385	360	337	316	297	279	263	238	216
			88-119	**120**	**123**	**126**	**129**	**132**	**135**	**138**	**141**	**144**	**147**	**150**	**155**	**160**	**165**	**170**	**175**
88SLH**16**	46	88	93,000	771	735	701	671	642	615	591	567	545	524	503	471	443	417	393	372
				361	336	313	291	272	254	238	223	210	197	186	168	153	140	127	117
88SLH**17**	51	88	105,150	871	830	789	753	719	687	659	630	605	579	557	521	489	459	432	407
				404	375	349	325	304	284	266	249	234	220	207	187	170	156	143	130
88SLH**18**	58	88	120,600	1001	953	908	866	827	791	756	725	695	666	639	599	561	528	497	468
				460	427	397	370	346	323	303	284	267	250	236	214	195	177	162	149
88SLH**19**	65	88	139,500	1157	1101	1049	999	954	912	873	836	801	770	738	692	648	609	573	540
				521	484	450	420	392	367	343	322	302	284	267	243	221	201	184	169
88SLH**20**	76	88	160,500	1334	1281	1232	1184	1133	1085	1041	998	959	921	885	830	780	734	692	626
				623	579	539	502	469	438	410	385	361	340	320	290	264	241	220	202
88SLH**21**	89	88	198,000	1649	1568	1494	1425	1361	1301	1244	1191	1143	1097	1053	986	924	869	816	770
				724	673	626	584	545	509	477	447	420	395	372	337	307	280	256	235

VULCRAFT LOAD TABLE
SUPER LONGSPAN STEEL JOISTS, SLH-SERIES

Based on a 50 ksi Maximum Yield Strength

LRFD

Joist Designation	Approx. Wt. In Lbs. per Linear Ft. (Joists Only)	Depth In Inches	Safe Load* In Lbs. Between	CLEAR SPAN IN FEET**															
			96-128	**129**	**132**	**135**	**138**	**141**	**144**	**147**	**150**	**155**	**160**	**165**	**170**	**175**	**180**	**185**	**190**
96SLH**17**	52	96	105,000	810	776	744	711	684	657	632	608	570	536	503	474	447	422	399	378
				389	363	339	318	298	280	263	247	224	204	186	170	156	143	132	122
96SLH**18**	58	96	118,200	912	875	839	803	770	740	713	686	645	608	572	540	510	483	458	434
				443	413	386	362	340	319	300	282	256	232	212	194	178	163	150	139
96SLH**19**	66	96	141,300	1091	1046	1001	957	917	878	842	809	758	711	668	629	594	560	530	501
				502	469	438	410	385	361	340	320	290	264	241	220	202	186	171	158
96SLH**20**	74	96	159,000	1236	1184	1131	1083	1037	993	952	915	857	804	756	713	672	635	600	567
				569	531	496	465	436	409	385	362	329	299	272	249	229	210	193	178
96SLH**21**	90	96	199,500	1541	1473	1410	1350	1296	1243	1196	1149	1079	1013	953	897	846	800	756	716
				698	652	610	571	535	503	473	445	404	367	335	306	281	258	238	220
96SLH**22**	102	96	223,500	1725	1662	1601	1542	1487	1436	1382	1329	1248	1173	1104	1041	984	930	881	834
				811	757	708	663	622	584	549	517	469	426	389	355	326	300	276	255
			104-137	**138**	**141**	**144**	**147**	**150**	**155**	**160**	**165**	**170**	**175**	**180**	**185**	**190**	**195**	**200**	**205**
104SLH**18**	59	104	115,200	831	798	768	734	708	666	627	594	561	531	503	477	453	431	410	390
				426	400	375	353	332	301	274	250	229	209	192	177	164	152	140	130
104SLH**19**	67	104	140,100	1011	971	933	897	861	809	761	719	678	641	606	575	546	519	488	468
				484	453	426	401	377	342	311	284	260	238	218	201	186	172	160	148
104SLH**20**	75	104	157,500	1146	1107	1071	1032	992	932	875	822	774	731	690	653	620	587	557	530
				548	513	483	453	427	387	352	321	293	269	247	228	210	195	181	167
104SLH**21**	90	104	198,000	1434	1376	1322	1271	1220	1145	1077	1016	959	906	857	812	771	732	696	662
				673	632	593	558	525	476	433	395	361	331	301	280	259	240	222	206
104SLH**22**	104	104	222,000	1607	1551	1499	1449	1401	1325	1245	1175	1107	1047	990	939	891	846	804	767
				783	734	689	648	610	553	503	459	420	385	353	326	301	278	258	240
104SLH**23**	109	104	244,500	1772	1712	1644	1578	1514	1418	1331	1251	1178	1112	1050	993	942	893	848	806
				819	768	721	678	638	578	526	480	439	403	370	341	315	291	270	250
			112-146	**147**	**150**	**155**	**160**	**165**	**170**	**175**	**180**	**185**	**190**	**195**	**200**	**205**	**210**	**215**	**220**
112LSH**19**	67	112	137,850	935	900	846	795	750	708	669	636	603	573	543	518	494	471	450	429
				466	439	398	362	330	302	276	255	234	216	200	186	172	160	149	140
112SLH**20**	76	112	156,000	1065	1032	974	915	863	815	771	732	695	660	626	597	569	542	518	495
				528	497	450	410	374	342	313	288	266	245	227	210	195	181	169	158
112SLH**21**	91	112	196,500	1337	1287	1208	1136	1070	1010	956	905	858	815	774	737	702	669	639	611
				650	612	555	504	460	421	386	355	327	301	279	259	240	224	208	195
112SLH**22**	104	112	220,500	1499	1451	1377	1307	1236	1167	1104	1046	992	942	894	852	812	774	738	705
				755	711	644	586	535	489	449	412	380	350	324	301	279	260	242	226
112SLH**23**	110	112	243,000	1653	1601	1518	1439	1352	1272	1200	1134	1074	1019	966	918	873	831	792	756
				790	744	674	613	560	512	469	431	397	367	340	315	292	272	253	236
112SLH**24**	131	112	288,000	1956	1895	1799	1709	1611	1521	1439	1364	1293	1229	1167	1112	1059	1010	963	920
				957	901	817	743	678	620	569	523	481	444	411	381	354	329	307	287
			102-164	**165**	**170**	**175**	**180**	**185**	**190**	**195**	**200**	**205**	**210**	**215**	**220**	**230**	**235**	**240**	
120SLH**20**	77	120	148,350	896	846	798	758	719	684	651	621	593	564	539	516	494	473	453	435
				430	393	361	332	306	282	261	242	225	209	195	182	170	159	149	140
120SLH**21**	92	120	184,500	1122	1059	1001	948	899	855	813	774	738	704	672	642	615	588	564	540
				530	485	444	409	376	347	321	298	277	258	240	224	209	196	184	173
120SLH**22**	104	120	211,500	1283	1223	1155	1094	1038	987	939	894	852	813	776	743	710	680	651	624
				616	564	516	475	438	404	374	347	322	300	279	261	244	228	214	201
120SLH**23**	111	120	234,000	1415	1347	1272	1206	1145	1088	1035	986	939	894	854	815	779	744	713	683
				644	590	541	497	458	423	391	363	336	313	292	272	255	238	224	210
120SLH**24**	132	120	277,500	1676	1593	1505	1425	1353	1287	1224	1166	1112	1059	1013	968	926	887	849	815
				781	715	655	603	555	512	474	440	408	380	354	330	309	289	271	255
120SLH**25**	152	120	318,000	1926	1827	1728	1638	1554	1476	1404	1337	1275	1217	1163	1112	1064	1017	975	935
				915	837	768	706	650	600	555	515	478	445	415	387	362	339	318	298

VULCRAFT LOAD TABLE
SUPER LONGSPAN STEEL JOISTS, ASD SLH-SERIES

JANUARY 1, 2007

Based on a 50 ksi Maximum Yield Strength

The black figures in the following table give the TOTAL safe uniformly-distributed load-carrying capacities, in pounds per linear foot, of **ASD SLH-Series** Joists. The weight of DEAD loads, including the joists, must in all cases be deducted to determine the LIVE load-carrying capacities of the joists. The approximate DEAD load of the joists may be determined from the weights per linear foot shown in the tables. All loads shown are for roof construction only.

The red figures in this table are the LIVE loads per linear foot of joist which will produce an approximate deflection of 1/360 of the span. LIVE loads which will produce a deflection of 1/240 of the span may be obtained by multiplying the red figures by 1.5. In no case shall the TOTAL load capacity of the joists be exceeded.

*The safe load for the clear spans shown in the shaded section is equal to (Safe Load) / (Clear Span + 0.67). [The added 0.67 feet (8 inches) is required to obtain the proper length on which the Load Tables were developed.]
In no case shall the safe uniform load, for clear spans less than the minimum clear span shown in the shaded area, exceed the uniform load calculated for the minimum clear span listed in the shaded area.

This load table applies to joists with either parallel chords or standard pitched top chords. When top chords are pitched, the design capacities are determined by the nominal depth of the joists at the center of the span. Standard top chord pitch is 1/4 inch per foot. If pitch exceeds this standard, the load table does not apply. This load table may be used for parallel chord joists installed to a maximum slope of 1/2 inch per foot.

When holes are required in top or bottom chords, the carrying capacities must be reduced in proportion to reduction of chord areas.

The top chords are considered as being stayed laterally by the roof deck.

The approximate joist weights per linear foot shown in these table do not include accessories.

When erecting SLH joists, hoisting cables shall not be released until all rows of bridging are completely installed.

To solve for **live** loads for clear spans shown in the shaded area (or lesser clear spans), multiply the live load of the shortest clear span shown in the Load tables by (the shortest clear span shown in the Load table + 0.67 feet)^2 and divide by (the actual clear span +.067 feet)^2. The live load shall **not** exceed the safe uniform load.

**For spans between those listed use a linear interpolation.

ASD

Joist Designation	Approx. Wt. In Lbs. per Linear Ft. (Joists Only)	Depth In Inches	Safe Load* In Lbs. Between	CLEAR SPAN IN FEET**															
			80-110	**111**	**114**	**117**	**120**	**123**	**126**	**129**	**132**	**135**	**138**	**141**	**144**	**147**	**150**	**155**	
80SLH**15**	40	80	52,000	466	442	421	401	383	366	350	335	321	307	295	283	272	261	244	228
				321	296	275	255	236	220	205	192	179	167	157	147	139	130	118	107
80SLH**16**	46	80	62,500	560	535	509	485	461	439	419	400	383	366	350	336	322	309	289	271
				375	347	321	297	276	257	240	224	209	196	184	172	162	162	138	126
80SLH**17**	53	80	72,200	647	617	587	559	533	510	487	466	446	427	410	393	378	363	340	319
				451	416	386	358	332	309	288	269	252	235	221	207	195	183	166	151
80SLH**18**	60	80	81,600	731	696	662	631	602	575	550	526	504	482	463	444	427	410	384	361
				516	477	441	409	380	354	330	308	288	270	253	237	223	210	190	173
80SLH**19**	67	80	95,200	853	812	773	736	701	670	640	612	585	560	537	516	495	476	445	418
				578	533	493	458	425	396	369	344	322	301	283	266	250	235	213	193
80SLH**20**	75	80	107,000	964	921	882	845	807	771	736	704	674	645	618	594	570	547	513	481
				646	596	552	512	475	443	412	385	360	337	316	297	279	263	238	216
			88-119	**120**	**123**	**126**	**129**	**132**	**135**	**138**	**141**	**144**	**147**	**150**	**155**	**160**	**165**	**170**	**175**
88SLH**16**	46	88	62,000	514	490	467	447	428	410	394	378	363	349	335	314	295	278	262	248
				361	336	313	291	272	254	238	223	210	197	186	168	153	140	127	117
88SLH**17**	51	88	70,100	581	553	526	502	479	458	439	420	403	386	371	347	326	306	288	271
				404	375	349	325	304	284	266	249	234	220	207	187	170	156	143	130
88SLH**18**	58	88	80,400	667	635	605	577	551	527	504	483	463	444	426	399	374	352	331	312
				460	427	397	370	346	323	303	284	267	250	236	214	195	177	162	149
88SLH**19**	65	88	93,000	771	734	699	666	636	608	582	557	534	513	492	461	432	406	382	360
				521	484	450	420	392	367	343	322	302	284	267	243	221	201	184	169
88SLH**20**	76	88	107,000	889	854	821	789	755	723	694	665	639	614	590	553	520	489	461	435
				623	579	539	502	469	438	410	385	361	340	320	290	264	241	220	202
88SLH**21**	89	88	132,000	1099	1045	996	950	907	867	829	794	762	731	702	657	616	579	544	513
				724	673	626	584	545	509	477	447	420	395	372	337	307	280	256	235

VULCRAFT LOAD TABLE
SUPER LONGSPAN STEEL JOISTS, SLH-SERIES

Based on a 50 ksi Maximum Yield Strength

ASD

Joist Designation	Approx. Wt. In Lbs. per Linear Ft. (Joists Only)	Depth In Inches	Safe Load* In Lbs. Between	CLEAR SPAN IN FEET**															
			96-128	**129**	**132**	**135**	**138**	**141**	**144**	**147**	**150**	**155**	**160**	**165**	**170**	**175**	**180**	**185**	**190**
96SLH**17**	52	96	70,000	540	517	496	474	456	438	421	405	380	357	335	316	298	281	266	252
				389	363	339	318	298	280	263	247	224	204	186	170	156	143	132	122
96SLH**18**	58	96	78,800	608	583	559	535	513	493	475	457	430	405	381	360	340	322	305	289
				443	413	386	362	340	319	300	282	256	232	212	194	178	163	150	139
96SLH**19**	66	96	94,200	727	697	667	638	611	585	561	539	505	474	445	419	396	373	353	334
				502	469	438	410	385	361	340	320	290	264	241	220	202	186	171	158
96SLH**20**	74	96	106,000	824	789	754	722	691	662	635	610	571	536	504	475	448	423	400	378
				569	531	496	465	436	409	385	362	329	299	272	249	229	210	193	178
96SLH**21**	90	96	133,000	1027	982	940	900	864	829	797	766	719	675	635	598	564	533	504	477
				698	652	610	571	535	503	473	445	404	367	335	306	281	258	238	220
96SLH**22**	102	96	149,000	1150	1108	1067	1028	991	957	921	886	832	782	736	694	656	620	587	556
				811	757	708	663	622	584	549	517	469	426	389	355	326	300	276	255
			104-137	**138**	**141**	**144**	**147**	**150**	**155**	**160**	**165**	**170**	**175**	**180**	**185**	**190**	**195**	**200**	**205**
104SLH**18**	59	104	76,800	554	532	512	489	472	444	418	396	374	354	335	318	302	287	273	260
				426	400	375	353	332	301	274	250	229	209	192	177	164	152	140	130
104SLH**19**	67	104	93,400	674	647	622	598	574	539	507	479	452	427	404	383	364	346	325	312
				484	453	426	401	377	342	311	284	260	238	218	201	186	172	160	148
104SLH**20**	75	104	105,000	764	738	714	688	661	621	583	548	516	487	460	435	413	391	371	353
				548	513	483	453	427	387	352	321	293	269	247	228	210	195	181	167
104SLH**21**	90	104	132,000	956	917	881	847	813	763	718	677	639	604	571	541	514	488	464	441
				673	632	593	558	525	476	433	395	361	331	301	280	259	240	222	206
104SLH**22**	104	104	148,000	1071	1034	999	966	934	883	830	783	738	698	660	626	594	564	536	511
				783	734	689	648	610	553	503	459	420	385	353	326	301	278	258	240
104SLH**23**	109	104	163,000	1181	1141	1096	1052	1009	945	887	834	785	741	700	662	628	595	565	537
				819	768	721	678	638	578	526	480	439	403	370	341	315	291	270	250
			112-146	**147**	**150**	**155**	**160**	**165**	**170**	**175**	**180**	**185**	**190**	**195**	**200**	**205**	**210**	**215**	**220**
112LSH**19**	67	112	91,900	623	600	564	530	500	472	446	424	402	382	362	345	329	314	300	286
				466	439	398	362	330	302	276	255	234	216	200	186	172	160	149	140
112SLH**20**	76	112	104,000	710	688	649	610	575	543	514	488	463	440	417	398	379	361	345	330
				528	497	450	410	374	342	313	288	266	245	227	210	195	181	169	158
112SLH**21**	91	112	131,000	891	858	805	757	713	673	637	603	572	543	516	491	468	446	426	407
				650	612	555	504	460	421	386	355	327	301	279	259	240	224	208	195
112SLH**22**	104	112	147,000	999	967	918	871	824	778	736	697	661	628	596	568	541	516	492	470
				755	711	644	586	535	489	449	412	380	350	324	301	279	260	242	226
112SLH**23**	110	112	162,000	1102	1067	1012	959	901	848	800	756	716	679	644	612	582	554	528	504
				790	744	674	613	560	512	469	431	397	367	340	315	292	272	253	236
112SLH**24**	131	112	192,000	1304	1263	1199	1139	1074	1014	959	909	862	819	778	741	706	673	642	613
				957	901	817	743	678	620	569	523	481	444	411	381	354	329	307	287
			102-164	**165**	**170**	**175**	**180**	**185**	**190**	**195**	**200**	**205**	**210**	**215**	**220**	**230**	**235**	**240**	
120SLH**20**	77	120	98,900	597	564	532	505	479	456	434	414	395	376	359	344	329	315	302	290
				430	393	361	332	306	282	261	242	225	209	195	182	170	159	149	140
120SLH**21**	92	120	123,000	748	706	667	632	599	570	542	516	492	469	448	428	410	392	376	360
				530	485	444	409	376	347	321	298	277	258	240	224	209	196	184	173
120SLH**22**	104	120	141,000	855	815	770	729	692	658	626	596	568	542	517	495	473	453	434	416
				616	564	516	475	438	404	374	347	322	300	279	261	244	228	214	201
120SLH**23**	111	120	156,000	943	898	848	804	763	725	690	657	626	596	569	543	519	496	475	455
				644	590	541	497	458	423	391	363	336	313	292	272	255	238	224	210
120SLH**24**	132	120	185,000	1117	1062	1003	950	902	858	816	777	741	706	675	645	617	591	566	543
				781	715	655	603	555	512	474	440	408	380	354	330	309	289	271	255
120SLH**25**	152	120	212,000	1284	1218	1152	1092	1036	984	936	891	850	811	775	741	709	678	650	623
				915	837	768	706	650	600	555	515	478	445	415	387	362	339	318	298

SECTION 200.
SCOPE

These specifications cover the design, manufacture and use of Super Longspan Steel Joists SLH Series.

SECTION 201.
DEFINITION

The term "Super Longspan Steel Joists SLH Series" as used herein, refers to open web, load-carrying members utilizing hot-rolled steel. SLH series are suitable for the direct support of roof decks in buildings.
The design for SLH Series joist chord or web sections shall be based on a yield strength of at least 36,000 psi, but not greater than 50,000 psi. Steel used for SLH Series joist chord or web sections shall have a minimum yield strength determined in accordance with one of the procedures specified in Section 202.2, which is equal to the yield strength assumed in the design. SLH Series joists shall be designed in accordance with these specifications to support the loads given in the attached Standard Load Tables for SLH Series joists.

SECTION 202.
MATERIALS

202.1 STEEL

The steel used in the manufacture of chord and web sections shall conform to one of the following ASTM Specifications:

- Carbon Structural Steel, ASTM A36/A36M.
- High-Strength, Low-Alloy Structural Steel, ASTM A242/A242M.
- High-Strength Carbon-Manganese Steel of Structural Quality ASTM A529/A529M, Grade 50.
- High-Strength Low-Alloy Columbium-Vanadium Structural Steel, ASTM A572/A572M Grade 42, 45, and 50.
- High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 inches (102 mm) thick, ASTM A588/A588M.
- Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Corrosion Resistance, ASTM A606.
- Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, ASTM A1008/A1008M.
- Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, ASTM A1011/A1011M.

or shall be of suitable quality ordered or produced to other than the listed specifications, provided that such material in the state used for final assembly and manufacture is weldable and is proved by tests performed by the producer or manufacturer to have the properties specified in Section 102.2.

202.2 MECHANICAL PROPERTIES

The yield strength used as a basis for the design stresses prescribed in Section 203 shall be at least 36,000 psi, but shall not be greater than 50,000 psi. Evidence that the steel furnished meets or exceeds the design yield strength shall, if requested, be provided in the form of an affidavit or by witnessed or certified test reports.

In the case of material, the mechanical properties of which conform to the requirements of one of the listed specifications, test specimens and procedure shall conform to those of such specifications and to ASTM A370.

In the case of material, the mechanical properties of which do not conform to the requirements of one of the listed specifications, the test specimens and procedure shall conform to the applicable requirements of ASTM A370 and the specimens shall exhibit a yield strength equal to or exceeding the design yield strength and an elongation of not less than (a) 20 percent in 2 inches for sheet and strip or (b) 18 percent in 8 inches for plates, shapes and bars with adjustments for thickness for plates, shapes, and bars as prescribed in ASTM A36/A36M, A242/A242M, A529/A529M, A572/A572M, and A588/A588M whichever specification is applicable on the basis of design yield strength. The number of tests shall be as prescribed in ASTM A6 for plates, shapes, and bars; and ASTM A570/A570M, A606, AND A607 for the sheet and strip.

202.3 WELDING ELECTRODES

The following electrodes shall be used for arc welding:
(a) For connected members both having a specified minimum yield strength greater than 36,000 psi
AWS A5.1 or A5.5, E70XX
AWS A5.17, F7X, EXXX flux electrode combination
AWS A5.18. E70S-X or E70U-1
AWS A5.20, E70T-X

(b) For connected members both having a specified minimum yield strength of 36,000 psi or one having a specified minimum yield strength of 36,000 psi and the other having a specified minimum yield strength greater than 36,000 psi
AWS A5.1, E60XX
AWS A5.17, F6X-EXXX flux electrode combination
AWS A5.20, E6O0T-X
or any of those listed in Section 202.3 (a)
Other welding methods, providing equivalent strength as demonstrated by tests, may be used.

202.4 PAINT

The Standard shop paint is a **primer coat** intended to protect the steel for only a short period of exposure in ordinary atmospheric conditions and shall be considered an impermanent and provisional coating. The Standard shop paint shall conform to one of the following:
(a) Steel Structures Painting Council Specification, SSPC No. 15.
(b) Or, shall be a shop paint which meets the minimum performance requirements of one of the above listed specifications.

SECTION 203.
DESIGN AND MANUFACTURE

203.1 METHOD

Joists shall be designed in accordance with these specifications as simply supported uniformly loaded

trusses supporting a roof deck so constructed as to brace the top chord of the joists against lateral buckling. Where any applicable design feature is not specifically covered herein, the design shall be in accordance with the American Institute of Steel Construction Specification for the Design, Fabrication and Erection of Structural Steel for Buildings, latest adoption, where the material used consists of plates, shapes or bars.

Design Basis:

Designs shall be made according to the provisions in this Specification for either Load and Resistance Factor Design (LRFD) or for Allowable Strength Design (ASD).

Load Combinations:

LRFD:

When load combinations are not specified to the joist manufacturer, the required stress shall be computed for the factored loads based on the factors and load combinations as follows:

1.4D

1.2D + 1.6 (L, or L_r, or S, or R)

ASD:

When load combinations are not specified to the joist manufacturer, the required stress shall be computed based on the load combinations as follows:

D

D + (L, or L_r, or S, or R)

Where:

D = dead load due to the weight of the structural elements and the permanent features of the structure

L = live load due to occupancy and movable equipment

L_r = roof live load

S = snow load

R = load due to initial rainwater or ice exclusive of the ponding contribution

When special loads are specified and the specifying professional does not provide the load combinations, the provisions of ASCE 7, *"Minimum Design Loads for Buildings and Other Structures"* shall be used for LRFD and ASD load combinations.

203.2 DESIGN AND ALLOWABLE STRESSES

Design Using Load and Resistance Factor Design (LRFD)

Joists shall have their components so proportioned that the required stresses, f_u, shall not exceed ϕF_n where,

f_u = required stress ksi (MPa)

F_n = nominal stress ksi (MPa)

ϕ = resistance factor

ϕF_n = design stress

Design Using Allowable Strength Design (ASD)

Joists shall have their components so proportioned that the required stresses, f, shall not exceed F_n / Ω where,

f = required stress ksi (MPa)

F_n = nominal stress ksi (MPa)

Ω = safety factor

F_n/Ω = allowable stress

Stresses:

(a) Tension: $\phi_t = 0.90$ (LRFD) $\Omega_t = 1.67$ (ASD)

For Chords: $F_y = 50$ ksi (345 MPa)

For Webs: $F_y = 50$ ksi (345 MPa), or $F_y = 36$ ksi (250 MPa)

Design Stress = $0.9F_y$ (LRFD) (203.2-1)

Allowable Stress = $0.6F_y$ (ASD) (203.2-2)

(b) Compression: $\phi_c = 0.90$ (LRFD) $\Omega_c = 1.67$ (ASD)

For members with $K\ell/r \le 4.71\sqrt{E/QF_y}$

$$F_{cr} = Q\left[0.658^{\left(\frac{QF_y}{F_e}\right)}\right]F_y \qquad (203.2\text{-}3)$$

For members with $K\ell/r > 4.71\sqrt{E/QF_y}$

$$F_{cr} = 0.877F_e \qquad (203.2\text{-}4)$$

Where, F_e = elastic buckling stress determined in accordance with Equation 203.2-5.

$$F_e = \frac{\pi^2 E}{\left(K\ell/r\right)^2} \qquad (203.2\text{-}5)$$

For hot-rolled sections, "Q" is the full reduction factor for slender compression elements.

Design Stress = $0.9F_{cr}$ (LRFD) (203.2-6)

Allowable Stress = $0.6F_{cr}$ (ASD) (203.2-7)

In the above equations, ℓ is taken as the distance in inches (millimeters) between panel points for the chord members and the appropriate length for web members, and r is the corresponding least radius of gyration of the member or any component thereof. E is equal to 29,000 ksi (200,000 MPa).

Use $1.2\ell/r_x$ for a crimped, first primary compression web member when a moment-resistant weld group is not used for this member; where = r_x member radius of gyration in the plane of the joist.

For cold-formed sections the method of calculating the nominal column strength is given in the AISI, *North American Specification for the Design of Cold-Formed Steel Structural Members*.

(c) Bending: $\phi_b = 0.90$ (LRFD) $\Omega_6 = 1.67$ (ASD)

Bending calculations are to be based on using the elastic section modulus.

For chords and web members other than solid rounds:

$F_y = 50$ ksi (345 MPa)

Design Stress = $0.9F_y$ (LRFD) (203.2-8)

Allowable Stress = $0.6F_y$ (ASD) (203.2-9)

For web members of solid round cross section:

$F_y = 50$ ksi (345 MPa), or $F_y = 36$ ksi (250 MPa)

Design Stress = $1.45F_y$ (LRFD) (203.2-10)

Allowable Stress = $0.95F_y$ (ASD) (203.2-11)

For bearing plates:

$F_y = 50$ ksi (345MPa), or $F_y = 36$ ksi (250MPa)

Design Stress = $1.35F_y$ (LRFD) (203.2-12)

Allowable Stress = $0.9F_y$ (ASD) (203.2-13)

(d) Weld Strength:

Shear at throat of fillet welds:

Nominal Shear Stress = $F_{nw} = 0.6F_{exx}$ (203.2-14)

LRFD: $\phi_w = 0.75$

Design Shear Strength =

$\phi R_n = \phi_w F_{nw} A = 0.45F_{exx} A$ (203.2-15)

ASD: $\Omega_w = 2.0$

Allowable Shear Strength =

$R_n/\Omega_w = F_{nw}A/\Omega_w = 0.3F_{exx} A$ (203.2-16)

A = effective throat area

Made with E70 series electrodes or F7XX-EXXX flux-electrode combinations. . . . . $F_{exx} = 70$ ksi (483 MPa)

Made with E60 series electrodes or F6XX-EXXX flux-electrode combinations. . . . . $F_{exx} = 60$ ksi (414 MPa)

Tension or compression on groove or butt welds shall be the same as those specified for the connected material.

203.3 MAXIMUM SLENDERNESS RATIOS

The slenderness ratios, 1.0 ℓ/ r and 1.0 ℓ_s /r of members as a whole or any component part shall not exceed the values given in Table 203.3-1, Parts A.

The effective slenderness ratio, $K\ell/r^*$, to be used in calculating the nominal stresses F_{cr} and F'_e, is the largest value as determined from Table 203.3-1, Parts B and C.

In compression members when fillers or ties are used, they shall be spaced so that the ℓ_s/r_z ratio of each component does not exceed the governing ℓ/r ratio of the member as a whole.

The terms used in Table 203.3-1 are defined as follows:

ℓ = Length center-to-center of panel points, except ℓ = 36 in. (914 mm) for calculating ℓ/r_y of top chord member.

ℓ_s = maximum length center-to-center between panel point and filler (tie), or between adjacent fillers (ties).

r_x = member radius of gyration in the plane of the joist.

r_y = member radius of gyration out of the plane of the joist.

r_z = least radius of gyration of a member component.

* See P.N. Chod and T. V. Galambos, Compression Chords Without Fillers in Longspan Steel Joists, Research Report No. 36, June 1975 Structural Division, Civil Engineering Department, Washington University, St. Louis, MO.

TABLE 203.3-1
MAXIMUM AND EFFECTIVE SLENDERNESS RATIOS

I TOP CHORD INTERIOR PANEL

A. The slenderness ratios, 1.0 ℓ/r and 1.0 ℓ_s/r, of members as a whole or any component part shall not exceed 90.

B. *The effective slenderness ratio to determine* "F_{cr}"

1. With fillers or ties	0.75 ℓ/r_x	1.0 ℓ/r_y		1.0 ℓ_s/r_z
2. Without fillers or ties			0.75 ℓ/r_z	
3. Single component members	0.75 ℓ/r_x	1.0 ℓ/r_y		

C. *The effective slenderness ratio to determine* "F'_e"

1. With fillers or ties	0.75 ℓ/r_x
2. Without fillers or ties	0.75 ℓ/r_x
3. Single component members	0.75 ℓ/r_x

II TOP CHORD END PANEL

A. The slenderness ratios, 1.0 ℓ/r and 1.0 ℓ_s/r, of members as a whole or any component part shall not exceed 120.

B. *The effective slenderness ratio to determine* "F_{cr}"

1. With fillers or ties	1.0 ℓ/r_x	1.0 ℓ/r_y		1.0 ℓ_s/r_z
2. Without fillers or ties			1.0 ℓ/r_z	
3. Single component members	1.0 ℓ/r_x	1.0 ℓ/r_y		

C. *The effective slenderness ratio to determine* "F'_e"

1. With fillers or ties	1.0 ℓ/r_x
2. Without fillers or ties	1.0 ℓ/r_x
3. Single component members	1.0 ℓ/r_x

III TENSION MEMBERS - CHORDS AND WEBS

A. The slenderness ratios, 1.0 ℓ/r and 1.0 ℓ_s/r, of members as a whole or any component part shall not exceed 240.

IV COMPRESSION WEB MEMBERS

A. The slenderness ratios, 1.0 ℓ/r and 1.0 ℓ_s/r, of members as a whole or any component part shall not exceed 200.

B. *The effective slenderness ratio to determine* "F_{cr}"

1. With fillers or ties	0.75 ℓ/r_x	1.0 ℓ/r_y		1.0 ℓ_s/r_z
2. Without fillers or ties			1.0 ℓ/r_z	
3. Single component members	0.75 ℓ/r_x*	1.0 ℓ/r_y		

* Use 1.2 ℓ/r_x for a crimped, first primary compression web member when a moment-resistant weld group is not used for this member.

203.4 MEMBERS

(a) Chords

The bottom chord shall be designed as an axially loaded tension member.

The radius of gyration of the top chord about its vertical axis shall not be less than $\ell/170$ where ℓ is the spacing in inches (millimeters) between lines of bridging as specified in Section 204.5(d)

The top chord shall be considered as stayed laterally by the floor slab or roof deck provided the requirements of Section 204.9(e) of this specification are met.

The top chord shall be designed as a continuous member subject to combined axial and bending stresses and shall be so proportioned that

For LRFD:

at the panel point:

$$f_{au} + f_{bu} \le 0.9F_y \qquad (203.4\text{-}1)$$

at the mid panel: for $\frac{f_{au}}{\phi_c F_{cr}} \ge 0.2$,

$$\frac{f_{au}}{\phi_c F_{cr}} + \frac{8}{9}\left[\frac{C_m f_{bu}}{\left[1-\left(\frac{f_{au}}{\phi_c F'_e}\right)\right] Q\phi_b F_y}\right] \le 1.0 \qquad (203.4\text{-}2)$$

for $\frac{f_{au}}{\phi_c F_{cr}} < 0.2$,

$$\left(\frac{f_{au}}{2\phi_c F_{cr}}\right) + \left[\frac{C_m f_{bu}}{\left[1-\left(\frac{f_{au}}{\phi_c F'_e}\right)\right] Q\phi_b F_y}\right] \le 1.0 \qquad (203.4\text{-}3)$$

f_{au} = P_u/A = Required compressive stress, ksi (MPa)

P_u = Required axial strength using LRFD load combinations, kips (N)

f_{bu} = M_u/S = Required bending stress at the location under consideration, ksi (MPa)

M_u = Required flexural strength using LRFD load combinations, kip-in. (N-mm)

S = Elastic Section Modulus, in.^{3} (mm^3)

F_{cr} = Nominal axial compressive stress in ksi (MPa) based on ℓ/r as defined in Section 203.2(b)

$C_m = 1 - 0.3\, f_{au}/\phi F'_e$ for end panels

$C_m = 1 - 0.4\, f_{au}/\phi F'_e$ for interior panels

F_y = Specified minimum yield strength, ksi (MPa)

$$F'_e = \frac{\pi^2 E}{\left(K\ell/r_x\right)^2}, \text{ ksi (MPa)}$$

Where ℓ is the panel length,in inches (millimeters), as defined in Section 203.2(b) and r_x is the radius of gyration about the axis of bending.

Q = Form factor defined in Section 203.2(b)

A = Area of the top chord, in.^{2}, (mm^2)

For ASD:

at the panel point:

$$f_a + f_b \le 0.6F_y \qquad (203.4\text{-}4)$$

at the mid panel: for $\frac{f_a}{F_a} \ge 0.2$,

$$\frac{f_a}{F_a} + \frac{8}{9}\left[\frac{C_m f_b}{\left[1-\left(\frac{1.67 f_a}{F'_e}\right)\right] QF_b}\right] \le 1.0 \qquad (203.4\text{-}5)$$

for $\frac{f_a}{F_a} < 0.2$,

$$\left(\frac{f_a}{2F_a}\right) + \left[\frac{C_m f_b}{\left[1-\left(\frac{1.67 f_a}{F'_e}\right)\right] QF_b}\right] \le 1.0 \qquad (203.4\text{-}6)$$

f_a = P/A = Required compressive stress, ksi (MPa)

P = Required axial strength using ASD load combinations, kips (N)

f_b = M/S = Required bending stress at the location under consideration, ksi (MPa)

M = Required flexural strength using ASD load combinations, kip-in. (N-mm)

S = Elastic Section Modulus, in.^{3} (mm^3)

F_a = Allowable axial compressive stress, based on ℓ/r as defined in Section 203.2(b), ksi (MPa)

F_b = Allowable bending stress; $0.6F_y$, ksi (MPa)

$C_m = 1 - 0.50\, f_a/F'_e$ for end panels

$C_m = 1 - 0.67\, f_a/F'_e$ for interior panels

(b) Web

The vertical shears to be used in the design of the web members shall be determined from full uniform loading, but such vertical shears shall be not less than 25 percent of the end reaction.

Interior vertical web members used in modified Warren type web systems shall be designed to resist the gravity loads supported by the member plus an additional axial load of 1½ percent of the top chord axial force.

(c) Depth
Joists can have either a top chord pitch of 1/4 inch per foot or parallel chords. The depth, for the purpose of design, in all cases shall be the depth at mid-span. Parallel chord joists must be installed with a minimum slope of 1/4 inch per foot.

(d) Eccentricity
Members connected at a joint shall have their center of gravity lines meet at a point, if practical. Eccentricity on either side of the neutral axis of chord members may be neglected when it does not exceed the distance between the neutral axis and the back of the chord. Otherwise, provision shall be made for the stresses due to eccentricity. Ends of joists shall be proportioned to resist bending produced by eccentricity at the support.

(e) Extended Ends
Extended top chords or full depth cantilever ends require the special attention of the specifying engineer or architect.
The magnitude and location of the design loads to be supported, the deflection requirements, and the proper bracing shall be clearly indicated on the structural drawings.

203.5 CONNECTIONS

(a) Methods
Joint connections and splices shall be made by attaching the members to one another by arc or resistance welding or other approved method.

1) Welded Connections
   (a) Selected welds shall be inspected visually by the manufacturer. Prior to this inspection, weld slag shall be removed.
   (b) Cracks are not acceptable and shall be repaired.
   (c) Thorough fusion shall exist between layers of weld metal and between weld metal and base metal for the required design length of the weld; such fusion shall be verified by visual inspection.
   (d) Unfilled weld craters shall not be included in the design length of the weld.
   (e) Undercut shall not exceed 1/16 inch for welds oriented parallel to the principal stress.
   (f) The sum of surface (piping) porosity diameters shall not exceed 1/16 inch in any 1 inch of design weld length.
   (g) Weld spatter that does not interfere with paint coverage is acceptable.

2) Welding Program
   Manufacturers shall have a program for establishing weld procedures and operator qualification and for weld sampling and testing.

3) Weld inspection by Outside Agencies (See Section 204.14 of these specifications).
   The agency shall arrange for visual inspection to determine that welds meet the acceptance standards of Section 203.5 a. 1) above. Ultrasonic X-Ray, and magnetic particle testing are inappropriate for joists due to the configurations of the components and welds.

(b) Strength
Joint connections shall develop the maximum force due to any of the design loads, but not less than 50 percent of the allowable strength of the member in tension or compression, whichever force is the controlling factor in the selection of the member.

(c) Shop Splices
Shop splices may occur at any point in chord or web members. Splices shall be designed for the member force, but not less than 50 percent of the allowable member strength. Members containing a butt weld splice shall develop an ultimatetensile force of at least 57,000 psi times the full design area of the chord or web. The term "member" shall be defined as all component parts, comprising the chord or web, at the point of splice.

(d) Field Splices
Field splices shall be bolted connections designed by the manufacturer. Splices shall be designed for the member shear and moment forces, but not less than 50 percent of the member strength.

(e) Bridging Clips
Where double angles, separated by a nominal gap, are used as chord members, the two angles must be tied together with a filler or tie at all bridging clip locations. These fillers and their connections must be capable of developing the bridging forces indicated by Section 204.6 (d).

203.6 CAMBER

Joists shall have approximate cambers in accordance with the following:

TABLE 203.6.1

Top Chord Length	Double Pitch Joists*	Parallel Chord Joists
111'-0"	3 1/4"	5 1/4"
120'-0"	3 1/2"	6"
130'-0"	3 7/8"	7"
140'-0"	4 1/8"	8"
150'-0"	4 3/8"	8 3/4"
160'-0"	4 3/4"	9 1/2"
180'-0"	5 1/4"	10 1/2"
200'-0"	5 7/8"	11 3/4"
220'-0"	6 1/2"	13"
240'-0"	7"	14"

* Pitched 1 1/4 in 12" or greater

203.7 SHOP PAINTING

Joists and accessories shall receive one shop coat of protective paint as specified in Section 202.4.

203.8 VERIFICATION OF DESIGN

Design data on SLH series joists will be supplied to the specifying engineer upon request.

SECTION 204. APPLICATION

204.1 USAGE

These specifications shall apply to any type of structure where roof decks are to be supported directly by steel joists installed as herein specified. Where joists are used other than on simple spans under uniformly distributed loading, as prescribed in Section 203.1, they shall be investigated and modified if necessary to limit the unit stresses to those listed in Section 203.2.

CAUTION: If a rigid connection of the bottom chord is to be made to the column or other support, it shall be made only after the application of the dead loads. The joist is then no longer simply supported and the system must be investigated for continuous frame action by the specifying professional.

204.2 SPAN

The clear span of joists shall not exceed 24 times their nominal depth.

204.3 DEPTH

The nominal depth of pitched chord joists shall be the depth at mid-span. The standard pitch of the top chord shall be 1/4 inch per foot.

204.4 PITCH

The standard configuration for SLH Series Joists is a double pitched top chord with a pitch of 1/4 inch per foot. The double pitched design was selected for economy and positive roof drainage.

204.5 END SUPPORTS

(a) Masonry and Concrete

SLH Series Joists supported by masonry or concrete are to bear on steel bearing plates, and shall be designed as steel bearing. Due consideration of the end reactions and all other vertical and lateral forces shall be taken by the specifying engineer or architect in the design of the steel bearing plate and the masonry or concrete. The ends of SLH Series Joists shall extend over the masonry or concrete support not less than the distance shown in Table 204.5.1. The plate shall be located not more than 1/2 inch from the face of the wall and shall be not less than 9 inches wide perpendicular to the length of the joist. It is to be designed by the specifying engineer or architect in compliance with the allowable unit stresses in Section A5.1 (Allowable Stress Design) of the AISC Specifications, of latest adoption. The steel bearing plate shall be furnished by other than the joist manufacturer.

(b) Steel

Due consideration of the end reactions and all other vertical and lateral forces shall be taken by the specifying engineer or architect in the design of the steel support. The end of SLH Series Joists shall extend over the steel support a distance not less than that shown in Table 204.5.1.

TABLE 204.5.1

Joist Section Number	Minimum Bearing Length*
SLH 15-18	4"
SLH 19-25	6"

*Excluding extension

204.6 BRIDGING

(a) Horizontal
Horizontal bridging lines shall consist of two continuous horizontal steel members, one attached to the top chord and the other attached to the bottom chord. The l/r ratio of the bridging member shall not exceed 300, where l is the distance in inches between attachments and r is the least radius of gyration of the bridging member.

(b) Diagonal
Diagonal bridging lines shall consist of cross-bracing with l/r ratio of not more than 200, where l is the distance in inches between connections and r is the least radius of gyration of the bracing member. Where cross-bracing members are connected at their point of intersection, the l distance shall be taken as the distance in inches between connections at the point of intersection of the bracing members and the connections to the chords of the joists.

(c) Bridging Lines
Bolted diagonal bridging shall be used except when the joist spacing is less than .66 x joist depth, then bolted horizontal bridging shall be used in addition to diagonal bridging.

(d) Spacing
The maximum spacing of lines of bridging shall not exceed the values in Table 204.6.1. Bridging shall be installed near a bottom chord panel point or an extra web member shall be furnished to brace the bottom chord for the vertical component of the bridging force equal to the horizontal bracing force. See Section 204.13 for bridging required for uplift forces.

TABLE 204.6.1

Joist-Section Number*	Max. Spac. Of Lines Of Bridging	Horizontal Bracing Force**
15 to 17	21'-0"	2,700 lbs
18	21'-0"	3,400 lbs
19	26'-0"	3,400 lbs
20	26'-0"	3,700 lbs
21	30'-0"	4,200 lbs
22	30'-0"	5,000 lbs
23	30'-0"	5,500 lbs
24	30'-0"	6,300 lbs
25	30'-0"	7,100 lbs

The number of lines of bridging is based on the joists clear span dimensions.

* Last two digits of designation shown in load table.

** Each connection to the chord shall resist one-half of this force.

(e) Connections
Connections to the chords of the steel joists and bridging anchors shall be made by positive mechanical means and capable of resisting a horizontal force not less than that specified in Table 204.6.1.

(f) Bottom Chord Bearing Joists
It is not recommended that SLH-Series joists be used in bottom chord bearing configuration.

204.7 INSTALLATION OF BRIDGING

All bridging and bridging anchors shall be completely installed before construction loads are placed on the joists. Bridging shall support the top and bottom chords against lateral movement during the construction period and shall hold the steel joists in the approximate position as shown on the plans.

The ends of all bridging lines terminating at walls or beams shall be anchored thereto.

204.8 END ANCHORAGE

(a) Masonry and Concrete
Ends of SLH Series Joists resting on steel bearing plates on masonry or structural concrete shall be attached thereto as shown Table 204.8.1.

(b) Steel
Ends of SLH Series Joists resting on steel supports shall be attached thereto as shown in Table 204.8.1. In steel frames, where columns are not framed in at least two directions with structural steel members, joists at column lines shall be field bolted at the columns to provide lateral stability during construction.

TABLE 204.8.1 END ANCHORAGE

Joist Section No.*	Fillet Weld	Bearing Seat Bolts For Erection
SLH 15-18	2 - 1/4" x 2"	2 - 3/4" A325
SLH 19-25	2 - 1/4" x 4"	2 - 3/4" A325

*Last two digits of designation shown in load table.

(c) Uplift
Where uplift forces are a design consideration, roof joists shall be anchored to resist such forces.

204.9 JOIST SPACING

Joists shall be spaced so that the loading on each joist does not exceed the allowable load given for the particular designation and span in the Load Table.

204.10 ROOF DECKS

(a) Material
Decks may consist of cast-in-place or precast concrete or gypsum, formed steel, wood or other suitable material capable of supporting the required load at the specified joist spacing.

(b) Thickness
Cast-in-place slabs shall not be less than 2 inches thick.

(c) Bearing
Slabs or decks shall bear uniformly along the top chords of the joist.

(d) Attachments

The spacing of attachments along the top chord shall not exceed 36 inches. Such attachments of the slab or deck to the top chords of joists shall be capable of resisting the following forces:

TABLE 204.10.1

Joist Section Number*	Equivalent Force Required
15 - 16 incl.	300 lbs./ft.
17 - 19 incl.	300 lbs./ft.
20 - 21 incl.	300 lbs./ft.
22 - 24 incl	420 lbs./ft.
25	520 lbs./ft.

*Last two digits of designation shown in load table.

(e) Wood Nailers

It is not recommended that SLH-Series joists be used in conjunction with wood nailers.

(f) Joist With Standing Seam Roofing

The stiffness and strength of standing-seam roof clips varies from one manufacturer to another. Therefore, some roof systems cannot be counted on to provide lateral stability to the joists which support the roof. Sufficient stability must be provided to brace the joists laterally under the full design load. The compression chord must resist the chord axial design force in the plane of the joist (i.e., x-x axis buckling) and out of the plane of the joist (i.e., y-y axis buckling). Out of plane strength may be achieved by adjusting the bridging spacing and/or increasing the compression chord area, the joist depth, and the y-axis radius of gyration. The effective slenderness ratio in the y-direction equals 0.94 L/r_y; where L is the bridging spacing. The maximum bridging spacing may not exceed that specified in Section 204.6d.

204.11 DEFLECTION

The deflection due to the design live load shall not exceed the following:

Roofs

l/360 of span where plaster ceiling is attached or suspended.

l/240 of span for all other cases.

The specifying engineer or architect shall give due consideration to the effects of deflection in selection of joists.

204.12 PONDING

Unless a roof surface is provided with sufficient slope toward points of free drainage or adequate individual drains to prevent the accumulation of rain water, the roof system shall be investigated to assure stability under ponding conditions in accordance with Section K2 (Allowable Stress Design) of the AISC Specifications.*

A top chord pitch of 1/4" or more per foot is recommended to minimize ponding.

The ponding investigation shall be performed by the specifying engineer or architect.

* For further information, refer to Steel Joist Institute Technical Digest #3, "Structural Design of Steel Joist Roofs to Resist Ponding Loads".

204.13 UPLIFT

Where uplift forces due to wind are a design requirement, these forces must be indicated on the structural drawings in terms of net uplift in pounds per square foot. When these forces are specified, they must be considered in the design of joists and bridging. A single line of bottom chord bridging must be provided near the first bottom chord panel points, whenever uplift due to wind forces is a design consideration.**

** For further information, refer to Steel Joist Institute Technical Digest #6, "Structural Design of Steel Joist Roofs to Resist Uplift Loads".

204.14 INSPECTION

Joists shall be inspected by the manufacturer before shipment to insure compliance of materials and workmanship with the requirements of these specifications. If the purchaser wishes an inspection of the steel joists by someone other than the manufacturer's own inspectors, he may reserve the right to do so in the "Invitation to Bid" or the accompanying "Job Specifications". Arrangements shall be made with the manufacturer for such inspection of the joists at the manufacturing facility by the purchaser's inspectors at purchaser's expense.

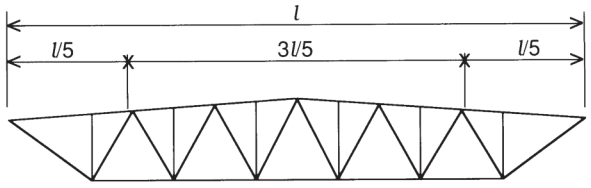
SECTION 205.
HANDLING AND ERECTION*

Particular attention should be paid to the erection of Super Longspan Steel Joists.

Care shall be exercised at all times to avoid damage through careless handling during unloading, storing, and erecting. Dropping of joists shall not be permitted.

Each joist shall be adequately braced laterally before any loads are applied. If lateral support is provided by bridging, the bridging lines must be anchored to prevent lateral movement.

Hoisting cables attached at a panel point approximately 1/5 of the span from each end will minimize erection stresses in the steel joist. **The angle of the hoisting cables from the vertical shall not exceed 30 degrees.** Two cranes are recommended for spans greater than 150 feet.



Hoisting cables shall not be released until all bridging lines are installed. For ease of alignment, anchorage of joist ends in accordance with Section 204.8 should follow the installation of bridging. During the construction period, the contractor shall provide means for the adequate distribution of concentrated loads so the carrying capacity of any joist is not exceeded.

* For thorough coverage of this topic, refer to the Steel Joist Institute Technical Digest #9, "Handling and Erection of Steel Joists and Girders".

WHAT ARE JOIST GIRDERS?

Joist girders are primary framing members. The design is simple span, supporting equally spaced concentrated loads from open web steel joists. These concentrated loads are considered to act at the panel points of the joist girder.

Joist girders are designed to allow for the efficient use of steel in longer spans for primary framing members.

The following weight tables list joist girders from 20" to 96" deep and spans up to 100 feet. (For depths and lengths not listed contact Vulcraft.) The depth designation is determined by the nominal depth at the center of the span, except for offset double pitched girders, where the depth is determined at the ridge.

The standard configuration of a joist girder is parallel chord with underslung ends and bottom chord extensions. (Joist girders can be furnished in other configurations, see below.) The standard depth of bearing for joist girders is 7 1/2 inches at the end of the bearing seat.*

The standard method of connecting girders to columns is two 3/4" diameter A325 bolts. A loose connection of the lower chord to the column or other support is required during erection in order to stabilize the lower chord laterally and to help brace the joist girder against overturning. **CAUTION: IF A RIGID CONNECTION OF THE BOTTOM CHORD IS TO BE MADE TO COLUMN OR OTHER SUPPORT, IT IS TO BE MADE ONLY AFTER THE APPLICATION OF THE DEAD LOADS. THE JOIST GIRDER IS THEN NO LONGER SIMPLY SUPPORTED AND THE SYSTEM MUST BE INVESTIGATED FOR CONTINUOUS FRAME ACTION BY THE SPECIFYING PROFESSIONAL.**

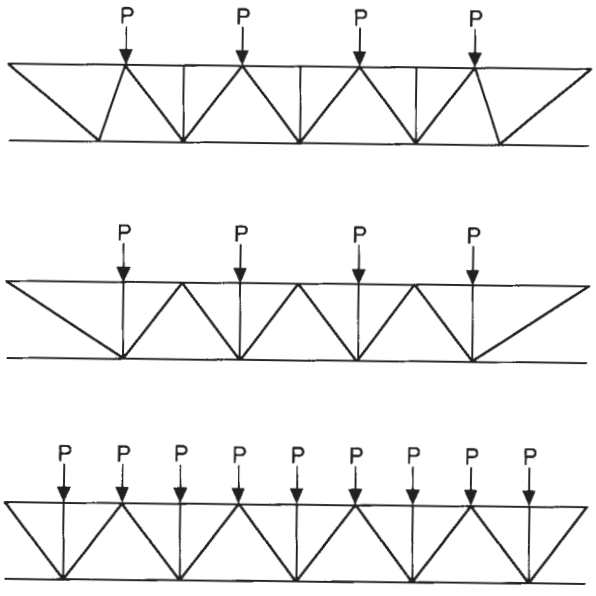
Joist girders along the perimeter, with joists coming in from one side only, and those with unbalanced loads must be designed such that the reactions pass through the center of the joist girder.

The weight tables list the approximate weight per linear foot for a joist girder supporting the panel point loads given by the specifying engineer. **NOTE: THE WEIGHT OF THE JOIST GIRDER MUST BE INCLUDED IN THE PANEL POINT LOAD. (SEE THE EXAMPLE ON PAGE 101).**

For calculating the approximate deflection or checking ponding the following formula may be used in determining the approximate moment of inertia of the joist girder. $I_{JG} = 0.027\ NPLd$

Where N = number of joist spaces, P = panel point load in kips, L = joist girder length in feet and d = effective depth of the joist girder in inches. Contact Vulcraft if a more exact joist girder moment of inertia must be known.

*Increase seat depth to 10" if weight of joist girder appears to the right of the stepped blue lines in the weight tables.



G TYPE

VG TYPE

BG TYPE

OTHER CONFIGURATIONS AVAILABLE ARE:

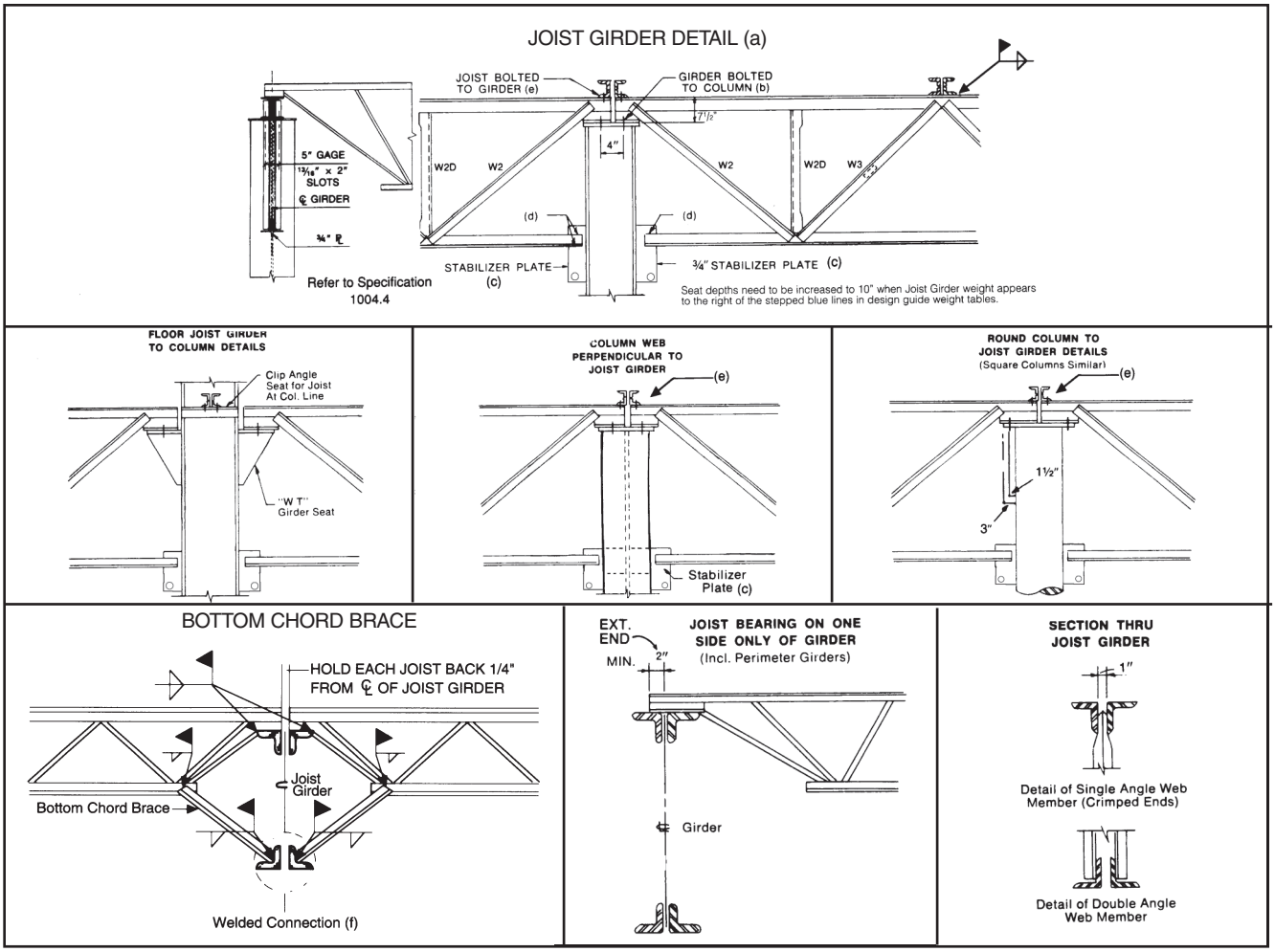
DOUBLE PITCH TC, UNDERSLUNG

SINGLE PITCH TC, UNDERSLUNG

OFFSET DOUBLE PITCH TC, UNDERSLUNG

SEE PAGE 101
FOR DESIGN EXAMPLE

NOTE: JOIST GIRDER WEB CONFIGURATION MAY VARY FROM THAT SHOWN. IF EXACT CONFIGURATION IS REQUIRED CONTACT VULCRAFT.



SEE PAGE 93 FOR MOMENT CONNECTION DETAILS

JOIST GIRDER NOTES

(a) All Joist Girder dimensions shown are subject to change when required by the physical size of large Joist Girders. If changes are necessary Vulcraft will so note on the placement plans.

(b) The standard connection for Joist Girders to columns is 13/16 inch slots for 3/4 inch bolts in girder bearings. **The girder erection bolts are by others.** If the specifying professional wishes to use the Joist Girder bearing to transmit horizontal loads, the required amount of weld to connect the Joist Girder seat to the column should be specified. For additional information see the section of this catalog "JOIST GIRDERS IN MOMENT RESISTIVE FRAMES." (page 92)

(c) Stabilizer plates between bottom chord angles stabilize the bottom chord laterally and brace the Joist Girder against overturning during erection. (Refer to 1004.4)

(d) Joist Girder bottom chord struts do not require welding to the stabilizer plate unless required by design to transmit horizontal forces. When welding is required, the amount of weld should be specified by the specifying professional. UNLESS OTHERWISE SPECIFIED, BOTTOM CHORD STRUTS SHOULD NOT BE WELDED.

(e) Joists are connected to the girder by welding except that the joists at (or nearest) the column shall also be bolted (O.S.H.A. Sec. 1910.12 Construction Standards Sec 1518.751).

(f) The l/r_y of the bottom chord of the Joist Girder cannot exceed 240. For STANDARD Joist Girders, the specifying engineer can use the "Joist Girder Bottom Chord Brace Chart" in conjunction with the "Design Guide Weight Table/Joist Girders, G Series" to select the correct number of bottom chord braces. Joist Girders which must resist uplift, end moments, or axial bottom chord forces may require additional braces.

JOIST GIRDER NOTES

If fixed end moments or uplift are present, the specifying professional should also specify bottom chord braces to be designed and furnished by the joist girder manufacturer. If any additional braces are required due to the compression load in the bottom chord, Vulcraft will indicate their location on the placement plans. Bottom chord braces may be either welded or bolted to the girder, but are typically welded to the joist.

JOIST GIRDER BOTTOM CHORD BRACE CHART*			
	SPAN IN FEET		
JOIST GIRDER WEIGHT/FT	NO BC BRACES	ONE BC BRACE @ CENTERLINE	TWO BC BRACES @ 1/3 POINTS
0-22	0' to 24'	>24' to 49'	>49' to 73'
23-30	0' to 28'	>28' to 57'	>57' to 85'
31-45	0' to 32'	>32' to 65'	>65' to 97'
46-66	0' to 36'	>36 to 73'	>73' to 110'
67-87	0' to 41'	>41' to 82'	>82' to 123'
88-135	0' to 49'	>49' to 98'	>98' to 147'
136-173	0' to 57'	>57' to 114'	>114' to 171'

* The bottom chords must be restrained in accordance with Section 1004.5 of The SJI Specifications.

ECONOMY TIPS

1. Designate Joist Girder with exact load required, such as 60G8N11.2K.
2. If Joist Girder depth is limited below the optimum depth as shown in the weight tables, use the maximum depth permitted by the building system: such as 53G8N12K (odd depths can be designed and furnished).
3. The Joist Girder designations shown in the weight guide are typical types included only as a guide. The specifying professional is encouraged to specify the exact depth, span and loading that best suits the building.
4. A Joist Girder depth in inches approximately equal to the span in feet is often a good combination for economy.
5. The specifying professional is urged to investigate several combinations of bay sizes and joist spaces to find the most economical combination.
6. The following table illustrates the economy possible using this system.

Table G-1	ROOF SYSTEM WEIGHT FOR RECOMMENDED BAY SIZES						
BAY SIZE	Weight of joists* + Girders** = Total (PSF)***						
Joist Span	Girder Span	Design Load (PSF) 35 (PSF)	40 (PSF)	45 (PSF)	50 (PSF)	Joist Space (Ft.)	Girder Depth (In.)
40'	40'	1.69 + .75 = 2.44	1.78 + .83 = 2.61	1.90 + .90 = 2.80	2.07 + 1.03 = 3.10	6.67	48
40'	50'	1.73 + .95 = 2.68	1.90 + 1.08 = 2.98	2.02 + 1.18 = 3.20	2.13 + 1.28 = 3.41	6.25	60
40'	60'	1.69 + 1.13 = 2.82	1.78 + 1.30 = 3.08	1.90 + 1.40 = 3.30	2.07 + 1.53 = 3.60	6.67	72
45'	40'	1.89 + .71 = 2.60	2.04 + .80 = 2.84	2.14 + .89 = 3.03	2.41 + .96 = 3.37	6.67	48
45'	50'	1.98 + .96 = 2.94	2.11 + 1.09 = 3.20	2.22 + 1.16 = 3.38	2.40 + 1.29 = 3.69	6.25	60
45'	60'	1.89 + 1.16 = 3.05	2.04 + 1.24 = 3.28	2.14 + 1.38 = 3.52	2.41 + 1.49 = 3.90	6.67	72
50'	40'	2.19 + .72 = 2.91	2.28 + .80 = 3.08	2.53 + .86 = 3.39	2.80 + 1.06 = 3.86	6.67	48
50'	50'	2.21 + .92 = 3.13	2.43 + 1.00 = 3.43	2.61 + 1.12 = 3.73	2.70 + 1.20 = 3.90	6.25	60
50'	60'	2.19 + 1.12 = 3.31	2.28 + 1.22 = 3.50	2.53 + 1.34 = 3.87	2.80 + 1.50 = 4.30	6.67	72

* Weight of joists in pounds per square foot.
** Weight of the joist girders in pounds per square foot.
*** Total weight of joists and joist girders in pounds per square foot.

The larger bay sizes become more economical as the column heights increase and in localities with high erection labor costs. Larger bays speed construction by reducing the number of pieces and therefore the number of crane lifts. Encasing the columns for fire proofing or decoration also makes the larger bays more attractive.

When a Joist Girder is used as a component of a moment resistive frame, both the design wind moment and any continuity (usually live load) moment must be specified for each end of each affected Joist Girder. Provided this information, Vulcraft will design the Joist Girder as a simply supported truss for full gravity loading. The "fixed end" moments are then applied to the Joist Girder. Using the appropriate combinations of the gravity loads, the wind moments, and/or the continuity moments, the critical member stresses are identified and the Joist Girder members are sized accordingly.

The Specifying Professional shall clarify when allowable stresses are permitted to be increased or load combinations reduced. **(Vulcraft does not design the Joist Girder for any dead load moments unless specifically instructed to do so on the structural drawings.)** For this reason it is very important that on the structural drawings the specifying professional specify that all dead loads be applied to the Joist Girders before the bottom chord struts are welded to the stabilizer plates.

One of the most important considerations of using a Joist Girder in a moment resistive frame is the connection of the Joist Girder to the column. As with a beam connection, special provisions must be made to develop the required moment capacity. As can be readily seen in Figure 1, the use of a standard Joist Girder seat results in an eccentric moment due to the depth of the seat. This moment must be resisted by the weld group connecting the Joist Girder seat to the cap plate of the column.

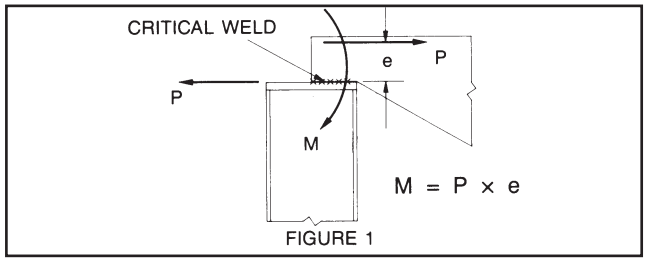


FIGURE 1

Vulcraft has done extensive testing of the maximum eccentric top chord force capacity for joist girders. Based on this test program, the maximum horizontal load for 7.5 inch deep seats are presented in Table 1 (below)

Joist Girder (7.5″ Seat) Top Chord Leg Size	ASD P_a * kips	LRFD ϕP_n * kips
2.5″	4	6
3.0″	8	12
3.5″ and larger	10	15

Table 1

*These values are based on using 3/4 inch A325 bolts and a minimum of two 1/4 inch fillet welds 5 inches long along the sides of the seat. Vulcraft must be notified of seat forces for final seat design.

If the axial load due only to the wind moment does not exceed the values in Table 1, a strap angle connecting the Joist Girders together as shown in Figure 2 can be used to resist the continuity moments, By tying the Joist Girder ends together, the Joist Girder-to-cap plate connection need only resist the wind loads, **the strap angles do not transfer wind moments**. The design of such a strap angle to resist the continuity moments is the responsibility of the specifying professional.

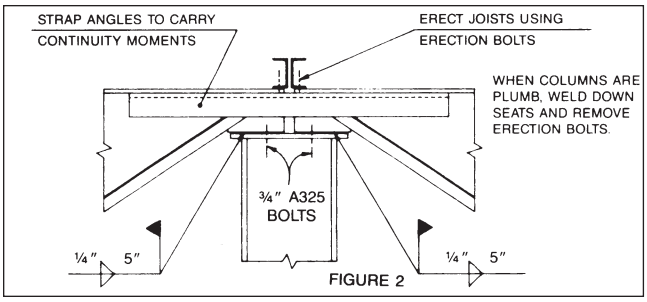


FIGURE 2

When the end moments on the Joist Girders are too large for the seat to resist, it is necessary to utilize a moment plate as shown in Details A-F. The use of this simple moment plate virtually eliminates all eccentricity problems.

By using the equations and Table 2 below, the specifying professional can determine the minimum Joist Girder top chord width for most Joist Girders. If the end moments are very large, the Joist Girder loads and/or spacings vary, or other special conditions exist, a more exact analysis is required. Once the Joist Girder top chord width is known, the specifying professional can easily size the moment plate and its weld requirements to complete the connection detail.

EQUATION 1 (ODD NO. OF JOIST SPACES)

$$A = \frac{.028P}{D}(N^2S - .67N + .67 - S)$$

EQUATION 2 (EVEN NO. OF JOIST SPACES)

$$A = \frac{.028P}{D}(N^2S - .67N + .67)$$

Where:
P = Panel point load (kips)
N = No. of joist spaces
S = Joist spacing (ft.)
D = Joist Girder depth (in.)

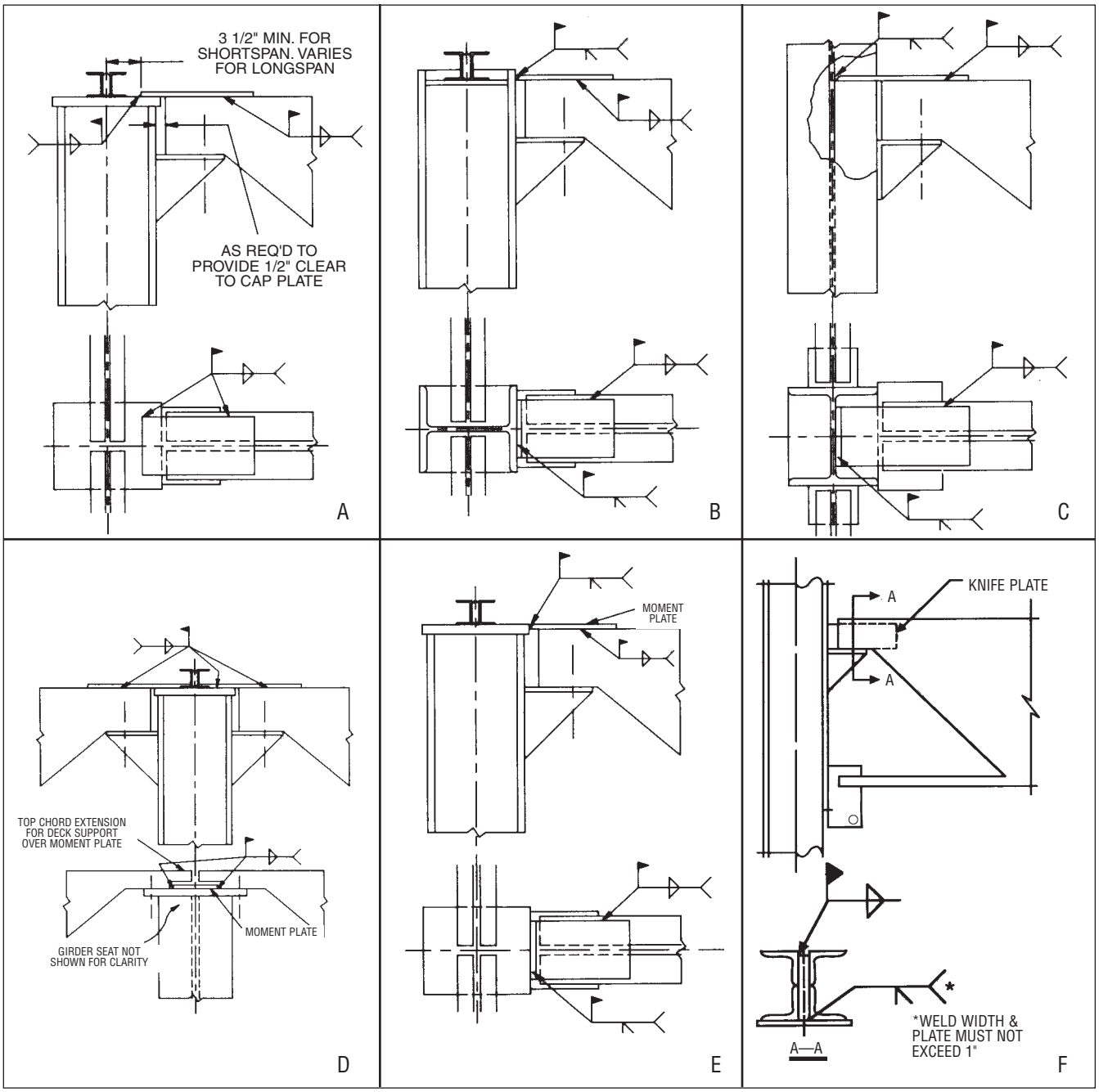
Table 2*

A	Minimum Top Chord Width
0.95 - 1.19	6"
1.20 - 1.78	7"
1.79 - 2.48	8"
2.49 - 3.75	9"
3.76 - 4.76	11"
4.78 - 8.44	13"
Greater than 8.44	Consult Vulcraft

Please note that this chart is to be used only for designing moment plates. It is not intended for use as a general detailing aid.

*The bearing seat width may be larger than the top chord width. Contact Vulcraft if seat width is needed for determining column plate sizes.

Presented below are six suggested details for a moment resistive connection involving roof Joist Girders. Similar details should be utilized for longspan joists with end moments. In all cases, the bottom chord is to be connected to the column with a vertical stabilizer plate which is to be sized to carry the required load and obtain required weld (use 6 x 6 x 3/4 plate minimum for Joist Girders).



NOTES:

(1) Connections type B & C would also be recommended for floor girder details.
(2) Where a backer bar is required for groove welds, additional clearance must be provided when determining girder hold back dimension.
(3) Similar details would apply at other types of columns.
(4) Additional stiffener plates as required not shown for clarity.
(5) In all details, moment plate design and material is not by Vulcraft.

STANDARD SPECIFICATIONS
FOR JOIST GIRDERS

Adopted by the Steel Joist Institute November 4, 1985
Revised to November 10, 2003 - Effective March 01, 2005

SECTION 1000. SCOPE

This specification covers the design, manufacture and use of Joist Girders. Load and Resistance Factor Design (LRFD) and Allowable Strength Design (ASD) are included in this specification.

SECTION 1001. DEFINITION

The term "Joist Girders", as used herein, refers to open web, load-carrying members utilizing hot-rolled or cold-formed steel, including cold-formed steel whose yield strength* has been attained by cold working.

The design of Joist Girder chord and web sections shall be based on a yield strength of at least 36 ksi (250 MPa), but not greater than 50 ksi (345 MPa). Steel used for Joist Girder chord or web sections shall have a minimum yield strength determined in accordance with one of the procedures specified in Section 1002.2, which is equal to the yield strength assumed in the design. Joist Girders shall be designed in accordance with this specification to support panel point loadings.

* The term "Yield Strength" as used herein shall designate the yield level of a material as determined by the applicable method outlined in paragraph 13.1, "Yield Point" and in paragraph 13.2, "Yield Strength", of ASTM Standard A370, "Standard Test Methods and Definitions for Mechanical Testing of Steel Products", or as specified in Section 1002.2 of this Specification.

SECTION 1002. MATERIALS

1002.1 STEEL

The steel used in the manufacture of chord and web sections shall conform to one of the following ASTM Specifications:

- Carbon Structural Steel, ASTM A36/A36M.
- High-Strength, Low-Alloy Structural Steel, ASTM A242/A242M.
- High-Strength Carbon-Manganese Steel of Structural Quality ASTM A529/A529M, Grade 50.
- High-Strength Low-Alloy Columbium-Vanadium Structural Steel, ASTM A572/A572M Grade 42 and 50.
- High-Strength Low-Alloy Structural Steel with 50 ksi (345 MPa) Minimum Yield Point to 4 inches (100 mm) Thick, ASTM A588/A588M.
- Steel, Sheet and Strip, High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, with Improved Corrosion Resistance, ASTM A606.
- Steel, Sheet, Cold-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, ASTM A1008/A1008M.
- Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Improved Formability, ASTM A1011/A1011M.

or shall be of suitable quality ordered or produced to other than the listed specifications, provided that such material in the state used for final assembly and manufacture is weldable and is proved by tests performed by the producer or manufacturer to have the properties specified in Section 1002.2.

1002.2 MECHANICAL PROPERTIES

The yield strength used as a basis for the design stresses prescribed in Section 1003 shall be at least 36 ksi (250 MPa), but shall not be greater than 50 ksi (345 MPa). Evidence that the steel furnished meets or exceeds the design yield strength shall, if requested, be provided in the form of an affidavit or by witnessed or certified test reports.

For material used without consideration of increase in yield strength resulting from cold forming, the specimens shall be taken from as-rolled material. In the case of material properties of which conform to the requirements of one of the listed specifications, the test specimens and procedures shall conform to those of such specifications and to ASTM A370.

In the case of material the mechanical properties of which do not conform to the requirements of one of the listed specifications, the test specimens and procedures shall conform to the applicable requirements of ASTM A370 and the specimens shall exhibit a yield strength equal to or exceeding the design yield strength and an elongation of not less than (a) 20 percent in 2 inches (51 millimeters) for sheet and strip, or (b) 18 percent in 8 inches (203 millimeters) for plates, shapes and bars with adjustments for thickness for plates, shapes and bars as prescribed in ASTM A36/A36M, A242/A242M, A529/A529M, A572/A572M, A588/A588M, whichever specification is applicable on the basis of design yield strength.

The number of tests shall be as prescribed in ASTM A6/A6M for plates, shapes, and bars; and ASTM A606, A1008/A1008M and A1011/A1011M for sheet and strip.

If as-formed strength is utilized, the test reports shall show the results of tests performed on full section specimens in accordance with the provisions of the AISI Specifications for the Design of Cold-Formed Steel Structural Members and shall indicate compliance with these provisions and with the following additional requirements:

a) The yield strength calculated from the test data shall equal or exceed the design yield strength.

b) Where tension tests are made for acceptance and control purposes, the tensile strength shall be at least 6 percent greater than the yield strength of the section.

c) Where compression tests are used for acceptance and control purposes, the specimen shall withstand a gross shortening of 2 percent of its original length without cracking. The length of the specimen shall not be greater than 20 times its least radius of gyration.

d) If any test specimen fails to pass the requirements of the subparagraphs (a), (b), or (c) above, as applicable, two retests shall be made of specimens from the same lot. Failure of one of the retest specimens to meet such requirements shall be the cause for rejection of the lot represented by the specimens.

1002.3 WELDING ELECTRODES

The following electrodes shall be used for arc welding:

a) For connected members both having a specified yield strength greater than 36 ksi (250 MPa).

AWS A5.1: E70XX
AWS A5.5: E70XX-X
AWS A5.17: F7XX-EXXX, F7XX-ECXXX flux electrode combination
AWS A5.18: ER70S-X, E70C-XC, E70C-XM
AWS A5.20: E7XT-X, E7XT-XM
AWS A5.23: F7XX-EXXX-XX, F7XX-ECXXX-XX
AWS A5.28: ER70S-XXX, E70C-XXX
AWS A5.29: E7XTX-X, E7XTX-XM

b) For connected members both having a specified minimum yield strength of 36 ksi (250 MPa) or one having a specified minimum yield strength of 36 ksi (250 MPa), and the other having a specified minimum yield strength greater than 36 ksi (250 MPa).

AWS A5.1: E60XX
AWS A5.17: F6XX-EXXX, F6XX-ECXXX flux electrode combination
AWS A5.20: E6XT-X, E6XT-XM
AWS A5.29: E6XTX-X, E6XT-XM
or any of those listed in Section 1002.3(a).

Other welding methods, providing equivalent strength as demonstrated by tests, may be used.

1002.4 PAINT

The standard shop paint is intended to protect the steel for only a short period of exposure in ordinary atmospheric conditions and shall be considered an impermanent and provisional coating.

When specified, the standard shop paint shall conform to one of the following:

a) Steel Structures Painting Council Specification, SSPC No. 15

b) Or, shall be a shop paint which meets the minimum performance requirements of the above listed specification.

SECTION 1003.
DESIGN AND MANUFACTURE

1003.1 METHOD

Joist Girders shall be designed in accordance with this specification as simply supported primary members. All loads shall be applied through steel joists, and will be equal in magnitude and evenly spaced along the joist girder top chord. Where any applicable design feature is not specifically covered herein, the design shall be in accordance with the following specifications:

a) Where the steel used consists of hot-rolled shapes, bars or plates, use the American Institute of Steel Construction, *Specification for Structural Steel Buildings*.

b) For members that are cold-formed from sheet or strip steel, use the American Iron and Steel Institute, *North American Specification for the Design of Cold-Formed Steel Structural Members*.

Design Basis:

Designs shall be made according to the provisions in this Specification for either Load and Resistance Factor Design (LRFD) or for Allowable Strength Design (ASD).

Load Combinations:

LRFD:

When load combinations are not specified to the joist manufacturer, the required stress shall be computed for the factored loads based on the factors and load combinations as follows:

1.4D

1.2D + 1.6 (L, or L_r, or S, or R)

ASD:

When load combinations are not specified to the joist manufacturer, the required stress shall be computed based on the load combinations as follows:

D

D + (L, or L_r, or S, or R)

Where:

D = dead load due to the weight of the structural elements and the permanent features of the structure

L = live load due to occupancy and movable equipment

L_r = roof live load

S = snow load

R = load due to initial rainwater or ice exclusive of the ponding contribution

When special loads are specified and the specifying professional does not provide the load combinations, the provisions of ASCE 7, *"Minimum Design Loads for Buildings and Other Structures"* shall be used for LRFD and ASD load combinations.

1003.2 DESIGN AND ALLOWABLE STRESSES

Design Using Load and Resistance Factor Design (LRFD)

Joist Girders shall have their components so proportioned that the required stresses, f_u, shall not exceed ϕF_n where,

f_u	=	required stress	ksi (MPa)
F_n	=	nominal stress	ksi (MPa)
ϕ	=	resistance factor	
ϕF_n	=	design stress	

Design Using Allowable Strength Design (ASD)

Joist Girders shall have their components so proportioned that the required stresses, *f*, shall not exceed F_n/Ω where,

f	=	required stress	ksi (MPa)
F_n	=	nominal stress	ksi (MPa)
Ω	=	safety factor	
F_n/Ω	=	allowable stress	

Stresses:

(a) Tension: $\phi_t = 0.90$ (LRFD) $\Omega_t = 1.67$ (ASD)

For Chords: $F_y = 50$ ksi (345 MPa)

For Webs: $F_y = 50$ ksi (345 MPa), or $F_y = 36$ ksi (250 MPa)

Design Stress = $0.9F_y$ (LRFD) (1003.2-1)

Allowable Stress = $0.6F_y$ (ASD) (1003.2-2)

(b) Compression: $\phi_c = 0.90$ (LRFD) $\Omega_c = 1.67$ (ASD)

For members with $\ell/r \le 4.71\sqrt{E/QF_y}$

$$F_{cr} = Q\left[0.658^{\left(\frac{QF_y}{F_e}\right)}\right]F_y \qquad (1003.2\text{-}3)$$

For members with $\ell/r > 4.71\sqrt{E/QF_y}$

$$F_{cr} = 0.877F_e \qquad (1003.2\text{-}4)$$

Where F_e = Elastic bucking stress determined in accordance with Equation 1003.2-5.

$$F_e = \frac{\pi^2 E}{\left(\ell/r\right)^2} \qquad (1003.2\text{-}5)$$

For hot-rolled sections, "Q" is the full reduction factor for slender compression elements.

Design Stress = $0.9F_{cr}$ (LRFD) (1003.2-6)

Allowable Stress = $0.6F_{cr}$ (ASD) (1003.2-7)

In the above equations, ℓ is taken as the distance, in inches (millimeters), between panel points for the chord members and the appropriate length for web members, and *r* is the corresponding least radius of gyration of the member or any component thereof. *E* is equal to 29,000 ksi (200,000 MPa).

Use 1.2 ℓ/r_x for a crimped, first primary compression web member when a moment-resistant weld group is not used for this member; where r_x = member radius of gyration in the plane of the joist.

For cold-formed sections, the method of calculating the nominal column strength is given in the AISI, *North American Specification for the Design of Cold-Formed Steel Structural Members.*

(c) Bending: $\phi_b = 0.90$ (LRFD) $\Omega_b = 1.67$ (ASD)

Bending calculations are to be based on using the elastic section modulus.

For chords and web members other than solid rounds:
$F_y = 50$ ksi (345 MPa)

Design Stress = $0.90F_y$ (LRFD) (1003.2-8)

Allowable Stress = $0.60F_y$ (ASD) (1003.2-9)

For web members of solid round cross section:
$F_y = 50$ ksi (345 MPa), or $F_y = 36$ ksi (250 MPa)

Design Stress = $1.45F_y$ (LRFD) (1003.2-10)

Allowable Stress = $0.95F_y$ (ASD) (1003.2-11)

For bearing plates:
$F_y = 50$ ksi (345 MPa), or $F_y = 36$ ksi (250 MPa)

Design Stress = $1.35F_y$ (LRFD) (1003.2-12)

Allowable Stress = $0.90F_y$ (ASD) (1003.2-13)

(d) Weld Strength:

Shear at throat of fillet welds:

Nominal Shear Stress = $F_{nw} = 0.6F_{exx}$ (1003.2-14)

LRFD: $\phi_w = 0.75$

Design Shear Strength =
$\phi R_n = \phi_w F_{nw} A = 0.45F_{exx} A$ (1003.2-15)

ASD: $\Omega_w = 2.0$

Allowable Shear Strength = (1003.2-16)
$R_n/\Omega_w = F_{nw} A/\Omega_w = 0.3F_{exx} A$

A = effective throat area

Made with E70 series electrodes or F7XX-EXXX flux-electrode combinations ..... $F_{exx} = 70$ ksi (483 MPa)

Made with E60 series electrodes or F6XX-EXXX flux-electrode combinations ..... $F_{exx} = 60$ ksi (414 MPa)

Tension or compression on groove or butt welds shall be the same as those specified for the connected material.

1003.3 MAXIMUM SLENDERNESS RATIOS

The slenderness ratio ℓ/r, where ℓ is the length center-to-center of support points and r is the corresponding least radius of gyration, shall not exceed the following:

Top chord interior panels 90

Top chord end panels 120

Compression members other than top chord 200

Tension members 240

1003.4 MEMBERS

(a) Chords

The bottom chord shall be designed as an axially loaded tension member. The radius of gyration of the bottom chord about its vertical axis shall not be less than $\ell/240$ where ℓ is the distance between lines of bracing.

The top chord shall be designed as an axial loaded compression member. The radius of gyration of the top chord about the vertical axis shall not be less than Span/575.

The top chord shall be considered as stayed laterally by the steel joists provided positive attachment is made.

(b) Web

The vertical shears to be used in the design of the web members shall be determined from full loading, but such vertical shear shall be not less than 25 percent of the end reaction.

Interior vertical web members used in modified Warren type web systems that do not support the direct loads through steel joists shall be designed to resist an axial load of 2 percent of the top chord axial force.

Tension members shall be designed to resist at least 25 percent of their axial force in compression.

(c) Fillers and Ties

In compression members composed of two components, when fillers, ties or welds are used, they shall be spaced so the ℓ/r ratio for each component does not exceed the ℓ/r ratio of the member as a whole. In tension members composed of two components, when fillers, ties or welds are used, they shall be spaced so that the ℓ/r ratio of each component does not exceed 240. The least radius of gyration shall be used in computing the ℓ/r ratio of a component.

(d) Eccentricity

Members connected at a joint shall have their center of gravity lines meet at a point, if practical. Eccentricity on either side of the centroid of chord members may be neglected when it does not exceed the distance between the centroid and the back of the chord. Otherwise, provision shall be made for the stresses due to eccentricity. Ends of Joist Girders shall be proportioned to resist bending produced by eccentricity at the support.

In those cases where a single angle compression member is attached to the outside of the stem of a tee or double angle chord, due consideration shall be given to eccentricity.

(e) Extended Ends

Extended top chords or full depth cantilever ends require the special attention of the specifying professional. The magnitude and location of the loads to be supported, deflection requirements, and proper bracing shall be clearly indicated on the structural drawings.

1003.5 CONNECTIONS

(a) Methods

Joint connections and splices shall be made by attaching the members to one another by arc or resistance welding or other accredited methods.

(1) Welded Connections

a) Selected welds shall be inspected visually by the manufacturer. Prior to this inspection, weld slag shall be removed.

b) Cracks are not acceptable and shall be repaired.

c) Thorough fusion shall exist between layers of weld metal and between weld metal and base metal for the required design length of the weld; such fusion shall be verified by visual inspection.

d) Unfilled weld craters shall not be included in the design length of the weld.

e) Undercut shall not exceed 1/16 inch (2 millimeters) for welds oriented parallel to the principal stress.

f) The sum of surface (piping) porosity diameters shall not exceed 1/16 inch (2 millimeters) in any 1 inch (25 millimeters) of design weld length.

g) Weld spatter that does not interfere with paint coverage is acceptable.

(2) Welding Program

Manufacturers shall have a program for establishing weld procedures and operator qualification, and for weld sampling and testing.

(3) Weld Inspection by Outside Agencies (See Section 1004.10 of this specification).

The agency shall arrange for visual inspection to determine that welds meet the acceptance standards of Section 1003.5(a)(1). Ultrasonic, X-Ray, and magnetic particle testing are inappropriate for Joists Girders due to the configurations of the components and welds.

(b) Strength

(1) Joint Connections – Joint connections shall develop the maximum force due to any of the design loads, but not less than 50 percent of the strength of the member in tension or compression, whichever force is the controlling factor in the selection of the member.

(2) Shop Splices - Shop splices may occur at any point in chord or web members. Splices shall be designed for the member force but not less than 50 percent of the member strength. Members containing a butt weld splice shall develop an ultimate tensile force of at least 57 ksi (393 MPa) times the full design area of the chord or web. The term “member” shall be defined as all component parts comprising the chord or web, at the point of splice.

(c) Field Splices

Field Splices shall be designed by the manufacturer and may be either bolted or welded. Splices shall be designed for the member force, but not less than 50 percent of the member strength.

1003.6 CAMBER

Joist Girders shall have approximate cambers in accordance with the following:

TABLE 1003.6-1

Top Chord Length		Approximate Camber	
20'-0"	(6096 mm)	1/4"	(6 mm)
30'-0"	(9144 mm)	3/8"	(10 mm)
40'-0"	(12192 mm)	5/8"	(16 mm)
50'-0"	(15240 mm)	1"	(25 mm)
60'-0"	(18288 mm)	1 1/2"	(38 mm)
70'-0"	(21336 mm)	2"	(51 mm)
80'-0"	(24384 mm)	2 3/4"	(70 mm)
90'-0"	(27342 mm)	3 1/2"	(89 mm)
100'-0"	(30480 mm)	4 1/4"	(108 mm)
110'-0"	(33528 mm)	5"	(127 mm)
120'-0"	(36576 mm)	6"	(152 mm)

The specifying professional shall give consideration to coordinating Joist Girder camber with adjacent framing.

1003.7 VERIFICATION OF DESIGN AND MANUFACTURE

(a) Design Calculations

Companies manufacturing Joist Girders shall submit design data to the Steel Joist Institute (or an independent agency approved by the Steel Joist Institute) for verification of compliance with the SJI Specifications.

(b) In-Plant Inspections

Each manufacturer shall verify their ability to manufacture Joist Girders through periodic In-Plant Inspections. Inspections shall be performed by an independent agency approved by the Steel Joist Institute. The frequency, manner of inspection, and manner of reporting shall be determined by the Steel Joist Institute. The In-Plant Inspections are not a guarantee of the quality of any specific Joist Girder; this responsibility lies fully and solely with the individual manufacturer.

SECTION 1004.
APPLICATION

1004.1 USAGE

This specification shall apply to any type of structure where steel joists are to be supported directly by Joist Girders installed as hereinafter specified. Where Joist Girders are used other than on simple spans under equal concentrated gravity loading, as prescribed in Section 1003.1, they shall be investigated and modified if necessary to limit the unit stresses to those listed in Section 1003.2. The magnitude and location of all loads and forces, other than equal concentrated gravity loading, shall be provided on the structural drawings. The specifying professional shall design the supporting structure, including the design of columns, connections, and moment plates*. This design shall account for the stresses caused by lateral forces and the stresses due to connecting the bottom chord to the column or other support.

The designed detail of a rigid type connection and moment plates shall be shown on the structural drawings by the specifying professional. The moment plates shall be furnished by other than the joist manufacturer.

* For further reference, refer to Steel Joist Institute Technical Digest #11, "Design of Joist-Girder Frames"

1004.2 SPAN

The span of a Joist Girder shall not exceed 24 times its depth.

1004.3 DEPTH

Joist Girders may have either parallel top chords or a top chord slope of 1/8 inch per foot (1:96). The nominal depth of sloping chord Joist Girders shall be the depth at mid-span.

1004.4 END SUPPORTS

(a) Masonry and Concrete

Joist Girders supported by masonry or concrete are to bear on steel bearing plates and shall be designed as steel bearing. Due consideration of the end reactions and all other vertical and lateral forces shall be taken by the specifying professional in the design of the steel bearing plate and the masonry or concrete. The ends of Joist Girders shall extend a distance of not less than 6 inches (152 millimeters) over the masonry or concrete support and be anchored to the steel bearing plate. The plate shall be located not more than 1/2 inch (13 millimeters) from the face of the wall and shall be not less than 9 inches (229 millimeters) wide perpendicular to the length of the girder. The plate is to be designed by the specifying professional and shall be furnished by other than the joist manufacturer.

Where it is deemed necessary to bear less than 6 inches (152 millimeters) over the masonry or concrete support, special consideration is to be given to the design of the steel bearing plate and the masonry or concrete by the specifying professional. The girders must bear a minimum of 4 inches (102 millimeters) on the steel bearing plate.

(b) Steel

Due consideration of the end reactions and all other vertical and lateral forces shall be taken by the specifying professional in the design of the steel support. The ends of Joist Girders shall extend a distance of not less than 4 inches (102 millimeters) over the steel supports and shall have positive attachment to the support, either by bolting or welding.

1004.5 BRACING

Joist Girders shall be proportioned such that they can be erected without bridging (See Section 1004.9 for bracing required for uplift forces). Therefore, the following requirements must be met:

a) The ends of the bottom chord are restrained from lateral movement to brace the girder from overturning. For Joist Girders at columns in steel frames, restraint shall be provided by a stabilizer plate on the column.

b) No other loads shall be placed on the Joist Girder until the steel joists bearing on the girder are in place and welded to the girder.

1004.6 END ANCHORAGE

(a) Masonry and Concrete

Ends of Joist Girders resting on steel bearing plates on masonry or structural concrete shall be attached thereto with a minimum of two 1/4 inch (6 millimeters) fillet welds 2 inches (51 millimeters) long, or with two 3/4 inch (19 millimeters) bolts, or the equivalent.

(b) Steel

Ends of Joist Girders resting on steel supports shall be attached thereto with a minimum of two 1/4 inch (6 millimeters) fillet welds 2 inches (51 millimeters) long, or with two 3/4 inch (19 millimeters) bolts, or the equivalent. In steel frames, bearing seats for Joist Girders shall be fabricated to allow for field bolting.

(c) Uplift

Where uplift forces are a design consideration, roof Joist Girders shall be anchored to resist such forces (Refer to Section 1004.9).

1004.7 DEFLECTION

The deflections due to the design live load shall not exceed the following:

Floors: 1/360 of span.

Roofs: 1/360 of span where a plaster ceiling is attached or suspended.

1/240 of span for all other cases.

The specifying professional shall give consideration to the

effects of deflection and vibration* in the selection of Joist Girders.

* For further reference, refer to Steel Joist Institute Technical Digest #5, "Vibration of Steel Joist-Concrete Slab Floors" and the Institute's Computer Vibration Program.

1004.8 PONDING*

The ponding investigation shall be performed by the specifying professional.

* For further reference, refer to Steel Joist Institute Technical Digest #3, "Structural Design of Steel Joist Roofs to Resist Ponding Loads" and AISC Specifications.

1004.9 UPLIFT

Where uplift forces due to wind are a design requirement, these forces must be indicated on the contract drawings in terms of NET uplift in pounds per square foot (Pascals). The contract drawings must indicate if the net uplift is based on ASD or LRFD. When these forces are specified, they must be considered in the design of Joist Girders and/or bracing. If the ends of the bottom chord are not strutted, bracing must be provided near the first bottom chord panel points whenever uplift due to wind forces is a design consideration.*

* For further reference, refer to Steel Joist Institute Technical Digest #6, "Structural Design of Steel Joist Roofs to Resist Uplift Loads".

1004.10 INSPECTION

Joist Girders shall be inspected by the manufacturer before shipment to verify compliance of materials and workmanship with the requirements of this specification. If the purchaser wishes an inspection of the Joist Girders by someone other than the manufacturer's own inspectors, they may reserve the right to do so in their "Invitation to Bid" or the accompanying "Job Specifications". Arrangements shall be made with the manufacturer for such inspection of the Joist Girders at the manufacturing shop by the purchaser's inspectors at purchaser's expense.

SECTION 1005.*
HANDLING AND ERECTION

Particular attention should be paid to the erection of Joist Girders.

Care shall be exercised at all times to avoid damage through careless handling during unloading, storing and erecting. Dropping of Joist Girders shall not be permitted.

In steel framing, where Joist Girders are utilized at column lines, the Joist Girder shall be field-bolted at the column. Before hoisting cables are released and before an employee is allowed on the Joist Girder the following conditions must be met:

a) The seat at each end of the Joist Girder is attached in accordance with Section 1004.6.

   When a bolted seat connection is used for erection purposes, as a minimum, the bolts must be snug tightened. The snug tight condition is defined as the tightness that exists when all plies of a joint are in firm contact. This may be attained by a few impacts of an impact wrench or the full effort of an employee using an ordinary spud wrench.

b) Where stabilizer plates are required the Joist Girder bottom chord must engage the stabilizer plate.

During the construction period, the contractor shall provide means for the adequate distribution of loads so that the carrying capacity of any Joist Girder is not exceeded.

Joist Girders shall not be used as anchorage points for a fall arrest system unless written direction to do so is obtained from a "qualified person".[1]

Field welding shall not damage the Joist Girder. The total length of weld at any one cross-section on cold-formed members whose yield strength has been attained by cold working and whose as-formed strength is used in the design, shall not exceed 50 percent of the overall developed width of the cold-formed section.

* For a thorough coverage of this topic, refer to SJI Technical Digest #9, "Handling and Erection of Steel Joists and Joist Girders".

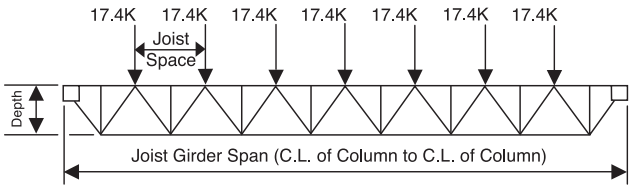
[1] See Appendix E for OSHA definition of "qualified person".

SECTION 1006.
HOW TO SPECIFY JOIST GIRDERS

For a given Joist Girder span, the specifying professional first determines the number of joist spaces. Then the panel point loads are calculated and a depth is selected. The following tables give the Joist Girder weight in pounds per linear foot (kiloNewtons per meter) for various depths and loads.

1. The purpose of the Joist Girder Design Guide Weight Table is to assist the specifying professional in the selection of a roof or floor support system.
2. It is not necessary to use only the depths, spans, or loads shown in the tables.
3. Holes in chord elements present special problems which must be considered by both the specifying professional and the Joist Girder Manufacturer. The sizes and locations of such holes shall be clearly indicated on the structural drawings.

Example using *Load and Resistance Factor Design (LRFD)* and U. S. Customary units:



STANDARD DESIGNATION

44G	8N	17.4F
Depth in Inches	Number of Joist Spaces	Factored Load in Kips at Each Panel Point

Given 42'-0" x 50'-0" bay. Joists spaced on 5'-3" centers

Live Load = 30 psf x 1.6

Dead Load = 15 psf x 1.2
(includes the approximate Joist Girder weight)

Total Load = 66 psf (factored)

Note: Web configuration may vary from that shown. Contact Joist Girder manufacturer if exact layout must be known.

1. Determine number of actual joist spaces (N).
   In this example, N = 8
2. Compute total factored load:

   Total load = 5.25 x 66 psf = 346.5 plf
3. Joist Girder Section: (Interior)

   a) Compute the factored concentrated load at top chord panel points

   P = 346.5 x 50 = 17,325 lbs = 17.4 kips
   (use 18K for depth selection).

   b) Select Joist Girder depth:

   Refer to the LRFD Joist Girder Design Guide Weight Table for the 42'-0" span, 8 panel, 18.0K Joist Girder. The rule of about one inch of depth for each foot of span is a good compromise of limited depth and economy. Therefore, select a depth of 44 inches.

   c) The Joist Girder will then be designated 44G8N17.4F. Note that the letter "F" is included at the end of the designation to clearly indicate that this is a factored load.

   d) The LRFD Joist Girder Design Guide Weight Table shows the weight for a 44G8N17.4K as 49 pounds per linear foot. The designer should verify that the weight is not greater than the weight assumed in the Dead Load above.

   e) Check live load deflection:

   Live load = 30 psf x 50 ft = 1500 plf

   Approximate Joist Girder moment of inertia

   = 0.018 NPLd

   = 0.018 x 8 x 17.4 x 42 x 44 = 4630 in.^{4}

Allowable deflection for plastered ceilings

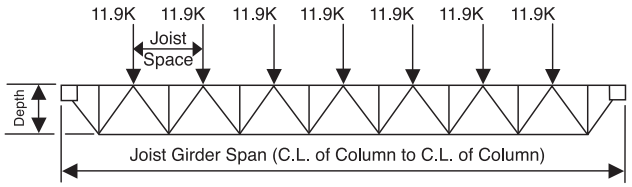
$$= L/360 = \frac{42(12)}{360} = 1.40 \text{ in.}$$

$$\text{Deflection} = 1.15\left[\frac{5wL^4}{384EI}\right] = \frac{1.15(5)(1.500/12)(42x12)^4}{384(29000)(4630)}$$

= 0.90 in. < 1.40 in., Okay

Live load deflection rarely governs because of the relatively small span-depth ratios of Joist Girders.

Example using *Allowable Strength Design (ASD)* and U. S. Customary units:



STANDARD DESIGNATION

44G	8N	11.9K
Depth in Inches	Number of Joist Spaces	Load in Kips at Each Panel Point

Given 42'-0" x 50'-0" bay. Joists spaced on 5'-3" centers.

Live Load = 30 psf

Dead Load = 15 psf
(includes the approximate Joist Girder weight)

Total Load = 45 psf

Note: Web configuration may vary from that shown. Contact Joist Girder manufacturer if exact layout must be known.

1. Determine number of actual joist spaces (N).

   In this example, N = 8
2. Compute total load:

   Total load = 5.25 x 45 psf = 236.25 plf
3. Joist Girder Section: (Interior)

   a) Compute the concentrated load at top chord panel points

   P = 236.25 x 50 = 11,813 lbs = 11.9 kips
   (use 12K for depth selection).

   b) Select Joist Girder depth:

   Refer to the ASD Joist Girder Design Guide Weight Table for the 42'-0" span, 8 panel, 12.0K Joist Girder.

The rule of about one inch of depth for each foot of span is a good compromise of limited depth and economy. Therefore, select a depth of 44 inches.

c) The Joist Girder will then be designated 44G8N11.9K.

d) The ASD Joist Girder Design Guide Weight Table shows the weight for a 44G8N12K as 49 pounds per linear foot. The designer should verify that the weight is not greater than the weight assumed in the Dead Load above.

e) Check live load deflection:

Live load = 30 psf x 50 ft = 1500 plf.

Approximate Joist Girder moment of inertia

= 0.027 NPLd

= 0.027 x 8 x 11.9 x 42 x 44 = 4750 in.^{4}

Allowable deflection for plastered ceilings

$$= L/360 = \frac{42(12)}{360} = 1.40 \text{ in.}$$

$$\text{Deflection} = 1.15 \left[\frac{5wL^4}{384EI}\right] = \frac{1.15(5)(1.500/12)(42x12)^4}{384(29000)(4750)}$$

= 0.88 in. < 1.40 in., Okay

Live load deflection rarely governs because of the relatively small span-depth ratios of Joist Girders.

DESIGN GUIDE WEIGHT TABLE FOR JOIST GIRDERS
U. S. CUSTOMARY

Based on a 50ksi maximum yield strength

Girder Span (ft)	Joist Spaces (ft)	Girder Depth (in)	Joist Girder Weight – Pounds Per Linear Foot Load on Each Panel Point																					
		LRFD	6K	7.5K	9K	10.5K	12K	13.5K	15K	16.5K	18K	21K	24K	27K	30K	37.5K	45K	52.5K	60K	75K	90K	105K	120K	150K
		ASD	4K	5K	6K	7K	8K	9K	10K	11K	12K	14K	16K	18K	20K	25K	30K	35K	40K	50K	60K	70K	80K	100K
20	2N@ 10.00	16	16	16	16	16	16	16	16	17	18	21	23	26	30	35	41	47	54	69	83	100	108	140
		20	16	16	16	16	16	16	16	16	16	17	19	22	24	31	35	39	44	56	64	76	85	104
		24	16	16	16	16	16	16	17	17	17	17	17	19	20	26	29	34	37	48	57	66	73	88
	3N@ 6.67	16	16	16	16	16	16	18	20	22	24	27	31	35	38	48	54	69	79	101	114	141	152	187
		20	16	16	16	16	16	16	17	19	21	23	26	28	31	38	47	56	64	78	95	109	117	156
		24	16	16	17	17	17	17	17	18	19	23	25	26	31	34	38	45	51	67	80	97	109	122
	4N@ 5.00	16	16	16	18	20	22	26	28	29	32	38	42	50	54	66	83	100	108	140	162	188	209	314
		20	16	16	16	17	20	20	21	23	26	30	34	39	43	52	60	76	85	105	124	145	169	238
		24	16	16	16	16	17	19	20	21	22	25	28	32	38	44	54	61	75	89	107	126	149	189
	5N@ 4.00	16	16	18	19	24	26	29	33	37	39	47	54	59	66	83	101	113	140	172	212	247	296	
		20	16	16	17	19	21	26	28	29	32	37	41	49	53	65	80	95	104	134	167	198	221	296
		24	16	16	17	19	20	22	24	28	28	31	35	39	45	55	67	78	88	109	128	152	183	244
	10N@ 2.00	16	28	33	39	47	54	62	72	78	83	101	109	131	141	195	226	247	358					
		20	23	29	31	37	43	49	56	61	64	77	86	104	108	145	179	203	236	317				
		24	21	25	28	32	39	43	46	55	54	66	80	84	89	119	141	171	197	250	313			
22	2N@ 11	16	18	18	18	18	18	18	19	20	20	23	26	29	32	39	46	53	61	77	98	107	119	158
		20	18	18	18	18	18	18	18	19	19	20	21	23	27	33	37	46	48	62	70	83	101	121
		24	19	19	19	19	19	19	19	19	19	19	20	21	24	29	33	36	42	49	63	72	81	103
	3N@ 7.33	16	15	15	15	16	17	19	23	24	25	29	33	37	40	53	61	73	90	103	129	149	170	207
		20	16	16	16	16	16	17	19	20	23	24	27	30	34	42	48	55	67	80	102	115	132	165
		24	16	16	16	16	16	16	17	18	19	24	24	27	28	36	43	48	57	70	82	97	111	137
	4N@ 5.5	16	16	17	18	21	24	28	30	33	36	40	46	53	58	77	98	100	119	159	179	206	235	
		20	16	16	17	18	20	22	25	27	28	33	37	42	48	60	71	84	102	115	143	165	187	244
		24	16	16	16	17	19	20	20	21	26	27	31	34	40	47	61	69	76	104	113	145	148	206
	6N@ 3.67	16	17	21	26	29	35	39	42	49	50	58	73	82	99	107	139	160	180	237				
		20	17	19	21	26	28	31	34	38	42	51	59	60	68	85	103	122	143	175	222	252	322	
		24	16	17	19	21	25	27	30	32	34	40	47	54	61	75	87	106	113	148	178	202	240	330
	11N@ 2.00	16	32	39	49	57	64	77	82	99	100	113	140	150	162	222	256							
		20	26	31	37	43	52	59	64	76	80	94	103	116	133	168	203	235	289					
		24	24	28	32	38	43	50	54	62	65	78	90	108	110	138	182	205	238	301				
24	2N@ 12.00	20	18	18	18	18	18	18	18	19	19	21	24	27	30	36	44	47	54	68	78	99	103	131
		24	18	18	18	18	18	18	18	18	19	20	21	22	26	32	34	40	46	55	67	79	93	106
		28	19	19	19	19	19	19	19	19	19	19	20	21	23	28	32	35	41	48	57	69	72	95
	3N@ 8.00	20	16	16	16	16	16	18	20	22	23	26	29	33	36	45	54	62	74	92	105	130	151	175
		24	16	16	16	16	16	16	17	19	21	24	27	29	31	38	47	55	64	78	94	108	117	156
		28	16	16	16	16	17	17	17	18	18	24	26	26	30	35	40	48	55	67	86	97	108	122
	4N@ 6.00	20	16	16	17	19	21	25	27	28	31	36	39	47	50	63	78	100	101	130	161	183	192	246
		24	17	17	17	18	19	22	24	25	28	32	35	38	43	54	65	76	85	107	124	147	168	225
		28	16	16	16	16	17	20	20	21	25	27	30	36	38	44	53	62	74	88	108	126	149	187
	5N@ 4.8	20	16	17	20	22	25	28	31	35	36	43	51	55	62	78	100	105	131	164	196	225	282	
		24	16	16	18	20	21	26	28	29	32	36	41	49	53	65	80	94	104	134	157	186	218	285
		28	16	16	17	19	20	22	25	27	29	32	36	42	46	58	66	82	97	115	138	168	180	231
	6N@ 4.00	20	17	20	23	27	30	33	38	41	44	51	59	69	74	101	109	141	163	192	245	294		
		24	16	17	20	23	26	29	32	34	38	43	53	60	61	76	103	106	124	172	196	232	267	
		28	17	17	20	22	25	28	29	31	33	39	44	49	55	76	84	106	112	129	177	202	240	289
	12N@ 2.00	20	29	38	45	51	59	70	75	84	101	103	122	143	166	196	265	320						
		24	27	31	38	45	53	61	62	72	77	87	105	113	126	175	199	249	288					
		28	25	29	33	40	45	54	56	69	71	79	91	113	114	144	183	215	234	305				
26	2N@ 13.00	20	22	22	22	22	22	22	23	24	24	26	27	29	32	37	45	53	60	68	90	99	112	140
		24	23	23	23	23	23	23	23	23	24	25	25	27	29	32	38	44	51	61	70	83	101	115
		28	23	23	23	23	23	23	23	23	23	24	25	26	27	31	34	39	45	52	62	71	81	103
	3N@ 8.67	20	15	15	16	16	17	19	22	23	25	28	33	36	39	50	57	68	78	99	113	140	151	196
		24	16	16	16	16	16	17	19	21	23	25	28	31	34	40	51	58	67	80	102	113	132	155
		28	16	16	16	16	16	17	17	19	20	25	25	28	29	38	45	48	56	69	81	97	110	136
	4N@ 6.5	20	16	16	18	21	24	27	28	30	33	39	42	50	54	69	82	100	107	140	161	186	213	284
		24	16	16	17	18	20	23	25	27	28	33	37	40	48	60	71	79	101	110	143	166	188	223
		28	16	16	16	17	19	20	20	22	26	29	32	35	39	50	60	69	76	104	112	145	149	204
	5N@ 5.2	20	17	18	21	25	28	31	35	39	40	48	54	62	69	91	100	114	140	172	200	239	275	
		24	16	16	19	21	24	27	28	31	34	38	43	51	55	71	84	103	108	143	166	201	225	310
		28	16	16	17	19	21	23	27	28	29	34	39	43	50	61	80	86	104	118	147	178	200	249
	7N@ 3.71	20	20	24	28	33	36	42	47	54	58	65	78	91	100	119	140	162	192	238	308			
		24	17	20	26	28	31	35	40	44	49	56	64	71	80	103	116	143	166	198	242	293		
		28	17	20	22	27	29	32	35	38	42	50	58	62	70	86	106	114	137	178	212	253	292	
	13N@ 2.00	20	42	50	58	70	86	91	103	109	110	131	152	173	202	252								
		24	35	43	50	62	66	76	88	93	97	112	127	154	166	225	248							
		28	32	40	48	55	64	68	74	90	90	100	115	130	148	177	232	283						
Bearing Depth			7 1/2 in.													10 in.								

Joist Girder weights between the heavy black and blue lines have 7 1/2 inch bearing depths.
Joist Girder weights to the right of the heavy blue line have 10 inch bearing depths. Check with Vulcraft for material availability.

DESIGN GUIDE WEIGHT TABLE FOR JOIST GIRDERS
U. S. CUSTOMARY

Based on a 50ksi maximum yield strength

Girder Span (ft)	Joist Spaces (ft)	Girder Depth (in)	Joist Girder Weight – Pounds Per Linear Foot Load on Each Panel Point																					
		LRFD	6K	7.5K	9K	10.5K	12K	13.5K	15K	16.5K	18K	21K	24K	27K	30K	37.5K	45K	52.5K	60K	75K	90K	105K	120K	150K
		ASD	4K	5K	6K	7K	8K	9K	10K	11K	12K	14K	16K	18K	20K	25K	30K	35K	40K	50K	60K	70K	80K	100K
28	2N@ 14.00	24	29	29	29	29	29	29	29	30	31	31	33	34	37	39	42	49	57	65	77	91	103	129
		28	29	29	30	30	30	30	30	30	30	31	32	34	34	38	40	43	46	58	66	78	93	106
		32	30	30	30	30	30	30	30	30	30	31	32	33	34	37	39	40	44	52	60	68	76	95
	3N@ 9.33	24	16	16	16	16	16	18	21	22	23	26	29	33	36	44	54	61	70	91	105	124	133	174
		28	16	16	16	16	16	16	18	19	21	23	26	29	31	39	47	52	61	77	94	107	115	156
		32	16	16	16	16	17	17	17	18	19	24	24	27	29	36	42	47	54	70	80	97	110	131
	4N@ 7.00	24	16	16	17	19	21	24	27	28	31	35	39	45	50	62	74	91	101	121	143	165	190	244
		28	17	17	17	18	20	23	24	25	28	32	36	39	44	57	64	76	85	109	124	151	170	206
		32	16	16	16	18	19	20	21	22	24	27	31	37	39	46	54	62	74	88	108	126	149	185
	5N@ 5.6	24	16	17	19	22	24	28	31	33	35	41	47	55	62	78	92	105	114	152	176	215	244	
		28	16	16	17	20	21	26	28	29	32	35	40	47	52	64	80	94	104	134	156	186	213	260
		32	16	16	17	19	20	22	26	27	29	32	38	42	46	58	66	82	97	111	136	162	190	232
	6N@ 4.67	24	17	19	21	25	29	32	36	39	43	50	59	66	73	100	109	121	142	191	219	254	314	
		28	16	19	21	22	26	29	32	34	37	44	52	57	60	76	103	105	123	149	194	223	253	
		32	17	17	20	22	24	27	30	31	34	38	45	51	54	71	87	105	108	148	177	201	230	301
	7N@ 4.00	24	18	22	26	31	33	37	43	48	51	59	67	79	84	103	131	144	166	219	261			
		28	17	20	24	26	29	32	36	41	45	53	61	65	74	95	109	125	147	184	224	272	312	
		32	17	20	23	25	27	30	33	37	40	47	55	60	67	83	106	115	127	169	202	240	277	
	14N@ 2.00	24	33	43	51	59	66	79	84	102	103	121	143	155	173	221	281							
		28	30	38	45	53	61	70	75	82	88	106	114	137	149	198	235	274	332					
		32	28	33	40	47	54	63	72	76	79	100	113	118	132	172	206	244	284					
30	2N@ 15.00	24	29	29	29	29	29	29	30	30	31	32	33	35	37	40	46	53	60	72	85	102	103	139
		28	29	29	29	29	29	30	30	30	30	32	32	34	36	38	41	44	49	65	74	86	92	115
		32	30	30	30	30	30	30	30	30	30	31	32	33	34	37	40	41	45	55	66	75	89	106
		36	30	30	30	30	30	30	30	30	30	31	32	32	33	36	38	41	42	51	60	68	76	95
	3N@ 10.00	24	15	16	16	16	18	19	22	24	25	29	31	34	38	48	57	65	74	91	109	130	151	176
		28	16	16	16	16	16	17	20	21	24	25	28	31	33	43	50	58	67	79	94	108	126	156
		32	16	16	16	16	16	17	18	19	21	25	26	29	30	38	45	51	60	69	89	96	110	136
		36	16	17	17	17	17	17	17	18	20	24	26	27	30	34	42	46	55	70	80	92	99	122
	4N@ 7.5	24	16	16	17	20	24	26	27	30	32	37	42	47	54	66	78	99	104	140	161	183	210	265
		28	16	16	17	18	21	23	25	27	28	33	37	42	46	56	71	79	93	110	143	156	179	223
		32	16	16	16	18	19	20	21	23	27	29	32	36	41	50	60	69	76	104	112	146	149	202
		36	16	16	17	17	18	19	21	22	24	27	30	35	38	45	54	62	71	87	106	115	147	184
	5N@ 6.00	24	16	17	20	23	26	29	32	34	38	45	53	58	62	78	100	108	131	162	193	231	262	
		28	16	16	19	21	24	27	28	31	34	38	46	49	56	71	79	102	107	143	166	195	224	285
		32	16	16	17	19	21	25	26	28	31	36	39	44	50	64	73	85	104	118	147	177	198	248
		36	16	17	17	19	21	22	25	27	29	31	38	40	44	58	66	76	88	108	127	151	179	220
	6N@ 5.00	24	17	19	24	28	31	34	39	42	47	54	62	69	78	100	109	140	161	190	237	288		
		28	16	19	20	26	28	31	34	37	40	46	52	60	67	84	102	111	143	167	195	222	289	
		32	16	17	20	22	26	28	31	32	35	41	47	53	60	74	87	106	113	148	175	200	237	304
		36	17	18	19	21	24	28	28	30	33	38	44	49	55	67	79	90	108	129	154	180	206	275
	8N@ 3.75	24	21	25	31	36	41	47	50	58	62	73	83	100	102	131	162	188	216	255				
		28	20	23	29	32	37	40	44	49	53	61	72	81	86	111	144	147	175	224	281			
		32	19	22	26	30	32	36	41	45	50	57	65	75	82	105	114	147	159	204	242	308	343	
		36	19	21	24	28	30	35	38	39	43	53	59	69	74	89	111	118	152	185	218	256	314	
	15N@ 2.00	24	40	50	58	66	78	92	101	106	115	142	165	181	196	257	326							
		28	34	41	52	60	68	76	85	103	105	113	137	152	176	216	265	329						
		32	30	39	47	54	62	73	77	83	91	111	117	133	159	195	242	275	325					
		36	29	35	42	49	56	66	72	79	82	103	117	127	142	183	222	260	290					
32	3N@ 10.67	24	15	15	15	17	19	21	23	25	26	31	34	37	42	50	63	72	86	102	123	130	150	197
		28	16	16	16	16	17	19	21	22	24	27	29	32	35	44	51	64	67	87	105	114	132	173
		32	16	16	16	16	16	17	19	21	22	25	27	30	32	39	45	52	60	77	93	107	115	156
		36	16	16	17	17	17	17	18	19	21	25	25	28	30	37	44	51	54	69	79	97	110	131
	4N@ 8.00	24	16	16	18	22	24	26	29	31	34	40	45	53	58	69	89	99	107	139	161	187	222	273
		28	16	16	17	19	22	24	26	27	30	35	38	46	48	62	70	83	101	115	143	165	187	243
		32	17	17	17	18	20	24	25	25	28	32	36	39	46	56	65	73	85	109	124	151	172	203
		36	16	16	18	18	19	20	22	23	26	28	34	37	39	50	57	66	75	88	107	125	149	184
	5N@ 6.4	24	16	19	22	26	29	31	34	38	41	47	54	61	68	91	103	113	140	172	200	237	275	
		28	16	17	19	22	24	27	29	32	35	41	47	54	62	71	92	102	114	143	175	209	233	305
		32	16	16	18	20	22	26	27	30	33	36	42	47	55	64	80	94	103	133	156	187	203	258
		36	16	17	17	19	20	23	25	28	29	35	37	43	48	58	72	82	96	111	137	162	189	230
	6N@ 5.33	24	18	21	25	29	33	36	40	46	49	57	65	73	82	100	119	141	161	214	242	307		
		28	17	19	21	26	28	31	36	39	43	50	59	62	70	92	102	121	142	171	219	249	290	
		32	16	19	20	24	26	28	32	34	37	44	52	57	60	76	103	105	123	149	194	223	253	321
		36	17	17	20	21	25	27	30	32	35	39	46	51	57	74	87	105	108	148	176	200	229	299
	8N@ 4.00	24	23	28	33	39	42	50	57	58	65	77	91	100	108	140	162	188	216	282				
		28	21	26	28	33	37	42	48	51	59	67	75	85	101	111	143	167	192	241	292			
		32	20	23	27	30	34	38	42	46	52	61	69	76	86	109	125	149	176	207	258	304		
		36	19	22	26	29	32	36	39	43	46	54	62	74	76	97	116	129	152	195	241	277	316	
Bearing Depth			7 1/2 in.																10 in.					

Joist Girder weights between the heavy black and blue lines have 7 1/2 inch bearing depths.
Joist Girder weights to the right of the heavy blue line have 10 inch bearing depths. Check with Vulcraft for material availability.

DESIGN GUIDE WEIGHT TABLE FOR JOIST GIRDERS

Based on a 50ksi maximum yield strength **U. S. CUSTOMARY**

Girder Span (ft)	Joist Spaces (ft)	Girder Depth (in)	Joist Girder Weight – Pounds Per Linear Foot Load on Each Panel Point																				
		LRFD	6K	7.5K	9K	10.5K	12K	13.5K	15K	16.5K	18K	21K	24K	27K	30K	37.5K	45K	52.5K	60K	75K	90K	105K	120K	150K
		ASD	4K	5K	6K	7K	8K	9K	10K	11K	12K	14K	16K	18K	20K	25K	30K	35K	40K	50K	60K	70K	80K	100K
34	3N@ 11.33	32	18	18	18	19	19	19	20	22	23	26	28	32	35	42	49	58	66	87	91	112	126	156
		36	18	19	19	19	19	19	20	20	22	26	27	29	31	39	45	51	60	73	89	99	115	136
		40	19	19	19	19	19	19	20	20	21	25	27	28	32	37	44	46	54	70	79	92	110	132
	4N@ 8.50	28	16	16	18	20	23	26	27	29	32	36	40	47	54	62	78	91	100	130	152	174	199	243
		32	16	16	17	19	20	24	24	27	30	32	37	42	47	56	71	79	92	108	134	155	177	223
		36	16	17	18	18	19	21	23	26	27	29	33	38	41	50	61	69	76	104	113	146	149	200
		40	16	18	18	18	19	20	21	23	26	28	33	35	39	45	54	62	74	87	106	115	148	182
	5N@ 6.80	28	16	17	21	23	26	29	32	35	38	45	47	54	62	77	99	106	120	153	185	212	248	
		32	16	17	18	21	24	27	30	32	34	39	46	48	55	70	79	101	107	133	156	197	214	267
		36	16	16	17	20	21	25	28	28	33	36	39	47	50	64	73	85	104	119	146	170	198	241
		40	17	17	18	19	21	23	26	29	29	35	38	40	48	58	66	80	96	111	137	151	181	227
	6N@ 5.67	28	17	20	24	28	30	33	36	41	44	54	58	65	73	100	108	130	142	190	220	248	307	
		32	17	19	21	25	28	31	34	37	40	48	52	59	67	83	102	110	123	167	193	224	252	
		36	17	18	20	22	26	28	31	32	36	41	50	53	60	74	86	105	113	148	177	199	228	298
		40	17	18	19	22	24	27	29	30	33	39	42	51	54	67	83	97	108	128	153	187	216	269
36	7N@ 4.86	28	19	23	27	31	34	39	43	47	54	62	70	78	91	105	131	152	175	219	255			
		32	18	20	26	27	31	35	38	42	47	56	64	71	79	102	111	134	155	193	223	268		
		36	17	20	22	27	29	32	36	38	42	50	57	65	69	86	105	118	136	176	203	241	285	
		40	17	20	23	25	28	30	33	36	39	45	53	59	63	79	99	109	122	154	196	225	258	332
	9N@ 3.78	28	25	28	34	39	43	51	58	63	67	78	92	101	109	142	164	194	220	284				
		32	21	26	30	35	40	44	49	56	60	70	80	95	103	124	148	175	198	265	325			
		36	20	25	28	32	36	41	45	50	53	62	72	81	88	113	127	150	178	227	275	330		
		40	19	23	28	30	34	38	43	46	51	59	68	76	84	107	116	142	159	206	250	299		
	3N@ 12.00	28	18	18	18	18	19	21	23	25	27	30	33	40	41	48	60	69	81	94	109	130	151	186
		32	18	18	18	18	18	19	21	23	25	27	30	33	36	44	54	61	71	87	104	112	132	164
		36	18	18	19	19	19	19	20	21	22	26	28	31	34	43	48	55	63	76	93	107	115	156
		40	19	19	19	19	19	19	19	20	22	26	26	29	32	40	44	51	57	69	89	97	110	131
	4N@ 9.00	28	16	16	19	21	23	27	29	31	34	39	45	50	54	69	81	99	104	140	161	183	211	265
		32	16	16	17	20	23	24	26	28	31	35	40	46	48	62	70	83	101	115	143	165	188	230
		36	17	17	17	18	21	24	25	27	28	33	37	40	46	57	65	73	85	109	125	150	172	212
		40	16	18	18	18	19	21	23	23	26	28	32	38	40	50	58	66	76	96	111	126	149	183
	5N@ 7.20	28	16	18	21	25	26	31	34	36	40	45	54	61	68	81	100	114	130	162	196	231	262	
		32	16	17	20	22	24	27	30	34	35	41	46	54	59	70	91	101	112	143	177	199	233	300
		36	16	16	18	21	23	26	28	30	33	37	42	47	55	63	79	93	104	133	156	186	200	258
		40	17	17	17	20	21	24	26	28	31	36	39	43	49	57	73	81	95	111	137	162	188	230
	6N@ 6.00	28	18	20	25	27	33	36	39	42	47	57	62	69	77	99	113	140	160	191	236	282		
		32	17	20	23	25	28	31	35	39	42	48	55	62	70	83	102	121	142	167	199	241	285	
		36	16	18	21	24	26	29	32	36	37	44	52	56	63	80	102	106	123	147	193	214	252	317
		40	17	18	20	22	26	27	30	33	35	41	46	53	58	71	86	105	111	148	177	200	228	296
	7N@ 5.14	28	19	24	28	33	37	40	47	50	54	62	77	82	99	113	140	162	188	225	291			
		32	18	21	26	28	32	37	40	43	49	56	64	71	80	102	116	143	166	196	246	297		
		36	18	20	25	28	31	33	36	41	44	53	57	65	73	94	109	125	147	183	213	256	306	
		40	17	20	24	26	29	31	34	37	41	49	55	62	66	82	106	113	127	167	200	231	274	
	9N@ 4.00	28	24	31	36	41	46	54	57	65	69	82	99	104	113	141	173	205	236	293				
		32	23	27	31	37	40	48	52	59	63	73	84	102	103	133	157	185	215	268				
		36	21	26	29	33	37	41	50	52	56	65	74	85	95	113	146	160	187	236	298			
		40	20	24	27	30	35	39	43	46	51	62	68	76	87	107	121	151	178	207	270	307		
38	3N@ 12.67	32	22	23	23	23	23	24	25	26	26	29	33	36	40	47	57	65	74	91	109	124	142	173
		36	23	23	23	23	23	24	25	26	26	27	28	32	36	43	50	61	67	85	97	112	126	156
		40	23	23	23	23	24	24	24	25	26	29	28	31	33	43	48	55	63	73	89	99	115	145
		44	23	24	24	24	24	24	24	25	26	28	29	29	33	39	44	50	58	70	88	96	110	131
	4N@ 9.50	32	16	16	18	21	23	26	28	30	32	36	41	46	54	62	78	91	100	120	152	175	190	244
		36	16	17	17	19	23	24	26	26	29	34	38	42	47	56	71	79	93	108	134	155	177	223
		40	17	17	18	18	20	23	24	26	28	31	35	38	41	51	61	72	80	104	113	146	149	199
		44	18	18	18	18	19	21	23	24	27	29	34	36	39	48	58	66	74	88	106	121	148	182
	5N@ 7.60	32	16	17	20	23	26	29	32	35	37	44	47	55	62	77	91	105	115	152	177	207	233	
		36	16	17	18	22	24	27	29	31	34	38	46	49	56	71	79	93	107	134	158	184	213	274
		40	16	16	17	20	22	25	28	30	33	37	41	47	50	63	74	93	104	118	147	171	197	239
		44	17	17	18	20	21	23	26	28	30	35	39	42	49	57	69	81	96	111	137	161	188	221
	6N@ 6.33	32	17	20	23	27	31	34	36	39	43	51	58	65	73	99	106	121	142	189	218	251	305	
		36	17	19	21	26	28	32	34	37	40	48	52	59	64	83	102	110	123	167	192	222	260	
		40	17	18	20	23	26	29	32	33	36	42	50	56	61	73	86	105	113	148	176	199	228	298
		44	17	18	20	22	26	28	30	33	34	39	46	51	58	70	82	97	108	127	163	189	210	272
	8N@ 4.75	32	20	26	30	35	39	43	49	55	59	67	79	92	101	121	143	167	191	239	309			
		36	20	24	28	32	36	41	44	50	53	61	69	81	86	106	125	147	175	224	258	325		
		40	20	25	28	31	34	37	43	48	51	58	66	74	82	106	115	139	168	202	240	292	333	
		44	19	23	27	29	32	36	39	43	49	54	60	72	76	98	111	123	153	184	222	272	309	
	10N@ 3.80	32	27	32	38	45	48	55	62	70	78	91	102	107	121	155	191	212	260					
		36	25	30	35	39	47	49	56	64	71	79	93	103	108	145	173	196	214	282				
		40	23	28	33	37	42	48	50	57	64	76	81	95	106	120	150	176	203	264	314			
		44	22	26	31	35	38	44	49	53	58	67	76	83	97	113	139	168	192	239	288			
Bearing Depth			7 1/2 in.															10 in.					

Joist Girder weights between the heavy black and blue lines have 7 1/2 inch bearing depths.
Joist Girder weights to the right of the heavy blue line have 10 inch bearing depths. Check with Vulcraft for material availability.

DESIGN GUIDE WEIGHT TABLE FOR JOIST GIRDERS

Based on a 50ksi maximum yield strength

U. S. CUSTOMARY

Girder Span (ft)	Joist Spaces (ft)	Girder Depth (in)	Joist Girder Weight – Pounds Per Linear Foot Load on Each Panel Point																				
		LRFD	6K	7.5K	9K	10.5K	12K	13.5K	15K	16.5K	18K	21K	24K	27K	30K	37.5K	45K	52.5K	60K	75K	90K	105K	120K	150K
		ASD	4K	5K	6K	7K	8K	9K	10K	11K	12K	14K	16K	18K	20K	25K	30K	35K	40K	50K	60K	70K	80K	100K
40	3N@ 13.33	32	22	23	23	23	24	24	25	26	27	30	34	38	40	51	60	69	81	94	108	124	150	185
		36	23	23	23	23	23	24	25	25	27	27	32	34	39	46	54	61	70	87	104	111	126	164
		40	23	23	23	23	23	23	24	25	27	27	28	32	35	43	49	55	62	84	93	107	125	156
		44	23	23	23	24	24	24	24	26	26	28	28	32	33	42	47	55	63	73	89	99	115	131
		48	23	24	24	24	24	24	24	26	26	29	29	29	32	38	44	51	57	70	80	92	102	131
	4N@ 10.00	32	16	16	19	22	25	26	28	30	33	39	45	50	53	68	77	90	104	129	152	173	202	252
		36	16	17	18	21	25	25	26	29	31	34	40	44	48	62	71	79	93	115	143	166	179	230
		40	17	17	17	19	23	25	26	27	29	32	38	41	46	56	68	77	93	109	119	150	172	212
		44	16	16	18	18	20	21	23	24	28	30	34	37	40	51	57	66	76	104	111	126	150	189
		48	17	17	18	18	19	20	23	25	26	28	32	34	37	49	58	66	74	87	108	116	139	178
	5N@ 8.00	32	16	18	22	25	28	31	34	37	40	46	54	58	65	78	100	106	130	157	188	227	255	
		36	16	17	20	23	25	27	31	34	35	41	46	54	59	71	91	102	107	143	167	196	230	298
		40	16	16	18	21	23	27	28	30	33	37	42	47	53	64	80	93	104	128	159	182	210	262
		44	17	17	17	20	23	24	28	29	31	35	39	46	49	60	73	81	96	116	138	161	186	245
		48	17	17	17	19	23	25	25	28	29	33	37	41	47	57	67	80	93	111	122	152	178	217
	6N@ 6.67	32	17	20	24	28	32	35	39	42	47	54	62	69	77	99	108	140	151	189	220	266		
		36	17	20	23	26	28	31	35	38	41	48	55	62	70	83	102	115	142	167	197	232	275	
		40	17	18	21	25	28	29	32	36	38	44	49	56	64	79	94	105	118	147	185	215	245	313
		44	17	18	21	22	27	29	30	33	36	42	49	53	58	74	86	105	111	148	177	199	227	294
		48	17	18	20	24	25	28	29	31	33	40	44	52	55	72	79	98	108	130	156	180	204	271
	7N@ 5.71	32	19	24	28	32	34	40	45	47	54	62	70	77	91	105	130	152	175	218	255			
		36	18	21	26	28	32	35	40	43	48	56	63	71	79	102	115	143	155	197	232	276		
		40	18	20	25	28	31	33	36	41	45	51	57	65	72	94	108	118	145	184	214	255	300	
		44	18	21	23	27	29	31	34	37	41	50	58	63	67	82	106	113	127	167	199	237	272	
		48	18	22	24	27	30	33	37	39	42	48	57	63	71	81	99	114	125	169	195	234	267	
	8N@ 5.00	32	21	27	31	36	39	47	50	58	62	70	83	100	101	121	152	175	197	241				
		36	21	25	29	32	37	40	48	51	56	64	72	84	93	111	144	156	182	222	277			
		40	20	23	27	30	35	38	41	46	51	61	69	76	86	105	119	148	171	203	257	294		
		44	20	24	29	30	34	38	41	45	50	58	66	75	78	98	113	129	153	193	240	278	320	
		48	19	24	26	29	32	35	40	43	46	55	60	72	76	90	111	118	144	183	218	261	295	
	10N@ 4.00	32	27	33	40	43	51	58	63	70	78	92	103	110	122	168	190	218	246					
		36	27	30	35	41	48	55	62	64	72	79	94	107	116	145	181	199	240	306				
		40	25	28	33	39	43	50	56	57	65	74	86	95	109	134	160	186	212	277				
		44	23	28	31	37	40	48	51	57	59	74	81	88	98	120	150	175	190	255	302			
		48	22	26	29	34	38	42	50	54	59	67	76	83	98	114	140	157	182	230	277	324		
42	3N@ 14.00	32	29	29	29	30	31	31	32	33	34	35	38	40	45	53	60	69	81	94	118	140	160	185
		36	29	29	30	30	30	31	32	34	33	35	36	38	40	47	57	64	70	87	109	122	141	173
		40	30	30	30	30	30	30	31	34	34	34	35	37	39	46	53	61	71	85	97	112	126	156
		44	30	30	30	30	30	30	32	32	33	35	35	36	37	43	48	56	63	73	89	99	115	146
		48	30	30	30	30	31	31	32	32	33	35	35	36	39	43	48	53	61	74	88	99	110	132
	4N@ 10.50	32	16	17	20	23	25	28	30	33	35	42	45	50	57	68	89	99	104	140	161	186	214	274
		36	16	16	18	21	23	25	28	30	33	37	44	46	52	66	75	91	101	115	143	175	191	240
		40	17	17	18	21	22	24	26	28	30	34	38	45	47	59	68	79	94	109	134	159	177	214
		44	17	17	18	19	21	25	25	27	29	32	36	42	46	54	65	74	82	106	120	138	164	202
		48	18	18	18	18	20	25	27	25	28	31	35	39	43	50	63	71	81	98	114	139	153	192
	5N@ 8.40	32	17	20	23	26	28	33	36	39	44	47	54	61	68	90	103	113	130	172	197	225	256	
		36	16	17	21	23	26	28	32	34	37	44	48	54	62	74	91	105	115	152	177	207	233	
		40	16	18	20	22	24	27	29	32	34	40	45	52	55	67	79	93	107	133	156	186	210	266
		44	16	18	19	21	25	26	28	30	32	38	41	47	53	64	77	93	104	119	148	171	200	238
		48	17	18	18	20	24	24	27	29	30	36	39	43	49	57	70	81	96	111	137	162	187	220
	6N@ 7.00	32	18	21	26	29	33	37	40	45	47	57	65	73	81	99	119	140	160	190	236	289		
		36	17	20	24	27	30	34	36	39	43	51	58	62	70	91	106	121	142	177	209	240	293	
		40	17	19	21	26	28	32	34	36	40	47	55	59	64	79	103	109	123	167	192	222	253	
		44	17	18	21	24	26	29	32	34	36	43	50	57	60	76	95	105	113	148	176	202	227	303
		48	17	18	21	24	26	29	30	33	35	41	46	52	58	70	83	106	108	139	163	188	208	270
	7N@ 6.00	32	20	24	29	34	37	42	47	53	54	68	77	90	99	113	140	162	187	226	289			
		36	20	23	27	30	35	38	41	46	51	59	70	78	83	102	122	142	166	205	248	292		
		40	18	22	25	28	32	35	39	42	47	56	63	71	79	95	109	134	147	182	222	272	303	
		44	18	21	24	27	30	32	36	40	43	51	57	65	73	87	106	119	137	176	202	246	283	
		48	18	20	24	26	29	32	34	37	41	47	52	59	67	83	98	113	122	164	191	220	255	
	8N@ 5.25	32	22	28	33	38	43	47	54	58	65	77	83	100	105	140	163	188	216	268				
		36	20	26	29	34	40	43	49	55	59	67	79	84	101	116	143	167	190	231	290			
		40	20	24	28	33	36	41	45	50	53	61	69	81	86	107	126	151	175	215	264	326		
		44	21	23	28	31	34	37	43	47	52	58	66	79	83	107	116	141	157	201	239	291	333	
		48	21	25	28	29	32	35	39	44	48	56	64	69	78	100	111	130	156	182	214	278	315	
	11N@ 3.82	32	31	37	45	53	61	69	77	82	91	104	114	130	151	189	218	267						
		36	27	35	41	48	55	62	70	72	79	92	106	115	132	166	197	232	270					
		40	27	32	37	42	49	56	64	65	73	84	103	108	117	149	182	209	243	310				
		44	25	31	35	40	48	51	58	65	66	81	95	106	111	139	167	190	218	281				
		48	24	29	34	38	45	50	54	60	67	76	84	98	108	122	154	180	205	259	318			
Bearing Depth			7 1/2 in.														10 in.							

Joist Girder weights between the heavy black and blue lines have 7 1/2 inch bearing depths.
Joist Girder weights to the right of the heavy blue line have 10 inch bearing depths. Check with Vulcraft for material availability.

DESIGN GUIDE WEIGHT TABLE FOR JOIST GIRDERS

Based on a 50ksi maximum yield strength

U. S. CUSTOMARY

Girder Span (ft)	Joist Spaces (ft)	Girder Depth (in)	Joist Girder Weight – Pounds Per Linear Foot Load on Each Panel Point																			
		LRFD	6K	7.5K	9K	10.5K	12K	13.5K	15K	16.5K	18K	21K	24K	27K	30K	37.5K	45K	52.5K	60K	75K	90K	105K	120K	150K
		ASD	4K	5K	6K	7K	8K	9K	10K	11K	12K	14K	16K	18K	20K	25K	30K	35K	40K	50K	60K	70K	80K	100K
45	3N@ 15.00	36	30	30	30	30	31	31	32	34	35	36	38	39	44	52	60	69	81	95	120	134	151	187
		40	30	30	30	30	31	31	32	33	35	35	37	38	39	51	59	62	70	88	110	122	141	166
		44	30	30	30	31	31	31	32	33	34	34	36	37	38	46	53	59	67	85	98	113	126	157
		48	30	30	30	31	31	31	32	32	33	36	36	38	37	41	48	58	63	82	90	101	117	148
		54	30	30	30	32	32	32	32	32	33	36	36	37	39	41	48	53	60	71	89	97	104	132
	4N@ 11.25	36	18	19	20	23	25	27	29	31	34	42	43	50	57	65	77	90	104	130	152	174	199	252
		40	19	19	20	21	24	25	28	30	32	37	43	46	51	65	75	87	101	115	143	165	178	230
		44	19	19	20	21	23	26	26	28	30	34	40	44	47	59	68	76	93	109	134	156	178	211
		48	19	20	20	21	22	25	25	26	29	32	35	40	42	54	64	73	81	104	114	136	151	198
		54	20	20	20	21	22	24	25	26	27	30	33	38	41	50	58	66	74	97	108	116	140	176
	5N@ 9.00	36	16	18	23	25	28	30	33	36	39	46	54	58	65	78	99	110	131	152	194	228	254	
		40	16	18	21	23	26	28	31	34	37	44	46	54	58	75	91	105	112	143	176	206	231	295
		44	16	17	20	23	24	27	29	32	34	39	45	48	56	67	79	94	107	133	156	182	209	265
		48	17	18	19	24	25	26	28	30	32	37	41	46	53	64	78	89	96	118	148	162	186	238
		54	17	18	18	21	24	26	26	29	31	33	40	43	47	58	70	79	92	112	131	153	166	217
	6N@ 7.50	36	17	22	24	29	32	35	39	43	47	54	62	69	78	99	109	140	151	189	217	261		
		40	17	20	24	27	30	33	35	38	42	49	55	62	71	92	102	116	142	168	196	246	281	
		44	17	19	23	26	28	31	33	36	39	47	52	56	64	80	103	109	123	159	192	222	250	
		48	17	19	22	24	27	29	31	34	37	43	50	57	61	74	87	105	113	148	175	199	227	295
		54	17	18	21	24	25	28	30	33	35	38	45	52	55	68	83	98	108	128	155	178	202	266
	7N@ 6.43	36	20	24	28	32	36	40	46	47	54	62	70	77	91	105	130	152	175	217	255			
		40	19	22	27	30	34	38	41	46	49	56	63	71	79	102	116	143	155	196	231	290		
		44	18	22	25	28	31	36	39	42	47	56	63	65	72	94	109	123	147	182	213	257	299	
		48	18	21	24	27	29	33	37	40	43	50	57	65	73	82	105	119	136	175	201	238	278	
		54	24	24	26	30	32	35	39	41	45	49	57	63	72	83	100	114	125	165	195	231	263	
	9N@ 5.00	36	25	30	35	39	47	54	58	63	70	78	92	101	109	141	164	194	226	282				
		40	22	28	32	37	42	48	52	56	64	72	84	93	103	123	156	179	197	250				
		44	23	28	31	36	39	45	50	53	57	66	76	86	130	113	146	175	187	244	295			
		48	22	26	29	34	37	41	46	51	54	63	74	81	88	109	129	152	177	226	269	313		
		54	21	24	28	31	35	39	43	46	51	60	69	76	84	108	116	144	159	193	243	280	321	
	12N@ 3.75	36	32	39	48	55	62	70	78	83	100	106	121	142	155	191	225	272						
		40	30	35	42	49	56	64	71	79	84	103	108	123	145	171	198	246	294					
		44	28	33	40	48	53	57	65	74	81	95	105	111	125	163	196	216	264					
		48	27	31	37	43	52	58	63	68	75	83	97	108	116	153	179	201	240	301				
		54	25	30	36	40	47	52	58	62	73	79	86	101	112	133	158	184	218	274	333			
48	4N@ 12.00	36	18	19	21	24	26	29	31	34	37	43	48	56	57	73	89	102	109	139	171	195	221	273
		40	19	19	20	22	24	27	29	32	35	41	44	49	57	65	77	91	104	130	152	174	200	253
		44	19	19	20	21	25	27	29	30	32	36	43	45	50	63	75	87	93	113	134	155	177	231
		48	19	20	20	20	24	27	27	30	31	33	40	44	46	60	68	77	89	109	129	157	172	212
		54	20	20	21	21	24	25	26	26	29	32	37	41	43	49	61	70	79	97	112	128	149	188
	5N@ 9.60	36	17	21	24	27	30	33	36	39	44	50	57	64	68	90	103	113	130	171	197	228	266	
		40	17	19	24	25	27	31	33	37	39	44	51	57	65	77	91	106	125	153	177	206	234	
		44	17	18	23	25	26	29	31	34	36	43	47	52	59	71	87	101	107	133	156	195	222	278
		48	17	17	22	24	24	27	30	32	35	39	45	47	53	67	78	90	108	128	157	184	207	266
		54	18	18	21	22	24	26	28	30	32	37	41	46	49	61	70	81	96	116	137	163	185	229
	6N@ 8.00	36	18	23	26	30	34	37	40	45	50	61	68	76	81	99	119	140	160	201	236	288		
		40	17	22	24	27	32	35	38	41	46	54	62	69	77	92	106	130	143	176	218	250	292	
		44	17	20	24	27	30	33	36	39	42	48	55	63	71	84	103	111	132	168	195	231	265	
		48	17	20	24	25	28	31	34	36	39	47	50	57	64	80	94	108	118	148	182	213	251	313
		54	17	20	22	24	27	29	32	35	38	40	49	52	58	74	83	106	111	139	163	195	216	279
	8N@ 6.00	36	24	28	33	39	43	50	54	61	65	77	91	100	105	140	163	188	216	278				
		40	21	27	31	35	40	46	49	55	59	71	79	92	101	116	143	167	191	246	300			
		44	21	27	29	33	37	41	47	50	56	64	72	81	94	109	135	159	174	223	280			
		48	21	24	29	32	36	39	43	49	51	61	67	76	82	107	120	150	175	203	249	301		
		54	23	26	28	33	37	40	43	49	51	59	67	75	81	98	114	130	154	191	229	268	314	
	9N@ 5.33	36	27	31	37	42	47	54	61	69	70	91	99	105	114	151	174	206	237					
		40	24	29	35	38	43	49	55	63	67	78	92	101	107	142	165	191	219	266				
		44	25	28	33	36	42	48	52	57	64	73	80	94	104	118	147	175	199	235	284			
		48	23	28	31	35	40	43	49	53	57	66	74	82	96	111	138	161	186	235	284			
		54	23	26	29	33	37	41	45	50	52	60	68	76	84	108	122	153	165	204	254	301		
	12N@ 4.00	36	34	41	50	58	68	76	82	91	100	109	130	142	164	192	243	294						
		40	32	38	46	55	62	70	74	79	92	102	116	132	144	180	219	258	301					
		44	30	35	42	50	56	64	71	73	81	103	108	117	134	173	198	239	276	288				
		48	29	34	40	46	51	57	66	72	75	86	105	111	120	151	187	215	248	318				
		54	27	32	38	42	51	54	61	68	73	84	98	108	114	141	167	201	227	288				
Bearing Depth			7 1/2 in.														10 in.							

Joist Girder weights between the heavy black and blue lines have 7 1/2 inch bearing depths.
Joist Girder weights to the right of the heavy blue line have 10 inch bearing depths. Check with Vulcraft for material availability.

DESIGN GUIDE WEIGHT TABLE FOR JOIST GIRDERS

Based on a 50ksi maximum yield strength

U. S. CUSTOMARY

Girder Span (ft)	Joist Spaces (ft)	Girder Depth (in)	Joist Girder Weight – Pounds Per Linear Foot Load on Each Panel Point																				
		LRFD	6K	7.5K	9K	10.5K	12K	13.5K	15K	16.5K	18K	21K	24K	27K	30K	37.5K	45K	52.5K	60K	75K	90K	105K	120K	150K
		ASD	4K	5K	6K	7K	8K	9K	10K	11K	12K	14K	16K	18K	20K	25K	30K	35K	40K	50K	60K	70K	80K	100K
50	4N@ 12.50	40	23	24	24	27	27	28	31	33	36	42	44	50	56	65	85	90	104	130	152	173	199	252
		44	23	24	24	26	28	28	29	31	34	38	43	49	51	66	74	87	104	115	153	174	180	230
		48	23	24	24	26	28	28	29	30	32	36	42	44	50	60	68	79	93	108	133	156	178	213
		54	27	27	27	28	28	28	28	30	31	33	38	42	45	55	62	73	82	106	112	137	159	197
		60	27	28	28	28	28	29	29	30	31	32	36	40	43	51	59	69	76	97	113	122	138	178
	5N@ 10.00	40	17	21	24	25	29	32	35	38	42	46	54	58	65	86	100	110	125	152	184	219	253	
		44	16	19	23	24	28	30	33	36	39	44	50	54	58	75	91	105	113	152	177	205	230	294
		48	17	19	22	25	25	29	31	33	36	40	46	53	59	68	88	94	107	134	159	183	209	269
		54	18	18	21	24	26	27	30	31	33	38	42	46	52	61	78	90	96	117	138	162	184	238
		60	18	20	20	22	25	27	28	31	31	35	41	46	48	62	70	79	93	112	133	163	166	217
	6N@ 8.33	40	18	22	26	29	32	36	41	46	47	54	62	70	78	100	109	131	151	188	226	260		
		44	17	22	24	27	30	34	37	40	46	49	55	63	71	92	106	116	142	168	205	246	281	
		48	17	22	23	26	28	32	35	38	39	47	56	63	65	80	103	109	123	159	191	222	258	
		54	18	20	23	25	29	29	32	35	37	43	49	57	58	73	87	105	112	148	174	197	226	293
		60	18	21	22	25	27	31	31	33	35	41	45	51	59	68	83	98	109	129	155	178	205	265
	8N@ 6.25	40	23	27	31	37	41	48	54	55	62	71	83	92	102	122	153	176	195	248				
		44	22	27	31	34	39	44	49	52	56	65	75	84	102	111	144	167	182	222	288			
		48	22	25	29	33	37	40	45	50	53	61	73	81	86	107	126	149	175	214	263	310		
		54	25	26	31	34	37	41	46	48	51	58	70	76	83	106	114	141	163	193	239	283	315	
		60	24	25	28	32	35	39	42	47	49	57	64	72	77	99	115	125	146	178	215	258	291	
	10N@ 5.00	40	28	33	41	46	55	62	66	74	78	92	105	115	131	156	193	229	267					
		44	27	32	37	44	49	56	63	67	72	88	102	107	116	155	180	208	239	302				
		48	27	32	35	41	48	54	57	64	68	80	94	103	109	135	160	186	214	274				
		54	26	29	33	40	43	50	55	58	62	74	82	96	106	121	152	173	188	251	306			
		60	25	28	32	38	41	45	51	54	58	68	77	84	98	114	142	167	180	225	275	317		
	13N@ 3.85	40	35	41	51	59	67	74	83	92	102	111	132	144	169	196	252	303						
		44	32	39	48	56	61	69	75	85	95	105	117	134	148	194	228	260	313					
		48	30	36	44	51	57	66	74	77	87	105	111	120	138	174	200	248	288					
		54	29	34	40	48	53	60	68	74	78	90	108	114	125	157	191	216	256	326				
		60	28	33	40	45	50	57	64	71	73	83	94	113	115	148	174	216	235	297				
55	5N@ 11.00	44	19	22	25	27	30	32	35	38	43	49	54	61	66	85	95	111	125	153	180	219	253	
		48	19	21	24	25	29	30	33	36	39	45	50	58	62	75	91	106	112	153	177	205	230	
		54	20	21	23	25	26	29	31	34	36	44	46	52	60	67	88	94	108	128	158	182	207	265
		60	20	22	22	24	27	27	31	32	34	39	45	47	53	64	77	90	97	116	137	162	185	237
		66	21	22	23	24	26	28	29	32	33	37	42	46	49	62	71	80	93	112	133	164	176	217
	6N@ 9.17	44	18	23	26	29	33	37	40	46	47	54	62	70	77	100	114	131	151	188	226	261		
		48	18	23	24	29	31	34	37	42	46	52	59	66	71	92	106	116	143	177	205	246	279	
		54	19	22	24	27	30	33	35	39	41	47	56	60	65	80	95	109	119	160	181	211	251	
		60	19	20	23	25	30	31	34	37	40	44	50	58	61	77	96	105	112	149	174	197	226	279
		66	20	20	23	26	29	32	32	35	37	41	49	52	59	72	84	99	110	130	156	187	205	269
	7N@ 7.86	44	22	25	28	33	36	41	46	51	54	62	71	78	91	105	131	153	176	216	263			
		48	21	24	28	31	34	39	45	46	52	59	68	77	79	106	117	143	158	205	237	291		
		54	19	24	26	29	32	36	39	43	48	57	64	69	78	95	109	129	148	182	213	259	301	
		60	20	23	25	29	31	34	37	41	43	50	59	67	70	84	406	113	138	166	199	235	277	
		66	20	23	25	29	32	33	37	38	43	50	54	60	68	82	100	114	124	157	194	219	261	317
	9N@ 6.11	44	25	30	35	41	46	54	58	63	70	78	92	101	110	143	166	195	228	282				
		48	25	28	33	39	43	49	55	60	64	72	84	102	108	134	157	182	205	266				
		54	25	28	33	38	42	46	51	57	58	69	79	87	97	114	148	164	187	243	282			
		60	24	28	33	37	40	43	48	50	58	67	79	83	89	108	124	154	174	202	264	309		
		66	24	27	31	35	39	42	45	50	52	61	70	77	85	101	117	145	159	194	242	286	319	
	11N@ 5.00	44	31	37	46	52	58	66	70	78	91	101	107	131	142	179	205	253	297					
		48	29	34	41	47	55	63	67	72	79	93	106	116	113	158	195	231	269					
		54	28	33	39	46	49	57	62	69	73	81	96	109	116	150	181	199	241	302				
		60	26	32	37	41	48	51	59	64	68	80	84	98	112	140	166	189	214	269				
		66	27	31	36	39	46	50	55	62	65	74	84	100	102	124	147	170	194	261	293			
	14N@ 3.93	44	39	46	55	63	71	79	92	102	107	121	144	157	179	218	269							
		48	36	43	50	63	71	77	80	94	104	112	134	148	172	206	254	302						
		54	34	41	49	57	66	71	75	83	97	107	120	138	152	187	215	263	307					
		60	31	39	46	52	61	68	77	78	85	101	114	123	142	168	202	241	284					
		66	32	38	44	50	57	63	71	75	80	96	113	119	130	163	197	223	262	321				
Bearing Depth			7 1/2 in.													10 in.								

Joist Girder weights between the heavy black and blue lines have 7 1/2 inch bearing depths.
Joist Girder weights to the right of the heavy blue line have 10 inch bearing depths. Check with Vulcraft for material availability.

DESIGN GUIDE WEIGHT TABLE FOR JOIST GIRDERS

Based on a 50ksi maximum yield strength **U. S. CUSTOMARY**

Girder Span (ft)	Joist Spaces (ft)	Girder Depth (in)	Joist Girder Weight – Pounds Per Linear Foot Load on Each Panel Point																				
		LRFD	6K	7.5K	9K	10.5K	12K	13.5K	15K	16.5K	18K	21K	24K	27K	30K	37.5K	45K	52.5K	60K	75K	90K	105K	120K	150K
		ASD	4K	5K	6K	7K	8K	9K	10K	11K	12K	14K	16K	18K	20K	25K	30K	35K	40K	50K	60K	70K	80K	100K
60	5N@ 12.00	48	21	23	26	28	31	34	37	42	43	50	55	62	66	85	96	111	125	153	189	218	252	
		54	21	21	24	27	30	32	35	38	42	44	51	56	62	75	88	106	112	144	168	204	221	281
		60	21	22	23	26	28	30	33	35	38	44	46	51	57	68	86	95	108	128	158	182	208	256
		66	22	22	23	25	28	29	33	34	36	40	46	47	53	65	78	91	97	117	139	162	188	228
		72	22	23	23	24	27	29	31	34	35	38	44	47	52	62	72	81	93	113	135	164	177	217
	6N@ 10.00	48	21	23	26	31	34	38	40	46	47	58	66	70	77	100	114	131	152	188	227	262		
		54	19	23	25	29	32	35	38	41	45	53	59	67	71	92	106	117	119	169	204	229	269	
		60	19	22	26	28	31	34	36	39	42	48	55	61	68	81	95	110	134	160	181	209	242	
		66	20	22	25	27	30	32	34	67	41	47	50	58	62	77	96	106	112	140	175	198	216	278
		72	20	21	24	27	29	32	33	35	38	43	50	52	60	72	84	99	114	142	166	188	206	266
	8N@ 7.50	48	24	28	32	38	41	48	54	55	62	70	78	92	101	121	152	176	192	241				
		54	23	26	31	35	39	43	47	55	56	64	72	81	94	109	134	158	180	221	268			
		60	23	26	29	32	38	41	44	49	52	59	66	76	83	106	120	149	163	199	239	290		
		66	29	31	34	36	40	46	48	50	56	64	72	76	82	101	116	142	165	191	230	280	313	
		72	30	31	33	34	38	43	47	49	51	59	69	74	83	102	118	126	147	190	228	255	191	
	10N@ 6.00	48	30	36	43	50	58	65	66	75	78	92	106	116	132	157	193	229	265					
		54	29	34	40	46	51	59	60	68	76	88	95	107	144	147	180	205	232	296				
		60	27	33	38	41	47	53	61	61	70	79	90	97	110	136	162	183	210	272				
		66	27	32	36	40	46	49	55	62	64	75	81	97	99	120	143	165	190	254	296			
		72	27	32	35	39	43	48	53	58	61	73	77	86	100	116	137	169	191	225	283			
	12N@ 5.00	48	35	41	49	55	63	71	79	92	93	107	116	142	156	191	229	266						
		54	33	39	46	50	57	65	73	80	81	104	109	118	135	172	197	238	274					
		60	32	37	41	50	56	59	67	74	79	96	107	112	121	163	187	219	247	316				
		66	31	36	40	47	53	60	61	68	76	85	99	110	115	145	177	201	228	288				
		72	30	35	40	44	52	54	63	64	75	80	89	104	114	130	160	194	219	273	319			
	15N@ 4.00	48	39	49	62	70	78	92	101	106	110	132	155	167	189	228	289							
		54	37	47	56	64	73	81	94	95	105	118	135	158	171	208	254	298						
		60	35	42	51	59	68	76	83	88	98	112	122	141	164	197	229	276	307					
		66	36	44	54	57	65	73	80	88	94	113	118	130	158	193	221	261	294					
		72	36	43	49	57	67	75	77	84	91	107	121	126	143	178	219	240	283					
65	6N@ 10.83	54	22	25	28	31	34	38	43	45	47	55	66	69	75	92	107	132	152	177	207	250	288	
		60	22	24	26	31	32	36	38	42	46	53	60	67	71	92	107	116	133	169	195	231	262	
		66	22	24	26	29	31	34	36	40	43	49	54	61	68	80	96	110	119	159	184	209	236	
		72	23	24	26	29	30	33	35	39	43	47	50	56	63	75	92	107	113	141	166	196	218	276
	8N@ 8.13	54	24	28	33	38	42	47	52	55	63	70	78	92	101	116	143	166	192	229	284			
		60	23	26	32	36	39	43	48	50	57	65	72	80	94	109	135	158	180	210	259			
		66	32	34	41	43	44	48	53	55	61	68	73	81	93	114	133	151	167	212	246	296		
		72	32	34	34	42	45	47	49	54	57	69	74	82	83	106	121	143	167	194	241	277		
	10N@ 6.50	54	31	37	44	50	56	63	67	75	76	92	107	113	127	156	182	220	243					
		60	30	35	41	46	52	58	64	68	77	88	95	109	115	136	180	196	222	283				
		66	28	34	39	44	47	54	61	65	70	82	91	98	112	132	163	184	210	263				
		72	28	34	37	41	47	50	56	63	63	72	81	94	100	120	143	168	193	247	295			
	11N@ 5.91	54	32	39	45	52	59	66	71	77	87	101	107	126	133	176	205	230	264					
		60	32	36	45	48	54	61	69	73	78	94	108	110	118	160	181	208	243					
		66	30	36	41	46	50	56	62	70	71	83	97	111	113	141	166	200	215	287				
		72	29	34	39	43	50	55	60	65	73	81	93	100	114	167	166	187	214	257				
	13N@ 5.00	54	36	42	50	57	65	72	80	92	102	108	123	144	158	192	229	269						
		60	34	40	49	57	61	70	74	81	94	105	111	125	148	182	209	252	286					
		66	33	38	45	52	60	67	72	75	83	99	109	116	129	167	199	234	263					
		72	32	38	43	51	55	62	70	77	78	88	110	116	120	158	182	210	253	309				
Bearing Depth			7 1/2 in.													10 in.								

Joist Girder weights between the heavy black and blue lines have 7 1/2 inch bearing depths.
Joist Girder weights to the right of the heavy blue line have 10 inch bearing depths. Check with Vulcraft for material availability.

DESIGN GUIDE WEIGHT TABLE FOR JOIST GIRDERS

Based on a 50ksi maximum yield strength **U. S. CUSTOMARY**

Girder Span (ft)	Joist Spaces (ft)	Girder Depth (in)	Joist Girder Weight – Pounds Per Linear Foot Load on Each Panel Point																				
		LRFD	6K	7.5K	9K	10.5K	12K	13.5K	15K	16.5K	18K	21K	24K	27K	30K	37.5K	45K	52.5K	60K	75K	90K	105K	120K	150K
		ASD	4K	5K	6K	7K	8K	9K	10K	11K	12K	14K	16K	18K	20K	25K	30K	35K	40K	50K	60K	70K	80K	100K
70	7N@ 10.00	54	24	28	32	36	40	44	50	54	58	65	73	86	91	111	131	153	175	226	263			
		60	23	26	31	33	38	44	46	51	53	63	67	75	87	106	126	153	165	204	242	284		
		66	23	27	31	32	36	39	45	47	52	59	67	71	78	94	114	135	156	184	222	260		
		72	23	26	29	33	35	39	42	47	48	55	62	70	78	96	111	121	140	183	211	145	286	
		84	26	28	30	32	35	37	40	44	47	51	59	66	71	83	102	117	125	170	192	220	254	313
	9N@ 7.78	54	27	33	37	44	48	54	61	66	70	90	100	105	114	151	174	202	225	276				
		60	25	31	35	40	47	49	56	64	67	76	93	102	107	134	156	180	205	256				
		66	25	31	35	40	47	49	56	62	69	74	82	96	106	121	149	174	200	244	300			
		72	25	31	35	40	46	49	56	57	63	72	81	93	99	115	141	163	185	216	273			
		84	25	31	35	40	43	49	51	53	58	67	76	80	89	104	119	145	171	195	234	287	317	
	11N@ 6.36	54	33	43	50	58	66	67	75	86	92	106	115	132	153	177	217	250	258					
		60	32	40	46	51	59	67	68	76	87	94	108	118	134	167	205	231	236					
		66	32	38	44	47	55	61	68	40	78	91	97	110	120	160	183	207	221	290				
		72	31	36	41	47	54	57	63	72	73	83	98	112	114	142	166	191	196	256	300			
		84	31	35	39	45	50	53	58	68	68	76	87	99	106	126	149	172						
	12N@ 5.83	54	36	45	52	59	67	75	78	92	101	107	132	142	154	192	229	268	287					
		60	34	41	48	56	60	68	77	80	93	107	115	133	145	180	205	245	267					
		66	32	39	47	50	58	65	70	78	82	96	110	120	136	163	198	224	246	304				
		72	33	38	44	50	57	63	69	73	71	94	108	117	124	156	188	214						
		84	31	37	42	47	53	55	65	69	80	86	91	106	119	142	170	196	221	277	318			
	14N@ 5.00	54	40	48	58	66	75	90	92	105	106	131	152	164	177	225	266							
		60	38	46	56	64	71	79	92	93	104	117	133	155	169	205	244	288						
		66	36	43	50	58	65	74	81	94	96	110	120	136	160	184	233	267						
		72	36	42	51	58	65	72	76	84	95	110	115	126	145	189	223	251	285					
		84	34	43	47	54	62	66	74	78	83	101	108	122	134	166	199	234	262	320				
80	8N@ 10.00	60	29	32	38	43	47	52	58	65	66	78	91	100	105	131	153	189	205	253				
		66	29	32	36	40	46	48	53	59	63	71	79	93	105	126	154	177	192	233	284			
		72	30	32	34	38	43	47	79	54	61	69	78	89	95	115	136	159	182	260	258			
		84	30	32	34	38	43	47	48	54	61	69	78	89	95	115	134	157	179	217	264			
		96	30	32	34	38	43	47	49	54	61	69	78	89	95	115	126	141	163	199	225	272	301	
	10N@ 8.00	60	32	37	42	49	55	62	70	78	78	100	105	115	132	164	191	226	252					
		66	35	42	46	55	61	64	72	77	86	98	109	114	129	169	194	219	250					
		72	34	38	46	51	57	64	65	74	78	91	101	110	126	159	183	207	235					
		84	34	37	46	48	53	59	61	67	72	82	95	104	113	135	166	185	212	256				
		96	35	36	42	48	50	55	58	64	72	78	86	98	104	125	143	171	192	239	281			
	13N@ 6.15	60	40	47	59	66	71	78	92	101	106	116	143	155	175	206	252							
		66	38	47	54	60	68	77	80	94	103	109	134	145	157	195	231	261						
		72	37	44	50	59	67	71	79	83	96	111	120	137	152	186	213	253	298					
		84	36	43	50	54	59	67	75	79	84	101	112	119	128	170	193	229	255					
		96	37	42	47	53	57	66	72	81	79	94	109	118	124	155	177	201	235	294				
	16N@ 5.00	60	47	55	67	78	92	101	107	115	132	153	175	192	206	252								
		66	44	55	65	72	80	94	104	109	117	134	158	180	194	232	287							
		72	43	51	59	70	79	83	97	107	111	121	149	162	185	225	268							
		84	42	49	57	64	74	81	90	104	106	120	131	152	174	207	253	287						
		96	44	48	58	64	70	81	86	92	97	114	128	140	159	196	231	268	298					
90	9N@ 10.00	72	38	40	44	47	52	57	61	68	76	88	94	108	115	145	178	205	228	278				
		84	38	40	44	47	52	57	61	69	73	82	94	104	114	134	162	187	212	258				
		96	38	40	44	47	52	57	61	67	71	77	85	98	108	125	139	170	190	221	278			
		108	38	40	44	47	52	57	61	67	70	75	80	89	99	114	129	152	176	205	247	286		
	11N@ 8.18	72	41	46	51	61	64	73	78	89	94	108	115	131	146	181	216	246						
		84	41	45	47	53	61	67	72	78	90	94	113	120	133	161	190	220	250					
		96	44	45	47	50	56	64	70	72	80	94	98	107	123	146	180	196	235	286				
		108	45	46	48	51	57	60	66	75	76	84	98	104	113	140	164	186	204	262				
	15N@ 6.00	72	45	55	61	72	80	94	103	109	114	134	156	179	184	233	285							
		84	47	50	58	65	73	81	93	98	112	121	140	163	166	210	242	295						
		96	48	50	57	64	71	81	87	92	106	121	128	144	163	199	232	261	302					
		108	49	53	57	62	70	75	83	93	97	113	126	134	152	182	210	249	277					
	18N@ 5.00	72	49	62	73	80	94	108	115	128	135	157	181	205	229	280								
		84	49	62	74	82	91	107	117	122	130	149	174	195	210	256	306							
		96	49	60	69	77	86	95	111	121	126	139	156	181	199	233	285							
		108	49	61	66	74	87	92	101	115	118	132	145	165	184	223	267	298						
Bearing Depth			7 1/2 in.											10 in.										

Joist Girder weights between the heavy black and blue lines have 7 1/2 inch bearing depths.
Joist Girder weights to the right of the heavy blue line have 10 inch bearing depths. Check with Vulcraft for material availability.

DESIGN GUIDE WEIGHT TABLE FOR JOIST GIRDERS

Based on a 50ksi maximum yield strength **U. S. CUSTOMARY**

Girder Span (ft)	Joist Spaces (ft)	Girder Depth (in)	Joist Girder Weight – Pounds Per Linear Foot Load on Each Panel Point																				
		LRFD	6K	7.5K	9K	10.5K	12K	13.5K	15K	16.5K	18K	21K	24K	27K	30K	37.5K	45K	52.5K	60K	75K	90K	105K	120K	150K
		ASD	4K	5K	6K	7K	8K	9K	10K	11K	12K	14K	16K	18K	20K	25K	30K	35K	40K	50K	60K	70K	80K	100K
100	10N@ 10.00	84	56	57	58	62	64	72	76	88	90	103	118	129	142	172	200	225	257					
		96	58	58	59	61	64	67	70	78	88	94	106	120	131	152	180	204	228					
		108	58	60	60	61	63	68	70	73	77	93	96	111	111	139	170	188	209	258				
		120	60	60	62	64	66	67	68	71	74	85	99	108	113	139	157	188	201	242	289			
	12N@ 8.33	84	50	54	58	66	70	75	89	92	101	112	129	138	159	187	221	257						
		96	50	54	57	61	68	70	80	84	96	106	116	123	137	179	205	228	271					
		108	52	54	58	62	65	72	74	79	89	101	110	121	128	164	193	221	246	299				
		120	54	57	60	62	66	69	77	79	86	92	107	117	126	151	178	206	239	283				
	16N@ 6.25	84	55	60	71	76	83	96	110	112	119	139	161	184	199	235	288							
		96	56	60	67	75	79	88	102	105	119	128	145	168	191	218	265	301						
		108	58	63	67	72	81	87	93	106	111	125	136	157	180	204	251	292						
		120	60	65	68	74	79	90	93	98	110	117	134	147	166	208	248	275	304					
	17N@ 5.88	84	57	65	73	82	92	98	112	114	123	151	164	187	203	250								
		96	60	65	72	81	89	103	110	123	123	145	177	179	198	256	285							
		108	64	67	72	76	86	96	108	113	123	135	158	172	182	231	264	308						
		120	67	68	73	80	85	90	99	112	119	133	143	167	178	214	250	281	330					
	20N@ 5.00	84	67	77	87	105	115	122	132	148	159	193	208	226	246									
		96	67	73	82	95	111	120	126	135	152	177	199	211	227	279								
		108	66	72	79	91	101	116	125	130	131	162	184	197	207	267	316							
		120	71	75	82	88	96	106	120	123	136	149	170	193	205	246	289	332						
Bearing Depth			7 1/2 in.										10 in.											

Joist Girder weights between the heavy black and blue lines have 7 1/2 inch bearing depths.
Joist Girder weights to the right of the heavy blue line have 10 inch bearing depths. Check with Vulcraft for material availability.

NOTES

FIRE-RESISTANCE RATINGS WITH STEEL JOISTS

The Underwriters Laboratories (U.L.) Fire Resistance Directory lists hundreds of assemblies and their fire resistance ratings. The Specifying Professional can choose between numerous Floor-Ceiling and Roof-Ceiling assemblies that include steel joists and Joist Girders.

As a convenience, a selected number of assemblies are listed on the following pages. In addition, the Steel Joist Institute's Technical Digest #10 "Design of Fire Resistive Assemblies with Steel Joists" has a complete listing of steel joist assemblies and additional information about fire ratings. However, the listing that follows and the Technical Digest are intended as a guide only, and the Specifying Professional must refer to the current U.L. Fire Resistance Directory for complete design requirements.

Hundreds of fire tests on steel joist-supported assemblies have been conducted at nationally recognized testing laboratories in accordance with ASTM Standard E119, ANSI A2.1/UL 263, and NFPA 251. Because of practical loading restrictions and limitations of furnace dimensions, the vast majority of these tests were run using lightweight joists – normally from 8 inches to 14 inches (203 mm to 356 mm) deep. This practice was advantageous in that it established the minimum acceptable joists at the shallow and lightweight end of the joist load tables. This also resulted in a specified minimum joist designation being listed in the U.L. Fire Resistance Assembly, which is the joist that combines the required minimum depth and minimum weight per foot. Joists of the same series which equal or exceed the specified minimum joist depth and joist weight per foot may be used provided the accessories are compatible. The dimension from the bottom chord of the joists to the ceiling, whether given or calculated, is a minimum.

Where a U.L. Fire Resistance Assembly is being utilized, the Specifying Professional shall indicate the assembly number being used on the structural contract drawings. In addition, the Specifying Professional shall consider the following, as applicable:

- Joist designations specified on the structural contract drawings shall not be less than the minimum size for that assembly. The assembly may also require a minimum bridging size that may be larger than required by the SJI Specifications for the particular designation and joist spacing.
- Some assemblies stipulate minimum size materials or minimum cross sectional areas for individual joist and Joist Girder components. It is the responsibility of the Specifying Professional to show all special requirements on the contract drawings.
- Note that the maximum joist spacing shown for Floor-Ceiling Assemblies may be increased from the spacing listed in the U.L. Fire Resistance Directory to a maximum of 48 inches on center, provided the floor slab meets the structural requirements and the spacing of hanger wires supporting the ceiling is not increased.
- Some assemblies stipulate an allowable maximum joist design stress level less than the 30 ksi (207 MPa) used in the joist and Joist Girder Specifications. It is the responsibility of the Specifying Professional to apply the proper stress level reductions (when applicable) when selecting joists and/or Joist Girders. This is accomplished by prorating the joist and/or Joist Girder capacities. To adjust the stress level of joists or Joist Girders, multiply the design load by the ratio of the joist design stress to the required maximum [e.g. 30/26 (207/179), 30/24 (207/165), 30/22 (207/152)], and then using this increased load, select a joist or Joist Girder from the load and/or weight tables.
- Some U.L. Roof-Ceiling Assemblies using direct applied protection limit the spacing of the joists for certain types and gages of metal decking – refer to the U.L. Fire Resistance Directory for this information.
- Where fire protective materials are to be applied directly to the steel joists or Joist Girders, it is often desired to have the joist furnished as unpainted. The Specifying Professional should indicate on the structural contract drawings if the joists or Joist Girders are to be painted or not.
- Certain older U.L. fire rated assemblies may refer to joist series that predate the K-Series joists. Where one of these assemblies is selected, refer to the U.L Fire Resistance Directory for special provisions for substituting a K-Series joist in lieu of an S-, J-, and/or H-Series joist.

FLOOR – CEILING ASSEMBLIES WITH MEMBRANE PROTECTION

Restrained Assembly Rating	Protection Material	Minimum Joist Size	Concrete		Maximum Joist Spacing (in.)	Minimum Primary Support Member	UL Design Number
			Minimum Thickness (in.)	Type			
1 Hr.	Acoustical	12K1, 18LH02	2.5	LW, NW	NL	20G@13plf W8 x 15	D216
							D219
	Exposed Grid	10K1	2.5	NW	72	20G@14plf* W6 x 12	G205
		10K1	2		72	W6 x 12	G208
		10K1	2.5		72	20G@14plf* W6 x 12	G256
	Gypsum Board	10K1	2.5	NW	48	W8 x 24	G548
1 1/2 Hr.	Acoustical	12K1, 18LH02	2.5	LW, NW	NL	20G@13plf W8 x 15	D216
							D219
	Gypsum Board			NW		20G@20plf W8 x 28	D502
	Exposed Grid	10K1	2.5	NW	24 (48)	20G@13plf W6 x 12	G203
		10K1	2.5		72	20G@14plf* W6 x 12	G205
		10K1	2		72	W6 x 12	G208
		10K1	2.5		24 (48)		G213
		10K1	2.5		24 (48)	20G@13plf W8 x 31	G228
		10K1	2		24 (48)	20G@13plf W8 x 24	G229
		10K1	2.5		24 (48)	20G@13plf W6 x 12	G243
		10K1	2.5		24 (48)	20G@13plf W8 x 31	G268
	Gypsum Board	12K1	2	NW	24 (48)	NS	G502
2 Hr.	Acoustical	12K1, 18LH02	2.5	LW, NW	NL	20G@13plf W8 x 15	D216
							D219
	Gypsum Board			NW		20G@20plf W8 x 28	D502
	Concealed Grid	10K1	2.25	NW	24 (48)	W6 x 25	G023
		8K1	2.5		24 (48)	20G@13plf W8 x 20	G031
		10K1			30 (48)	20G@13plf W10 x 21	G036
	Exposed Grid	10K1	2.5	NW	24 (48)	20G@13plf W6 x 12	G203
		10K1	2.5		72	20G@14plf* W6 x 12	G205
		10K1	2.5		72	W6 x 12	G208
		10K1	2.5		24 (48)		G213
		10K1	2.5		24 (48)	W8 x 31	G227
		10K1	2.5		24 (48)	20G@13plf W8 x 31	G228

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FLOOR – CEILING ASSEMBLIES WITH MEMBRANE PROTECTION

Restrained Assembly Rating	Protection Material	Minimum Joist Size	Concrete		Maximum Joist Spacing (in.)	Minimum Primary Support Member	UL Design Number
			Minimum Thickness (in.)	Type			
2 Hr.	Exposed Grid	10K1	2.5	NW	24 (48)	20G@13plf W8 x 24	G229
		10K1	2.5		24 (48)	20G@13plf W6 x 12	G243
		10K1	2.5		72	20G@14plf* W6 x 12	G256
		10K1	2.5		24 (48)	20G@13plf W8 x 31	G268
	Gypsum Board	10K1	2	NW	24 (48)	NS	G505
		10K1	2.5		24 (48)	20G@14plf* W8 x 31	G514
		10K1	2.5		24 (48)	20G@13plf W10 x 21	G523
		10K1	2.5		24 (48)	20G@13plf W8 x 24	G529
		10K1	2.5		24 (48)	20G@13plf W10 x 21	G547
3 Hr.	Acoustical	12K1, 18LH02	3.25	LW, NW	NL	20G@13plf W8 x 15	D216
							D219
	Concealed Grid	10K1	3.5	NW	24 (48)	20G@13plf W8 x 20	G033
		10K1	3.25		30 (48)	20G@13plf W10 x 21	G036
	Exposed Grid	10K1	3.5	NW	48	20G@14plf* W6 x 12	G205
		10K1	3.5		24 (48)	W6 x 12	G213
		10K1	3.25		24 (48)	20G@13plf W8 x 24	G229
		10K1	3.5		48	20G@14plf* W6 x 12	G256
		10K1 (22 ksi max.)	2.63		24 (48)	20G@13plf W8 x 31	G268
	Gypsum Board	10K1	3	NW	24 (48)	20G@13plf W10 x 21	G523
		10K1	2.75		24 (48)	20G@13plf W8 x 24	G529
		10K1	3		24 (48)	20G@13plf W10 x 21	G547

*** Special Area Requirements**
NL = Not Listed
NS = Not Specified

FLOOR – CEILING ASSEMBLIES WITH SPRAY APPLIED FIRE RESISTIVE MATERIALS

Restrained Assembly Rating	Protection Material	Minimum Joist Size	Concrete		Maximum Joist Spacing	Minimum Primary Support Member	UL Design Number
			Minimum Thickness (in.)	Type			
1 Hr.	SAFRM	NS	2.5	LW, NW	NL	W8 x 28	D759
		10K1	2.5				D779
		10K1	2.5				D780
		NS	3.25	LW			D782
		10K1*	2.5	LW			D925
			3.5	NW			
		16K6*	NS	LW, NW	42	20G@20plf W8 x 28	G701
		16K6	3	LW	50.5	NS	G702
			3.75	NW			
		16K6*	2.5	LW, NW	42	NS	G705
		16K6	3	LW	50.5	NS	G706
			3.75	NW			
		16K6*	2.5	LW, NW	42	20G@20plf W8 x 28	G708
		NS	2.5		42	W8 x 28	G709
		16K6*	2.5		42	20g@20plf W8 x 24	G801
		12K1	3	LW	50.5	NS	G802
			3.75	NW			
1 1/2 Hr.	SAFRM	NS	2.5	LW, NW	NL	W8 x 28	D759
		10K1	2.5				D779
		10K1	2.5				D780
		NS	3.25	LW			D782
		10K1*	3	LW			D925
			4	NW			
		16K6*	2.5	LW, NW	42	20G@20plf W8 x 28	G701
		16K6	3.5	LW	50.5	NS	G702
			4.5	NW			
		16K6*	2.5	LW, NW	42	NS	G705
		16K6	3.5	LW	50.5	NS	G706
			4.5	NW			
		16K6*	2.5	LW, NW	42	20G@20plf W8 x 28	G708
		NS	2.5		42	W8 x 28	G709
		16K6*	2.5		42	20G@20plf W8 x 24	G801
		12K5	3.5	LW	50.5	NS	G802
			4.5	NW			

(Continued Next Page)

FLOOR – CEILING ASSEMBLIES WITH SPRAY APPLIED FIRE RESISTIVE MATERIALS

Restrained Assembly Rating	Protection Material	Minimum Joist Size	Concrete		Maximum Joist Spacing	Minimum Primary Support Member	UL Design Number
			Minimum Thickness (in.)	Type			
2 Hr.	SAFRM	NS	2.5	LW, NW	NL	W8 x 28	D759
		10K1	2.5				D779
		10K1	2.5				D780
		NS	3.25	LW			D782
		10K1*	3.25	LW			D925
			4.5	NW			
		16K6*	2.5	LW, NW	42	20G@20plf W8 x 28	G701
		16K6	4	LW	50.5	NS	G702
			5.25	NW			
		16K6*	2.5	LW,NW	42	NS	G705
		16K6	4	LW	50.5	NS	G706
			5.25	NW			
		16K6*	2.5	LW, NW	42	20G@20plf W8 x 28	G708
		NS	2.5		42	W8 x 28	G709
		16K6*	2.5		42	20G@20plf W8 x 24	G801
		12K5	4	LW	50.5	NS	G802
			5.25	NW			
3 Hr.	SAFRM	NS	2.5	LW, NW	NL	W8 x 28	D759
		10K1	2.5				D779
		10K1	2.5				D780
		NS	3.25	LW			D782
		10K1*	4.19	LW			D925
			5.25	NW			
		16K6*	NS	LW, NW	42	20G@20plf W8 x 28	G701
		16K6*	2.75		42	NS	G705
		16K6*	2.75		42	20G@20plf W8 x 28	G708
		NS	2.75		42	W8 x 28	G709
		16K6*	2.75		42	20G@20plf W8 x 24	G801
4 Hr.	SAFRM	10K1	2.5	LW, NW	NL	W8 x 28	D779
		NS	3.25	LW			D782

*** Special Area Requirements**
NL = Not Listed
NS = Not Specified

ROOF – CEILING ASSEMBLIES WITH MEMBRANE PROTECTION

Restrained Assembly Rating	Protection Material	Minimum Joist Size	Built Up Roof		Maximum Joist Spacing (in.)	Minimum Primary Support Member	UL Design Number
			Deck Material Description	Insulation			
1 Hr.	Exposed Grid	12K1	22 MSG Min.	Fiber Board	84	W8 x 17	P201
		10K1	26 MSG Min.		48	W6 x 12	P202
		10K1	26 MSG Min.		48	20G@13plf	P211
		12K3	28 MSG Min.		72	20G@13plf W8 x 17	P214
		12K1	26 MSG Min.		72	20G@13plf W6 x 12	P225
		12K3	24 MSG Min.	Building Units	48	NS	P227
		12K3	26 MSG Min.	Fiber Board	72	20G@13plf W6 x 12	P230
		12K1	26 MSG Min.	Insulating Concrete	48	20G@14plf* W8 x 15	P231
		12K3	24 MSG Min.	Foamed Plastic	72	W8 x 15	P235
		10K1	28 MSG Min.	Insulating Concrete	72	20G@13plf W8 x 15	P246
		12K5	26 MSG Min.	Fiber Board	48	W6 x 12	P250
		12K1	28 MSG Min.	Insulating Concrete	72	20G@13plf W6 x 12	P251
		10K1	22 MSG Min.	Fiber Board	72	W6 x 12	P254
		10K1	28 MSG Min.	Insulating Concrete	72	W8 x 15	P255
		10K1	24 MSG Min.	Fiber Board	72	NS	P259
		12K1	28 MSG Min.	Insulating Concrete	72	20G@13plf W6 x 12	P261
		12K1	26 MSG Min.	Insulating Concrete	72	20G@14plf* W8 x 15	P264
		10K1	Metal Roof Deck Panels	Batts and Blankets	60	NS	P265
		10K1	26 MSG Min.	Fiber Board	48	W6 x 16	P267
		10K1	Metal Roof Deck Panels	Batts and Blankets	60	NS	P268
		12K1	26 MSG Min.	Insulating Concrete	72	20G@14plf* W8 x 15	P269
	Fiber Board	10K1	24 MSG Min.	Fiber Board	NS	W6 x 16	P301
		10K1	22 MSG Min.		48	NS	P302
		10K1	22 MSG Min.		NS	W6 x 16	P303
	Gypsum Board	12K3	26 MSG Min.	Insulating Concrete	60	W8 x 24	P509
		12K3	24 MSG Min.	Fiber Board	72	20G@13plf W8 x 13	P510
		10K1	20 MSG Min.	Fiber Board	48	NS	P519

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ROOF – CEILING ASSEMBLIES WITH MEMBRANE PROTECTION

Restrained Assembly Rating	Protection Material	Minimum Joist Size	Built Up Roof		Maximum Joist Spacing (in.)	Minimum Primary Support Member	UL Design Number
			Deck Material Description	Insulation			
1 1/2 Hr.	Exposed Grid	12K1	26 MSG Min.	Fiber Board	72	20G@13plf W6 x 12	P225
		12K3	24 MSG Min.	Building Units	48	NS	P227
		12K3	26 MSG Min.	Fiber Board	48	20G@13plf W6 x 12	P230
		12K1	26 MSG Min.	Insulating Concrete	48	20G@14plf* W8 x 24	P231
		12K5	26 MSG Min.	Fiber Board	48	W6 x 12	P250
		12K1	28 MSG Min.	Insulating Concrete	72	20G@13plf W6 x 12	P251
		10K1	24 MSG Min.	Fiber Board	72	NS	P259
		10K1	Metal Roof Deck Panels	Batts and Blankets	60	NS	P265
		10K1	20 MSG Min.	Fiber Board	48	NS	P266
		10K1	Metal Roof Deck Panels	Batts and Blankets	60	NS	P268
		12K1	26 MSG Min.	Insulating Concrete	72	20G@14plf* W8 x 24	P269
	Fiber Board	10K1	24 MSG Min.	Fiber Board	NS	W6 x 16	P301
	Metal Lath	12K5	22 MSG Min.	Fiber Board	72	NS	P404
	Gypsum Board	12K3	24 MSG Min.	Fiber Board	72	20G@13plf W8 x 13	P510
2 Hr.	Exposed Grid	10K1	24 MSG Min.	Fiber Board	72	W6 x 12	P237
		12K1	28 MSG Min.	Insulating Concrete	72	20G@13plf W6 x 12	P251
		10K1	20 MSG Min.	Fiber Board	48	NS	P266
	Fiber Board	10K1	24 MSG Min.	Fiber Board	NS	W6 x 16	P301
	Metal Lath	12K5	22 MSG Min.	Fiber Board	72	NS	P404
	Gypsum Board	10K1	22 MSG Min.	Fiber Board	72	20G@13plf	P514
			20 MSG Min.		48	NS	P519
		14K1	26 MSG Min.	Insulating Concrete	66	NS	P520
3 Hr.	Metal Lath	10K1	28 MSG Min.	Insulating Concrete	48	NS	P405

* Special Area Requirements
NL = Not Listed
NS = Not Specified

ROOF – CEILING ASSEMBLIES WITH SPRAY APPLIED FIRE RESISTIVE MATERIALS

Restrained Assembly Rating	Protection Material	Minimum Joist Size	Built Up Roof		Maximum Joist Spacing (in.)	Minimum Primary Support Member	UL Design Number
			Deck Material Description	Insulation			
1 Hr.	SAFRM	10K1	22 MSG Min.	Building Units	NS	NS	P822
		12K3	22 MSG Min.	Fiber Board	NS	W8 x 20	P824
1 Hr. and 1-1/2 Hr.	SAFRM	12K5	28 MSG Min.	Insulating Concrete	96	W6 x 16	P919
1-1/2 Hr. and 2 Hr.	SAFRM	10K1	22 MSG Min.	Building Units	NS	W6 x 16	P728
1 Hr., 1-1/2 Hr. and 2 Hr.	SAFRM	14K4	22 MSG Min.	Fiber Board	NS	20G@13plf W6 x 16	P701
		14K4	22 MSG Min.	Fiber Board	NS	20G@13plf W6 x 16	P711
		12K3	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P717
		10K1	22 MSG Min.	Foamed Plastic	NS	20G@13plf W8 x 28	P725
		10K1	22 MSG Min.	Fiber Board	NS	20G@13plf W6 x 16	P726
		14K4	22 MSG Min.	Fiber Board	NS	20G@13plf W6 x 16	P734
		14K4	22 MSG Min.	Fiber Board	NS	20G@13plf W6 x 16	P736
		10K1	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P739
		10K1	22 MSG Min.	Fiber Board	NS	W6 x 16	P740
		10K1	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P743
		12K3	22 MSG Min.	Fiber Board	NS	20G@13plf W6 x 16	P801
		10K1	22 MSG Min.	Fiber Board	NS	20G@13plf W6 x 16	P815
		10K1	22 MSG Min.	Fiber Board	NS	W6 x 16	P816
		10K1	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P819
		10K1	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P825
		10K1	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P827
		12K1	22 MSG Min.	Fiber Board	NS	20G@13plf W8 x 20	P828
		10K1	28 MSG Min.	Insulating Concrete	NS	20G@13plf W8 x 10	P902
		10K1	28 MSG Min.	Insulating Concrete	NS	W8 x 10	P907
		10K1	28 MSG Min.	Insulating Concrete	NS	20G@13plf W8 x 10	P908

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ROOF – CEILING ASSEMBLIES WITH SPRAY APPLIED FIRE RESISTIVE MATERIALS

Restrained Assembly Rating	Protection Material	Minimum Joist Size	Built Up Roof		Maximum Joist Spacing (in.)	Minimum Primary Support Member	UL Design Number
			Deck Material Description	Insulation			
1 Hr., 1-1/2 Hr. and 2 Hr.	SAFRM	10K1	28 MSG Min.	Insulating Concrete	NS	W8 x 10	P920
		12K5	28 MSG Min.	Insulating Concrete	NS	20G@13plf W8 x 10	P921
		10K1	28 MSG Min.	Insulating Concrete	NS	W6 x 16	P922
		10K1	28 MSG Min.	Insulating Concrete	NS	20G@13plf W8 x 10	P923
		10K1	28 MSG Min.	Insulating Concrete	NS	20G@13plf W8 x 10	P925
		12K5	28 MSG Min.	Insulating Concrete	NS	W8 x 10	P926
		14K4	28 MSG Min.	Insulating Concrete	NS	20G@13plf W8 x 10	P927
		12K5	28 MSG Min.	Insulating Concrete	NS	20G@13plf W8 x 10	P928
		12K3	28 MSG Min.	Insulating Concrete	NS	20G@13plf W8 x 10	P929
		10K1	28 MSG Min.	Insulating Concrete	NS	W6 x 16	P936
2 Hr.	SAFRM	12K3	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P718
		12K3	22 MSG Min.	Foamed Plastic	NS	20G@13plf W6 x 16	P720
		12K3	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P729
1 Hr., 1-1/2 Hr., 2 Hr. and 3 Hr.	SAFRM	10K1	22 MSG Min.	Foamed Plastic	NS	20G@13plf W6 x 16	P719
		10K1	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P722
		10K1	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P723
		10K1	22 MSG Min.	Foamed Plastic	NS	W8 x 28	P732
		10K1*,16K2	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P733
		10K1*	22 MSG Min.	Foamed Plastic	NS	W6 x 16	P826

* Special Area Requirements
NS = Not Specified

NOTES

Combined K, VS, LH & DLH Series Load Table

The following table is an economy guide with the Joists listed in sequence of increasing relative cost. That is, the most economical joist for given length is listed first. The economies were based on production costs and do not include bridging requirements or erection costs.

HOW TO USE THE ECONOMICAL JOIST GUIDE: The specifying professional simply turns to the length required and proceeds down the allowable loads column until the first joist type in the list that will carry the required load is found. (However, additional bridging due to erection stability requirements should be taken into consideration.) This will then be the most economical joist type for the combination of length and required load. The approximate weight per foot of the joist is listed to the right of the live load.

EXAMPLE: Given 40'-0" length and a required load of 300 plf. On page 126 of the table under 40', it is found that a 30K7 at 40'-0" will carry 319 plf TL.

The figures shown in red are the live loads per lineal foot of joist which will produce an approximate deflection of 1/360 of the length. If a deflection limitation of 1/240 is required multiply the figures in red by 1.5. In no case shall the total load capacity of the joist be exceeded.

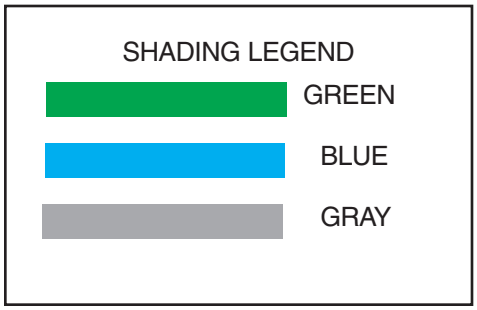
NOTE: Length as used in the economical joist guide means: **clear span + 8" for K Series and clear span + 12" for LH and DLH Series joists.**

You will note that the tables have been shaded to match the load tables. This shading indicates when bolted cross bridging needs to be installed per the Steel Joist Institute specification for a particular joist series.

Where the joist span is in the **GREEN SHADED** area of the table, the row of bridging nearest the mid span shall be diagonal bridging with bolted connections at chords and intersection. Hoisting cables shall not be released until this row of bolted diagonal bridging is completely installed.

Where the joist span is in the **BLUE SHADED** area of the table, all rows of bridging shall be diagonal bridging with bolted connections at chords and intersection. Hoist cables shall not be released until the two rows of bridging nearest the third points are completely installed.

Where the joist span is in the **GRAY SHADED** area of the table hoisting cables shall not be released until all rows of bridging are completely installed.



Total loads shown in the table are allowable total loads in ASD; the loads multiplied by 1.5 are approximately factored total loads in LRFD.

ECONOMICAL JOIST GUIDE
Combined K, VS, LH & DLH Series Load Table

Joist	Allowable Loads (PLF)		Joist Weight
10' LENGTH			
10K 1	550	550	5.0
11' LENGTH			
10K 1	550	542	5.0
12' LENGTH			
10K 1	550	455	5.0
13' LENGTH			
10K 1	479	363	5.0
12K 1	550	510	5.0
14' LENGTH			
10K 1	412	289	5.0
14K 1	550	550	5.2
15' LENGTH			
10K 1	358	234	5.0
12K 1	434	344	5.0
14K 1	511	475	5.2
14K 3	550	507	5.9
16' LENGTH			
10K 1	313	192	5.0
12K 1	380	282	5.0
14K 1	448	390	5.2
12K 3	476	351	5.7
14K 3	550	467	5.9
17' LENGTH			
10K 1	277	159	5.0
12K 1	336	234	5.0
14K 1	395	324	5.2
12K 3	420	291	5.7
16K 2	512	488	5.5
16K 3	550	526	6.3
18' LENGTH			
10K 1	246	134	5.0
12K 1	299	197	5.0
14K 1	352	272	5.2
12K 3	374	245	5.5
14K 3	441	339	5.8
16K 2	456	409	5.5
16K 3	508	456	6.3
14K 4	530	397	6.7
14K 6	550	408	6.9
19' LENGTH			
10K1	221	113	5.0
12K1	268	167	5.0
14K1	315	230	5.2
12K3	335	207	5.6
16K2	408	347	5.5
16K3	455	386	6.3
18K3	514	494	6.6
16K4	547	452	7.0
16K5	550	455	7.2
20' LENGTH			
12K 1	241	142	5.0
14K 1	284	197	5.2
12K 3	302	177	5.5

Joist	Allowable Loads (PLF)		Joist Weight
20' LENGTH (Cont.)			
16K2	368	297	5.5
16K3	410	330	6.2
18K3	463	423	6.5
16K4	493	386	7.0
16K5	550	426	7.5
21' LENGTH			
12K1	218	123	5.0
14K1	257	170	5.2
12K3	273	153	5.5
14K3	322	212	5.7
16K2	333	255	5.5
16K3	371	285	6.3
18K3	420	364	6.6
16K4	447	333	7.0
20K3	468	453	6.7
16K5	503	373	7.5
18K4	506	426	7.2
20K4	550	520	7.6
22' LENGTH			
12K1	199	106	5.0
14K1	234	147	5.1
12K3	249	132	5.5
14K3	293	184	5.6
16K2	303	222	5.5
16K3	337	247	6.2
18K3	382	316	6.5
16K4	406	289	6.9
20K3	426	393	6.7
18K4	460	370	7.2
20K4	514	461	7.6
18K5	518	414	7.7
22K6	550	548	7.5
18LH2	554	439	8.8
18LH3	614	488	10
18LH4	715	566	11
18LH5	808	637	12
18LH6	955	738	14
18LH7	992	776	15
18LH8	1034	810	15
18LH9	1108	864	16
23' LENGTH			
14K1	214	128	5.1
12K3	227	116	5.5
16K2	277	194	5.5
16K3	308	216	6.0
18K3	349	276	6.6
16K4	371	252	7.0
20K3	389	344	6.7
18K4	420	323	7.2
20K4	469	402	7.6
18K5	473	362	7.7
22K6	550	518	7.7
18LH3	587	446	10
18LH4	684	517	11
20LH5	697	589	11
18LH5	772	582	13
18LH6	913	674	15
18LH7	949	709	15
20LH8	1024	858	15
18LH9	1059	790	16
20LH9	1121	935	16
20LH10	1209	1008	17
24' LENGTH			
14K1	196	113	5.1
12K3	208	101	5.6

Joist	Allowable Loads (PLF)		Joist Weight
24' LENGTH (Cont.)			
16K2	254	170	5.5
16K3	283	189	6.1
18K3	320	242	6.5
16K4	340	221	6.9
20K3	357	302	6.7
18K4	385	284	7.2
20K4	430	353	7.6
18K5	434	318	7.7
18K6	473	345	8.5
20K5	485	396	8.2
24K6	550	544	7.7
18LH3	562	409	10
20LH4	621	503	10
18LH4	655	474	11
20LH5	668	540	11
18LH5	739	534	12
18LH6	875	619	15
20LH6	892	713	15
18LH7	908	650	15
18LH8	946	679	16
20LH7	951	761	15
20LH8	980	787	16
18LH9	1014	725	17
20LH9	1073	857	16
20LH10	1158	924	17
25' LENGTH			
14K1	180	100	5.1
16K2	234	150	5.5
16K3	260	167	5.9
18K3	294	214	6.3
16K4	313	195	6.9
20K3	329	266	6.7
18K4	355	250	7.1
16K6	384	238	8.1
18K5	400	281	7.7
16K7	428	263	8.6
18K6	435	305	8.5
20K5	446	350	8.2
18K7	485	337	9.0
20K6	486	380	8.9
16K9	514	311	10
24K6	550	520	8.6
20LH4	596	463	10
18LH4	628	436	11
20LH5	641	497	11
18LH5	709	492	13
20LH6	855	656	15
18LH7	872	599	16
18LH8	908	625	16
20LH7	912	701	16
20LH8	941	724	16
18LH9	973	667	17
20LH9	1030	789	17
20LH10	1111	851	18
26' LENGTH			
14K1	166	83	5.1
16K2	216	133	5.5
16K3	240	148	5.9
18K3	272	190	6.4
16K4	289	173	6.8
20K3	304	236	6.7
18K4	328	222	7.2
20K4	366	277	7.6
18K5	369	249	7.7
22K4	404	338	8.0
20K5	412	310	8.2
20K6	449	337	8.9
22K5	455	379	8.8
26K5	542	535	8.8

Joist	Allowable Loads (PLF)		Joist Weight
26' LENGTH (Cont.)			
24K6	543	493	8.9
24K7	550	499	9.2
20LH4	574	428	11
18LH4	604	403	12
20LH5	616	459	11
18LH5	684	454	13
20LH6	822	606	15
18LH7	840	553	16
18LH8	876	577	16
20LH7	878	647	16
18LH9	936	616	17
20LH9	990	729	17
20LH10	1068	786	18
27' LENGTH			
14K1	154	79	5.1
16K2	200	119	5.5
16K3	223	132	5.9
18K3	252	169	6.3
16K4	268	155	6.8
20K3	281	211	6.6
18K4	303	198	7.0
20K4	339	247	7.4
18K5	342	222	7.7
22K4	374	301	8.0
20K5	382	277	8.2
20K6	416	301	8.8
22K5	422	337	8.7
24K6	503	439	8.6
26K6	547	519	8.9
26K7	550	522	9.1
20LH4	566	406	11
18LH4	571	367	12
20LH5	609	437	12
18LH5	648	414	14
20LH6	791	561	15
20LH7	845	599	16
20LH8	873	619	16
20LH9	953	675	17
20LH10	1028	724	19
28' LENGTH			
14K1	143	70	5.1
16K2	186	106	5.5
16K3	207	118	5.8
18K3	234	151	6.2
16K4	249	138	6.6
20K3	261	189	6.7
16K5	281	155	7.4
18K4	282	177	7.2
20K4	315	221	7.5
18K5	318	199	7.7
18K6	346	216	8.5
20K5	355	248	8.2
22K5	392	302	8.8
26K5	466	427	8.1
24K6	467	393	8.5
22K7	475	364	9.2
26K6	508	464	8.9
28K6	548	541	9.2
28K7	550	543	9.2
20LH4	558	386	12
20LH5	602	416	13
18LH5	614	378	14
20LH6	763	521	15
20LH7	814	556	16
20LH8	842	575	17
20LH9	918	626	18
20LH10	991	673	20

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Joist	Allowable Loads (PLF)		Joist Weight
29' LENGTH			
16K3	193	106	5.9
18K3	218	136	6.2
16K4	232	124	6.7
20K3	243	170	6.6
18K4	263	159	7.0
20K4	293	199	7.4
18K5	296	179	7.7
22K4	324	242	7.8
20K5	330	223	8.1
22K5	365	272	8.7
26K5	434	384	8.0
24K6	435	354	8.4
28K6	511	486	9.1
28K7	550	522	9.5
18LH5	581	345	14
20LH5	595	395	13
18LH6	648	377	15
24LH6	708	567	14
24LH7	778	623	15
20LH7	786	518	16
24LH8	830	662	16
24LH9	977	775	18
24LH10	1033	822	19
24LH11	1088	861	20
30' LENGTH			
18K3	203	123	6.1
16K4	216	112	6.6
20K3	227	153	6.5
18K4	245	144	6.9
20K4	274	179	7.3
18K5	276	161	7.7
20K5	308	201	8.0
20K6	336	218	8.7
22K6	371	266	8.2
26K5	405	346	8.0
24K6	406	319	8.4
26K6	441	377	8.8
28K6	477	439	9.0
26K7	492	417	9.2
28K7	531	486	9.5
26K8	544	457	10
26K9	550	459	10
20LH5	571	366	13
18LH6	605	340	15
24LH6	684	529	14
24LH7	752	582	15
24LH8	802	618	16
24LH9	944	724	18
24LH10	998	768	19
24LH11	1052	804	21
31' LENGTH			
16K4	203	101	6.6
20K3	212	138	6.6
18K4	229	130	6.9
20K4	256	162	7.4
18K5	258	146	7.7
22K4	283	198	7.8
20K5	289	182	8.1
24K4	310	237	8.4
20K6	314	198	8.8
22K5	319	222	8.7
22K6	347	241	8.3
26K5	379	314	8.1
24K6	380	289	8.6
22K7	387	267	8.8
28K6	446	397	9.0
22K9	465	316	10
28K8	550	480	10
24LH6	662	495	14

Joist	Allowable Loads (PLF)		Joist Weight
31' LENGTH (Cont.)			
24LH7	727	545	15
24LH8	776	579	16
24LH9	913	677	19
24LH10	965	718	20
24LH11	1017	752	21
32' LENGTH			
16K2	142	71	5.5
16K3	158	79	5.8
18K3	178	101	6.1
20K4	240	147	7.2
18K5	242	132	7.6
20K5	271	165	7.9
24K4	290	215	8.1
22K5	299	201	8.4
22K6	326	219	8.4
26K5	356	285	8.0
24K6	357	262	8.5
26K6	387	309	8.6
28K6	418	361	8.9
22K9	436	287	10
28K7	466	400	9.5
26K8	477	375	9.9
28K8	515	433	10
28K9	549	463	11
24LH6	641	465	14
24LH7	704	511	15
24LH8	752	543	16
24LH9	884	635	19
24LH10	935	674	20
24LH11	985	705	20
33' LENGTH			
18K3	168	92	6.1
20K4	226	134	7.3
22K4	249	164	7.9
20K5	254	150	8.1
24K4	273	196	8.3
20K6	277	163	8.7
22K5	281	183	8.5
26K5	334	259	8.0
24K6	335	239	8.3
26K6	364	282	8.6
28K6	393	329	8.8
26K7	406	312	9.1
28K7	438	364	9.4
28K8	484	399	10
26K9	488	370	11
28K9	527	432	11
28K10	532	435	11
24LH6	621	437	15
24LH7	683	480	16
24LH8	729	510	16
24LH9	857	597	19
24LH10	906	633	20
24LH11	955	663	22
34' LENGTH			
18K3	158	84	6.1
20K3	176	105	6.4
18K4	190	98	6.9
18K6	233	120	8.2
24K4	257	179	8.1
20K6	261	149	8.6
22K5	265	167	8.4
26K5	315	237	7.9
26K6	343	257	8.5
28K6	370	300	8.8
26K7	382	285	9.1
28K7	412	333	9.4

Joist	Allowable Loads (PLF)		Joist Weight
34' LENGTH (Cont.)			
24K9	423	286	10
28K8	456	364	10
28K9	496	395	11
28K10	516	410	11
28LH6	552	443	13
28LH7	624	499	14
28LH8	668	533	15
24LH8	707	480	17
28LH9	823	656	17
24LH9	832	562	20
28LH10	900	714	19
28LH11	965	763	20
28LH12	1060	835	23
28LH13	1105	872	23
35' LENGTH			
18K3	149	77	6.1
20K3	166	96	6.5
18K4	179	90	6.9
20K4	200	112	7.3
20K6	246	137	8.7
26K5	297	217	7.9
26K6	323	236	8.5
28K6	349	275	8.7
26K7	360	261	9.0
28K7	389	305	9.4
28K8	430	333	9.9
26K9	433	310	10
28K9	468	361	11
28K10	501	389	11
28LH6	537	417	13
28LH7	606	471	14
28LH8	649	503	15
24LH8	677	447	17
28LH9	799	618	18
28LH10	874	673	20
28LH11	938	719	21
28LH12	1030	787	23
28LH13	1073	822	24
36' LENGTH			
18K3	141	70	6.1
20K3	157	88	6.4
18K4	169	82	6.9
20K4	189	103	7.2
18K5	191	92	7.5
24K6	281	183	8.3
22K7	286	169	8.7
24K7	313	203	8.8
28K6	330	252	8.8
26K7	340	240	9.1
24K8	346	222	9.5
28K7	367	280	9.4
26K8	376	263	9.8
30K7	395	323	9.6
28K9	442	332	11
28K10	487	366	12
28LH6	521	394	13
28LH7	589	445	14
28LH8	631	475	15
24LH8	649	416	17
28LH9	777	584	18
28LH10	850	636	19
28LH11	911	680	21
28LH12	1001	744	23
28LH13	1043	777	24
37' LENGTH			
20K3	148	81	6.4
20K4	179	95	7.3

Joist	Allowable Loads (PLF)		Joist Weight
37' LENGTH (Cont.)			
26K5	265	183	7.9
24K6	266	169	8.3
28K6	312	232	8.7
26K7	322	221	9.1
28K7	348	257	9.3
30K7	373	297	9.5
28K8	384	282	9.9
26K9	387	262	10
30K8	413	325	10
28K9	418	305	11
30K9	449	352	11
30K10	474	374	12
28LH6	507	373	13
24LH6	530	331	15
28LH7	573	421	15
24LH7	588	367	16
28LH8	614	449	16
24LH8	622	388	17
28LH9	755	553	18
28LH10	826	602	21
28LH11	886	643	21
28LH12	974	704	23
28LH13	1015	735	25
38' LENGTH			
20K3	141	74	6.3
20K4	170	87	7.2
24K6	252	156	8.3
28K6	296	214	8.6
26K7	305	204	9.0
28K7	329	237	9.2
30K7	354	274	9.5
28K8	364	260	9.9
26K9	367	241	10
30K8	391	300	10
28K9	396	282	11
30K9	426	325	11
30K10	461	353	11
28LH6	494	354	13
24LH6	504	306	15
28LH7	558	399	15
24LH7	565	343	16
28LH8	597	426	16
28LH9	735	524	19
28LH10	804	570	20
28LH11	863	609	22
28LH12	948	667	23
28LH13	988	696	26
39' LENGTH			
20K3	133	69	6.4
20K4	161	81	7.3
20K5	181	90	7.9
28K6	280	198	8.6
26K7	289	188	9.0
28K7	313	219	9.1
30K7	336	253	9.5
28K8	346	240	9.9
26K9	348	223	10
30K8	371	277	10
28K9	376	260	11
30K9	404	300	11
26K10	413	262	12
30K10	449	333	12
32LH7	486	388	13
32LH8	528	421	14
28LH7	543	379	15
32LH9	662	526	17
32LH10	732	581	18
32LH11	802	635	20
28LH11	841	578	22

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Joist	Allowable Loads (PLF)		Joist Weight
39' LENGTH (Cont.)			
32LH12	941	742	23
28LH13	962	661	26
32LH13	1050	825	25
32LH14	1081	850	26
32LH15	1117	878	26
40' LENGTH			
20K3	127	64	6.4
20K4	153	75	7.2
22K4	169	91	7.6
20K5	172	84	7.9
24K7	253	148	8.9
26K7	275	174	9.0
28K7	297	203	9.1
30K7	319	234	9.4
28K8	328	222	9.9
26K9	331	207	10
28K9	357	241	11
30K9	384	278	11
26K10	393	243	12
30K10	438	315	12
32LH7	474	368	13
32LH8	514	400	14
28LH7	529	360	15
32LH9	645	500	16
32LH10	713	552	18
32LH11	782	604	20
32LH12	918	705	23
32LH13	1024	784	26
32LH14	1054	807	26
32LH15	1089	834	27
41' LENGTH			
22K4	161	85	7.6
24K4	176	101	8.0
24K7	241	137	8.9
26K7	262	162	9.0
24K8	266	150	9.5
24K9	290	162	10
30K7	303	217	9.5
26K9	315	192	10
28K9	340	224	11
30K9	365	258	11
26K10	374	225	12
30K10	427	300	12
32LH7	462	351	13
32LH8	502	380	14
28LH7	516	342	16
32LH9	630	476	17
32LH10	696	525	19
32LH11	762	574	21
28LH11	799	523	23
32LH12	895	671	23
32LH13	998	746	26
32LH14	1028	768	26
32LH15	1062	794	28
42' LENGTH			
22K4	153	79	7.6
24K7	229	127	8.9
26K7	249	150	9.0
24K8	253	139	9.6
28K7	269	175	9.2
26K8	275	164	9.7
30K7	289	202	9.5
26K9	300	178	10
30K8	320	221	10
28K9	324	208	11
30K9	348	240	11
26K10	356	210	12

Joist	Allowable Loads (PLF)		Joist Weight
42' LENGTH (Cont.)			
28K10	384	245	12
30K10	413	282	12
30K11	417	284	12
32LH7	451	334	14
32LH8	490	362	15
28LH7	505	326	16
28LH8	540	348	16
32LH9	614	453	17
32LH10	679	500	19
32LH11	744	547	21
32LH12	874	639	24
32LH13	974	710	26
32LH14	1003	732	27
32LH15	1037	756	28
43' LENGTH			
22K4	146	73	7.5
24K4	160	88	8.0
26K5	196	116	7.9
30K7	276	188	9.3
26K9	286	166	10
30K8	305	206	10
28K9	309	194	11
30K9	332	223	11
26K10	339	195	12
28K10	367	228	12
30K10	394	263	12
30K11	407	270	13
36LH8	434	354	13
32LH7	441	318	14
32LH8	478	346	15
36LH9	555	451	16
36LH10	612	499	17
36LH11	668	543	18
32LH11	727	522	21
36LH12	799	647	21
32LH12	853	610	25
36LH13	940	758	25
32LH13	952	678	27
36LH14	1036	833	28
36LH15	1092	877	29
44' LENGTH			
22K4	139	68	7.5
24K4	153	82	8.1
22K5	157	76	8.3
26K5	187	108	7.9
26K6	204	118	8.5
24K7	209	110	8.9
28K6	220	137	8.6
30K8	291	192	10
28K9	295	181	11
30K9	317	208	11
26K10	324	182	12
28K10	350	212	12
30K10	376	245	12
30K11	398	258	13
36LH8	424	338	13
32LH7	431	304	14
32LH8	467	330	15
36LH9	543	431	16
36LH10	598	476	17
36LH11	653	518	18
36LH12	781	617	21
32LH12	834	582	25
36LH13	918	724	25
36LH14	1012	795	28
36LH15	1067	837	29

Joist	Allowable Loads (PLF)		Joist Weight
45' LENGTH			
24K4	146	76	7.8
26K5	179	101	7.9
26K6	194	110	8.5
28K6	210	128	8.6
26K7	217	122	9.0
24K8	220	113	9.5
28K7	234	142	9.2
24K10	285	144	12
26K10	310	170	12
28K10	334	198	12
30K10	359	229	12
30K11	389	246	13
36LH8	414	323	13
32LH7	421	291	14
32LH8	457	315	15
36LH9	531	412	16
36LH10	584	455	17
36LH11	638	495	19
36LH12	763	590	21
32LH12	815	556	26
36LH13	898	692	25
36LH14	990	760	28
36LH15	1043	800	29
46' LENGTH			
24K4	139	71	7.9
26K5	171	95	7.9
26K6	186	103	8.5
28K6	201	120	8.6
26K7	207	114	9.1
24K8	211	106	9.6
26K8	229	125	9.7
26K10	296	159	12
28K10	320	186	12
30K10	344	214	12
30K11	380	236	14
36LH8	405	309	13
32LH7	412	278	14
28LH7	427	251	16
32LH8	447	302	16
36LH9	519	394	16
36LH10	572	435	18
36LH11	624	474	19
32LH11	679	455	22
36LH12	747	564	23
32LH12	797	532	26
36LH13	878	662	26
36LH14	968	727	28
36LH15	1020	765	30
47' LENGTH			
24K4	133	67	7.9
26K5	164	89	7.9
26K6	178	96	8.5
28K6	192	112	8.6
24K8	202	99	9.6
24K10	261	126	12
26K10	284	149	12
28K10	306	174	12
30K10	329	201	12
36LH7	360	270	12
30K11	372	226	14
36LH8	396	296	13
32LH7	403	266	15
28LH7	410	236	16
32LH8	437	289	16
28LH8	438	525	17
36LH9	508	377	17
36LH10	559	417	18
36LH11	611	454	20
32LH11	664	436	22

Joist	Allowable Loads (PLF)		Joist Weight
47' LENGTH (Cont.)			
36LH12	731	541	23
32LH12	780	510	26
36LH13	859	634	26
32LH13	870	566	28
36LH14	947	696	29
36LH15	999	733	30
48' LENGTH			
24K4	128	63	7.9
26K5	157	83	7.8
26K6	171	90	8.4
24K7	175	85	8.9
28K6	184	105	8.6
24K6	194	93	9.6
24K10	250	118	12
26K10	272	140	12
28K10	294	163	12
30K10	315	188	12
30K12	365	216	14
36LH8	388	284	14
28LH7	394	222	16
32LH8	428	277	16
36LH9	497	362	17
36LH10	548	400	18
36LH11	598	435	20
32LH11	650	418	23
36LH12	715	518	23
32LH12	764	489	27
36LH13	841	607	26
36LH14	927	667	29
36LH15	978	703	31
40LH15	1009	810	31
40LH16	1112	890	34
49' LENGTH			
26K5	150	78	7.9
26K6	164	85	8.4
28K6	177	99	8.6
26K7	183	94	9.1
28K7	197	110	9.3
26K8	202	103	9.7
30K7	212	127	9.4
28K8	218	120	9.9
26K9	220	112	10
30K8	234	139	10
30K10	303	177	12
30K11	347	202	14
30K12	357	207	14
28LH7	379	209	16
32LH8	419	266	16
36LH9	487	347	17
36LH10	536	383	18
36LH11	586	417	20
32LH11	637	401	23
36LH12	701	497	24
32LH12	748	469	27
36LH13	824	583	28
32LH13	834	521	30
32LH14	859	536	31
36LH14	908	640	30
36LH15	958	674	31
40LH15	988	777	31
40LH16	1089	854	34
50' LENGTH			
26K5	144	73	7.9
26K6	157	80	8.5
26K7	175	89	9.1
28K7	189	103	9.3
26K8	194	97	9.7

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Joist	Allowable Loads (PLF)		Joist Weight
50' LENGTH (Cont.)			
30K7	203	119	9.4
26K9	211	105	10
28K9	228	123	11
30K9	245	141	11
26K10	250	124	12
28K10	270	144	12
30K11	333	190	14
30K12	350	199	14
36LH8	372	262	14
32LH8	411	255	16
36LH9	477	333	17
36LH10	526	368	18
36LH11	574	400	21
32LH11	625	385	23
36LH12	687	477	23
36LH13	807	559	28
36LH14	890	615	30
36LH15	938	647	32
40LH15	968	746	31
40LH16	1067	820	34
51' LENGTH			
26K5	139	69	7.9
26K6	151	75	8.5
28K6	163	88	8.6
26K7	168	83	9.1
28K7	182	97	9.3
26K8	186	91	9.8
26K9	203	99	10
28K9	219	115	11
30K9	235	133	11
26K10	241	116	12
28K10	260	136	12
30K10	279	157	12
30K11	320	179	14
30K12	343	192	15
28LH7	352	186	16
36LH8	365	251	14
32LH8	397	242	16
36LH9	468	320	17
36LH10	515	354	19
36LH11	563	385	21
32LH11	602	363	23
36LH12	673	459	24
36LH13	791	538	28
32LH13	801	480	30
36LH14	872	591	31
36LH15	920	622	33
40LH15	949	717	31
40LH16	1046	788	33
52' LENGTH			
26K5	133	65	7.9
26K6	145	71	8.4
28K6	157	83	8.6
26K7	162	79	9.1
28K7	175	92	9.3
26K8	179	86	9.7
26K9	195	93	10
28K9	210	109	11
30K9	226	126	11
26K10	231	110	12
28K10	250	128	12
30K10	268	148	12
28K12	325	165	15
30K12	336	184	15
28LH7	339	176	16
32LH8	383	229	16
36LH9	459	308	18
36LH10	505	340	19
36LH11	552	370	21

Joist	Allowable Loads (PLF)		Joist Weight
52' LENGTH (Cont.)			
32LH11	580	343	23
36LH12	660	441	25
36LH13	776	517	28
36LH14	855	568	31
36LH15	902	598	33
40LH15	931	690	31
40LH16	1026	758	34
53' LENGTH			
28K6	151	78	8.6
28K7	168	87	9.2
30K7	181	100	9.4
28K8	186	95	9.9
28K9	203	103	11
30K9	218	119	11
28K10	240	121	12
30K10	258	140	12
40LH8	315	233	12
30K12	330	177	16
44LH9	380	309	14
36LH9	450	296	18
44LH11	454	368	16
32LH9	463	270	19
36LH10	496	327	19
36LH11	541	356	21
44LH12	562	454	19
36LH12	647	424	25
36LH13	761	498	28
44LH14	767	616	26
36LH14	839	547	31
36LH15	885	575	34
44LH15	892	716	31
40LH15	913	664	32
44LH16	1029	824	34
44LH17	1105	880	37
54' LENGTH			
28K6	145	74	8.7
28K7	162	82	9.2
30K7	174	94	9.4
28K8	179	89	9.9
28K9	195	97	11
30K9	209	112	11
28K10	232	114	12
30K10	249	132	12
30K11	285	150	14
40LH8	309	225	13
36LH7	313	204	13
30K12	324	170	16
44LH9	373	298	14
36LH9	442	285	18
44LH11	445	354	16
32LH9	447	256	19
36LH10	486	315	19
40LH11	488	350	18
36LH11	531	343	22
44LH12	552	437	19
36LH12	635	409	25
44LH13	654	518	23
36LH13	747	479	29
44LH14	753	594	26
36LH14	824	527	32
36LH15	868	554	34
44LH15	876	690	31
40LH15	896	639	33
44LH16	1010	793	34
44LH17	1084	848	37
55' LENGTH			
28K6	140	70	8.6

Joist	Allowable Loads (PLF)		Joist Weight
55' LENGTH (Cont.)			
28K7	156	77	9.3
30K7	168	89	9.4
28K8	173	85	9.9
30K8	185	98	10
28K9	188	92	11
30K9	202	106	11
28K10	223	108	12
30K10	240	125	12
40LH8	304	216	13
36LH7	307	197	13
30K12	312	161	16
44LH9	366	287	15
36LH9	434	275	18
40LH10	439	312	17
36LH10	477	304	20
36LH11	521	330	22
32LH11	522	292	24
44LH12	541	421	20
36LH12	624	394	25
44LH13	642	499	23
36LH13	734	462	29
44LH14	739	572	26
36LH14	809	507	32
36LH15	852	534	34
44LH15	860	665	31
40LH15	880	616	33
44LH16	991	765	34
44LH17	1065	817	36
56' LENGTH			
28K6	135	66	8.6
28K7	151	73	9.2
30K7	162	84	9.4
28K8	166	80	9.9
30K8	179	92	10
28K9	181	87	11
30K9	195	100	11
28K10	215	102	12
30K10	231	118	12
30K11	265	135	14
40LH8	298	209	13
30K12	301	153	16
44LH9	359	277	15
36LH9	426	265	18
44LH11	429	329	17
40LH10	431	301	17
36LH10	469	293	21
40LH11	471	326	19
36LH11	512	319	23
44LH12	532	406	20
36LH12	613	380	25
44LH13	631	482	23
40LH13	675	465	26
36LH13	720	445	30
44LH14	726	552	27
32LH14	738	395	33
36LH14	794	489	34
36LH15	837	515	35
44LH15	844	641	30
40LH15	864	594	33
44LH16	974	737	35
44LH17	1046	788	37
57' LENGTH			
30K7	156	80	9.4
30K8	173	88	10
30K9	188	95	11
30K10	223	112	12
30K11	256	128	14
40LH8	293	201	13
48LH10	353	293	15

Joist	Allowable Loads (PLF)		Joist Weight
57' LENGTH (Cont.)			
48LH11	383	316	15
36LH9	418	256	18
44LH11	422	318	17
40LH10	424	290	17
36LH10	461	283	21
36LH11	503	308	22
36LH12	602	367	25
44LH13	619	465	23
40LH13	664	449	26
36LH13	708	430	30
32LH14	713	374	33
36LH14	780	472	34
36LH15	822	497	36
44LH14	829	619	31
40LH15	849	573	33
48LH16	905	737	31
44LH16	956	711	36
44LH17	1027	761	38
58' LENGTH			
30K7	151	76	9.4
30K8	167	83	10
30K9	181	90	11
30K10	215	106	12
30K11	247	121	14
40LH8	288	195	13
44LH9	347	258	15
48LH11	376	305	15
40LH9	378	254	17
44LH10	383	284	16
32LH9	391	208	19
44LH11	414	307	17
40LH10	416	280	18
36LH10	454	273	21
36LH11	495	297	22
36LH12	593	354	25
44LH13	609	449	23
36LH13	697	415	30
44LH14	701	514	28
36LH14	768	456	35
36LH15	809	480	36
44LH15	815	597	31
48LH16	890	712	31
40LH16	919	608	37
44LH16	940	687	37
48LH17	999	796	37
44LH17	1009	734	40
59' LENGTH			
30K7	146	72	9.4
30K8	161	79	10
30K9	175	86	11
30K10	208	101	12
40LH8	283	188	13
48LH10	341	273	14
44LH10	377	274	16
32LH9	379	198	19
44LH11	407	296	17
36LH10	440	260	20
36LH11	480	283	23
36LH12	575	338	25
44LH13	598	434	24
36LH13	675	395	30
44LH14	689	497	28
36LH14	755	434	35
36LH15	795	464	36
44LH15	801	577	31
40LH15	820	535	34
48LH16	874	688	32
40LH16	903	588	37
44LH16	924	664	37

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Joist	Allowable Loads (PLF)		Joist Weight
59' LENGTH (Cont.)			
48LH17	982	769	37
44LH17	992	710	39
60' LENGTH			
30K7	141	69	9.4
30K8	156	75	10
30K9	169	81	11
30K10	201	96	12
30K11	231	109	14
40LH8	278	182	13
48LH10	335	264	15
44LH10	370	265	16
44LH11	401	287	17
36LH10	426	248	20
40LH11	439	283	19
36LH11	465	269	23
36LH12	557	322	25
44LH13	588	419	25
36LH13	654	376	30
44LH14	677	480	28
36LH14	729	412	34
48LH15	746	577	28
36LH15	781	448	36
44LH15	788	558	31
48LH16	860	665	32
44LH16	908	642	36
48LH17	965	744	37
44LH17	975	686	39
61' LENGTH			
40LH8	274	176	13
48LH10	330	256	15
44LH10	364	257	16
44LH11	394	277	17
40LH10	396	253	18
36LH10	413	236	21
40LH11	432	274	21
36LH11	451	257	23
44LH12	488	342	21
40LH12	526	334	25
44LH13	579	405	25
40LH13	620	391	28
48LH14	638	487	26
44LH14	666	464	28
48LH15	734	558	29
44LH15	775	540	31
40LH15	793	500	36
48LH16	846	643	33
44LH16	893	621	37
48LH17	949	719	37
44LH17	959	664	39
62' LENGTH			
40LH8	269	170	14
48LH10	324	247	15
44LH10	358	248	17
44LH11	388	268	18
40LH10	389	245	19
36LH10	401	225	21
40LH11	425	265	21
36LH11	438	246	23
44LH12	480	331	21
40LH12	517	323	25
44LH13	569	392	25
40LH13	610	379	29
48LH14	628	472	26
44LH14	655	450	29
52DLH14	736	584	29
44LH15	762	522	31
52DLH15	827	658	32

Joist	Allowable Loads (PLF)		Joist Weight
62' LENGTH (Cont.)			
48LH16	832	623	33
44LH16	879	601	37
52DLH16	892	732	34
48LH17	934	696	37
44LH17	944	642	41
52DLH17	1026	835	40
63' LENGTH			
40LH8	265	165	14
48LH10	319	239	15
40LH9	348	215	18
44LH10	353	240	17
44LH11	381	260	18
40LH10	383	237	19
36LH10	389	215	21
40LH11	418	257	21
36LH11	425	234	23
44LH12	472	321	22
40LH12	509	313	25
44LH13	560	380	25
40LH13	600	367	28
52DLH13	634	506	26
44LH14	645	435	29
52DLH14	724	565	29
44LH15	750	506	31
52DLH15	814	637	32
48LH16	819	603	33
44LH16	865	582	37
52DLH16	878	708	35
48LH17	919	674	38
44LH17	929	622	40
52DLH17	1010	809	40
64' LENGTH			
40LH8	261	160	15
48LH10	314	232	15
40LH9	342	209	18
44LH10	347	233	17
44LH11	375	252	18
40LH10	377	230	19
36LH10	378	206	21
40LH11	412	249	21
48LH12	430	314	19
44LH12	465	311	22
36LH12	493	267	25
44LH13	551	368	25
40LH13	591	355	28
52DLH13	625	490	26
44LH14	635	422	29
52DLH14	713	547	29
44LH15	738	490	31
52DLH15	801	617	32
48LH16	806	584	34
52DLH16	864	686	35
48LH17	905	653	39
44LH17	914	602	43
52DLH17	994	783	40
65' LENGTH			
40LH8	257	155	15
48LH10	309	225	15
44LH10	342	226	17
44LH11	370	244	18
40LH10	371	223	19
40LH11	405	241	21
48LH12	424	305	20
44LH12	458	301	23
36LH12	478	255	25
40LH12	493	294	25
52DLH12	506	392	22

Joist	Allowable Loads (PLF)		Joist Weight
65' LENGTH (Cont.)			
44LH13	543	357	26
40LH13	581	344	28
52DLH13	614	475	26
44LH14	625	409	29
52DLH14	702	531	30
44LH15	727	475	31
52DLH15	789	598	33
52DLH16	851	665	34
44LH17	900	584	43
52DLH17	979	759	40
66' LENGTH			
40LH8	254	150	15
48LH10	305	216	16
44LH10	337	219	17
44LH11	364	237	18
40LH10	367	216	20
40LH11	399	234	22
48LH12	417	295	20
44LH12	451	292	23
40LH12	486	285	25
52DLH12	498	380	23
44LH13	535	346	26
52DLH13	605	461	26
44LH14	615	396	31
52DLH14	691	515	30
44LH15	716	461	31
40LH15	734	427	36
52DLH15	777	580	34
48LH16	781	549	35
52DLH16	838	645	37
44LH17	886	566	43
52DLH17	964	736	40
67' LENGTH			
40LH8	247	144	15
44LH9	300	193	16
40LH9	323	188	18
44LH10	332	212	18
44LH11	359	230	18
56DLH11	422	363	20
44LH12	444	283	23
36LH12	450	232	25
40LH12	472	273	25
52DLH12	491	369	23
44LH13	527	336	26
48LH14	581	404	27
52DLH13	596	447	27
44LH14	606	385	30
40LH14	638	367	34
48LH15	668	462	31
52DLH14	681	499	31
44LH15	705	447	31
40LH15	712	408	36
52DLH15	765	563	34
48LH16	770	533	35
52DLH16	825	626	37
48LH17	864	596	40
44LH17	873	549	44
52DLH17	950	715	40
68' LENGTH			
40LH8	241	138	15
44LH9	296	187	17
40LH9	315	180	18
44LH10	327	206	18
56DLH11	415	352	20
44LH12	437	275	23
40LH12	459	261	25
44LH13	519	326	26

Joist	Allowable Loads (PLF)		Joist Weight
68' LENGTH (Cont.)			
48LH14	572	392	28
52DLH13	587	434	27
44LH14	597	373	30
48LH15	658	449	32
52DLH14	671	485	31
44LH15	695	434	31
52DLH15	754	546	34
48LH16	758	517	36
52DLH16	813	608	37
48LH17	851	578	41
44LH17	860	533	45
52DLH17	935	694	42
69' LENGTH			
40LH8	234	132	15
44LH9	291	182	17
40LH9	306	173	18
44LH10	322	200	18
40LH10	338	190	20
44LH11	348	216	20
56DLH11	409	342	21
44LH12	431	267	23
40LH12	447	251	25
48LH13	478	323	24
44LH13	511	317	29
52DLH13	578	421	27
44LH14	588	363	31
48LH15	648	436	32
52DLH14	661	471	31
44LH15	684	421	31
56DLH15	735	568	32
52DLH15	743	530	34
48LH16	747	502	36
52DLH16	801	590	38
48LH17	839	562	41
44LH17	848	518	45
52DLH17	922	674	44
70' LENGTH			
40LH8	228	127	15
40LH9	298	166	18
44LH10	317	195	18
40LH10	329	183	20
44LH11	343	210	20
36LH11	348	173	23
40LH11	358	198	22
56DLH11	403	332	21
44LH12	425	259	24
40LH12	435	241	25
52DLH12	469	338	24
48LH13	471	313	24
44LH13	504	307	27
48LH14	556	370	29
52DLH13	570	409	29
44LH14	580	352	31
48LH15	639	423	32
52DLH14	652	457	31
44LH15	675	409	31
52DLH15	732	515	34
48LH16	736	488	36
52DLH16	789	573	37
48LH17	827	546	41
44LH17	835	503	45
56DLH17	901	700	40
52DLH17	909	654	44
71' LENGTH			
40LH8	222	122	15
44LH9	283	172	17
40LH9	291	160	18

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Joist	Allowable Loads (PLF)		Joist Weight
71' LENGTH (Cont.)			
44LH10	313	189	18
40LH10	321	176	20
44LH11	338	204	20
40LH11	349	190	22
56DLH11	398	323	21
44LH12	419	252	24
40LH12	424	231	25
52DLH12	463	328	24
48LH13	464	305	26
44LH13	497	299	28
40LH13	500	271	30
52DLH13	562	398	28
44LH14	572	342	31
52DLH14	642	444	31
44LH15	665	398	31
52DLH15	722	501	35
52DLH16	778	557	37
48LH17	815	530	41
44LH17	824	489	45
56DLH17	889	680	40
52DLH17	896	636	44
60DLH18	1017	818	46
72' LENGTH			
36LH7	196	95	15
36LH8	215	104	16
40LH8	217	117	16
44LH9	279	167	17
40LH9	283	153	18
44LH10	308	184	18
40LH10	313	169	20
44LH11	333	199	19
56DLH11	392	314	20
44LH12	413	245	25
52DLH12	456	319	24
48LH13	458	296	26
44LH13	490	291	29
52DLH13	554	387	28
44LH14	564	333	31
52DLH14	633	432	31
44LH15	656	387	31
52DLH15	712	487	35
48LH16	716	461	38
52DLH16	767	542	38
44LH17	812	475	45
52DLH17	883	618	44
60DLH18	1003	796	46
73' LENGTH			
40LH8	211	112	15
44LH9	275	162	17
40LH9	276	147	18
44LH10	304	179	18
40LH10	305	162	20
44LH11	329	193	19
56DLH11	387	305	20
44LH12	407	238	25
52DLH12	450	311	24
48LH13	451	288	26
44LH13	483	283	29
52DLH13	546	376	28
44LH14	556	324	31
52DLH14	625	420	32
44LH15	647	376	31
52DLH15	702	474	37
48LH16	706	448	37
52DLH16	757	527	38
44LH17	801	462	47
52DLH17	871	601	44
60DLH18	989	774	46

Joist	Allowable Loads (PLF)		Joist Weight
74' LENGTH			
40LH8	206	108	15
40LH9	269	141	18
44LH9	272	158	18
40LH10	297	156	20
44LH10	300	174	19
56DLH11	381	297	21
44LH12	402	232	25
52DLH12	444	302	24
48LH13	445	280	25
44LH13	477	275	29
48LH14	525	331	29
52DLH13	539	366	29
44LH14	549	315	31
52DLH14	616	409	32
44LH15	639	366	31
60DLH15	669	525	32
52DLH15	692	461	37
52DLH16	747	513	38
48LH17	782	488	45
44LH17	790	450	47
60DLH17	846	667	40
52DLH17	859	585	45
60DLH18	976	753	46
75' LENGTH			
40LH8	201	104	15
44LH9	265	152	18
40LH10	290	150	20
44LH10	293	168	19
56DLH11	376	289	21
44LH12	393	224	25
48LH13	439	273	25
44LH13	466	265	28
48LH14	518	322	29
56DLH13	532	356	29
44LH14	534	302	31
52DLH14	608	398	33
44LH15	623	352	31
60DLH15	660	511	32
52DLH15	683	449	37
48LH16	687	425	39
60DLH16	726	571	35
52DLH16	737	499	40
48LH17	771	475	45
44LH17	780	438	47
60DLH17	834	649	40
52DLH17	848	570	45
60DLH18	963	733	47
76' LENGTH			
40LH8	196	100	15
44LH9	259	146	17
40LH10	283	144	20
44LH10	286	162	19
48LH11	287	177	18
44LH11	310	175	21
52DLH10	353	240	21
44LH12	383	215	25
52DLH11	387	263	23
52DLH12	432	286	26
48LH13	433	266	26
44LH13	454	254	28
48LH14	511	313	30
52DLH13	525	347	30
52DLH14	600	388	34
44LH15	608	339	31
60DLH15	652	497	32
52DLH15	674	437	37
60DLH16	716	556	36
52DLH16	727	486	40
48LH17	761	462	45

Joist	Allowable Loads (PLF)		Joist Weight
76' LENGTH (Cont.)			
44LH17	769	428	47
60DLH17	823	632	41
52DLH17	837	555	45
60DLH18	950	714	47
77' LENGTH			
40LH8	192	97	16
44LH9	253	141	18
44LH10	279	155	19
48LH11	283	172	18
44LH11	302	168	21
44LH12	374	207	25
52DLH11	382	256	24
52DLH12	427	279	26
48LH13	428	259	27
44LH13	444	246	28
52DLH13	518	338	30
40LH15	538	268	36
56DLH14	577	404	32
52DLH14	592	378	34
44LH15	593	326	31
60DLH15	643	484	34
52DLH15	665	425	38
60DLH16	707	541	36
56DLH16	711	508	37
52DLH16	717	473	40
48LH17	751	450	45
52DLH17	826	540	46
60DLH18	938	695	47
78' LENGTH			
40LH8	187	93	16
44LH9	247	136	18
44LH10	272	150	19
48LH11	279	168	18
44LH11	295	162	21
44LH12	365	200	25
52DLH11	377	249	24
52DLH12	421	272	26
48LH13	422	252	26
44LH13	433	236	28
52DLH13	511	329	30
40LH15	524	258	36
56DLH14	569	394	32
52DLH14	585	368	34
52DLH15	657	415	38
48LH16	661	393	40
60DLH16	698	528	38
56DLH16	702	495	38
52DLH16	708	461	41
48LH17	742	439	45
52DLH17	815	526	45
60DLH18	926	677	46
79' LENGTH			
40LH8	183	90	15
44LH9	242	131	18
44LH10	266	144	19
48LH11	276	164	18
44LH11	289	157	21
52DLH10	339	222	22
44LH12	356	192	25
52DLH11	372	243	24
52DLH12	416	265	26
48LH13	417	246	26
44LH13	423	228	29
52DLH13	505	321	30
56DLH14	562	384	31
52DLH14	577	359	34
52DLH15	648	404	38

Joist	Allowable Loads (PLF)		Joist Weight
79' LENGTH (Cont.)			
48LH16	652	383	40
60DLH16	689	514	38
56DLH16	693	482	38
52DLH16	699	450	41
48LH17	732	428	45
64DLH17	788	622	41
60DLH17	792	585	44
52DLH17	805	513	48
60DLH18	914	660	47
80' LENGTH			
40LH8	178	86	15
40LH9	233	113	18
44LH9	236	127	18
40LH10	255	124	20
44LH10	260	139	19
48LH11	272	160	18
44LH11	282	151	21
52DLH10	335	217	22
44LH12	347	185	25
52DLH11	368	237	24
52DLH12	410	258	26
48LH13	412	240	26
44LH13	413	220	29
48LH14	486	283	32
52DLH13	498	313	31
60DLH14	527	380	30
56DLH14	555	374	32
52DLH14	570	350	35
52DLH15	640	394	38
64DLH16	675	533	35
60DLH16	680	501	38
56DLH16	684	470	38
52DLH16	690	438	41
48LH17	723	417	47
60DLH17	782	570	44
52DLH17	795	500	48
60DLH18	903	644	48
81' LENGTH			
44LH9	231	122	18
44LH10	254	134	19
48LH11	269	156	18
44LH11	276	146	21
52DLH10	331	211	22
44LH12	339	179	25
48LH12	340	196	23
52DLH11	363	231	23
52DLH12	405	252	26
48LH13	407	234	27
48LH14	480	276	32
52DLH13	492	305	31
56DLH14	548	365	32
52DLH14	563	341	35
52DLH15	632	384	38
64DLH16	667	520	36
60DLH16	672	489	38
52DLH16	682	428	42
48LH17	714	407	47
64DLH17	769	592	41
52DLH17	785	488	48
64DLH18	888	669	47
60DLH18	891	628	53
68DLH19	998	803	52
82' LENGTH			
44LH9	226	118	18
44LH10	249	130	19
44LH11	269	140	21
44LH12	331	172	25

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Combined K, VS, LH & DLH Series Load Table

Joist	Allowable Loads (PLF)		Joist Weight
82' LENGTH (Cont.)			
52DLH11	359	225	24
52DLH12	400	246	27
48LH13	402	228	28
44LH14	446	231	31
52DLH13	486	298	31
60DLH14	514	362	31
44LH15	524	271	31
52DLH14	556	333	35
60DLH15	604	427	34
52DLH15	624	375	39
64DLH16	659	508	36
60DLH16	664	477	38
52DLH16	673	417	44
48LH17	706	397	47
52DLH17	775	476	48
64DLH18	877	653	46
60DLH18	880	613	53
68DLH19	986	783	52
83' LENGTH			
44LH9	221	114	18
44LH10	243	125	19
44LH11	264	136	21
44LH12	323	166	25
48LH12	329	185	24
52DLH11	354	220	25
52DLH12	396	240	27
44LH14	436	223	31
60DLH13	457	332	28
56DLH13	473	311	30
52DLH13	480	291	32
60DLH14	508	353	30
44LH15	512	261	31
52DLH14	549	325	35
60DLH15	596	417	34
56DLH15	611	392	37
60DLH16	656	466	38
52DLH16	665	407	44
48LH17	690	383	47
60DLH17	754	529	45
52DLH17	766	465	48
64DLH18	866	637	48
60DLH18	870	598	53
68DLH19	974	765	54
84' LENGTH			
44LH9	216	110	18
44LH10	238	121	19
44LH11	258	131	21
44LH12	315	160	25
52DLH10	319	196	23
48LH12	322	179	24
52DLH11	350	215	25
52DLH12	391	234	27
44LH14	425	215	31
56DLH13	467	304	30
52DLH13	475	284	32
44LH15	500	252	31
60DLH14	502	345	31
48LH15	521	287	36
52DLH14	543	317	37
60DLH15	589	407	34
56DLH15	604	383	38
60DLH16	648	455	39
52DLH16	657	397	44
48LH17	675	371	47
60DLH17	745	517	45
56DLH17	751	485	46
52DLH17	757	454	52
64DLH18	856	622	48
60DLH18	859	584	53

Joist	Allowable Loads (PLF)		Joist Weight
84' LENGTH (Cont.)			
68DLH19	962	746	54
85' LENGTH			
44LH9	211	108	18
44LH10	233	117	19
44LH11	252	127	21
44LH12	308	155	25
52DLH10	315	192	24
52DLH11	346	210	25
52DLH12	386	229	27
44LH14	415	207	31
56DLH13	462	297	30
52DLH13	469	277	32
44LH15	488	243	31
60DLH14	496	336	31
48LH15	510	278	36
52DLH14	536	310	37
60DLH15	582	397	34
56DLH15	596	374	38
60DLH16	640	444	39
56DLH16	644	416	41
52DLH16	650	388	45
48LH17	660	358	47
72DLH17	690	564	38
60DLH17	736	505	45
56DLH17	742	474	46
52DLH17	748	443	52
64DLH18	846	607	47
60DLH18	849	570	53
68DLH19	951	729	54
86' LENGTH			
44LH9	207	103	18
44LH10	228	113	19
44LH11	247	123	21
44LH12	300	149	25
52DLH10	312	187	24
52DLH11	342	205	26
52DLH12	382	223	27
44LH14	406	200	31
56DLH13	456	290	30
52DLH13	463	271	33
60DLH14	490	329	32
48LH15	499	269	36
52DLH14	530	302	37
60DLH15	575	388	36
56DLH15	589	365	38
52DLH15	595	341	41
68DLH16	626	488	37
64DLH16	628	461	38
60DLH16	633	434	40
56DLH16	636	407	41
52DLH16	642	379	45
48LH17	646	346	47
72DLH17	682	551	38
60DLH17	727	493	45
56DLH17	733	463	48
52DLH17	739	433	52
68DLH18	816	627	46
60DLH18	839	557	53
68DLH19	940	712	54
87' LENGTH			
44LH9	202	99	18
44LH10	223	110	19
44LH11	242	119	21
44LH12	293	144	25
52DLH10	308	183	24
52DLH11	338	200	26
52DLH12	377	218	27

Joist	Allowable Loads (PLF)		Joist Weight
87' LENGTH (Cont.)			
44LH14	396	193	31
48LH14	425	227	32
56DLH13	451	283	31
52DLH13	458	264	33
44LH15	466	227	31
60DLH14	485	321	32
48LH15	488	260	36
52DLH14	524	295	37
64DLH15	552	403	35
56DLH15	583	357	38
52DLH15	588	333	41
64DLH16	621	451	38
56DLH16	629	397	41
52DLH16	635	370	45
72DLH17	674	538	39
60DLH17	719	482	46
56DLH17	725	452	48
52DLH17	730	423	52
68DLH18	807	613	46
60DLH18	830	544	53
68DLH19	929	696	54
88' LENGTH			
44LH9	198	96	18
44LH10	218	106	19
44LH11	236	115	21
44LH12	287	139	25
52DLH10	305	179	23
52DLH11	334	196	26
52DLH12	373	213	27
44LH14	387	187	31
48LH14	416	220	32
56DLH13	446	277	31
52DLH13	453	258	33
44LH15	455	219	31
60DLH14	479	314	32
52DLH14	518	289	37
64DLH15	545	393	35
60DLH15	562	370	37
56DLH15	582	325	41
64DLH16	614	440	38
52DLH16	627	362	45
72DLH17	666	526	41
60DLH17	711	471	46
56DLH17	716	442	48
52DLH17	722	413	52
72DLH18	780	594	47
68DLH18	797	599	48
60DLH18	820	532	53
72DLH19	915	674	54
68DLH19	918	680	56
89' LENGTH			
48LH10	212	112	18
48LH11	229	120	20
52DLH10	301	175	23
52DLH11	330	191	26
52DLH12	369	209	28
48LH14	407	212	32
52DLH13	448	253	33
60DLH14	474	307	32
52DLH14	512	282	38
64DLH15	539	385	34
60DLH15	556	362	37
52DLH15	575	318	41
64DLH16	607	431	38
60DLH16	611	405	40
52DLH16	620	354	45
72DLH17	659	514	41
60DLH17	703	460	46
56DLH17	708	432	49

Joist	Allowable Loads (PLF)		Joist Weight
89' LENGTH (Cont.)			
52DLH17	714	404	52
72DLH18	771	581	47
68DLH18	788	586	48
60DLH18	811	520	53
72DLH19	905	659	54
68DLH19	908	665	55
90' LENGTH			
48LH10	208	108	18
48LH11	225	117	20
52DLH10	298	171	24
52DLH11	327	187	26
48LH13	338	175	29
52DLH12	365	204	29
48LH14	399	206	32
60DLH13	422	282	30
56DLH13	436	265	31
52DLH13	443	247	34
60DLH14	468	300	32
52DLH14	507	276	38
64DLH15	533	376	34
60DLH15	550	354	37
64DLH16	600	421	39
60DLH16	604	396	40
52DLH16	614	346	45
72DLH17	651	503	40
60DLH17	695	450	46
72DLH18	763	568	46
68DLH18	780	573	48
60DLH18	802	508	53
72DLH19	894	644	54
68DLH19	898	650	55
91' LENGTH			
48LH10	204	105	18
48LH11	220	113	20
52DLH10	291	165	24
52DLH11	320	181	26
48LH13	332	170	29
52DLH12	357	197	29
48LH14	390	199	32
60DLH13	417	276	30
52DLH13	433	239	33
48LH15	448	228	36
64DLH14	460	313	32
60DLH14	463	293	34
52DLH14	497	266	38
64DLH15	527	368	35
60DLH15	544	346	37
64DLH16	593	412	39
60DLH16	598	387	42
52DLH16	601	335	45
60DLH17	687	440	46
72DLH18	754	555	46
67DLH18	771	560	48
60DLH18	793	497	53
72DLH19	885	630	54
68DLH19	888	636	55
92' LENGTH			
48LH10	200	102	18
48LH11	216	110	20
52DLH10	285	159	24
52DLH11	313	174	26
48LH13	325	164	29
52DLH12	349	191	29
56DLH12	352	209	27
48LH14	383	193	32
60DLH13	412	270	30
52DLH13	424	231	33

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Combined K, VS, LH & DLH Series Load Table

Joist	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
92' LENGTH (Cont.)			
56DLH13	427	253	32
48LH15	439	221	36
60DLH14	458	287	34
52DLH14	486	258	38
64DLH15	521	360	35
60DLH15	538	339	38
52DLH15	545	291	42
56DLH15	551	319	41
60DLH16	591	379	42
56DLH16	595	355	45
60DLH17	680	431	46
72DLH18	746	543	46
68DLH18	763	548	48
60DLH18	784	486	53
68DLH19	878	622	55
93' LENGTH			
48LH10	196	99	18
48LH11	212	106	20
52DLH10	279	154	23
52DLH11	306	169	26
48LH13	318	159	29
52DLH12	342	185	29
56DLH12	349	204	27
48LH14	375	187	32
52DLH13	414	224	33
48LH15	430	214	36
60DLH14	453	281	34
52DLH14	476	249	38
56DLH14	477	277	37
60DLH15	532	332	38
52DLH15	533	282	42
56DLH15	545	312	41
68DLH16	578	417	38
60DLH16	585	371	42
56DLH16	588	348	45
64DLH17	669	448	46
60DLH17	672	421	49
56DLH17	678	395	51
68DLH18	754	536	48
64DLH18	773	507	53
60DLH18	776	476	56
68DLH19	869	609	54
94' LENGTH			
48LH10	192	96	18
48LH11	208	103	20
52DLH10	273	150	23
52DLH11	299	164	26
48LH13	312	154	29
52DLH12	334	179	29
56DLH12	345	200	27
48LH14	367	181	32
52DLH13	406	216	33
48LH15	422	208	36
60DLH14	448	275	34
52DLH14	466	242	37
52DLH14	472	271	37
60DLH15	526	325	38
56DLH15	539	306	41
68DLH16	572	408	38
60DLH16	579	363	41
56DLH16	582	340	45
72DLH17	623	461	42
60DLH17	665	412	49
56DLH17	670	387	51
72DLH18	730	520	47
60DLH18	768	466	55
72DLH19	856	590	55
68DLH19	859	596	58

Joist	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
95' LENGTH			
48LH10	188	93	18
48LH11	204	100	20
52DLH10	267	145	23
52DLH11	293	158	26
52DLH12	327	173	29
56DLH12	341	196	27
48LH14	360	176	32
52DLH13	397	209	33
60DLH13	399	253	31
48LH15	413	201	36
60DLH14	444	269	34
52DLH14	457	234	37
56DLH14	467	265	37
68DLH15	477	340	34
60DLH15	521	318	38
56DLH15	533	299	41
68DLH16	566	400	38
64DLH16	568	378	41
60DLH16	573	355	44
56DLH16	576	333	45
72DLH17	617	451	42
60DLH17	658	404	48
56DLH17	663	379	51
72DLH18	723	509	48
60DLH18	760	456	56
72DLH19	847	578	55
68DLH19	850	583	60
96' LENGTH			
48LH10	185	90	18
48LH11	200	91	20
52DLH10	261	140	24
52DLH11	287	153	26
48LH13	300	145	29
52DLH12	320	168	29
60DLH12	325	205	27
56DLH12	338	192	29
48LH14	353	171	32
52DLH13	389	203	33
60DLH13	395	248	32
48LH15	405	195	36
64DLH14	436	281	32
60DLH14	439	264	34
52DLH14	447	227	38
56DLH14	462	260	38
60DLH15	515	311	38
48LH17	525	252	47
64DLH16	562	370	41
60DLH16	567	348	44
56DLH16	570	326	45
72DLH17	610	442	42
64DLH17	648	421	46
60DLH17	651	395	49
56DLH17	656	371	51
72DLH18	715	499	48
64DLH18	748	476	53
60DLH18	752	447	57
72DLH19	838	566	55
68DLH19	841	571	60
97' LENGTH			
52DLH10	256	136	24
52DLH11	281	149	26
52DLH12	314	163	29
60DLH12	322	201	27
56DLH12	334	188	28
52DLH13	381	197	33
60DLH13	391	243	32
60DLH14	434	258	34
52DLH14	438	220	38
56DLH14	457	254	38

Joist Type	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
97' LENGTH (Cont.)			
64DLH15	494	324	37
60DLH15	510	305	40
72DLH16	537	380	38
64DLH16	557	362	42
60DLH16	561	341	44
72DLH17	604	433	42
64DLH17	641	412	46
56DLH17	650	363	51
72DLH18	708	488	48
64DLH18	741	466	53
60DLH18	744	437	59
72DLH19	830	554	55
68DLH19	833	559	60
98' LENGTH			
52DLH10	251	132	24
52DLH11	275	144	26
52DLH12	307	158	29
60DLH12	318	197	27
56DLH12	331	184	30
52DLH13	373	191	33
60DLH13	387	238	32
56DLH13	401	223	34
60DLH14	430	253	34
56DLH14	453	249	38
64DLH15	489	317	37
60DLH15	505	298	40
72DLH16	531	373	39
64DLH16	551	355	42
60DLH16	555	334	44
56DLH16	559	313	46
72DLH17	598	424	43
64DLH17	635	404	46
56DLH17	643	356	51
72DLH18	700	478	48
64DLH18	733	456	53
60DLH18	736	428	59
72DLH19	821	543	55
68DLH19	824	548	60
99' LENGTH			
52DLH10	246	128	24
52DLH11	270	140	26
52DLH12	301	153	29
60DLH12	315	193	27
56DLH12	324	178	29
52DLH13	366	185	33
60DLH13	383	233	33
56DLH13	394	216	33
60DLH14	426	248	34
56DLH14	444	242	38
64DLH15	484	311	37
60DLH15	500	292	40
64DLH16	545	348	42
60DLH16	549	327	44
72DLH17	592	415	43
64DLH17	628	395	46
56DLH17	630	345	51
72DLH18	693	469	48
64DLH18	726	447	53
60DLH18	729	420	59
72DLH19	813	532	58
68DLH19	816	537	61
100' LENGTH			
52DLH10	241	124	24
52DLH11	264	135	26
52DLH12	295	149	29
60DLH12	312	189	27
56DLH12	318	173	29

Joist Type	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
100' LENGTH (Cont.)			
52DLH13	358	180	33
60DLH13	379	228	32
56DLH13	386	209	33
52DLH14	413	201	37
60DLH14	421	243	35
56DLH14	435	234	38
64DLH15	480	304	37
60DLH15	495	287	41
72DLH16	521	358	39
60DLH16	544	320	45
72DLH17	586	407	44
64DLH17	622	388	49
72DLH18	686	459	48
64DLH18	718	438	55
60DLH18	721	411	59
72DLH19	805	521	58
68DLH19	808	526	61
101' LENGTH			
52DLH10	236	120	23
52DLH11	259	132	26
56DLH12	289	144	29
60DLH12	309	185	27
56DLH12	312	168	29
52DLH13	351	174	33
60DLH13	375	224	32
56DLH13	379	204	33
52DLH14	405	194	37
60DLH14	417	238	35
56DLH14	427	228	37
68DLH15	449	301	35
64DLH15	475	298	39
60DLH15	490	281	41
60DLH16	538	314	46
72DLH17	580	399	44
64DLH17	616	380	49
60DLH17	619	357	52
72DLH18	679	450	51
64DLH18	711	430	56
60DLH18	714	403	59
72DLH19	797	511	60
68DLH19	800	516	61
102' LENGTH			
52DLH10	231	116	23
52DLH11	254	128	26
52DLH12	284	140	29
56DLH12	306	163	29
52DLH13	344	170	33
64DLH13	358	232	31
60DLH13	372	219	34
52DLH14	397	189	37
60DLH14	413	233	35
56DLH14	419	221	38
68DLH15	445	295	35
64DLH15	470	292	39
60DLH15	485	275	41
60DLH16	533	308	46
72DLH17	574	391	45
64DLH17	610	372	49
60DLH17	613	350	52
72DLH18	673	442	51
60DLH18	707	395	59
72DLH19	789	501	60
68DLH19	792	506	61
103' LENGTH			
52DLH10	227	114	24
52DLH11	249	124	26
52DLH12	278	135	29

ECONOMICAL JOIST GUIDE
Combined K, VS, LH & DLH Series Load Table

Joist Type	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
103' LENGTH (Cont.)			
60DLH12	303	178	28
52DLH13	338	164	33
64DLH13	355	228	32
60DLH13	368	215	34
52DLH14	390	184	38
64DLH14	406	244	34
60DLH14	409	229	37
56DLH14	411	214	38
68DLH15	440	289	35
64DLH15	466	287	39
60DLH15	480	270	41
68DLH16	522	340	41
60DLH16	528	302	46
72DLH17	569	384	45
68DLH17	588	386	47
60DLH17	607	343	52
64DLH18	697	413	56
60DLH18	700	388	59
72DLH19	781	491	60
68DLH19	784	496	61
104' LENGTH			
52DLH10	223	110	24
52DLH11	244	120	26
52DLH12	273	132	29
56DLH12	295	153	30
60DLH12	300	175	29
52DLH13	331	159	33
64DLH13	351	224	32
56DLH13	358	186	34
60DLH13	365	211	34
52DLH14	382	178	38
64DLH14	402	239	34
60DLH14	405	224	37
64DLH15	461	281	39
60DLH15	476	265	43
72DLH16	501	331	40
68DLH16	517	333	41
60DLH16	523	296	46
72DLH17	563	376	45
68DLH17	583	379	46
60DLH17	601	337	52
72DLH18	660	425	53
68DLH18	674	428	53
60DLH18	694	380	59
68DLH19	777	486	61
105' LENGTH			
56DLH11	253	136	26
56DLH12	289	150	29
60DLH12	297	171	29
64DLH13	348	219	32
56DLH13	351	181	34
60DLH13	361	207	34
64DLH14	398	235	34
60DLH14	401	220	37
68DLH15	432	278	37
64DLH15	457	276	40
60DLH15	471	260	43
72DLH16	496	324	40
68DLH16	512	327	42
60DLH16	518	290	45
68DLH17	577	372	46
60DLH17	595	330	52
68DLH18	668	420	53
60DLH18	687	373	59
68DLH19	769	477	61
106' LENGTH			
56DLH11	248	133	26
56DLH12	284	145	29
60DLH12	295	168	29
56DLH13	344	175	34
60DLH13	358	203	34
64DLH14	395	230	34
60DLH14	398	216	37
68DLH15	428	273	37
64DLH15	452	271	40
60DLH15	467	255	43
72DLH16	491	318	41
64DLH16	509	303	45
60DLH16	513	285	46
68DLH17	572	365	46
60DLH17	590	324	52
68DLH18	662	412	53
60DLH18	681	366	59
68DLH19	762	468	60
107' LENGTH			
56DLH11	244	129	36
56DLH12	278	141	29
60DLH12	289	163	29
60DLH13	351	197	34
64DLH14	391	226	34
68DLH15	424	268	38
64DLH15	448	266	40
60DLH15	458	248	43
72DLH16	487	312	41
64DLH16	504	298	46
72DLH17	548	355	46
68DLH17	566	358	49
60DLH17	579	315	52
64DLH17	581	338	52
68DLH18	655	405	53
60DLH18	668	357	59
64DLH18	671	383	59
68DLH19	755	459	61
108' LENGTH			
56DLH11	239	125	26
56DLH12	273	137	29
60DLH12	284	158	29
60DLH13	345	191	34
60DLH14	383	205	37
64DLH14	387	222	36
72DLH15	417	260	36
68DLH15	420	263	38
64DLH15	444	261	40
60DLH15	450	242	43
72DLH16	482	307	41
64DLH16	500	292	46
72DLH17	542	349	46
60DLH17	569	306	52
64DLH17	576	332	52
60DLH18	656	346	59
64DLH18	665	376	59
72DLH19	745	447	61
68DLH19	748	451	61
109' LENGTH			
56DLH11	235	122	26
56DLH12	268	133	29
60DLH12	279	154	29
56DLH13	325	161	33
60DLH13	339	187	34
60DLH14	376	199	37
64DLH14	384	218	37
72DLH15	413	255	36
68DLH15	416	258	38
64DLH15	440	256	41
60DLH15	442	235	43
72DLH16	478	301	41
64DLH16	495	287	46
72DLH17	537	342	47
60DLH17	558	298	52
64DLH17	571	326	52
60DLH18	644	337	59
64DLH18	659	369	59
72DLH19	738	439	61
68DLH19	741	443	67
110' LENGTH			
56DLH11	231	118	26
60DLH12	274	150	29
60DLH13	333	181	34
60DLH14	370	193	37
64DLH14	380	214	37
72DLH15	409	251	36
68DLH15	412	254	38
60DLH15	434	228	43
64DLH15	436	251	41
72DLH16	473	295	41
60DLH16	476	255	46
64DLH16	491	281	46
72DLH17	533	336	47
60DLH17	548	290	52
68DLH17	551	338	49
64DLH17	565	320	52
60DLH18	632	327	59
68DLH18	637	383	56
64DLH18	653	362	59
72DLH19	731	431	61
68DLH19	734	434	67
111' LENGTH			
56DLH11	227	115	26
56DLH12	259	126	30
60DLH12	270	146	29
64DLH12	271	161	28
56DLH13	314	152	34
60DLH13	327	176	34
64DLH13	329	196	33
60DLH14	363	189	37
64DLH14	377	210	37
68DLH15	408	249	38
64DLH15	432	247	41
56DLH16	436	214	46
64DLH16	486	276	46
72DLH17	528	330	47
68DLH17	546	332	49
64DLH17	560	314	52
72DLH18	618	373	53
60DLH18	621	319	59
64DLH18	647	356	59
72DLH19	725	423	61
68DLH19	727	427	67
112' LENGTH			
56DLH11	223	113	26
56DLH12	254	123	29
60DLH12	265	142	29
64DLH12	269	159	29
56DLH13	308	149	33
60DLH13	322	171	34
64DLH13	326	193	34
60DLH14	356	183	37
64DLH14	373	206	37
68DLH15	405	245	38
64DLH15	428	242	41
64DLH16	482	271	46
72DLH17	523	324	47
64DLH17	555	309	52
72DLH18	613	366	53
64DLH18	641	349	59
72DLH19	718	415	61
68DLH19	721	419	67
113' LENGTH			
60DLH12	261	138	29
64DLH12	266	156	29
60DLH13	316	167	34
64DLH13	323	189	34
60DLH14	350	178	37
64DLH14	370	203	37
68DLH15	401	240	39
64DLH15	424	238	41
60DLH16	451	235	46
72DLH16	461	280	43
68DLH16	476	282	45
72DLH17	518	318	47
60DLH17	519	267	52
64DLH17	550	303	52
72DLH18	607	360	53
64DLH18	636	343	59
72DLH19	712	408	62
68DLH19	714	412	67
114' LENGTH			
60DLH12	256	134	29
64DLH12	264	153	29
60DLH13	311	163	34
64DLH13	321	186	34
60DLH14	344	173	37
64DLH14	367	199	37
68DLH15	398	236	39
60DLH15	405	205	43
64DLH15	421	234	43
60DLH16	444	228	46
72DLH16	457	275	43
68DLH16	472	277	46
64DLH16	474	262	46
72DLH17	514	313	50
64DLH17	546	298	52
60DLH18	589	394	59
64DLH18	630	337	59
72DLH19	706	401	64
68DLH19	708	404	67
115' LENGTH			
60DLH12	252	131	29
64DLH12	259	150	29
60DLH13	306	158	34
64DLH13	315	181	34
60DLH14	338	170	37
64DLH14	360	193	37
68DLH15	394	232	39
60DLH15	398	200	43
64DLH15	414	228	43
72DLH16	453	270	43
68DLH16	467	272	46
72DLH17	509	307	50
64DLH17	536	290	52
60DLH18	578	286	59
72DLH18	597	347	54
64DLH18	619	328	59
68DLH19	702	397	66
116' LENGTH			
60DLH12	248	128	29

ECONOMICAL JOIST GUIDE
Combined K, VS, LH & DLH Series Load Table

Joist Type	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
116' LENGTH (Cont.)			
64DLH12	255	146	29
60DLH13	301	154	34
64DLH13	310	176	34
60DLH14	332	165	37
64DLH14	354	189	37
68DLH15	391	228	39
60DLH15	392	194	43
64DLH15	407	223	43
60DLH16	428	217	46
68DLH16	463	268	46
60DLH17	493	247	52
72DLH17	505	302	50
64DLH17	527	283	52
60DLH18	568	279	59
64DLH18	608	320	59
68DLH19	696	391	66
117' LENGTH			
60DLH12	244	124	29
64DLH12	251	142	29
60DLH13	296	151	34
64DLH13	305	171	34
60DLH14	327	161	37
64DLH14	349	184	37
72DLH15	385	222	38
68DLH15	387	224	41
64DLH15	400	217	43
60DLH16	421	211	46
64DLH16	450	242	46
68DLH16	459	263	46
60DLH17	484	241	52
72DLH17	501	297	50
64DLH17	518	275	52
60DLH18	559	272	59
64DLH18	598	311	59
68DLH18	599	388	60
72DLH19	687	381	67
68DLH19	690	384	67
118' LENGTH			
60DLH12	240	121	29
64DLH12	247	138	29
60DLH13	291	147	34
60DLH14	321	156	37
64DLH14	343	179	37
72DLH15	382	218	38
68DLH15	384	220	41
64DLH15	394	211	43
60DLH16	414	206	46
72DLH16	441	257	45
68DLH16	456	259	46
72DLH17	496	292	50
64DLH17	509	268	52
68DLH17	513	294	53
60DLH18	549	266	59
64DLH18	587	304	59
68DLH18	594	333	60
72DLH19	682	374	67
68DLH19	684	377	67
119' LENGTH			
60DLH12	236	118	29
64DLH12	243	135	29
60DLH13	286	143	34
64DLH13	295	163	34
60DLH14	316	152	37
64DLH14	337	174	37
68DLH14	340	193	38
72DLH15	378	214	38
68DLH15	381	217	40

Joist Type	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
119' LENGTH (Cont.)			
64DLH15	387	206	43
60DLH16	407	201	46
72DLH16	437	252	45
68DLH16	452	254	46
72DLH17	492	287	49
64DLH17	501	262	52
68DLH17	509	289	53
60DLH18	540	259	59
64DLH18	578	296	59
68DLH18	589	327	60
72DLH19	676	368	67
68DLH19	678	371	67
120' LENGTH			
60DLH12	232	115	29
64DLH12	239	132	29
60DLH13	282	139	34
64DLH13	291	159	34
60DLH14	310	149	37
64DLH14	332	171	37
68DLH14	337	190	38
72DLH15	375	211	38
68DLH15	378	213	40
64DLH15	381	201	43
60DLH16	400	196	46
72DLH16	434	248	45
68DLH16	448	250	46
72DLH17	488	282	49
64DLH17	492	255	52
68DLH17	505	284	53
60DLH18	531	252	59
64DLH18	568	288	59
68DLH18	584	321	60
68DLH19	673	365	67
121' LENGTH			
64DLH12	235	129	29
64DLH13	286	155	34
64DLH14	326	166	37
68DLH14	334	187	38
72DLH15	372	207	40
68DLH15	375	209	40
72DLH16	430	244	45
68DLH16	444	246	49
72DLH17	484	278	49
68DLH17	501	280	53
64DLH18	559	282	59
68DLH18	579	316	60
68DLH19	667	359	67
122' LENGTH			
64DLH12	231	125	29
64DLH13	281	152	34
68DLH13	288	171	35
64DLH14	321	162	37
68DLH14	332	185	38
72DLH15	369	204	40
68DLH15	372	206	42
72DLH16	427	240	45
68DLH16	441	242	49
64DLH17	476	243	52
68DLH17	497	275	53
64DLH18	549	274	59
68DLH18	575	311	60
72DLH19	659	350	67
68DLH19	662	353	67
123' LENGTH			
64DLH12	228	122	29

Joist Type	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
123' LENGTH (Cont.)			
64DLH13	277	148	34
68DLH13	284	168	35
64DLH14	316	158	37
68DLH14	327	179	38
68DLH15	365	201	42
72DLH15	366	200	41
72DLH16	423	236	45
68DLH16	433	236	49
64DLH17	468	237	52
68DLH17	489	268	53
64DLH18	540	267	59
68DLH18	566	304	60
72DLH19	654	344	67
124' LENGTH			
64DLH12	224	119	29
64DLH13	273	144	34
68DLH13	279	164	35
64DLH14	311	154	37
68DLH14	322	175	38
68DLH15	360	196	42
72DLH15	363	197	41
64DLH16	401	203	46
72DLH16	420	232	47
68DLH16	427	230	49
64DLH17	461	231	52
68DLH17	481	262	53
64DLH18	532	261	59
68DLH18	557	297	60
72DLH19	649	339	68
125' LENGTH			
64DLH12	221	216	29
64DLH13	269	141	34
64DLH14	306	151	37
68DLH14	317	171	38
68DLH15	354	191	41
72DLH15	360	194	41
64DLH16	394	198	46
72DLH16	416	229	47
68DLH16	420	225	49
64DLH17	454	226	52
68DLH17	474	256	53
64DLH18	523	255	59
68DLH18	549	289	60
72DLH19	643	333	67
126' LENGTH			
64DLH12	218	114	29
64DLH13	264	131	34
64DLH14	301	147	37
68DLH14	312	167	38
72DLH15	357	191	41
64DLH16	388	193	46
72DLH16	413	225	47
64DLH17	446	220	52
68DLH17	467	249	53
64DLH18	515	249	59
68DLH18	540	283	60
72DLH18	544	289	59
72DLH19	638	328	67
127' LENGTH			
64DLH12	214	111	29
64DLH13	260	134	34
64DLH14	296	143	37
68DLH14	308	163	38
72DLH14	309	168	37
68DLH15	343	182	41

Joist Type	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
127' LENGTH (Cont.)			
72DLH15	354	188	41
64DLH16	382	189	46
72DLH16	410	221	47
64DLH17	439	215	52
72DLH17	461	252	53
64DLH18	507	243	59
68DLH18	532	276	60
72DLH18	540	284	59
72DLH19	633	323	67
128' LENGTH			
64DLH12	211	109	29
64DLH13	257	131	34
64DLH14	292	140	37
68DLH14	303	159	38
72DLH14	307	166	37
68DLH15	337	178	41
72DLH15	352	185	41
64DLH16	376	185	46
72DLH16	407	218	47
64DLH17	432	210	52
68DLH17	453	238	53
72DLH17	457	248	53
64DLH18	499	237	59
68DLH18	524	269	60
72DLH18	536	280	59
68DLH19	601	305	67
72DLH19	628	318	67
129' LENGTH			
68DLH13	259	145	35
68DLH14	299	155	38
72DLH14	305	163	38
72DLH15	349	182	41
72DLH16	403	215	49
68DLH17	446	232	53
72DLH17	454	244	53
68DLH18	516	263	60
72DLH18	532	276	59
72DLH19	623	313	67
130' LENGTH			
68DLH13	255	142	35
68DLH14	294	152	38
72DLH14	303	171	38
72DLH15	347	191	41
72DLH16	401	225	49
68DLH17	439	228	55
72DLH17	451	256	56
68DLH18	508	257	60
72DLH18	528	289	59
68DLH19	583	291	67
72DLH19	619	328	70
131' LENGTH			
68DLH13	252	138	35
68DLH14	290	148	38
72DLH14	298	167	38
68DLH15	322	166	41
72DLH15	342	187	43
72DLH16	395	219	49
68DLH17	433	222	53
72DLH17	445	250	53
68DLH18	501	251	59
72DLH18	520	283	59
68DLH19	574	285	67
72DLH19	609	321	70

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Combined K, VS, LH & DLH Series Load Table

Joist Type	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
132' LENGTH			
68DLH13	248	135	35
68DLH14	286	145	38
72DLH14	294	163	38
68DLH15	317	162	41
72DLH15	336	183	43
68DLH16	376	190	49
72DLH16	390	214	49
68DLH17	427	217	53
72DLH17	438	245	56
68DLH18	493	246	59
72DLH18	512	276	59
68DLH19	565	278	67
72DLH19	600	313	70
133' LENGTH			
68DLH13	244	133	35
68DLH14	281	141	38
72DLH14	290	159	38
68DLH15	312	158	41
72DLH15	331	178	41
68DLH16	371	186	49
72DLH16	384	209	49
68DLH17	420	212	53
72DLH17	432	239	56
68DLH18	486	240	59
72DLH18	505	270	59
68DLH19	557	272	67
72DLH19	591	306	70
134' LENGTH			
68DLH13	241	130	35
68DLH14	277	138	38
72DLH14	285	155	38
68DLH15	308	155	41
72DLH15	326	174	41
68DLH16	365	182	49
72DLH16	378	205	49
72DLH17	426	233	53
68DLH18	479	234	60
72DLH18	497	265	59
68DLH19	548	266	67
72DLH19	582	300	70
135' LENGTH			
68DLH13	237	127	35
68DLH14	273	135	38
72DLH14	281	152	38
68DLH15	303	152	42
72DLH15	322	171	42
68DLH16	360	178	49
72DLH16	373	200	49
68DLH17	408	203	53
72DLH17	420	228	53
68DLH18	472	230	60
72DLH18	490	258	59
68DLH19	540	260	67
72DLH19	573	293	70
136' LENGTH			
68DLH13	234	124	35
68DLH14	269	133	38
72DLH14	277	149	38
68DLH15	299	148	41
72DLH15	317	167	42
68DLH16	354	174	49
72DLH16	368	196	49
68DLH17	403	198	53
72DLH17	414	224	56
68DLH18	465	225	60

Joist Type	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
136' LENGTH (Cont.)			
72DLH18	483	252	59
68DLH19	532	254	67
72DLH19	565	286	70
137' LENGTH			
72DLH14	274	146	38
72DLH15	312	163	41
72DLH16	363	191	49
72DLH17	408	218	53
72DLH18	479	247	59
72DLH19	557	280	70
138' LENGTH			
72DLH14	270	143	38
72DLH15	308	160	42
72DLH16	358	188	49
72DLH17	402	213	53
72DLH18	470	242	59
72DLH19	549	274	70
139' LENGTH			
72DLH14	266	139	38
72DLH15	303	156	41
72DLH16	353	183	49
72DLH17	397	209	53
72DLH18	463	236	59
72DLH19	541	541	70
140' LENGTH			
72DLH14	262	136	38
72DLH15	299	152	41
72DLH16	348	179	49
72DLH17	391	205	53
72DLH18	457	231	59
72DLH19	533	263	70
141' LENGTH			
72DLH14	259	133	38
72DLH15	295	150	42
72DLH16	343	175	49
72DLH17	386	200	53
72DLH18	450	227	59
72DLH19	526	257	70
142' LENGTH			
72DLH14	255	131	38
72DLH15	291	147	42
72DLH16	338	171	49
72DLH17	381	196	53
72DLH18	444	222	59
72DLH19	518	251	70
143' LENGTH			
72DLH14	252	128	38
72DLH15	286	143	41
72DLH16	334	169	49
72DLH17	376	191	53
72DLH18	438	217	59
72DLH19	511	247	70
144' LENGTH			
72DLH14	248	125	38
72DLH15	282	140	41
72DLH16	329	165	49
72DLH17	371	188	53

Joist Type	Allowable Loads (PLF) Total	Live	Joist Weight (lbs./ft.)
144' LENGTH (Cont.)			
72DLH18	432	212	59
72DLH19	504	241	70

CODE OF STANDARD PRACTICE FOR STEEL JOISTS AND JOIST GIRDERS

Adopted by the Steel Joist Institute April 7, 1931
Revised to May 1, 2000 - Effective May 03, 2005

SECTION 1. GENERAL

1.1 SCOPE

The practices and customs set forth herein are in accordance with good engineering practice, tend to ensure safety in steel joist and Joist Girder construction, and are standard within the industry. There shall be no conflict between this code and any legal building regulation. This code shall only supplement and amplify such laws. Unless specific provisions to the contrary are made in a contract for the purchase of steel joists or Joist Girders, this code is understood to govern the interpretation of such a contract.

1.2 APPLICATION

This Code of Standard Practice is to govern as a standard unless otherwise covered in the architects' and engineers' plans and specifications.

1.3 DEFINITIONS

Material. Steel joists, Joist Girders, and accessories as provided by the seller.

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

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

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

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

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.

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.

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 the steel 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.

1.4 DESIGN

In the absence of ordinances or specifications to the contrary, all designs prepared by the **specifying professional** shall be in accordance with the Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption.

1.5 RESPONSIBILITY FOR DESIGN AND ERECTION

When Material requirements are specified, the Seller shall assume no responsibility other than to furnish the items listed in Section 5.2 (a). When Material requirements are not specified, the Seller shall furnish the items listed in Section 5.2 (a) in accordance with Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption, and this code. Pertinent design information shall be provided to the Seller as stipulated in Section 6.1. The Seller shall identify material by showing size and type. In no case shall the Seller assume any responsibility for the erection of the item furnished.

1.6 PERFORMANCE TEST FOR K-SERIES STEEL JOIST CONSTRUCTION

When performance tests on a structure are required, joists in the test panel shall have bridging and top deck applied as used. In addition to the full dead load, the test panel shall sustain for one hour a test load of 1.65 times the nominal live load. After this test load has been removed for a minimum of 30 minutes, the remaining deflection shall not exceed 20% of the deflection caused by the test load. The weight of the test panel itself shall constitute the dead load of the construction and shall include the weight of the joists, bridging, top deck, slab, ceiling materials, etc. The nominal live load shall be the live load specified and in no case shall it be more than the published joist capacity less the dead load. The cost of such tests shall be borne by the purchaser.

SECTION 2. JOISTS AND ACCESSORIES

2.1 STEEL JOISTS AND JOIST GIRDERS

Steel joists and Joist Girders shall carry the designations and meet the requirements of the Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption.

K-Series joists are furnished with parallel chords only, and with minimum standard end bearing depth of 2 1/2 inches (64 mm).

LH- and **DLH-**Series joists are furnished either underslung or square ended, with top chords either parallel, pitched one way or pitched two ways. Underslung types are furnished with standard end bearing depth of 5 inches (127 mm) for

LH-Series. **DLH-**Series are furnished with standard end bearing depths of 5 inches (127 mm) for section numbers thru 17 and 7 1/2 inches (191 mm) for section numbers 18 and 19. The standard pitch is 1/8 inch in 12 inches (1:96). The nominal depth of a pitched Longspan Joist is taken at the center of the span.

Joist Girders are furnished either underslung or square ended with top chords either parallel, pitched one way or pitched two ways. Underslung types are furnished with a standard end bearing depth of 7 1/2 inches (191 mm). The standard pitch is 1/8 inch in 12 inches (1:96). The nominal depth of a pitched Joist Girder is taken at the center of the span.

Because **LH-** and **DLH-**Series joists may have exceptionally high end reactions, it is recommended that the supporting structure be designed to provide a nominal minimum unit bearing pressure of 750 pounds per square inch (5171 kilo Pascal).

2.2 JOIST LOCATION AND SPACING

The maximum joist spacing shall be in accordance with the requirements of the Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption.

Where sidewalls, wall beams or tie beams are capable of supporting the floor slab or roof deck, the first adjacent joists may be placed one full space from these members. Joists are provided with camber and may have a significant difference in elevation with respect to the adjacent structure because of this camber. This difference in elevation should be given consideration when locating the first joist adjacent to a side wall, wall beam or tie beam.

Open Web Steel Joists, **K-**Series, should be placed no closer than 6 inches (152 mm) to supporting walls or members. Where partitions occur parallel to joists, there shall be at least one joist provided under each such partition, and more than one such joist shall be provided if necessary to safely support the weight of such partition and the adjacent floor, less the live load, on a strip of floor one foot (305 mm) in width. When partitions occur perpendicular to the joists, they shall be treated as concentrated loads, and joists shall be investigated as indicated in Section 6.1.

2.3 SLOPED END BEARINGS

Where steel joists or Joist Girders are sloped, beveled ends or sloped end bearings may be provided where the slope exceeds 1/4 inch in 12 inches (1:48). When sloped end bearings are required, the seat depths shall be adjusted to maintain the standard height at the shallow end of the sloped bearing. For Open Web Steel Joists, **K-**Series, bearing ends will not be beveled for slopes of 1/4 inch or less in 12 inches (1:48).

2.4 EXTENDED ENDS

Steel joist extended ends shall be in accordance with Manufacturer's Standard and shall meet the requirements of — See page 37.

2.5 CEILING EXTENSIONS

Ceiling extensions shall be furnished to support ceilings which are to be attached to the bottom of the joists. They are not furnished for the support of suspended ceilings. The ceiling extension shall be either an extended bottom chord element or a loose unit, whichever is standard with the manufacturer, and shall be of sufficient strength to properly support the ceiling.

TABLE 2.6-1a
K-SERIES JOISTS
MAXIMUM JOIST SPACING FOR HORIZONTAL BRIDGING

	**BRIDGING MATERIAL SIZE						
	Round Rod	**Equal Leg Angles**					
SECTION NUMBER*	1/2" round (13 mm) r = 0.13" (3.30 mm)	1 x 7/64 (25 mm x 3 mm) r = 0.20" (5.08 mm)	1-1/4 x 7/64 (32 mm x 3 mm) r = 0.25" (6.35 mm)	1-1/2 x 7/64 (38 mm x 3 mm) r = 0.30" (7.62 mm)	1-3/4 x 7/64 (45 mm x 3 mm) r = 0.35" (8.89 mm)	2 x 1/8 (52 mm x 3 mm) r = 0.40" (10.16 mm)	2-1/2 x 5/32 (64 mm x 4 mm) r = 0.50" (12.70 mm)
1 – 9	3'- 3" (991 mm)	5'- 0" (1524 mm)	6'- 3" (1905 mm)	7'- 6" (2286 mm)	8'- 7" (2616 mm)	10'- 0" (3048 mm)	12'- 6" (3810 mm)
10	3'- 0" (914 mm)	4'- 8" (1422 mm)	6'- 3" (1905 mm)	7'- 6" (2286 mm)	8'- 7" (2616 mm)	10'- 0" (3048 mm)	12'- 6" (3810 mm)
11–12	2'- 7" (787 mm)	4'- 0" (1219 mm)	5'- 8" (1727 mm)	7'- 6" (2286 mm)	8'- 7" (2616 mm)	10'- 0" (3048 mm)	12'- 6" (3810 mm)

* Refer to last digit(s) of Joist Designation

* * Connection to Joist must resist a nominal unfactored 700 pound force (3114 N)

TABLE 2.6-1b
LH-SERIES JOISTS
MAXIMUM JOIST SPACING FOR HORIZONTAL BRIDGING
SPANS OVER 60 ft. (18.3 m) REQUIRE BOLTED DIAGONAL BRIDGING

SECTION NUMBER*	**BRIDGING ANGLE SIZE – (EQUAL LEG ANGLE)					
	1 x 7/64 (25 mm x 3 mm) r = 0.20" (5.08 mm)	1-1/4 x 7/64 (32 mm x 3 mm) r = 0.25" (6.35 mm)	1-1/2 x 7/64 (38 mm x 3 mm) r = 0.30" (7.62 mm)	1-3/4 x 7/64 (45 mm x 3 mm) r = 0.35" (8.89 mm)	2 x 1/8 (52 mm x 3 mm) r = 0.40" (10.16 mm)	2-1/2 x 5/32 (64 mm x 4 mm) r = 0.50" (12.70 mm)
02, 03, 04	4' – 7" (1397 mm)	6' – 3" (1905 mm)	7' – 6" (2286 mm)	8' – 9" (2667 mm)	10' – 0" (3048 mm)	12' – 4" (3759 mm)
05 – 06	4' – 1" (1245 mm)	5' – 9" (1753 mm)	7' – 6" (2286 mm)	8' – 9" (2667 mm)	10' – 0" (3048 mm)	12' – 4" (3759 mm)
07 – 08	3' – 9" (1143 mm)	5' – 1" (1549 mm)	6' – 8" (2032 mm)	8' – 6" (2590 mm)	10' – 0" (3048 mm)	12' – 4" (3759 mm)
09 – 10		4' – 6" (1372 mm)	6' – 0" (1829 mm)	7' – 8" (2337 mm)	10' – 0" (3048 mm)	12' – 4" (3759 mm)
11 – 12		4' – 1" (1245 mm)	5' – 5" (1651 mm)	6' – 10" (2083 mm)	8' – 11" (2718 mm)	12' – 4" (3759 mm)
13 – 14		3' – 9" (1143 mm)	4' – 11" (1499 mm)	6' – 3" (1905 mm)	8' – 2" (2489 mm)	12' – 4" (3759 mm)
15 – 16			4' – 3" (1295 mm)	5' – 5" (1651 mm)	7' – 1" (2159 mm)	11' – 0" (3353 mm)
17			4' – 0" (1219 mm)	5' – 1" (1549 mm)	6' – 8" (2032 mm)	10' – 5" (3175 mm)

* Refer to last two digits of Joist Designation

** Connection to Joist must resist force listed in Table 104.5-1

2.6 BRIDGING AND BRIDGING ANCHORS

(a) Bridging standard with the manufacturer and complying with the Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption shall be used for bridging all joists furnished by the manufacturer. Positive anchorage shall be provided at the ends of each bridging row at both top and bottom chords.

(b) For **K-** and **LH-**Series Joists horizontal bridging is recommended for spans up to and including 60 feet (18.3 m) except where the Steel Joist Institute Standard Specifications Load Tables & Weight Tables require bolted diagonal bridging for erection stability.

LH- and **DLH-**Series Joists exceeding 60 feet (18.3 m) in length shall have bolted diagonal bridging for all rows.

Refer to Section 6 in the **K-**Series Specifications and Section 105 in the **LH-** and **DLH-**Series Specifications for erection stability requirements.

Refer to page 150 for OSHA steel joist erection stability requirements.

Horizontal bridging shall consist of continuous horizontal steel members. The ℓ/r ratio for horizontal bridging shall not exceed 300. The material sizes shown in Tables 2.6-1a and 2.6-1b meet the criteria.

(c) Diagonal cross bridging consisting of angles or other shapes connected to the top and bottom chords, of **K-**, **LH-** and **DLH-**Series Joists shall be used when required by the applicable Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption.

Diagonal bridging, when used, shall have an ℓ/r ratio not exceeding 200.

When the bridging members are connected at their point of intersection, the material sizes listed in Table 2.6-2 will meet the above specification.

(d) When bolted diagonal erection bridging is required, the following shall apply:

1. The bridging shall be indicated on the joist placement plan.
2. The joist placement plan shall be the exclusive indicator for the proper placement of this bridging.
3. Shop installed bridging clips, or functional equivalents, shall be provided where the bridging bolts to the steel joist.
4. When two pieces of bridging are attached to the steel joist by a common bolt, the nut that secures the first piece of bridging shall not be removed from the bolt for the attachment of the second piece.
5. Bridging attachments shall not protrude above the top chord of the steel joists.

TABLE 2.6-2
K, LH AND DLH SERIES JOISTS
MAXIMUM JOIST SPACING FOR DIAGONAL BRIDGING

JOIST DEPTH	**BRIDGING ANGLE SIZE – (EQUAL LEG ANGLE)				
	1 x 7/64 (25 mm x 3 mm) r = 0.20" (5.08 mm)	1-1/4 x 7/64 (32 mm x 3 mm) r = 0.25" (6.35 mm)	1-1/2 x 7/64 (38 mm x 3 mm) r = 0.30" (7.62 mm)	1-3/4 x 7/64 (45 mm x 3 mm) r = 0.35" (8.89 mm)	2 x 1/8 (50 mm x 3 mm) r = 0.40" (10.16 mm)
12" (305 mm)	6' – 6" (1981 mm)	8' – 3" (2514 mm)	9' – 11" (3022 mm)	11' – 7" (3530 mm)	
14" (356 mm)	6' – 6" (1981 mm)	8' – 3" (2514 mm)	9' – 11" (3022 mm)	11' – 7" (3530 mm)	
16" (406 mm)	6' – 6" (1981 mm)	8' – 2" (2489 mm)	9' – 10" (2997 mm)	11' – 6" (3505 mm)	
18" (457 mm)	6' – 6" (1981 mm)	8' – 2" (2489 mm)	9' – 10" (2997 mm)	11' – 6" (3505 mm)	
20" (508 mm)	6' – 5" (1955 mm)	8' – 2" (2489 mm)	9' – 10" (2997 mm)	11' – 6" (3505 mm)	
22" (559 mm)	6' – 4" (1930 mm)	8' – 1" (2463 mm)	9' – 10" (2997 mm)	11' – 6" (3505 mm)	
24" (610 mm)	6' – 4" (1930 mm)	8' – 1" (2463 mm)	9' – 9" (2971 mm)	11' – 5" (3479 mm)	
26" (660 mm)	6' – 3" (1905 mm)	8' – 0" (2438 mm)	9' – 9" (2971 mm)	11' – 5" (3479 mm)	
28" (711 mm)	6' – 2" (1879 mm)	8' – 0" (2438 mm)	9' – 8" (2946 mm)	11' – 5" (3479 mm)	
30" (762 mm)	6' – 2" (1879 mm)	7' – 11" (2413 mm)	9' – 8" (2946 mm)	11' – 4" (3454 mm)	
32" (813 mm)	6' – 1" (1854 mm)	7' – 10" (2387 mm)	9' – 7" (2921 mm)	11' – 4" (3454 mm)	13' – 0" (3962 mm)
36" (914 mm)		7' – 9" (2362 mm)	9' – 6" (2895 mm)	11' – 3" (3429 mm)	12' – 11" (3973 mm)
40" (1016 mm)		7' – 7" (2311 mm)	9' – 5" (2870 mm)	11' – 2" (3403 mm)	12' – 10" (3911 mm)
44" (1118 mm)		7' – 5" (2260 mm)	9' – 3" (2819 mm)	11' – 0" (3352 mm)	12' – 9" (3886 mm)
48" (1219 mm)		7' – 3" (2209 mm)	9' – 2" (2794 mm)	10' – 11" (3327 mm)	12' – 8" (3860 mm)
52" (1321 mm)			9' – 0" (2743 mm)	10' – 9" (3276 mm)	12' – 7" (3835 mm)
56" (1422 mm)			8' – 10" (2692 mm)	10' – 8" (3251 mm)	12' – 5" (3784 mm)
60" (1524 mm)			8' – 7" (2616 mm)	10' – 6" (3200 mm)	12' – 4" (3759 mm)
64" (1626 mm)			8' – 5" (2565 mm)	10' – 4" (3149 mm)	12' – 2" (3708 mm)
68" (1727 mm)			8' – 2" (2489 mm)	10' – 2" (3098 mm)	12' – 0" (3657 mm)
72" (1829 mm)			8' – 0" (2438 mm)	10' – 0" (3048 mm)	11' – 10" (3606 mm)

MINIMUM A307 BOLT REQUIRED FOR CONNECTION

SERIES	*SECTION NUMBER	BOLT DIAMETER
K	ALL	3/8" (10 mm)
LH, DLH	2 - 12	3/8" (10 mm)
LH, DLH	13 - 17	1/2" (13 mm)
DLH	18 and 19	5/8" (16 mm)

*Refer to last digit(s) of Joist Designation

2.7 HEADERS

Headers for Open Web Steel Joists, **K-**Series as outlined and defined in Section 5.2 (a) shall be furnished by the Seller. Such headers shall be any type standard with the manufacturer. Conditions involving headers shall be investigated and, if necessary, provisions made to provide a safe condition. Headers are not provided for Longspan Steel Joists, **LH-**Series, and Deep Longspan Steel Joists, **DLH-**Series.

2.8 BOTTOM CHORD LATERAL BRACING FOR JOIST GIRDERS

Bottom chord lateral bracing may be furnished to prevent lateral movement of the bottom chord of the Joist Girder and to prevent the ratio of chord length to chord radius of gyration from exceeding that specified in the Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption. The lateral bracing shall be that which is standard with the manufacturer, and shall be sufficient to properly brace the bottom chord of the Joist Girder.

SECTION 3.
MATERIALS

3.1 STEEL

The steel used in the manufacture of joists and Joist Girders shall comply with the Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption.

3.2 PAINT

(a) Standard Shop Paint - The shop coat of paint, when specified, shall comply with the Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption.

(b) Disclaimer - The typical shop applied paint that is used to coat steel joists and Joist Girders is a dip applied, air dried paint. The paint is intended to be an impermanent and provisional coating which will protect the steel for only a short period of exposure in ordinary atmospheric conditions.

Since most steel joists and Joist Girders are painted using a standard dip coating, the coating may not be uniform and may include drips, runs, and sags. Compatibility of any coating including fire protective coatings applied over a standard shop paint shall be the responsibility of the specifier and/or painting contractor.

The shop applied paint may require field touch-up/repair as a result of, but not limited to, the following:

1. Abrasions from: Bundling, banding, loading and unloading, chains, dunnage during shipping, cables and chains during erection, bridging, installation, and other handling at the jobsite.

   NOTE: Rusting should be expected at any abrasion.
2. Dirt.
3. Diesel smoke.
4. Road salt.
5. Weather conditions during storage.

The joist manufacturer shall not be responsible for the condition of the paint if it is not properly protected after delivery.

Inspections shall be made in accordance with the Steel Joist Institute Standard Specifications Load Tables & Weight Tables Section 5.12 for **K-**Series, Section 104.13 for **LH-** and **DLH-**Series, and Section 1004.10 for Joist Girders.

SECTION 4.
INSPECTION

SECTION 5.
ESTIMATING

5.1 PLANS FOR BIDDING

Plans to serve as the basis for bids shall show the character of the work with sufficient clarity to permit making an accurate estimate and shall show the following:

Designation and location of Materials (See Section 5.2 [a]), including any special design or configuration requirements.

Locations and elevations of all steel and concrete supporting members and bearing walls.

Location and length of joist extended ends.

Location and size of all openings in floors and roofs.

Location of all partitions.

Loads and their locations as defined in Section 6.1.

Construction and thickness of floor slabs, roof deck, ceilings and partitions.

Joists or Joist Girders requiring extended bottom chords.

Paint, if other than manufacturer's standard.

5.2 SCOPE OF ESTIMATE

(a) Unless otherwise specified, the following items shall be included in the estimate, and requirements shall be determined as outlined in Section 6.1.

Steel Joists.

Joist Girders.

Joist Substitutes.

Joist Extended Ends.

Ceiling Extensions.

Extended bottom chord used as strut.

Bridging and bridging anchors.

Joist Girder bottom chord bracing.

Headers which are defined as members supported by and carrying Open Web Steel Joists, **K-**Series.

One shop coat of paint, when specified, shall be in accordance with Section 3.2.

(b) The following items shall not be included in the estimate but may be quoted and identified by the joist manufacturer as separate items:

Headers for Longspan Steel Joists, **LH-**Series.

Headers for Deep Longspan Steel Joists, **DLH-**Series.

Reinforcement in slabs over joists.

Centering material, decking, and attachments.

Miscellaneous framing between joists for openings at ducts, dumbwaiters, ventilators, skylights, etc.

Loose individual or continuous bearing plates and bolts or anchors for such plates.

Erection bolts for joist and Joist Girder end anchorage.

Horizontal bracing in the plane of the top and bottom chords from joist to joist or joist to structural framing and walls.

Wood nailers.

Moment plates.

Special joist configuration or bridging layouts for ductwork or sprinkler systems.

Shear Studs.

SECTION 6.

PLANS AND SPECIFICATIONS

6.1 PLANS FURNISHED BY BUYER

The Buyer shall furnish the Seller plans and specifications as prepared by the **specifying professional** showing all Material requirements and steel joist and/or steel Joist Girder designations, the layout of walls, columns, beams, girders and other supports, as well as floor and roof openings and partitions correctly dimensioned. The live loads to be used, the wind uplift if any, the weights of partitions and the location and amount of any special loads, such as monorails, fans, blowers, tanks, etc., shall be indicated. The elevation of finished floors, roofs, and bearings shall be shown with due consideration taken for the effects of dead load deflections.

(a) Loads -

The Steel Joist Institute does not presume to establish the loading requirements for which structures are designed.

The Steel Joist Institute Load Tables are based on uniform loading conditions and are valid for use in selecting joist sizes for gravity loads that can be expressed in terms of "pounds per linear foot" (kiloNewtons per Meter) of joist. The Steel Joist Institute Joist Girder Weight Tables are based on uniformly spaced panel point loading conditions and are valid for use in selecting Joist Girder sizes for gravity conditions that can be expressed in kips (kiloNewtons) per panel point on the Joist Girder.

The **specifying professional** shall provide the nominal loads and load combinations as stipulated by the applicable code under which the structure is designed and shall provide the design basis (ASD or LRFD).

The **specifying professional** shall calculate and provide the magnitude and location of ALL JOIST and JOIST GIRDER LOADS. This includes all special loads (drift loads, mechanical units, net uplift, axial loads, moments, structural bracing loads, or other applied loads) which are to be incorporated into the joist or Joist Girder design. For Joist Girders, reactions from supported members shall be clearly denoted as point loads on the Joist Girder. When necessary to clearly convey the information, a Load Diagram or Load Schedule shall be provided.

The **specifying professional** shall give due consideration to the following loads and load effects:

1. Ponded rain water.
2. Accumulation of snow in the vicinity of obstructions such as penthouses, signs, parapets, adjacent buildings, etc.
3. Wind.
4. Type and magnitude of end moments and/or axial forces at the joist and Joist Girder end supports shall be shown on the structural drawings. For moment resisting joists or Joist Girders framing near the end of a column, due consideration shall be given to extend the column length to allow a plate type connection between the top of the joist or Joist Girder top chord and the column.

   Avoid resolving joist or Joist Girder end moments and axial forces through the bearing seat connection.

   A note shall be provided on the structural drawings stating that all moment resisting joists shall have all dead loads applied to the joist before the bottom chord struts are welded to the supporting connection whenever the moments provided do not include dead load.

   The top and bottom chord moment connection details shall be designed by the **specifying professional**. The joist designer shall furnish the **specifying professional** with the joist detail information if requested.

The nominal loads, as determined by the **specifying professional**, shall not be less than that specified in the applicable building codes.

Where concentrated loads occur, the magnitude and location of these concentrated loads shall be shown on the **structural drawings** when, in the opinion of the **specifying professional**, they may require consideration by the joist manufacturer.

The **specifying professional** shall use one of the following options that allows the:

- Estimator to price the joists.
- Joist manufacturer to design the joists properly.
- Owner to obtain the most economical joists.

Option 1: Select a Standard Steel Joist Institute joist for the uniform design loading and provide the load and location of any additional loads on the structural plan with a note "Joist manufacturer shall design joists for additional loads as shown". This option works well for a few added loads per joist with known locations.

Option 2: Select a KCS joist using moment and end reaction. This option works well for concentrated loads for which exact locations are not known or for multiple loading. See examples and limitations on the pages accompanying the KCS Joist Load Tables.

a) Determine the maximum moment

b) Determine the maximum end reaction (shear)

c) Select the required KCS joist that provides the required moment and end reaction (shear).

Option 3: Specify a SPECIAL joist with load diagrams. This option is preferred when the joist includes loading that cannot clearly be denoted on the structural drawings.

a) Provide a load diagram to clearly define ALL loads

b) Place the designation (i.e. 18K SP or 18LH SP) under the load diagram with the following note: "Joist manufacturer to design joist to support loads as shown above".

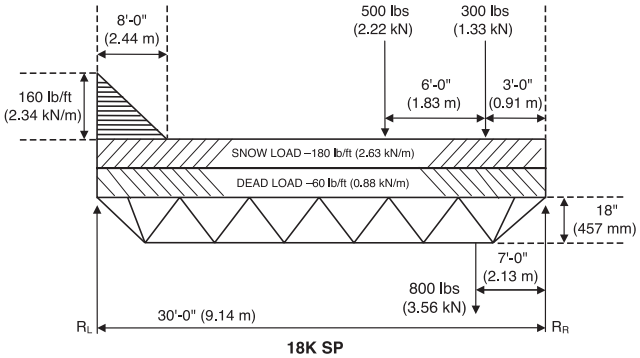
CAUTION: The **specifying professional** shall compare the equivalent uniform loads derived from the maximum moment and shear to the uniform loads tabulated in the **K-**Series Load Table. An equivalent unfactored uniform load in excess of 550 plf (8020 N/m) or a maximum unfactored end reaction exceeding 9200 lbs (40.9 kN) indicates that the **specifying professional** shall consider using additional joists to reduce the loading or use an **LH-**Series Joist and make provisions for 5 inch (127 mm) deep bearing seats.

SPECIAL LOADING : Please note the load combinations shown are for referenced examples only and it is not to be presumed that the joist designer is responsible for the applicable building code load combinations. If the loading criteria are too complex to adequately communicate in a simple load diagram, then the specifying professional shall provide a load schedule showing the specified design loads, load categories, and required load combinations with applicable load factors.

ASD EXAMPLE:

U.S. CUSTOMARY UNITS AND (METRIC UNITS)

Load diagram per ASCE 7 2.4.1(3) D + S

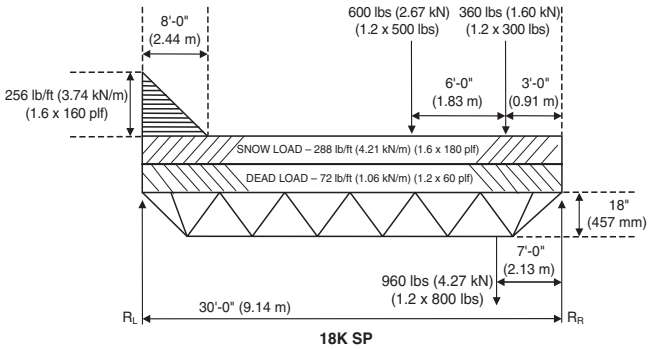


Joist manufacturer to design joist to support loads as shown above.

LRFD EXAMPLE:

U.S. CUSTOMARY UNITS AND (METRIC UNITS)

Factored Load diagram per ASCE 7 2.3.2(3) 1.2D + 1.6S



Joist manufacturer to design joist to support **factored loads** as shown.

(b) Connections -

Minimum End Anchorage for simple span gravity loading shall be in accordance with Steel Joist Institute Standard Specifications Load Tables & Weight Tables Section 5.6 for **K-**Series, Section 104.4 for **LH-** and **DLH-**Series, and Section 1004.6 for Joist Girders. The **specifying professional** is responsible for the design of the joist and Joist Girder connection when it is subject to any loads other than simple span gravity loading including uplift and lateral loads. The **specifying professional** is also responsible for bridging termination connections. The contract documents must clearly illustrate these connections.

(c) Special Considerations

The **specifying professional** shall indicate on the construction documents special considerations including:

a) Profiles for non-standard joist and Joist Girder configurations (Standard joist and Joist Girder configurations are as indicated in the Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption).

b) Oversized or other non-standard web openings

c) Extended ends

d) Deflection criteria for live and total loads for non-SJI standard joists

e) Non-SJI standard bridging

6.2 PLANS FURNISHED BY SELLER

The Seller shall furnish the Buyer with steel joist placement plans to show the Material as specified on the construction documents and are to be utilized for field installation in accordance with specific project requirements as stated in Section 6.1. Steel placement plans shall include, at a minimum, the following:

1. Listing of all applicable loads as stated in Section 6.1 and used in the design of the steel joists and Joist Girders as specified in the construction documents.

2. Profiles for non-standard joist and Joist Girder configurations (Standard joist and Joist Girder configurations are as indicated in the Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption).
3. Connection requirements for:
   a) Joists supports
   b) Joist Girder supports
   c) Field splices
   d) Bridging attachments
4. Deflection criteria for live load and total loads for non-SJI standard joists.
5. Size, location, and connections for all bridging
6. Joists headers

All Material shall be identified with its mark which also appears on the bill of material. The shop paint shall be as noted on the joist placement plans. **Steel joist placement plans do not require the seal and signature of the joist manufacturer's registered design professional.**

6.3 DISCREPANCIES

The specifying professional's bid plans and specifications will be assumed to be correct in the absence of written notice from the Buyer to the contrary. When plans are furnished by the Buyer which do not agree with the Architect's bid plans, such detailed plans shall be considered as a written notice of change of plans. However, it shall be the Buyer's responsibility to advise the Seller of those changes which affect the joists or Joist Girders.

6.4 APPROVAL

When joist placement plans are furnished by the Seller, prints thereof are submitted to the Buyer and owner for examination and approval. The Seller allows a maximum of fourteen (14) calendar days in their schedule for the return of placement plans noted with the owner's and customer's approval, or approval subject to corrections as noted. The Seller makes the corrections, furnishes corrected prints for field use to the owner/customer and is released by the owner/customer to start joist manufacture.

Approval by the owner/customer of the placement plans, sections, notes and joist schedule prepared by the Seller indicates that the Seller has correctly interpreted the contract requirements, and is released by the owner/customer to start joist manufacture. This approval constitutes the owner's/customer's acceptance of all responsibility for the design adequacy of any detail configuration of joist support conditions shown by the Seller as part of the preparation of these placement plans.

Approval does not relieve the Seller of the responsibility for accuracy of detail dimensions on the plans, nor the general fit-up of joists to be placed in the field.

6.5 CHANGES

When any changes in plans are made by the buyer (or the buyers representative) either prior to or after approval of detailed plans, or when any Material is required and was not shown on the plans used as the basis of the bid, the cost of such changes and/or extra Material shall be paid by the Buyer at a price to be agreed upon between Buyer and Seller.

6.6 CALCULATIONS

The seller shall design the steel joists and/or steel Joist Girders in accordance with the current Steel Joist Institute Standard Specifications Load Tables & Weight Tables to support the load requirements of Section 6.1. The **specifying professional** may require submission of the steel joist and Joist Girder calculations as prepared by a registered design professional responsible for the product design. If requested by the **specifying professional**, the steel joist manufacturer shall submit design calculations with a cover letter bearing the seal and signature of the joist manufacturer's registered design professional. In addition to standard calculations under this seal and signature, submittal of the following shall be included:

1. Non-SJI standard bridging details (e.g. for cantilevered conditions, net uplift, etc.)
2. Connection details for:
   a) Non-SJI standard connections (e.g. flush framed or framed connections)
   b) Field splices
   c) Joist headers

SECTION 7.*
HANDLING AND ERECTION

The current OSHA SAFETY STANDARDS FOR STEEL ERECTION, 29 CFR PART 1926, SUBPART R- STEEL ERECTION, refers to certain joists at or near columns to be designed with sufficient strength to allow one employee to release the hoisting cable without the need for erection bridging. **This STANDARD shall not be interpreted that any joist at or near a column line is safe to support an employee without bridging installed.** Many limitations exist that prevent these joists from being designed to safely allow an employee on an un-bridged joist. Because of these limitations these joists must be erected by incorporating erection methods ensuring joist stability and either:

1) Installing bridging or otherwise stabilizing the joist prior to releasing the hoisting cable, or
2) Releasing the hoisting cable without having a worker on the joist.

A steel joist or Joist Girder shall not be placed on any support structure unless such structure is stabilized. When steel joists or Joist Girders are landed on a structure, they shall be secured to prevent unintentional displacement prior to installation.

A bridging terminus point shall be established before joist bridging is installed.

Steel joist and Joist Girders shall not be used as anchorage points for a fall arrest system unless written directions to do so is obtained from a "qualified person"[1].

No modification that affects the strength of a steel joist or Joist Girder shall be made without the written approval of the project engineer of record.

The Buyer and/or Erector shall check all materials on arrival at job site and promptly report to Seller any discrepancies and/or damages. The Buyer and/or Erector shall comply with the requirements of the Steel Joist Institute Standard Specifications Load Tables & Weight Tables of latest adoption in the handling and erection of Material.

The Seller shall not be responsible for the condition of paint finish on Material if it is not properly protected after delivery.

The Seller shall not be responsible for improper fit of Material due to inaccurate construction work.

* For thorough coverage of this topic, refer to SJI Technical Digest #9, “Handling and Erection of Steel Joists and Joist Girders”.

(1) See page 150 for OSHA definition of a qualified person.

SECTION 8.

BUSINESS RELATIONS

8.1 PRESENTATION OF PROPOSALS

All proposals for furnishing Material shall be made on a Sales Contract Form. After acceptance by the Buyer, these proposals must be approved or executed by a qualified official of the Seller. Upon such approval the proposal becomes a contract.

8.2 ACCEPTANCE OF PROPOSALS

All proposals are intended for prompt acceptance and are subject to change without notice.

8.3 BILLING

Contracts on a lump sum basis are to be billed proportionately as shipments are made.

8.4 PAYMENT

Payments shall be made in full on each invoice without retention.

8.5 ARBITRATION

All business controversies which cannot be settled by direct negotiations between Buyer and Seller shall be submitted to arbitration. Both parties shall sign a submission to arbitration and if possible agree upon an arbitrator. If they are unable to agree, each shall appoint an arbitrator and these two shall appoint a third arbitrator. The expenses of the arbitration shall be divided equally between the parties, unless otherwise provided for in the agreements to submit to arbitration. The arbitrators shall pass final judgment upon all questions, both of law and fact, and their findings shall be conclusive.

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.

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*.

ASD (Allowable Strength Design). Method of proportioning structural components such that the *allowable strength* equals or exceeds the *required strength* of the component under the action of the *ASD load combinations*.

ASD Load Combination. *Load* combination in the *applicable building code* intended for allowable *strength design* (allowable stress design).

Allowable Strength*. *Nominal strength* divided by the safety factor, R_n/Ω.

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

Available Strength*. *Design strength* or *allowable strength* as appropriate.

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 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

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*.

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.

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.

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, that 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.

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

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 Load. Applied load determined in accordance with either *LRFD load combinations* or *ASD load combinations*, whichever is applicable.

Design Strength*. *Resistance factor* multiplied by the *nominal strength*, ϕR_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.

Elastic Analysis. *Structural analysis* based on the assumption that the structure returns to its original geometry on removal of the *load*.

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.

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*.

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.

Girt. Horizontal structural member that supports wall panels and is primarily subjected to bending under horizontal loads, such as wind load.

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.

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

Inelastic Analysis. *Structural analysis* that takes into account inelastic material behavior, including plastic analysis.

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 and DLH-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 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*.

Nailers. Strips of lumber attached to the top chord of a *joist* so plywood or other flooring can be nailed directly to the *joist*.

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*.

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*.

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.

Ponding. Retention of water at low or irregular areas on a roof due solely to the deflection of flat roof framing.

Purlin. Horizontal structural member that supports roof deck and is primarily subjected to bending under vertical loads such as dead, snow or wind loads.

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, ϕ. Factor that accounts for unavoidable deviations of the *nominal strength* from the actual strength and for the manner and consequences of failure.

Safety Factor, Ω. Factor that accounts for deviations of the actual strength from the *nominal strength*, deviations of the actual load from the *nominal load*, uncertainties in the analysis that transforms the load into a load effect 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.

Slenderness Ratio. The ratio of the effective length of a column 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.

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-K-1.1 Standard Specifications 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;** and ANSI/SJI-JG-1.1 Standard Specifications for **Joist Girders**.

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

Structural Analysis. Determination of *load effects* on members and connections based on principles of structural mechanics.

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.

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

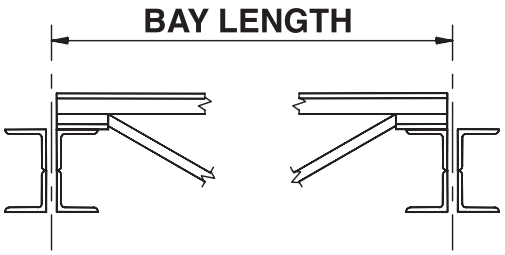
Webs. The vertical or diagonal members joined at the top and bottom *chords* of a *joist* or *Joist Girder* to form triangular patterns.

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

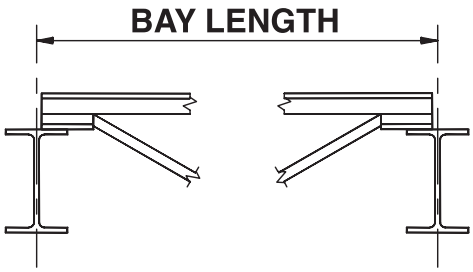
Yield Strength. Stress at which a material exhibits a specified limiting deviation from the proportionality of stress to strain as defined by ASTM.

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

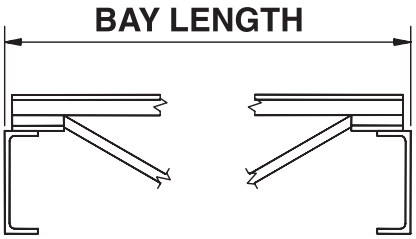
BAY LENGTH DEFINITIONS



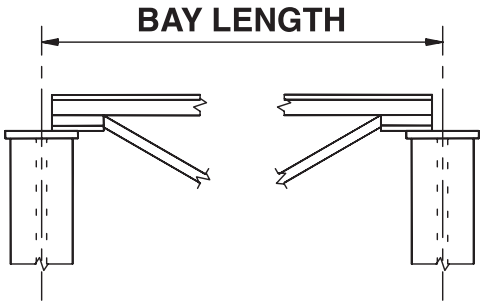
JOIST GIRDERS



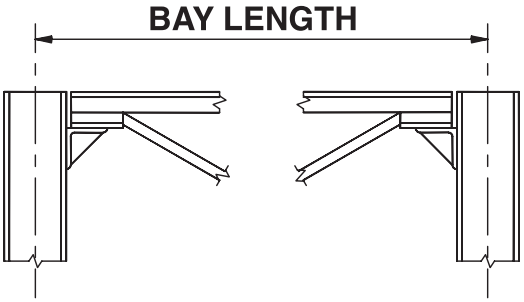
STEEL BEAM



STEEL CHANNEL



STEEL COLUMN



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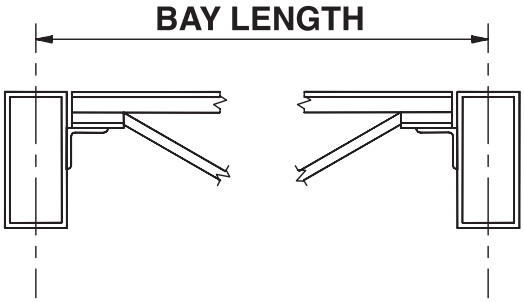
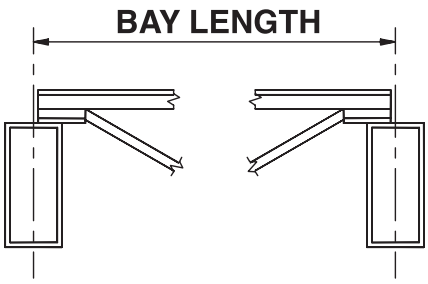
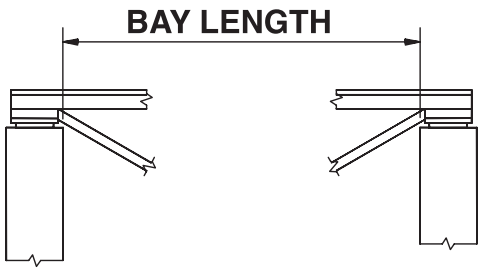


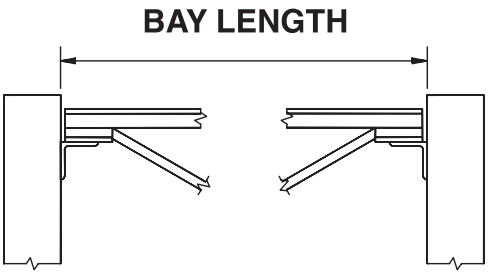
STEEL TUBE



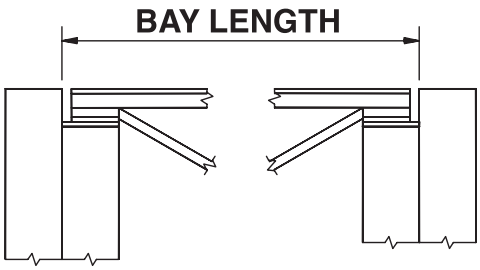
STEEL TUBE



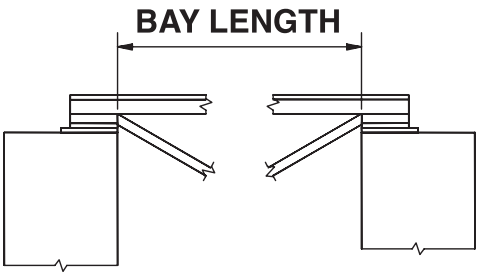
MASONRY OR TILT-UP



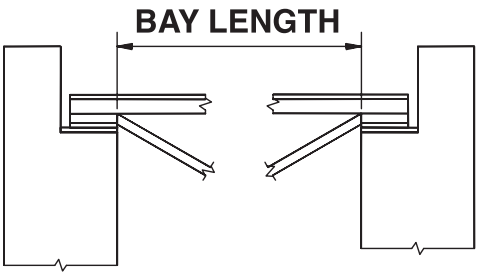
MASONRY OR TILT-UP



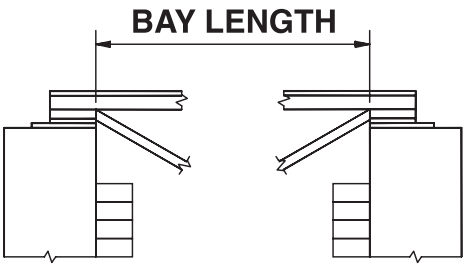
MASONRY WITH PILASTER



MASONRY OR TILT-UP



MASONRY OR TILT-UP



MASONRY WITH FACE BRICK

§ 1926.751 DEFINITIONS
(Selected items only).

Anchored bridging means that the steel joist bridging is connected to a bridging terminus point.

Bolted diagonal bridging means diagonal bridging that is bolted to a steel joist or joists.

Bridging clip means a device that is attached to the steel joist to allow the bolting of the bridging to the steel joist.

Bridging terminus point means a wall, a 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.

Column means a load-carrying vertical member that is part of the primary skeletal framing system. Columns do not include posts.

Constructibility means the ability to erect structural steel members in accordance with subpart R without having to alter the over-all structural design.

Construction load (for joist erection) means any load other than the weight of the employee(s), the joists and the bridging bundle.

Erection bridging means the bolted diagonal bridging that is required to be installed prior to releasing the hoisting cables from the steel joists.

Personal fall arrest system means 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.

Project structural engineer means the registered, licensed professional responsible for the design of structural steel framing and whose seal appears on the structural contract documents.

Qualified person (also defined in § 1926.32) means 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.

Steel joist means an open web, secondary load-carrying member of 144 feet (43.9 m) or less, designed by the manufacturer, used for the support of floors and roofs. This does not include structural steel trusses or cold-formed joists.

Steel joist girder means an open web, primary load-carrying member, designed by the manufacturer, used for the support of floors and roofs. This does not include structural steel trusses.

Structural steel means a steel member, or a member made of a substitute material (such as, but not limited to, fiberglass, aluminum or composite members). These members include, but are not limited to, steel joists, joist girders, purlins, columns, beams, trusses, splices, seats, metal decking, girts, and all bridging, and cold formed metal framing which is integrated with the structural steel framing of a building.

§ 1926.757 OPEN WEB STEEL JOISTS

(a) General.

(1) Except as provided in paragraph (a)(2) of this section, where steel joists are used and columns are not framed in at least two directions with solid web structural steel members, a steel joist shall be field-bolted at the column to provide lateral stability to the column during erection. For the installation of this joist:

(i) A vertical stabilizer plate shall be provided on each column for steel joists. The plate shall be a minimum of 6 inch by 6 inch (152 mm by 152 mm) and shall extend at least 3 inches (76 mm) below the bottom chord of the joist with a 13 /16 inch (21 mm) hole to provide an attachment point for guying or plumbing cables.

(ii) The bottom chords of steel joists at columns shall be stabilized to prevent rotation during erection.

(iii) Hoisting cables shall not be released until the seat at each end of the steel joist is field-bolted, and each end of the bottom chord is restrained by the column stabilizer plate.

(2) Where constructibility does not allow a steel joist to be installed at the column:

(i) an alternate means of stabilizing joists shall be installed on both sides near the column and shall:

(A) provide stability equivalent to paragraph (a)(1) of this section;

(B) be designed by a qualified person;

(C) be shop installed; and

(D) be included in the erection drawings.

(ii) hoisting cables shall not be released until the seat at each end of the steel joist is field-bolted and the joist is stabilized.

(3) Where steel joists at or near columns span 60 feet (18.3 m) 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.

(4) Where steel joists at or near columns span more than 60 feet (18.3 m), the joists shall be set in tandem with all bridging installed unless an alternative method of erection, which provides equivalent stability to the steel joist, is designed by a qualified person and is included in the site-specific erection plan.

(5) A steel joist or steel joist girder shall not be placed on any support structure unless such structure is stabilized.

(6) When steel joist(s) are landed on a structure, they shall be secured to prevent unintentional displacement prior to installation.

(7) No modification that affects the strength of a steel joist or steel joist girder shall be made without the approval of the project structural engineer of record.

(8) *Field-bolted joists*.

(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 (12.2 m) or more shall be fabricated to allow for field bolting during erection.

(ii) These connections shall be field-bolted unless constructibility does not allow.

(9) Steel joists and steel joist girders shall not be used as anchorage points for a fall arrest system unless written approval to do so is obtained from a qualified person.

(10) A bridging terminus point shall be established before bridging is installed.

(b) Attachment of steel joists and steel joist girders.

(1) Each end of "K" series steel joists shall be attached to the support structure with a minimum of two 1/8 -inch (3 mm) fillet welds 1 inch (25 mm) long or with two 1/2 -inch (13 mm) bolts, or the equivalent.

(2) Each end of "LH" and "DLH" series steel joists and steel joist girders shall be attached to the support structure with a minimum of two 1/4 -inch (6 mm) fillet welds 2 inches (51 mm) long, or with two 3/4 -inch (19 mm) bolts, or the equivalent.

(3) Except as provided in paragraph (b)(4) of this section, 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.

(4) Panels that have been pre-assembled from steel joists with bridging shall be attached to the structure at each corner before the hoisting cables are released.

(c) Erection of steel joists.

(1) Both sides of the seat of one end of each steel joist that requires bridging under Tables A and B shall be attached to the support structure before hoisting cables are released.

(2) For joists over 60 feet, both ends of the joist shall be attached as specified in paragraph (b) of this section and the provisions of paragraph (d) of this section met before the hoisting cables are released.

(3) 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.

NOTE: TABLES "A" & "B" HAVE BEEN EDITED TO CONFORM WITH STEEL JOIST INSTITUTE BOLTED DIAGONAL BRIDGING REQUIREMENTS. EDITED ITEMS ARE SHOWN WITH A STRIKE THROUGH NOTATION. NEW ITEMS ARE SHOWN IN RED

TABLE A. — ERECTION BRIDGING FOR SHORT SPAN JOISTS

Joist	Span
~~8L1~~ 8K1	NM
10K1	NM
12K1	23–0
12K3	NM
12K5	NM
14K1	27–0
14K3	NM
14K4	NM
14K6	NM
16K2	29–0
16K3	30–0
16K4	32–0
16K5	32–0
16K6	NM
16K7	NM
16K9	NM
18K3	31–0
18K4	32–0
18K5	33–0
18K6	35–0
18K7	NM
18K9	NM
18K10	NM
20K3	32–0
20K4	34–0
20K5	34–0
20K6	36–0
20K7	39–0
20K9	39–0
20K10	NM
22K4	34–0
22K5	35–0
22K6	36–0
22K7	40–0
22K9	40–0
22K10	~~40–0~~ NM
22K11	~~40–0~~ NM
24K4	36–0
24K5	38–0
24K6	39–0
24K7	43–0
24K8	43–0
24K9	44–0
24K10	NM
24K12	NM
26K5	38–0
26K6	39–0

NM = diagonal bolted bridging not mandatory ~~for joists under 40 feet~~.

▶ TABLE A. — ERECTION BRIDGING FOR SHORT SPAN JOISTS (continued)

Joist	Span
26K7	43–0
26K8	44–0
26K9	~~45–0~~ 44-0
26K10	49–0
26K12	NM
28K6	40–0
28K7	43–0
28K8	44–0
28K9	45–0
28K10	49–0
28K12	53–0
30K7	44–0
30K8	45–0
30K9	45–0
30K10	50–0
30K11	52–0
30K12	54–0
10KCS1	NM
10KCS2	NM
10KCS3	NM
12KCS1	NM
12KCS2	NM
12KCS3	NM
14KCS1	NM
14KCS2	NM
14KCS3	NM
16KCS2	NM
16KCS3	NM
16KCS4	NM
16KCS5	NM
18KCS2	35–0
18KCS3	NM
18KCS4	NM
18KCS5	NM
20KCS2	36–0
20KCS3	39–0
20KCS4	NM
20KCS5	NM
22KCS2	36–0
22KCS3	40–0
22KCS4	NM
22KCS5	NM
24KCS2	39–0
24KCS3	44–0
24KCS4	NM
24KCS5	NM
26KCS2	39–0
26KCS3	44–0
26KCS4	NM
26KCS5	NM
28KCS2	40–0
28KCS3	45–0
28KCS4	53–0
28KCS5	53–0
~~30KC53~~ 30KCS3	45–0
30KCS4	54–0
30KCS5	54–0

NM = diagonal bolted bridging not mandatory ~~for joists under 40 feet~~.

▶ TABLE B. — ERECTION BRIDGING FOR LONG SPAN JOISTS

Joist	Span
18LH02	33–0
18LH03	NM
18LH04	NM
18LH05	NM
18LH06	NM
18LH07	NM
18LH08	NM
18LH09	NM
20LH02	33–0
20LH03	38–0
20LH04	NM
20LH05	NM
20LH06	NM
20LH07	NM
20LH08	NM
20LH09	NM
20LH10	NM
24LH03	35–0
24LH04	39–0
24LH05	40–0
24LH06	45–0
24LH07	NM
24LH08	NM
24LH09	NM
24LH10	NM
24LH11	NM
28LH05	42–0
28LH06	~~42–0~~ 46-0
28LH07	~~NM~~ 54-0
28LH08	~~NM~~ 54-0
28LH09	NM
28LH10	NM
28LH11	NM
28LH12	NM
28LH13	NM
32LH06	47–0 through 60–0
32LH07	47–0 through 60–0
32LH08	55–0 through 60–0
32LH09	NM through 60–0
32LH10	NM through 60–0
32LH11	NM through 60–0
32LH12	NM through 60–0
32LH13	NM through 60–0
32LH14	NM through 60–0
32LH15	NM through 60–0
36LH07	47–0 through 60–0
36LH08	47–0 through 60–0
36LH09	57–0 through 60–0
36LH10	NM through 60–0
36LH11	NM through 60–0
36LH12	NM through 60–0
36LH13	NM through 60–0
36LH14	NM through 60–0
36LH15	NM through 60–0
40LH08	47-0 through 59–0
40LH09	47-0 through 59–0
44LH09	52-0 through 59–0

NM = diagonal bolted bridging not mandatory ~~for joists under 40 feet~~.

(4) Employees shall not be allowed on steel joists where the span of the steel joist is equal to or greater than the span shown in Tables A and B except in accordance with § 1926.757(d).

(5) When permanent bridging terminus points cannot be used during erection, additional temporary bridging terminus points are required to provide stability.

(d) Erection bridging.

(1) Where the span of the steel joist is equal to or greater than the span shown in Tables A and B, the following shall apply:

(i) A row of bolted diagonal erection bridging shall be installed near the midspan of the steel joist;

(ii) Hoisting cables shall not be released until this bolted diagonal erection bridging is installed and anchored; and

(iii) No more than one employee shall be allowed on these spans until all other bridging is installed and anchored.

(2) Where the span of the steel joist is over 60 feet (18.3 m) through 100 feet (30.5 m), the following shall apply:

(i) All rows of bridging shall be bolted diagonal bridging;

(ii) Two rows of bolted diagonal erection bridging shall be installed near the third points of the steel joist;

(iii) Hoisting cables shall not be released until this bolted diagonal erection bridging is installed and anchored; and

(iv) No more than two employees shall be allowed on these spans until all other bridging is installed and anchored.

(3) Where the span of the steel joist is over 100 feet (30.5 m) through 144 feet (43.9 m), the following shall apply:

(i) All rows of bridging shall be bolted diagonal bridging;

(ii) Hoisting cables shall not be released until all bridging is installed and anchored; and

(iii) No more than two employees shall be allowed on these spans until all bridging is installed and anchored.

(4) For steel members spanning over 144 feet (43.9 m), the erection methods used shall be in accordance with § 1926.756.

(5) Where any steel joist specified in paragraphs (c)(2) and (d)(1), (d)(2), and (d)(3) of this section is a bottom chord bearing joist, a row of bolted diagonal bridging shall be provided near the support(s). This bridging shall be installed and anchored before the hoisting cable(s) is released.

(6) When bolted diagonal erection bridging is required by this section, the following shall apply:

(i) The bridging shall be indicated on the erection drawing;

(ii) The erection drawing shall be the exclusive indicator of the proper placement of this bridging;

(iii) Shop-installed bridging clips, or functional equivalents, shall be used where the bridging bolts to the steel joists;

(iv) When two pieces of bridging are attached to the steel joist by a common bolt, the nut that secures the first piece of bridging shall not be removed from the bolt for the attachment of the second; and

(v) Bridging attachments shall not protrude above the top chord of the steel joist.

(e) Landing and placing loads.

(1) During the construction period, the employer placing a load on steel joists shall ensure that the load is distributed so as not to exceed the carrying capacity of any steel joist.

(2) Except for paragraph (e)(4) of this section, no construction loads are allowed on the steel joists until all bridging is installed and anchored and all joist-bearing ends are attached.

(3) The weight of a bundle of joist bridging shall not exceed a total of 1,000 pounds (454 kg). A bundle of joist bridging shall be placed on a minimum of three steel joists that are secured at one end. The edge of the bridging bundle shall be positioned within 1 foot (.30 m) of the secured end.

(4) No bundle of decking may be placed on steel joists until all bridging has been installed and anchored and all joist bearing ends attached, unless all of the following conditions are met:

(i) 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;

(ii) The bundle of decking is placed on a minimum of three steel joists;

(iii) The joists supporting the bundle of decking are attached at both ends;

(iv) At least one row of bridging is installed and anchored;

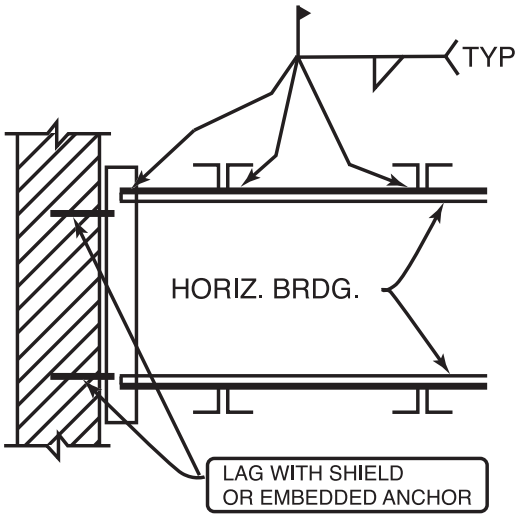
(v) The total weight of the bundle of decking does not exceed 4,000 pounds (1816 kg); and

(vi) Placement of the bundle of decking shall be in accordance with paragraph (e)(5) of this section.

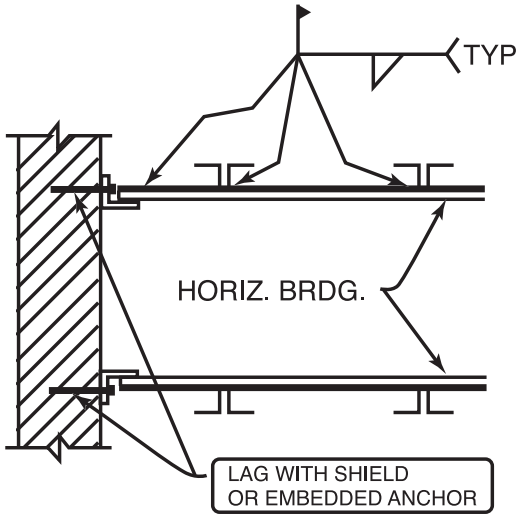
(5) The edge of the construction load shall be placed within 1 foot (.30 m) of the bearing surface of the joist end.

ILLUSTRATIONS OF OSHA BRIDGING TERMINUS POINTS
(NON-MANDATORY)

Guidelines for Complying with OSHA Steel Erection Standard, Paragraph §1926.757(a)(10) and §1926.757(c)(5).



HORIZONTAL BRIDGING
TERMINUS AT WALL



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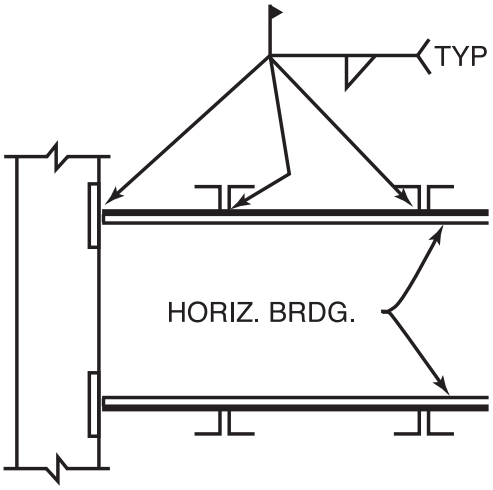
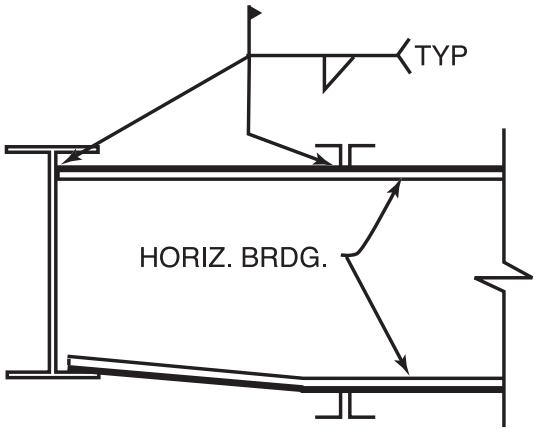
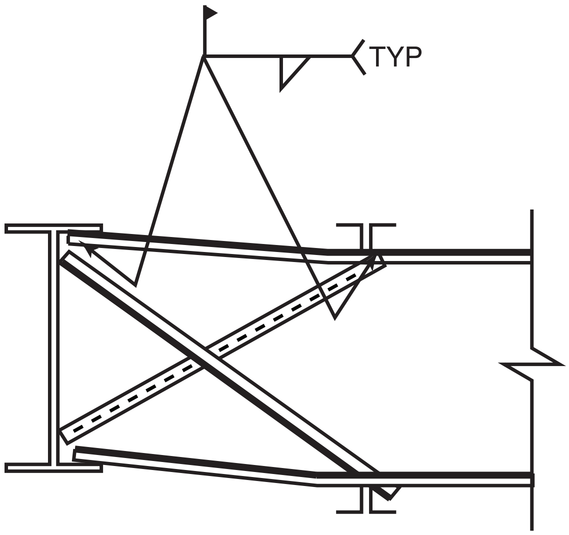
TERMINUS AT WALL



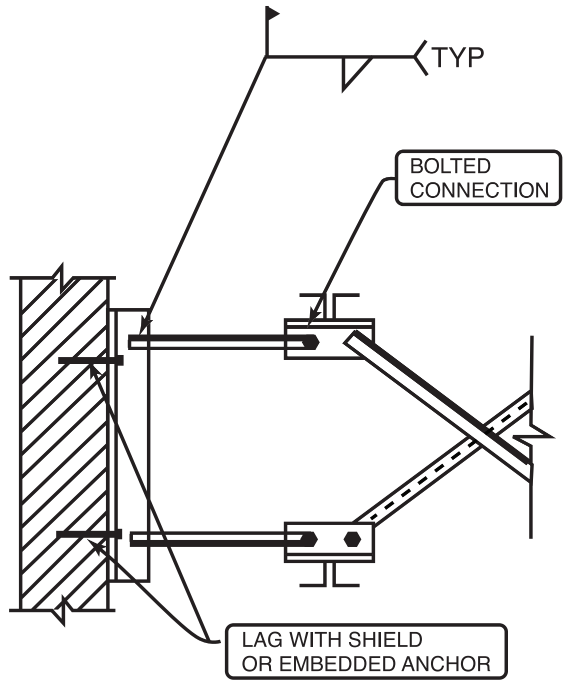
HORIZONTAL BRIDGING
TERMINUS AT PANEL WALL



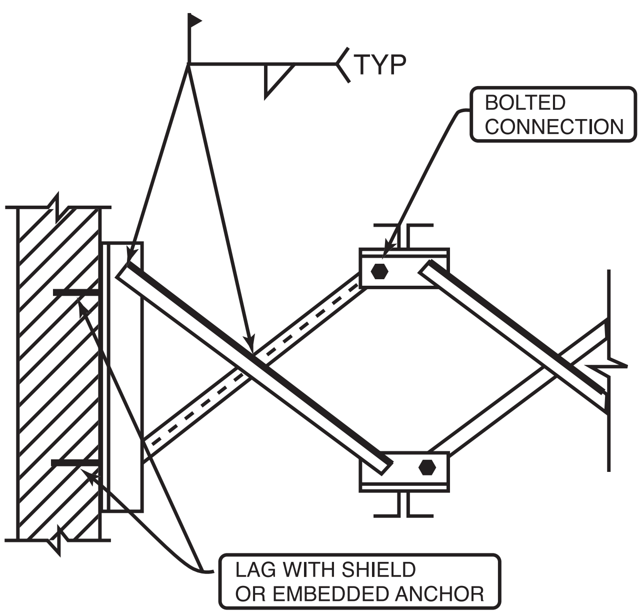
HORIZONTAL BRIDGING
TERMINUS AT
STRUCTURAL SHAPE



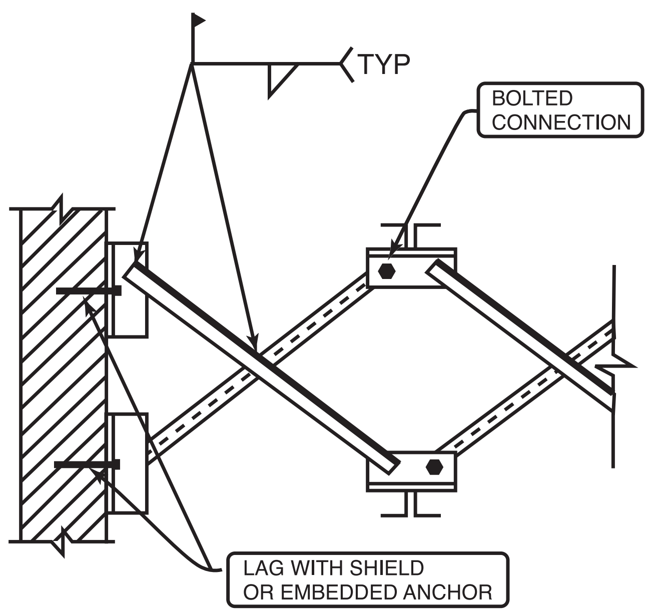
HORIZONTAL BRIDGING
TERMINUS AT STRUCTURAL
SHAPE WITH OPTIONAL
"X-BRIDGING"



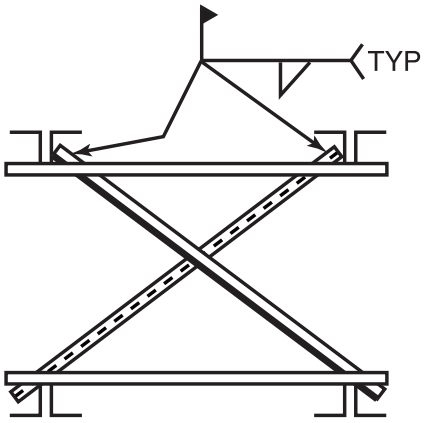
BOLTED DIAGONAL BRIDGING
TERMINUS AT WALL



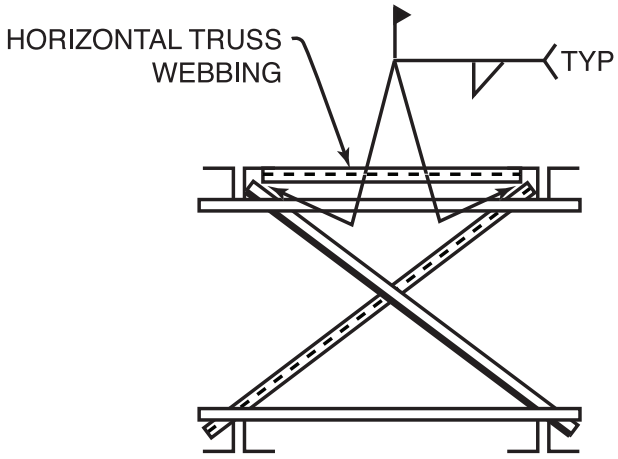
BOLTED DIAGONAL BRIDGING
TERMINUS AT WALL



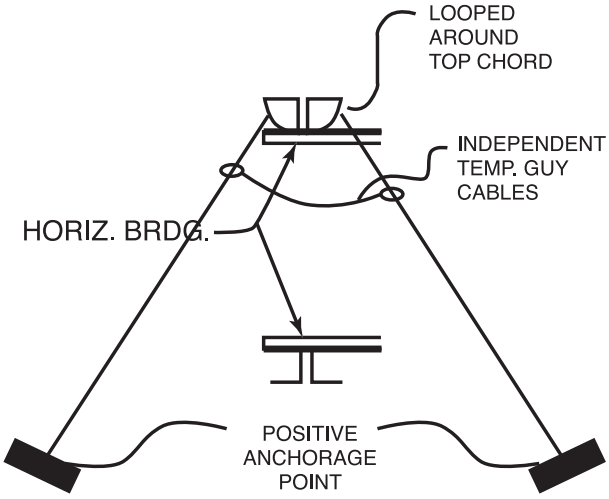
BOLTED DIAGONAL BRIDGING
TERMINUS AT WALL



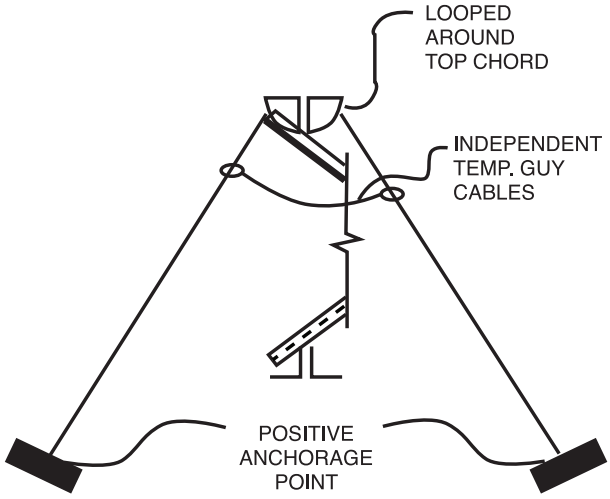
JOISTS PAIR BRIDGING
TERMINUS POINT



JOISTS PAIR BRIDGING
TERMINUS POINT



HORIZONTAL BRIDGING
TERMINUS POINT
SECURED BY TEMP.
GUY CABLES



DIAGONAL BRIDGING
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