Introduction of Open Web Steel Joist, Deck and Composite Steel Joist

ENCE710 – Advanced Steel Structures

C. C. Fu, Ph.D., P.E.
Department of Civil & Environmental Engineering
University of Maryland
College Park, MD

SJI Recommended Code of Standard Practice for Steel Joists and Joist Girders

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 applicable Steel Joist Institute Specifications and Load Table 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 applicable Steel Joist Institute Specifications of latest adoption, and this code. 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.

Example of a Typical Floor Plan

Each joist supports an area equal to its span times half the distance to the joist on either side.
The joists transfer their loads to the supporting truss girders.
The truss girders transfer their loads to the supporting piers and columns.
The pier supports half the area supported by the truss girder plus area from other structural elements that it supports.

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Steel Construction

Open Web Steel Joists

- Steel joists are prefabricated lightweight trusses that are available in different series:
  - **K series** - 8” through 30” in 2” increment with 64 designations; clear spans to 60’ (short span) (KCS series for special loading conditions)
  - **LH series** - 18” through 48”; clear spans to 96’ (long-span)
  - **DLH series** - 52” through 72”; clear spans to 144’ (deep long-span)
- For Composite Steel Joists, see David Samuelson’s paper (AISC Engineering Journal, 3rd Quarter, 2002)

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Pitched Top Chord Joists

- Designation: 12K4
  - 12 = depth in inches
  - K = joist series
  - 4 = designation within series (the higher the number, the heavier the joist)

- Pitched top chord joists (Note: Standard pitch is $\frac{1}{9}$” per ft)
Joist Girders

- Designed to carry the regularly spaced, concentrated loads consisting of the end supports of joists.
- Designation: 48G 8N 8.8K
  - 48G = depth in inches
  - 8N = number of joist spaces
  - 8.8K = load on each panel point in kips
Bridging

Diagonal Bridging
(for span L > 60')

Horizontal Bridging
(for span L < 60')

End Anchorage - Beam

Field welding
Beam anchors
Wall anchors

Standard Load Table/Open Web
Steel Joists, K-Series (ASD)

- Metal decking is used for floor and roof applications.
- Determine type of decking, thickness, gage of metal, finish required, and method of attachment
- Unit: square (100 sf)

Black figures: TOTAL safe uniformly distributed load-carrying capacities (lb/ft)
Red figures: LIVE loads (lb/ft) which will produce an approximate deflection of L/360.
Steel Joist and Metal Deck

Steel Deck Units

Finish, Depths, Gages and Grades
- Finish:
  - unpainted
  - primed
  - painted
  - galvanized
- Depths: from 9/16” to 7.6”
- Gages: from 10 (0.135”) to 28 (0.0149”)
- Grades: Yield points from 33 to 80 ksi
  (See Richard Heagler’s paper “Form Deck – A Versatile Family of Products,” by AISC, 2003)

Quantity takeoff
- Determine the LF of each different type of joist, use manufacturer’s table to find the weight per ft and total weight.
- Note type and number of accessories:
  - bridging (diagonal or horizontal)
  - end anchorage (beam or wall)